The Twenty-Third Manchester Phonology Meeting

ABSTRACTS BOOKLET

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elsewhere.

This booklet contains the abstracts for all the papers presented at the **twenty-third Manchester Phonology Meeting**, held at Hulme Hall, Manchester, in May 2015.

The abstracts are arranged in alphabetical order by the surname of the (first named) presenter. If any abstracts are missing from this booklet, it is most likely because the authors did not submit a non-anonymous version of their abstract.

The abstracts for the **oral paper sessions** are presented first, followed by the abstracts for the **poster paper sessions**, and the booklet concludes with abstracts for the **special session**.

The **final programme**, included in your registration pack and available on the conference website, gives the details of which papers are in which room, and at which times.

Oral papers

Cluster phonotactics require both syllables and strings: Evidence from Lakhota

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Like many languages, Lakhota (Siouan; South Dakota) allows a range of initial and medial consonant clusters, but systematically prohibits clusters of three of more consonants (*CCC). Many OT analyses stipulate a *CCC constraint, but it would be more satisfying to derive this effect from independent principles. One common approach (Ito 1986, et seq) relies on syllable structure constraints: CCC strings fail to surface because they are unsyllabifiable, and epenthesis or deletion applies to yield maximally biconsonantal clusters. Cue-based approaches, on the other hand, deny the usefulness of syllable structure in analyzing such effects, and derive them instead using string-based constraints against consonants in contexts where they are difficult to perceive, such as C__C. Analyses of cluster phonotactics often assume syllable-based constraints without explicitly arguing that syllables are necessary. Other analyses have successfully dispensed with syllable-based constraints (e.g., Steriade 1997), but this has only been demonstrated for a limited number of languages and patterns. In this paper, I argue that both syllable-based and cue-based constraints are needed in order to analyze Lakhota cluster phonotactics. Specifically, a string-based constraint is needed to derive the *CCC effect, while constraints on syllabification are required to license the range of attested initial clusters, and restrict medial ones. The novelty of the analysis is not in the constraints themselves (which are familiar); rather, it is in the fact that Lakhota provides unusually clear evidence that string-based constraints are inadequate, and that syllable structure facilitates the analysis of cluster distributions.

Lakhota syllables are maximally CCVC. There are two sources of evidence for this claim. In word-initial position, many CC clusters occur, and the same set of clusters occurs medially in roots and affixes; (1a) shows a small selection. In word-final position, roots and suffixes generally end with vowels, but a limited number of suffixes and function words do end with codas /p, k, s, ʃ, x, m, l/ ((1b)), and the same set of codas can be created through morphological trunction, apocope, and reduplication ((1c)). Crucially, although reduplication can create codas (kʰa**l**.kʰa.te), it cannot create CCC clusters: ʃka.ʃkate/*ʃka**l**.ʃkate 'play'. The illegal output would clearly be syllabifiable, since both the coda and onset are independently attested. Thus, such strings can not be ruled out by constraints on licit syllables. Instead, a string-based constraint against C/C__C is required, mirroring the perceptual disadvantage of C's not adjacent to a vowel. Furthermore the restricted set of codas in (1b) makes sense in perceptual terms: sonorants and fricatives provide internal cues, and do not rely on the release burst before a following vowel.

(1) CCVC syllables

a.	**bl**o	'potato'	wa**bl**ake	'1SG-see'	b.	isa**m**	'more'	c.	nu**m**	'two'
	ska	'white'	hã**sk**e	'tall'		henajo**s**	'they.DU'		ni-**ʃ**	'you-CONTR'
	kte	'kill'	i**kt**omi	'spider'		eja**ʃ**	'but'		ko**s**koze	'wave.RED'
	mni	'water'	o**mn**a	'smell'		mahe**l**	'inside'		kʰa**l**kʰate	'hot.RED'

The cue-based account leaves two problems unsolved, however. The first is what licenses initial #CC (#**k**te). The special status of initial consonants can be stipulated with contextual faithfulness (MAX/#__), but this does not follow from perceptual considerations. A more serious problem is the difference between C_1 in medial clusters ((1a)) vs. word-final clusters ((1b)). For example, ja**t**ke 'drink' shows that [t] is licensed post-vocalically, yet [t#] does not occur; conversely, final [l#] does occur, but medial *[VlkV] is prohibited, except through reduplication. Both problems are solved in an analysis that distinguishes onset from coda consonants. The clusters in (1a) are licit onsets, so occur both initially and medially. The consonants in (1b) are licit codas, and occur only in morphological contexts where codas are allowed. The only other constraints needed are *CCC (above), and a distinction between *CODA within roots (interestingly high-ranked) vs. elsewhere. These statements appear to have no cue-based equivalent; syllables are required.

Indonesian borrowing as evidence for Harmonic Grammar

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Adaptations of Arabic and Dutch loanwords into Indonesian reveal the influence of three markedness constraints generally observed in Indonesian (*ComplexCoda, *ComplexOnset, and MinWord); we show, furthermore, that these constraints must be allowed to gang up, as in Harmonic Grammar (e.g., Pater, Bhatt & Potts 2007, Pater 2009), to account for the deletions, epenthesis, and non-adaptations found in the data.

Indonesian syllables are generally (C)V(C), and bisyllabic words are the most frequent type (Lapoliwa 1981). In original data consisting of 681 syllabic adaptations of borrowed words produced by 24 native speakers of Indonesian, we find word-final clusters resolved by deletion or epenthesis, while word-initial clusters sometimes have epenthesis and sometimes are tolerated intact. These adaptations reveal the strength of the MinWord constraint: monosyllabic inputs with initial or final clusters are always adapted through vowel insertion (Tab. 1 & 2), resulting in bisyllabic (minimal) words in Indonesian. The location of epenthesis (into vs. after clusters) is determined by SyllCont, a constraint favoring a sonority fall across syllable boundaries. However, polysyllabic words reveal that when MinWord is in no danger (Tab. 3), a Max(C) violation is preferred for a potential coda cluster, while an onset cluster is tolerated intact. The rankings in Tableaux 1-3 will be motivated to show how a standard OT ranking analysis can successfully account for this data.

(1) /ðikr/	Min Wd	Dep-(V)	*Comp Coda	Max-(C)
a.[zikr]	*!		*	
☞b.[zikir]		*		
c.[zik]	*!			*

(2) /blus/	Min Wd	Dep (V)	Max (C)	*Comp Ons
a. [blus]	*!			*
☞b. [bəlus]		*		
c. [bus]	*!		*	

(3) /protɛst/	Min Wd	Dep-(V)	*Comp Coda	Max-(C)	*Comp Ons
a. [protɛst]			*!		*
☞b. [protɛs]				*	*
c. [porotɛs]		*!		*	
d. [potɛs]				**!	

(4) /ħaq/	MinWd	Dep (V)
a.[hak]	*	
☹b.[haki]		*

(output is [hak])

However, despite the apparent importance of the markedness constraint MinWord, Indonesian not only contains some native monosyllabic words ([om] 'uncle', but also has borrowed monosyllabic words which do not get epenthesis to meet the MinWord constraint. All such words lack potential clusters in onsets or codas, as in /ħaq/→ [hak]. The ranking of MinWord above Dep(V) is thus suspect (Tab. 4), as it predicts epenthesis for these forms as well. We resolve this by adopting a model of Harmonic Grammar, in which constraints are relatively weighted. While MinWord alone is not strong enough to force epenthesis in the absence of a cluster, MinWord can gang up with *ComplexCoda,*ComplexOns or Max(C) to force a violation of Dep-IO(V). The ranking shown below correctly accounts for all the data, including epenthesis in monosyllables with a final cluster, while the weighting of Dep(V) above MinWord prevents epenthesis in cases like /ħaq/→ [hak].

/ðikr/	3	2	2	1.5	1.25	Harmony
	Dep- (V)	MinWd	*CompCoda	Max-(C)	*CompOns	
a.[zikr]		-2	-2			-4
☞b.[zikir]	-3					-3
c.[zik]		-2		-1.5		-3.5

In addition to motivating Harmonic Grammar, the analysis supports the view that these adaptations are phonological, not purely phonetic (e.g., Silverman 1992; Yip 1993 & 2006; Peperkamp & Dupoux 2003), as identical clusters are treated differently based on word size.

Pashto second position en(do)clisis

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Pashto second position (2P) clitics can occupy a seemingly conflicting variety of positions in the string: On the one hand, 2P clitics seem to follow the first syntactic constituent which they cannot interrupt.

(1) [ağa šəl kaləna xαysta peğla aw loy təgay alək]$_{NP}$ **=me** nən byα wəlida
that 20- year pretty girl and big thirsty boy I today again saw
'I saw that 20-year old pretty girl and the big thirsty boy again today.'

However, 2P clitics also seem to be sensitive to stress. If the 'first syntactic constituent' is destressed, the clitic is placed after the next constituent that carries stress (the verb in (2)).

(2) rα ta pe [gαnḍə́]$_V$ **=de**
me for by_him sew you
'You were having him sew it for me.' (Tegey 1977, 118)

If the arguments are dropped and the verb is clause-initial, 2P clitics are placed depending on an aspect-caused stress shift: *after* the verb in the imperfective ((3a)) and *within* the verb in the perfective aspect ((3b)).

(3) a.	bαylodə́	**=me**	b.	bάy	**=me**	lodə
	lose	I		lose$_1$	I	lose$_2$
	'I was losing (it).'			'I lost (it).'		(Tegey 1977, 93)

The resulting conflict is twofold: a) Why does the clitic have to be placed after the whole constituent (no matter the size) in (1), while it can be placed *within* the verb in (3b)? b) As the placement is also determined by stress, what is the related prosodic domain for 2P clitic placement if a variety of hosts from considerable size ((1)) to partial words ((3)) have to be considered? Numerous approaches have been proposed in recent decades, trying to resolve these issues from syntactic (Kaisse 1985, Roberts 2000, a.o.) and prosodic (Hock 1996, Anderson 2005, a.o.) perspectives. However, none has been able to find a solution for (or considered) the full range of the phenomenon.

This paper adduces new evidence and shows that the full range of the data can be analysed given two fundamental assumptions as to the structure of Pashto. First, it is proposed that Pashto has a flat syntactic structure with a verbal complex (VC) (cf. Mohanan 1994, Butt 1995 for Urdu/Hindi). Second, while all previous accounts have considered the preverbal elements given in (2) as full constituents, there is syntactic *as well as* phonological evidence that the destressed pronominal preverbal elements are actually part of the overall VC.

This paper proposes the following solution: Pashto second position clitics are first and foremost syntactic clitics that are strictly placed after the first (preverbal) constituent of the clause. However, if the 2P clitics are stranded in the preverbal position without an adequate host, prosodic inversion (Halpern 1995) is applied as a last resort. The prosodic host is the first prosodic word in a nested prosodic word structure that stretches over the VC and its members, where the right boundary of the 'first prosodic word' is determined by the stressed element in the VC. Thus, example (3a) is phrased as ((bαylodə́)$_\omega$=**me**)$_\omega$ while (3b) is phrased as ((bάy)$_\omega$ =**me** lodə)$_\omega$. Evidence for this proposal comes from several strictly ordered postlexical phonological processes that are bound by the domain of the (nested) prosodic word: vowel coalescence, vowel harmony and initial /k/-deletion in complex verb structures.

Phases and phonologically conditioned allomorphy

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There are different ways to define morphophonological domains. Recent proposals have considered the possibility that syntactic phases (Chomsky 2001) coincide or are closely related to such domains (Samuels 2009, 2012, Scheer 2012, D'Alessandro and Scheer 2013, a. o.). For an item X within the phase complement PhC, [$_{Ph1}$ [$_{PhH}$Y] **[$_{PhC}$ X ...]**], the morphophonological computation cannot have access to information contained in its phase head. Strictly, it follows from the Phase Impenetrabilty Condition (PIC) that X cannot be further modified when higher phase material becomes accessible. Even if we relax the PIC and allow for accessibility to inner material at the postlexical level for certain phenomena, it seems clear that allomorphic choice should take place at an early stage, and should not be undone or modified once it has taken place.

The alternation shown by the definite article in Western Catalan dialects, and also in Old Catalan, challenges this view. There are two allomorphs, [lo] and [l], and the allomorphic choice is conditioned phonologically.

(1)	a.	C__C	Compren **lo** pa	'they-buy the bread'
	b.	#__C	**lo** pa	'the bread'
	c.	V__C	Compra **l** pa	's/he-buys the bread'
	d.	C__V	Compren **l** arròs	'they-buy the rice'
	e.	#__V	**l** arròs	'the rice'
	f.	V__V	Compra **l** arròs	's/he-buys the rice'

We will show that the [lo]~[l] alternation must be allomorphic because it is impossible to derive it by non-ad hoc phonological processes of deletion or insertion. A further crucial fact is that the phonological context in (1) also applies when the element to the left of the definite article is a complementizer:

(2)	a.	C__C	quan **lo** pa és bo	'when the bread is good'
	b.	V__C	que **l** pa és bo	'that the bread is good'
	c.	C__V	quan **l** arròs és bo	'when the rice is good'
	d.	V__V	que **l** arròs és bo	'that the rice is good'

If we follow an analysis based on phase spell-out, in a case like (2b), as in *Diu que lo/l pa és bo* 's/he says that the bread is good' in (3), when the complement of C (4a) is computed, the selected allomorph must be **lo**, since at that point the phonological context is identical to the one in (1b), #__C. When the higher domain which includes the complementizer is reached, it is too late to reverse the choice of the allomorph.

(3) Diu que **l/lo** pa és bo 's/he says that the bread is good'

(4) a. **[**$_{IP}$ **l/lo** pa és bo**]** → **[**$_{IP}$ **lo** pa és bo**]**
b. *[$_{C}$ que **[**$_{IP}$ **lo** pa és bo**]**]

We will also show that even in simpler cases like (1c) late insertion theories run into problems. Given this kind of evidence, we propose that allomorph selection is not determined by phase-driven spell-out domains, but by prosodic domains. We will discuss several approaches to phase spell-out that are relevant to this case (Bošković 2012;, Heck, Müller, & Trommer 2008; Newell 2008; Svenonius 2004).

Domain-Based Preservation of Nasal Harmony in Maxakalí Loanwords

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Maxakalí, a Macro-Jê language of Minas Gerais, Brazil, has a largely predictable relationship between the distribution of nasality on the stressed vowel (the final vowel in a CVCVC word) and segments in the rest of the word, summarized across three distinct domains below:

-*Rime Nasalization* Within a rime, the vowel and any consonantal coda must agree in nasality.

-*Onset Nasalization* Within a syllable, the onset consonant, if it is not voiceless, must agree in nasality with the vowel. (This is reflected in the writing system, whereby <mã> indicates [mã], whereas <ma> indicates [ba], specifically emphasizing the vowel as a determinant of the nasality of a voiced onset consonant).

-*Intersyllabic Harmony* All vowels to the left of the stressed vowel will retain the nasality of the stressed vowel, unless a voiceless consonant intervenes.

Many models of nasalization harmony might conflate all three generalizations into a single process, as native words such as [ɲãmĩɲ] 'spirit' or [ɲĩmãŋ] 'wing' in fact show nasalization of every segment in the word. Indeed, authors such as Gudschinsky, Popovich & Popovich (1970) and Rodrigues (1981) have assumed that nasalization spreads from the stressed vowel to every other segment in both directions, except where halted by voiceless consonants. Nonetheless, a number of researchers have posited that syllable-internal nasalization ('concord', or syllable phonotactics) and syllable-to-syllable nasalization ('harmony') are distinct processes (Piggott & van der Hulst 1997, Thomas 2014, Singerman 2014), which would suggest that the processes in (1) could 'go their own way' when speakers are confronted with novel phonetic sequences to adapt from donor languages, and thereby the opportunity to produce novel combinations according to their phonology. Wetzels (2009), working from dictionary data, observes that Rime Nasalization is exceptionless in Maxakalí loanwords from Portuguese (e.g. *tomate* > [tõmãn] 'tomato'). However, he notes that Onset Nasalization is variable (e.g. *feijão* > [pẽɲõŋ] or [pẽʒõŋ] 'bean'), and we have even found variable denasalization of the onset (e.g. *limão* > [dibãm] 'lime'), suggesting the potential future emergence of a /b~m/ contrast as unpredictable, rather than allophonic.

We conducted an analysis of loanword adaptation with speakers of Maxakalí from three age groups (ages 15-29; 30-44, 45 and up) and across both genders, in order to determine the extent of variability, and how much it differed across these three domains, and whether or not demographic factors played a role indicating change-in-progess. We report here the results of analysis with nine speakers (6 M, 3 F), with an average of 43 loanwords elicited from each. For Rime-Nasalization, we found a 100% rate of application among 562 tokens, confirming Wetzels' affirmation. For Onset-Nasalization, we found a 78% rate of application among 241 tokens (interestingly, with a lower rate within tonic syllables, suggesting that this may be the first place that a /b~m/ contrast will emerge); this confirms Wetzels' observation of the variability of Onset Nasalization, and indeed, we found a higher rate of application among the older speakers. Finally, for intersyllabic harmony, we found an overall rate of application of only 56%, whereby in forms such as *remédio* > [hemẽn] 'medicine', many speakers did not apply nasalization to the preceding vowel. In addition, no forms had intersyllabic harmony while failing to have Onset Nasalization.

These findings confirm the overall contribution of loanwords as a means of understanding the strength of generalizations in a given phonological system above and beyond what is observable in the static lexicon: in a method complementary to wug studies, loanwords allow one to measure the relative productivity of processes which otherwise might be spuriously unified as one. The case at hand confirms the independence of intrasyllabic nasalization phonotactics and intersyllable nasalization as distinctly domained processes, as observed elsewhere for languages such as Kaingang, Tupari, Moba Yoruba, and Mbya.

Ambisyllabic or Ambiguous Syllabification? Evidence from English Schwa Syncope

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The precise syllabification of a single intervocalic consonant in a trochaic sequence in English words has been a subject of controversy. In a word like *metal*, some phonologists (e.g. Kahn 1976) have proposed an ambisyllabic parse of the intervocalic /t/; others a coda parse (Hammond 1999), and still others a parse as onset of the second syllable (e.g. Jensen 2000). What is clear (Fallows 1981) is that if a single intervocalic consonant is immediately before a vowel bearing stress, (e.g. the /t/ in *metallic*), then that consonant comprises the onset of the 2nd syllable. There is also disagreement on syllabification of an intervocalic consonant in a trochaic sequence where the preceding vowel is long or a diphthong. For example in a word like *tyrant* Hammond (1999) would maintain that the /r/ comprises the onset of the second syllable. But Pater (2014), in an article on Canadian raising from a syllable perspective, indicates that in the word *Nike* /nayki/, the /k/ must either parse as a coda or be ambisyllabic since Canadian raising applies to *Nike*. To maintain this, Pater must distinguish between the syllabification of the /k/ in *Nike* from the intervocalic /k/ in *psychotic* where Canadian raising fails to apply. We believe the raising facts reflect the prosodic domain of a foot; that is, raising applies before a voiceless consonant in the same foot. Here the intervocalic /k/ in *Níke* is in the same foot as the diphthong (so raising applies), but the intervocalic /k/ in *psỳchótic* begins a new foot (so raising fails). In a sense, the precise syllabification of an intervocalic consonant in a trochee like *metal* or *Nike* does not matter. The syllabification of such consonants is not ambisyllabic, rather the syllabification is ambiguous.

Ambiguous syllabification of a foot internal intervocalic consonant is consistent with the emerging view of the importance of foot structure for English phonology (e.g. Davis & Cho 2003, Harris 2013, Martínez-Paricio 2013). On this view foot-initial position is enhanced or demarcated, e.g. by aspiration. Moreover, indeterminate or ambiguous syllabification in foot-medial position helps make clear foot-initial demarcation. If the syllable boundary is ambiguous, then listeners would know that they are not at a foot edge; this could help with parsing words in continuous speech. Evidence for foot-internal indeterminate syllabification comes from the schwa syncope (SS) problem (Zwicky 1972). The relevant instances involve words ending in a final dactyl. Consider the words in (a) where SS is likely to occur versus those in (b) where it is unlikely (target schwa is underlined): (a) *chocolate opera family javelin happening camera*; (b) *pelican felony tyranny monitor canopy Arabic*. The SS problem entails the reduction of a dispreferred dactylic foot into a preferred trochaic one. That foot reduction is at issue is seen by the fact that SS is unlikely to occur before a stress syllable; compare *ópera* (SS likely) with *óperàte* (SS unlikely). The salient observation regarding (a) and (b) that comes from Zwicky's work (though not exactly stated by him) is that SS is dispreferred if the resulting consonant cluster has falling sonority. For example, all the words in (b) would have falling sonority were SS to occur, whereas SS is favored if the resultant cluster has rising sonority as in (a). Given work on syllable contact, we know the preferred (distinct) syllable boundary is one that has falling sonority, but SS is favored in cases like (a) where the syllable boundary in the resulting trochaic sequence is less distinct. For example where exactly is the syllable boundary in the syncopated forms of *opera* and *javelin*? On the other hand, if the words in (b) were to undergo SS the syllable break would be distinct. While distinct syllabification is not avoided in a trochee if faithfulness is at issue (eg. *falcon*; *carpet*), in a situation where there's an effect of the emergence of the unmarked as in (a), we see that the preferred trochee ("derived" from a dactylic sequence) is one where the syllabification is at least somewhat indeterminate or ambiguous. We conclude that the syllabification of a single intervocalic consonant in a trochaic sequence in English is ambiguous and this can be understood given the importance of the foot (and foot boundaries) in English phonology.

How many prosodic constituents?

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The issue: Prosodic theory proposes that phonological strings are parsed into a set of hierarchically arranged constituents – the Prosodic Hierarchy – which provide the domains for phonological processes. (See, e.g. Inkelas 1989; Nespor &Vogel 1986; Selkirk 1986, 1995; Hayes 1989). Persistent research issues for the Prosodic Hierarchy are: What is the repertory of constituents? What cross-linguistically relevant motivations can be provided the constituents? In addressing these issues, two conflicting considerations must be balanced (Inkelas 2014): 1-The number of constituents should be as *parsimonious* as possible, as this is the best way to insure the posited constituents are of universal cross-linguistic relevance; and 2- The number of constituents must provide *sufficient* prosodic domains to account for morpho-syntactically conditioned phonological processes in all languages.

Selkirk (2009, 2011) and Itô & Mester (2012, 2013) have recently argued in favor of a parsimonious view. They make the strong claim that the Prosodic Hierarchy contains only the three universal, syntactically-defined constituents in (1):

(1) Prosodic Hierarchy (adapted, Itô & Mester 2013: 26; Selkirk 2011)

Intonational Phrase	matches	syntactic clause (CP)
Phonological Phrase	matches	syntactic phrase (XP)
P(rosodic) Word	matches	syntactic word (X^0)

Any additional prosodic domains must be defined as recursions of one of these constituents.

The goal of this talk: We argue that this view of the Prosodic Hierarchy is too parsimonious. An additional constituent, Prosodic Stem, is required to account for the cross-linguistically motivated distinction between stem- and word-level phonological domains (Kiparsky 2000; Bermudez-Otéro 2011, 2012). Prosodic Stem cannot be reanalyzed as (minimal) PWord.

A case study: The need for a Prosodic Stem constituent will be motivated by a case study of Shona (Bantu S10; Zimbabwe and Botswana). As work since Myers (1987) has argued, two processes – vowel hiatus resolution and tone – provide evidence for a distinction between Prosodic Word and Prosodic Stem domains. Vowel hiatus is resolved by glide insertion at the edges of Stems. Outside the Stem domain, vowel hiatus is resolved by deleting the first vowel. This is illustrated in: /ti-á = **ó**na/ → [ta=w**ó**na] 'we ate it (cl.9)' (stem edges are marked with '='). We also see OCP-motivated High tone (accented V) deletion applying across the Stem boundary in this form. Within maximal Stems (underlined), this process does not apply: e.g. /ku=**í** =**ó**na/ → output [ku = j**í** = w**ó**ná] 'to see it (cl. 9)'; tone spread also applies in this form. Other work on Shona – Hyman & Mathangwane 1998; Myers 1995, 1997, 1998; Kadenge 2010; Mudzingwa 2010; Mudzingwa & Kadenge 2011; Odden 1981 – agrees on a Word vs. Stem domain distinction.

Following Selkirk (2009, 2011) and Itô & Mester (2012, 2013), the Word vs Stem distinction would have to be recast as a recursion of Prosodic Word (PWord; the only lexical constituent in the current Prosodic Hierarchy). Stems would be parsed as minimal PWord, and Words as maximal PWord. We argue that this reanalysis is not plausible. First, verb stems are not X^0, so they do not fit the universal syntactic definition of PWords in (1). Furthermore, as Vigário (2010) and Vogel (2009, 2010) argue, recursive instantiations of the same prosodic constituent should, by definition, have the same prosodic properties. However, it is uncontroversial that stem vs. word domains have distinct prosodic properties in Shona and many other languages. For example, Words but not Stems are subject to a minimality restriction in several dialects of Shona. It violates our universal definition of PWord to assert that the minimal PWord of Shona (i.e., the Stem) does not have to satisfy PWord minimality.

In sum, this case study of Shona demonstrates the limits of recursion in achieving a parsimonious set of constituents in the Prosodic Hierarchy.

How low can you go? Templatic specifications in Nuer (Western Nilotic)

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Nuer is a Western Nilotic language spoken in South Sudan. Pluralization in this language unpredictably involves one of several suprasegmental processes, such as lengthening, lowering, consonant mutation etc. (see Frank 1999). This talk discusses the logic behind one pluralization scenario which *is* largely predictable, even though it is extremely non-concatenative: the pluralization of reduplicated adjectives. It is shown that the reduplicated adjectives are formed with the aid of an Afro-asiatic-like template, specified in terms of and melody.

Adjectives in Nuer may appear in a predicative construction <N ɛ mí A>, meaning 'N is A'. For instance [yaŋ ɛ mí bum] 'cow is strong'. A subset of all adjectives may also be fully reduplicated in this position [yaŋ ɛ mí ˈbumbum] 'cow is strong'. As shown in (1), in the plural, the vowel of these adjectives mutates in what can be partially characterized as a lowering chain shift (although cases of synchronic vocalic chains involving lowering are few and dubious, Parkinson 1996). Length is added in all cases, and glide formation is apparent in some cases (<y> is a high glide):

(1)	lowering, diphthongizing		non-alternating	
	a. ˈriwriw => ryɛwˈryɛɛw	'straight'	f. ˈdeldel => delˈdeel	'dense'
	b. ˈculcul => cɔlˈcwɔɔl	'dark'	g. ˈdɵkdɵk => dɵkˈdɵɵk	'fat'
	c. ˈpɔl => p^{ɔ}alˈpɔaal	'easy,light'	h. ˈyamyam =>yamˈyaam	'rude'
	non-diphthongizing			
	d. ˈɟɛɲɟɛɲ => ɟɛɲˈɟaaɲ	'shallow'		
	e. ˈwəcwəc =>wacˈwaac	'wet'		

The changes in (1) are representative of the behavior of the rest of the vowels. The goal of this talk is to characterize the regularity of the mutation. Why this specific change? Why is there no diphtongization in (1d,e)? Why is there no vowel lowering specifically in (1f-h)?

As a first step, the vocalic system of Nuer is examined and described in terms of Elements (Kaye et al 1985, Buckley 2011). Leaving aside several complications, the eight vowels apparent in (1) are analyzed in the following manner: [i] = |$\underline{I}$|, [e] = |$\underline{I}$,A|, [ɛ] = |I,$\underline{A}$|, [u] = |$\underline{U}$|, [ɵ] = |$\underline{U}$,A|, [ɔ] = |U,$\underline{A}$|, [ə] = |A|, [a] = |$\underline{A}$|. With these tools in hand, the following template is proposed for the Nuer adjectival plural:

(2)
```
C(V)V VC
     \/
     A
```
(with A underlined: $\underline{A}$)

This template obviates the need for any lowering mechanism. Derivations of the plural from the singular base are then discussed. The base vowel is spread to occupy the two obligatory slots of the plural template. If it is a headed expression, this creates a conflict with the prespecified headed $\underline{A}$ of the template. The resolution of the conflict depends on a requirement to preserve the head of the base vowel. If the base vowel is a possible glide (only [y,w,ɔ] can be glides), then the full vowel will fill the optional glide position and combine with the $\underline{A}$ as a non-head ([i]=>[yɛɛ], [u]=>[uɔɔ], [ɔ=>ɔaa]). In this manner, both heads can survive. If the base vowel cannot glide, then $\underline{A}$ will lose its head status and be combined with the head of the base vowel [e=>ee, ɵ=>ɵɵ, a=>aa]. If the original expression is unheaded (only [ə]), then there is no conflict and $\underline{A}$ remains the head [ə=>aa]. Derivations of sample cases are presented.

The analysis is then extended to bases with diphthongs such as [kwiy] 'small', whose reduplicated plural is [kwɛykwɛɛy]. The vowel of such bases, even though it is a possible glide, is unable to occupy the first V, which is occupied by the original glide. This emphasizes the importance of the fixed template in the analysis. Finally, the difference between the vowels of the two syllables in words like (1d) is interpreted as the result of the stresslessness and length of the first syllable.

The phonetics of epenthetic vowels under emphasis spread in Levantine Arabic

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This talk presents findings from a new phonetic study of vowel epenthesis in 77 Palestinian Arabic speakers, which sheds light on the reason that epenthetic vowels may be acoustically different than lexical vowels.

Colloquial Levantine Arabic dialects insert an epenthetic vowel into most CC coda clusters. Gouskova & Hall 2011 and Hall 2013 have shown that some speakers of Lebanese Arabic produce epenthetic [i]'s that are more back than lexical [i]. This pattern can be described as "non-categorical differentiation", in that the exemplar clouds of epenthetic [i] and lexical [i] overlap heavily, yet show significant distinctions in F2.

At least three explanations have been proposed for patterns like these. (1) **The underlying form influences phonetics.** Gouskova & Hall 2011 propose that phonetic implementation can access intermediate stages of derivation: in this case, something between the underlying Ø and surface [i]. (2) **A sociolinguistic variant form influences phonetics.** Some Lebanese speakers produce an epenthetic [ə] that is categorically distinct from their [i]. Hall 2013 suggests that non-categorical differentiators are influenced by such speakers. (3) **Epenthetic vowels are representationally deficient on the surface.** Louis Goldstein and colleagues have proposed in an Articulatory Phonology framework that epenthetic vowels have fewer gestural parameters specified than other vowels.

In the current study, many of the Palestinian speakers show non-categorical differentiation between epenthetic and lexical [e], similar to Gouskova and Hall's findings for Lebanese. Yet unlike Lebanese, no speakers produced epenthetic [ə]. This suggests that non-categorical differentiation cannot depend on existence of a sociolinguistic variant, contra theory (2). The study also compared epenthetic and lexical vowels in a context not previously studied: words that contain pharyngeal or 'emphatic' (pharyngealized) consonants. These trigger an assimilatory 'emphasis spread', which strongly affects vowel quality. Interestingly, the difference between epenthetic and lexical vowels disappears under emphasis spread. In pairs such as /dˤilʕ/ [dˤileʕ] 'rib' versus /tˤileʕ/ [tˤileʕ] `walked', the epenthetic and lexical vowels are acoustically identical. This is not predicted by theory (1), which assumes that underlying differences should still be accessible to the phonetics.

I argue that this finding lends support to theory (3). Epenthesis introduces a gesturally underspecified vowel, but if the vowel undergoes emphasis spread, the process of assimilation fills in values for the missing gestural parameters.

Loan adaptations via orthographic and auditory forms: English singletons as geminates or singletons in Italian

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Background:

The influence of orthography on loanword adaptation has been the focus of several studies (e.g. Smith 2006, Vendelin & Peperkamp 2006, Kang 2013), though a formalization of how the orthographic form can be integrated into a grammar model hasn't been proposed yet. Kang (2013) even claims that perceptual models of loan adaptations such as *Bidirectional Phonetics and Phonology* (BiPhon), applied by Boersma & Hamann (2009) to English borrowings in Korean, cannot deal with such orthographic influences.

Single consonants in English as geminates or singletons in Italian:

In this talk we take up two generalisations by Repetti (1993) on Italian borrowings of foreign origin. First, the adaptation of single consonants after short stressed vowels as geminates, as in *tunnel* /ˈtun.nel/, is due to a bimoricity requirement on the stressed syllable and a preference for stressed syllables to be closed. Second, gemination after unstressed vowels, observed in recent loans as e.g. *pullover* /pul.ˈloː.ver/, can only be due to an orthographic influence from the source language.

The data in (1) show that early Italian loanwords with a singleton-short vowel sequence in the source language were adapted with a geminate. For such early loans, we can safely assume that orthography did not play a role, but this leaves us to explain how the first geminate in (1b) came into being, since Repetti's reasoning cannot account for this.

(1) a)	*bistecca*	/bis.ˈtek.ka/	from English *beefsteak*, first attested in 1844
b)	*stoccafisso*	/stok.ka.ˈfis.so/	from German *Stockfisch*, first attested in 1432

Furthermore, more recent loanwords from English (2a) show that a preference for closed stressed syllables as proposed by Repetti does not seem to hold for cases where the consonant is represented with a single grapheme or with two different graphemes (e.g., *hacker*), as opposed to words with a double grapheme as in (2b).

(2) a)	/ˈɛː.**d**i.tor/	*e**d**itor*	b)	/ˈtɛ**n.n**is/	*te**nn**is*
	/ˈglɛː.**m**ur/	*gla**m**our*		/ˈi**p.p**i/	*hi**pp**ie*
	/ˈaː.**k**er/	*ha**ck**er*		/a**k.ˈk**aunt/	*a**cc**ount*

Our proposal:

We propose that the distribution of the geminates in the old loanwords (1) is purely perceptually motivated, as the vowels in the source language were too short (compared to the duration of the following consonant) to be perceived by Italians as being followed by a singleton (see Pickett et al. 1999). A perceptual account is also sufficient for the words in (2b). For the words in (2a) we propose an orthographic influence forbidding gemination.

Formal account:

We formalize the perceptual adaptation of the words in (1) and (2b) in terms of a BiPhon perception grammar, where a cue constraint prohibiting the mapping of short vowel cues onto an allophonic long vowel in the surface form (*[v̆]/Vː/) interacts with a structural constraint that requires stressed vowels to be bimoraic (/.ˈμμ./).

For the formalization of orthographic influences in loanword adaptation, we introduce orthographic constraints of the form <α>/x/ that regulate the mapping of a grapheme <α> onto a surface form /x/. To account for the adaptations in (2a), we propose the orthographic constraint *<c_1>/Cː/ "don't map a single grapheme onto a geminate consonant", which is higher ranked than the cue constraint *[v̆]/Vː/ in simultaneous perceptual and orthographic adaptations.

Weighted Scalar Constraints and Implicational Process Application

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Overview: Constraint scaling allows the severity of a markedness violation to be relativized to some scale (*cf.* HNUC – Prince & Smolensky 1993/2004). This paper argues that scaling constraints based on the strength of an adjacent morphological juncture can yield effects similar to those identified with Stratal OT under the Russian Doll Theorem (Bermúdez-Otero 2011), provided that constraints are weighted as in Harmonic Grammar (Legendre, Miyata & Smolensky 1990, Smolensky & Legendre 2006). Multiple rankings or a stratal architecture are not needed to capture patterns of apparent cyclic application; parallel optimization with weighted scalar constraints is sufficient.

Implicational application: According to the Russian Doll Theorem, given a set of nested morphological domains, if a phonological process applies in an inner domain *α* but its motivation is rendered opaque in domain *β*, then that process will also appear to have overapplied in all larger domains. The data in (1) illustrates with a case from the history of English. Deletion of [ɡ] following [ŋ] is motivated by a general phonotactic constraint $*ŋɡ]_σ$. In Stratal OT, deletion applies at each level of the grammar where $*ŋɡ]_σ$ dominates MAX-C. If this ranking is reversed between morphological levels, however, the motivation for deletion is obscured, giving rise to apparent overapplication of the /ŋɡ/→[ŋ] mapping.

(1)

	Stage			
	0	1	2	3
elong+ate	ŋɡ	ŋɡ	ŋɡ	ŋɡ
prolong#er	ŋɡ	ŋɡ	ŋɡ	ŋ
prolong##it	ŋɡ	ŋɡ	ŋ	ŋ
prolong||	ŋɡ	ŋ	ŋ	ŋ

Crucially, the appearance of overapplication at a given level entails similar overapplication in all higher domains; the pattern is strictly implicational.

Scaling constraints: We define markedness constraints such that the number of violations incurred increases with the strength of the morphological boundary to which they are adjacent. For the case in (1), the key constraint is $*ŋɡ]_D$, which, given the scale D = {+, #, ##, ||}, results in one violation for the mapping /ŋɡ/→[ŋ] in *elon<u>g</u>+ate*, two violations for the mapping /ŋɡ/→[ŋ] in *prolo<u>ng</u>#er*, etc.

Constraint weighting: If constraints are weighted, scaling markedness in this fashion gives rise to precisely the same patterns as the cyclic model of Stratal OT. As the weight of the markedness constraint increases relative to the weight of the conflicting faithfulness constraint, the marked structure is permitted at fewer types of juncture. The tableau in (2) demonstrates how assigning a weight of 7 to MAX-C and a weight of 3 to $*ŋɡ]_D$ results in a pattern like Stage 2 in (1). Increasing the weight of $*ŋɡ]_D$ to 4 would yield the pattern associated with Stage 3, while decreasing its weight to 2 would yield Stage 1, etc. This system generates only patterns consistent with the Russian Doll Theorem, and does so without having to assume cyclic derivation.

(2)			MAX-C $w = 7$	$*ŋɡ]_D$ $w = 3$	*H*
elong+ate	☞	ŋɡ		–1	–3
		ŋ	–1		–7
prolong#er	☞	ŋɡ		–2	–6
		ŋ	–1		–7
prolong##it		ŋɡ		–3	–9
	☞	ŋ	–1		–7
prolong||		ŋɡ		–4	–12
	☞	ŋ	–1		–7

Implications: The ability of scalar constraints to model such implicational patterns is specific to HG. Parallel OT with ranked scalar constraints predicts only systems where the marked structure is categorically allowed or repaired, while indexing ranked constraints to morphological domains predicts violations of the Russian Doll Theorem. This study thus provides further evidence for the claim that adopting a weighted model of constraint interaction has positive typological consequences while increasing the simplicity of the overall system (see also Potts *et al.* 2010). Ongoing research will determine the extent to which this approach can supplant the cyclic architecture of Stratal OT and related theories.

Quantity-quality interactions in Welsh vowels: phonologization across dialects

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This paper defends the emergent view of phonological features, where the inventory of contrasts in a given language is determined on the basis of language-specific contrast and phonological activity. I analyse the phonologization of 'tenseness' in south-western dialects of Welsh as an example of bottom-up creation of phonological categories on the basis of predictable categorical distributions.

Across Welsh dialects, the quality of (non-low) vowels in stressed syllables is closely intertwined with their length: generally, long stressed vowels are 'tense' [i u e o] while short stressed vowels are 'lax' [ɪ ʊ ɛ ɔ] (G. E. Jones 1984, Mayr & Davies 2011). In many contrastivist frameworks (including the traditional phonemic approach), the mutual predictability of length and quality forces analysts to make the apparently vacuous choice of designating only one of these as 'distinctive'.

South-West Welsh varieties (Awbery 1986, C. Jones & Thorne 1992, Wmffre 2003) are described as deviating from this picture and allowing 'lax' long mid vowels, specifically before high vowels in a following syllable:

(1) a. [ˈtɛːbɪg] *tebyg* 'similar'
b. [ˈgɔːvɪn] *gofyn* 'to ask'

(2) a. [ˈeːdɛ] *edau* 'thread'
b. [ˈoːgɔv] *ogof* 'cave'

If the distinction between [eː oː] and [ɛː ɔː] is real, it presents a potential explanandum for a quantity-based contrastivist approach to Welsh vowels. Specifically, if quantity rather than quality is phonologically distinctive in Welsh, vowel quality should be invisible to the phonology (e. g. Hall 2007), and its phonologization in South-West Welsh demands an explanation.

I present the results of an empirical study of the interaction between vowel quantity and vowel quality, with a focus on south-western varieties. Statistical analysis using generalized additive mixed models (Wood 2006) shows that the distinction described in the literature is not only real but also a categorical (and, I argue, phonological) effect rather than a continuous trade-off in the inherent length of vowels of different heights. F1 values in mid (but not high) vowels show statistically significant differences triggered by the phonological height specification of a following vowel, whilst there are no continuous durational effects on vowel quality.

This situation is consistent with an analysis where vowel quality, originally an enhancement of phonological quantity (e. g. Stevens & Keyser 2010), becomes stabilized as a property of (stressed) vowels. Learners reinterpret this categorical presence of relevant cues as reflecting the presence of a symbolic phonological feature (Bermúdez-Otero & Trousdale 2012), which then enters the phonological computation to participate in a dissimilation-like process involving an aperture contrast. I show that both a pre-enhancement system with no significant quantity-quality interactions and an enhanced system with a categorical distribution of 'tense' and 'lax' variants but no dissimilative pattern are attested in the data. The argument that phonologization proceeds on a category-by-category basis is supported by the apparent phonemicization of the contrast in at least one lexical item ([ˈfɛːnest(r)] 'window' rather than the expected *[ˈfeːnest(r)]).

The phonologization scenario I defend is broadly consistent with the life cycle of phonological processes (e. g. Bermúdez-Otero 2007, Ramsammy 2015). The predictions made by the theory of the life cycle are further confirmed by the fact that although duration does not influence the *quality* of stressed mid vowels, their *duration* is affected by the duration of following vowels in a manner consistent with the analysis of the pattern as a trade-off in inherent length. I argue that this makes the South-West Welsh pattern an example of *rule scattering*, where both the original phonetic pattern and the phonological pattern that arose out of it remain part of the grammar (Bermúdez-Otero 2014). Moreover, the bottom-up phonologization scenario is consistent with the emergent view of distinctive features (Mielke 2007) and requires allowing for at least some degree of arbitrariness in the mapping between phonological features and phonetic substance.

Phonotactic Probability and Sonority Sequencing in Polish Initial Clusters

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The Sonority Sequencing Principle (SSP) states that complex onsets with a sonority rise are preferred cross-linguistically. Experimental evidence indicates English speakers exhibit gradient sensitivity to the SSP even for onset clusters not attested in English (Davidson 2006, 2007; Berent et al. 2007; Daland et al. 2011). Berent et al. argue there is no direct lexical evidence for these preferences and suggest the principle must be innate. However, Daland et al. show that computational models that use phonological features can detect SSP preferences from English lexical statistics. This paper explores this controversy using computational and developmental approaches in a language (Polish) with very different sonority sequencing patterns from English. There are two contributions: 1) using computational modeling, we show that the lexical statistics of Polish contradict the SSP, favoring onset clusters with sonority plateaus, and 2) we show that children nonetheless exhibit sensitivity to the SSP, favoring onset clusters with a sonority rise.

The data for all analyses comes from the Weist-Jarosz Polish Corpus available via CHILDES (Weist and Witkowska-Stadnik 1986; Weist et al. 1984; Jarosz 2010). The corpus includes transcriptions of child-directed speech, which were used to estimate the phonotactic probabilities of initial clusters with various sonority profiles in the language input. Following Daland et al., we use Clement's (1988) coarse-grained sonority scale: Obstruent (0) < Nasal (1) < Liquid (2) < Glide (3) < Vowel (4). As shown in Table 1, statistics based on the lexicon (type frequency) and on word tokens (token frequency), both provide strong evidence favoring obstruent-obstruent clusters, contrary to the SSP. The situation is not improved by considering the relative frequencies of varying degrees of sonority rises because about half the input clusters have a sonority rise of 0. Splitting fricatives and plosives into separate sonority classes (not shown) doesn't help either because all four combinations are well represented in the input.

In the first developmental analysis we test whether Polish children are sensitive to the SSP. We fit logistic regression models to analyze the children's production accuracy on initial clusters varying in sonority profile while statistically controlling for other factors that may influence accuracy. We considered control predictors for phonological context (stress, identity of the adjacent vowel), subject, age, and word frequency. The predictor of interest, SSP, assigns a numerical value to each cluster (n=1334) based on the degree of sonority rise, as in Table 1. After inclusion of all five control predictors, SSP was significantly predictive of children's production accuracy ($\beta = 0.367$, $z = 6.9$; $p < 0.0001$). The direction of the effect was positive, indicating that children were significantly more accurate on clusters with a higher sonority rise. Therefore, the developmental data from this corpus of child Polish is consistent with the SSP.

In the second set of analyses, we considered several measures of phonotactic probability as predictors of accuracy in the regression models. Log token frequencies of both sonority rises and sonority profiles were significantly predictive of production accuracy. However, crucially, the predictions were in the wrong direction: *higher* log frequency of rises ($\beta = -0.89$, $z = -6.2$; $p < 0.0001$) and of profiles ($\beta = -0.38$, $z = -2.9$; $p < 0.005$) was associated with significantly *lower* accuracy. This confirms the observation made above that these input statistics make predictions for acquisition that conflict with the SSP. Results for type frequency were similar.

In sum, we demonstrate children acquiring Polish show sensitivity to the SSP and behave inconsistently with the input. The paper also considers alternative formulations of phonotactic probability: some improve the predictions, but none can fully capture the SSP effects. We discuss implications for models of phonotactics and phonological theory more generally.

Profile (Rise)	LF (-2)	OO (0)	NN (0)	ON (1)	NL (1)	OL (2)	NG (2)	OG (3)
Token Frequency	0.04%	50.90%	0.50%	3.60%	0.20%	20.40%	3.00%	21.30%
Type Frequency	0.10%	47.70%	0.20%	6.70%	0.60%	19.60%	2.90%	22.30%

Table 1 - Relative Frequency of Sonority Profiles (O=obstruent, N=nasal, L=liquid, G=glide)

The syllabic affiliation of final consonants: Evidence from second language acquisition

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This paper presents evidence from second language acquisition to establish the syllabic affiliation of word-final consonants. Brazilian Portuguese (BP) speakers have difficulty producing English /p/ and /k/ (among other consonants) in both medial coda and final position, since BP allows only /s r l N/ in these positions. The tendency is for learners to epenthesize [i] such that these consonants are realized as onsets: *ca*[pi]*tain, do*[ki]*tor, bisho*[pi]*, magi*[ki]. With increased proficiency, a stage may be reached where vowel insertion is suppressed. Uncontroversially, this implies that BP learners syllabify medial /p/ and /k/ in *captain* and *doctor* as codas (i.e., they expand the set of coda consonants). It is less clear, however, what happens when they acquire *word-final* /p/ and /k/. Final consonants may be analyzed as **codas** (Selkirk, 1982), as **onsets of empty nuclei** (Kaye, 1990), or even in some cases as codas and in others as onsets, depending on the language (Piggott, 1999).

Following Piggott (1999), we assume that BP, with its set of canonical coda consonants /s r l N/ in final position, has final codas; whereas English, with its larger set of consonants in word-final than in medial coda position (/p b t d k g f v θ ð s z š ž č ǰ m n ŋ l r/ vs. /p k f s m n ŋ l r/ in our view), has final onsets. Under this analysis, when BP speakers acquire medial coda and final /p k/ in English, they are acquiring two things: i) an expanded set of coda consonants, and ii) a representation of final consonants as onsets of empty nuclei. This view predicts that BP learners should exhibit *differential acquisition* of medial coda and final /p k/, since these involve separate prosodic representations. More strongly, medial coda /p k/ should be acquired before final /p k/, since only the latter require a novel prosodic structure, namely empty nuclei.

In order to test whether medial coda and final stops are acquired at different rates or in tandem, we adopted a variationist approach for data collection and analysis (e.g., Labov, 2001). Data were collected from 13 BP speakers learning English in Montreal, via three tasks: i) real-word elicitation; ii) non-word repetition; and iii) non-word reading aloud. For the real-word elicitation task, participants saw an image (e.g., *doctor*) and, based on the image, verbally completed the blank in a carrier sentence (e.g., *This is a* ___). For the non-word repetition task, participants heard a non-word twice (e.g., *gazoop*) and orally inserted the heard word at the end of a carrier sentence (e.g., *I can't find my* ___). The final task involved reading aloud these same non-words in isolation.

The data were coded for a range of factors, including presence/absence of [i]-epenthesis (the dependent variable) and whether /p k/ were in medial or final position. The results of a Goldvarb X (Sankoff et al., 2005) analysis revealed that the production of the target /p k/ was more problematic by far in word-final position (consistent with our hypothesis that these are onsets of empty nuclei) and, incidentally, when the preceding nucleus was unstressed. Our findings are robust and compellingly suggest that final consonants in English require a different prosodic representation than medial codas. Tentatively, the findings also support the view that BP final consonants must be syllabified as codas. In sum, our study points to Piggott's view of final consonants as being codas in some languages and onsets in others to be correct.

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The coordination of tone gestures in Thai

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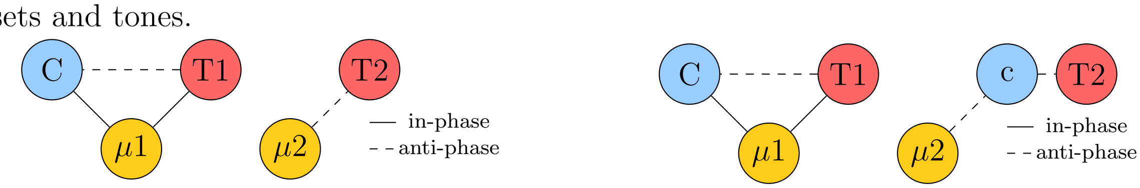
In addition to three level tones (low, mid, high), Thai additionally contrasts two contour tones, which are distributionally restricted to bimoraic words. The contour tones are true contours: the so-called "falling" tone (HL) first rises and then falls, while the "rising" tone (LH) falls and then rises. The standard account of this distribution is that the mora is the tone-bearing unit (TBU). In this paper, I propose that a TBU is a gesture with which a tone gesture (H or L) coordinates. In particular, I argue that in Thai, these gestures correspond to the segments that are traditionally regarded as moraic—i.e., vowels and moraic codas.

Morén and Zsiga (2006) account for the restricted distribution and realization of the contour tones by arguing that tone levels in Thai are associated to the right edge of a moraic TBU, based on acoustic evidence that showed that the turning point of the contour tone was approximately at the midpoint of the long vowel in a CVV syllable, or at the border between moras. Under the analysis offered by Morén and Zsiga, we expect that the segmental content of the mora has no effect on the alignment of tones. However, in bimoraic words with the shape CVVS(onorant) or CVVO(bstruent), the turning point of the tone occurs well after the acoustic end of the first mora.

This paper presents the results of an acoustic and articulatory study that examines the production of falling tones on CVV, CVS, CVVS, and CVVO words. The experimental data support the idea that bimoraic Thai words are organized into two sets of gestures that are selected as units ("co-selection sets"; Tilsen (2014)); these units correspond to the first and second moras. The order of gesture onsets in the first moraic co-selection set is *onset*-$\mu 1$-*T(one)1*, with $\mu 1$ at the midpoint between *onset* and *T1*. This pattern corresponds with the C-center effect found for complex onsets (Marin and Pouplier, 2010) and Mandarin tone (Gao, 2008), and indicates that *onset* and *T1* are in-phase coordinated with the $\mu 1$ gesture, but anti-phase coupled with each other.

In contrast, the order of gesture onsets in the second co-selection set is $\mu 2$(-*coda*)-*T(one)2*, which indicates that $\mu 2$ is first anti-phase coordinated to *coda*, if present. That is, *T2* does not have a direct relationship with the onset of $\mu 2$ in CVVS words, but is rather anti-phase coordinated to *coda*. This additional coordinative structure results in the acoustic delay of the turning point of the falling tone in CVVS words as compared to CVV words. The figure below depicts the proposed coordinative relationships in a CVV/ CVS words (Fig. 1a) and in CVVS/CVVO words (Fig. 1b). In the proposed model, each mora is a set of co-selected gestures that includes the moraic gestures and coordinated non-moraic gestures, such as onsets and tones.



(a) /mân/, /mâa/, /mûa/ (b) /mâan/, /mâat/, /mûan/, /mûat/

This work builds on recent work in Articulatory Phonology showing that pitch is fruitfully treated as a gesture similar to those involved in consonants and vowels (Prieto et al., 2007; Gao, 2008). By analyzing Thai tone in terms of gestural coordination, we are able to preserve the insights of the traditional moraic analysis, while accounting for the effect of segmental content on the realization of contour tones.

The interaction of post-lexical tone and foot structure in Uspanteko

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Central claim. This talk shows on the basis of Uspanteko (Mayan) that tonal surface contrasts within syllables do not have to imply that a language has lexical tone, but that such tonal contrasts can derive from differences in foot structure. The approach is in line with current metrical analyses of tone accent oppositions in Ancient Greek (Kager & Martínez-Paricio 2014), Franconian (e.g. Hermans 2009; Köhnlein 2011, to appear; Kehrein to appear; Van Oostendorp to appear), Scandinavian (e.g. Morén 2005, 2007; Morén-Duolljá 2013), and Scottish Gaelic (Iosad 2013).

Background. Uspanteko shows a remarkably rich interaction between the location of stress, vowel quality, and pitch accent / tone, described in detail in Bennett & Henderson (2013; *henceforth* B&H). The basic facts for bare roots are as follows:

(1) Main generalizations about stress and tone in Uspanteko

a. Stress falls on one of the two last syllables.
b. Heavy syllables are restricted to the final syllable and always receive stress.
c. In sequences of two light syllables, the vowel with the higher sonority receives stress in disyllabic words – if sonority is equal, both syllables can be stressed.
d. In trisyllabic words, stress is always final.
e. Some words carry a distinctive high tone, which is restricted to the penultimate vocalic mora of a word and can only occur in stressed syllables – accordingly, light final syllables never carry tone.
f. If stress is on the penult, the stressed syllable *always* has a high tone.
g. Heavy final syllables sometimes have a high tone on the first mora.

B&H provide an analysis of the patterns based on lexical tone but also acknowledge that the occurrence of tone is highly predictable: in most instances, it follows from vowel sonority and the number of syllables. As a consequence, the authors have to rely on an approach where the occurrence of tone is both a lexical and a post-lexical phenomenon.

A foot-based approach – representations. We argue that a more insightful analysis of the facts can be provided if we recognize that tonal oppositions in stressed syllables can be a surface correlate of contrastive foot structure – along these lines, all surface tones in Uspanteko are post-lexical. Notably, the general idea is compatible with B&H, who themselves argue that Uspanteko has both iambs and trochees. Adopting the distinction between iambs and trochees, we argue that (syllabic) iambs are headed by the foot-final syllable, and (moraic) trochees by the foot-initial mora (e.g. Kager 1993). Following Köhnlein (2011, to appear), we furthermore assume that foot heads constitute *head domains* that comprise the foot head itself as well as metrical structure dominated by it. In syllabic iambs, all moras (one or two) dominated by the head are part of the head domain (and therefore metrically 'strong'). In moraic trochees, the first mora is the head ('strong'), and the second mora the dependent ('weak').

A foot-based approach: tonal associations. Accentual prominence in Uspanteko is marked with a H*L pitch accent (the L can also be seen as a word-final boundary tone); vocalic moras are TBUs. The grammar governs how tones associate with moras, depending on the respective foot type. The crucial constraint for the mapping is *FT-HD/L (de Lacy 2002), which, in our interpretation, states that low tones are banned from foot head domains. In the case at hand, this means that a low tone cannot associate with a mora in a foot head domain.

The tonal mapping is as follows: H* always links to the first mora of the stressed syllable. In trochaic feet, the low trailing tone associates with the weak branch of the foot (the second mora). In syllabic iambs, all moras in stressed syllables are dominated by the foot head and thus strong; consequently, L cannot associate. Instead, it remains floating and lowers the pitch of the preceding H. As we show, it follows directly from our representations that 'distinctive' high is always restricted to the penultimate mora and that stressed penults always have tone.

A foot-based approach: distribution of word stress. The analysis also provides a straightforward explanation for the distribution of word stress (partially in line with B&H): i) all feet have to be aligned with the right word edge (ALL-FT-RIGHT), which derives the two-syllable window; ii) trisyllabic (or longer) monomorphemic words cannot have penultimate stress because the foot head must be aligned with the first or last syllable of a prosodic word (EDGEMOST); c) the observed sonority effects follow from interactions of vowel quality and headedness in metrical feet (Kenstowicz 1997; de Lacy 2002).

The mysterious double life of nasals in syllable phonotactics and the sonority hierarchy

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In this paper we investigate the phonotactic behavior of nasals and nasality. Nasality has been attested an ambivalent nature for its compatibility with voiced stops and vowels and its aversion against fricatives and liquids (Cohn 1993, cf. Mielke 2005). We argue that segments with the feature [nasal] in onsets are redundantly specified as [–continuant], with relatively low sonority, while they are redundantly specified as [+vocalic] in coda (or preconsonantal and prepausal) position, locating them very high on the sonority hierarchy.

In our database, currently containing 204 languages from 53 families, we found that of 115 languages with restricted consonant inventories in coda position 83% contain nasals and 25% display exclusively nasals. The languages solely displaying either liquids, or fricatives, or stops, jointly sum up to only 6%. In this corpus we also coded languages for which consonants can occupy the nucleus of a syllable. Of the 74 languages in the corpus that allow syllabic consonants, 92% display syllabic nasals and 57% of these allow only nasals to be syllabic, while only 39% allow syllabic liquids and only 7% allow only liquids as consonantal nuclei.

In the 28 languages with only nasals in the coda, most coda nasals are weight bearing (i.e., moraic), and at least half can carry tone. In some cases (coda) pattern with vowels. In Gilbertese (Austronesian), root final nasals are invariably moraic, even when parsed as onsets, triggering mora transfer (Blevins & Harrison 1999); in Ciyao (Niger-Congo), one of the two moraic nasals retains its moraicity in all contexts (Hyman 1997); Ikwere has a syllabic nasal that bears tone and triggers phrase-initial onset epenthesis (Clements & Osu 2005). The relatively low sonority of nasals is corroborated by their frequent alternation with voiced or prenasalized stops (e.g., in Yukaghir, Rotokas, Maxakalí, Apinayé, Lushoot-seed) as well as by their notoriously bad performance as the second member of onset clusters, with CN onsets implying CL onsets (Greenberg 1978, Berent et al. 2007). Among the nasal coda languages we found 3 with complex onsets (Karen Pwo, Lendu, Wan). In all three, only liquids can figure as the second member of an onset cluster. Yet, in all three, only nasals occur in the coda, to the exclusion of liquids, leading to a sonority paradox.

These typological observations pose a problem to the sonority hierarchy (Clements 1990, see also Parker 2002; vowels > liquids > nasals > obstruents) and its role in determining syllable phonotactics. It is widely assumed that sonority negatively correlates with compatibility with onset position and that sonority positively correlates with compatibility with nucleus and coda position and its moraicity (Sievers 1876/1893, Pike 1943, Hooper 1976, Vennemann 1988, Zec 1988, 2007, Clements 1990, Blevins 1995, Prince & Smolensky 1993, Morén 2001, Baertsch 2002, Davis & Baertsch 2011). We would thus have expected languages with only liquids in the coda or in the nucleus to outnumber those with only nasals, or for nasals in coda to imply liquids, yet this is not supported by our database.

On the basis of our data we conclude that nasals are "opportunistic", preferably surfaing as low sonority segments in onsets and preferably surfacing as high sonority segments in codas and nuclei. If we want to maintain the sonority hierarchy and the associated principles governing phonotactic patterns the hierarchy has to be revised with nasals taking two positions, one below and one above liquids, depending on the syllable constituent they are associated with.

Vowels > Nasal vocoids > Liquids > Nasal stops > Obstruents

How far can a tone spread? On mutually-feeding iterativity

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A number of tonal spreading processes are found to be sensitive to phrase boundaries in Copperbelt Bemba: (i) Unbounded High Spreading, (ii) Bounded High Spreading and (iii) Inter-word H Doubling. Of these, Unbounded Spreading most clearly diagnoses phonological phrase boundaries. Specifically, the rightmost lexical H in a word will undergo unbounded spreading if that word is phonological phrase-final (1a), but will undergo bounded spreading if another word follows in the same p-phrase (1b). (Lexical Hs are in bold and underlined. Phrasing indicated by brackets).

(1a) (b**<u>á</u>**-ká-lóóndólól-á)$_{PP}$ 'they will explain'
(1b) (b**<u>á</u>**-ká-lóòndòlòl-à s**<u>á</u>**àn**<u>á</u>**)$_{PP}$ 'they will explain a lot'

This talk aims to illustrate a case of mutually-feeding iterativity in phrasal phonology where a single High tone in an initial phonological phrase can surface on each lexically toneless syllable of subsequent phonological phrases in cases of multiple complementation. Mutually-feeding iterative H spreading only occurs across a series of single-word phonological phrases. Thus compare (2a) where it applies to (2b) where it does not.

(2a) (Verb-Object Pronoun) (Object) (Object) (Adverb)
(b**<u>á</u>**-ká-mú-shíík-íl-á) (Chítúúndú) (cáángá) (bwíínó)
'they will bury the bush-baby for Chitundu well'
(2b) (b**<u>á</u>**-ká-shíìk-ìl-à Chìtùùndù) (càààngà) (bwììnò)

A rule-based approach is forced to analyse the long-distance spreading patterns as involving mutually-feeding iterative rule interaction with an interleaving of Unbounded Spreading and Inter-Word H Doubling which spreads a H from a word-final mora to the initial mora of the next word. A single rule that spreads the lexical H from the first word to the last word will not suffice because spreading is sensitive to phrasing and does not apply if the initial p-phrase consists of more than one word (2b); bounded spreading applies instead.

We offer an analysis that captures the spirit of earlier domain juncture rules (Selkirk 1984) in an approach in which constraints cannot be defined across separate domains. We modify Crisp Edge from Ito & Mester (1999), Selkirk (2011) and define this together with a new constraint (Inter-Word H Spread) as families of constraints that individually reference a single domain. *INTER-WORD HL applies at the intonational phrase level and penalizes sequences of words *within* an intonational phrase with a HL juncture. CRISP EDGE in this case insists that a H tone not be shared across a prosodic word – demanding instead that it be crisply aligned with a single edge of a word – as long as the words occur *within* a phonological phrase. With these constraints in the ranking *BIN HTS ≫ *H ≫ *I-W HL$_{IP}$ ≫ CRISP E$_{PP}$ ≫ *P-FIN L we capture the main intuition of the data, namely that the language restricts unbounded spreading between two words in the same phonological phrase but allows it between two words in different phonological phrases i.e. the words allowing unbounded spreading must be contained in an intonational phrase.

The talk thus highlights domain internal markedness in that, counter-intuitively, lower domains in the prosodic hierarchy (phonological phrases) are more restrictive in the markedness they permit – they are less permissive of cross-boundary tone violations – than domains higher in the hierarchy (intonational phrases) where such violations are no longer detrimental.

On the phonological translation of the morphological right boundary "#"

Nicola Lampitelli & Xiaoliang Luo (LLL/U. Tours & U. Orléans)

Intro. One of the most interesting topics dealt with by current interface theories is how the morphosyntactic information is translated into phonology (Scheer 2011). This paper participates in this debate: we focus on the right boundary of words "#" of two languages, Italian and Mandarin Chinese (MC). We argue for the existence of a final CV unit (Lowenstamm 1996, 1999; Scheer 2004): this unit - a phonological object - underlies any word of both Italian and MC and is enforced by a general morphological requirement on well-formedness.

Italian. Italian nouns display overt inflection if and only if (i) they end in vowel; (ii) the final vowel is unstressed; (iii) the final vowel in the sg. is *-o* (*top-o* M.sg/*top-i* M.pl 'mouse'), *-a* (*ros-a* F.sg/*ros-e* F.pl 'rose') or *-e* (*can-e* M.sg/*can-i* M.pl 'dog' and *nav-e* F.sg/*nav-i* F.pl 'boat'). At first glance, one would suggest that the final vowel enforces a phonological well-formedness requirement (e.g. no final empty nuclei) to the effect that no noun remains consonant-final. But this is not true: (a) consonant-final nouns exist, cf. *top, film, etc..*; (b) if the final vowel were an epenthetic vowel, we'd expect only one and not four different ones; (c) some final-hiatus words exist (cf. *mare-a* 'tide'), there'd be no need for an extra V. Following Afuta (2002) and Charette (2006), we propose that the final vowel is associated to a root-external final CV unit (CV_{FIN}). Thus, the majority of roots are consonant-final and the final consonant is floating:

(1) a. t o p o [M.sg] — $CV+CV_{FIN}$ b. t o p i [M.pl] — $CV+CV_{FIN}$ c. t o p — CVCV d. n u c l e o [M.sg] — $CVCVCV+CV_{FIN}$

The different representations in (1a) and (1c) predict that *topo* and *top* behave differently when suffixed. For instance, in the case of DIM *-in(o)*, *top* displays the gemination of radical /p/, whereas *topo* does not:

(2) a. t o p i n o [M.sg] — $CV+CV[CV_{FIN}]$ 'small mouse' b. t o p i n o [M.sg] — $CVCV+CV[CV_{FIN}]$ 'small bra'

MC. The behavior of tones, especially the third tone (T3) [B.H], reveals the presence of the final CV: in monosyllabic words or in the final syllable of plurisyllabic words, T3 has two possible realizations (complete or incomplete). These are shown, respectively, in (3a) and (3b). In contrast, in non-final positions, the T3 is truncated and can only be incomplete (3c). In other words, in (3c) the floating H (underlined) cannot be realized. Finally, the comparison between (3d) and (3e) shows that the perfective morpheme *lə* suffixed to a T3 lexical unit (cf. 3e) receives the floating H tone of the T3. In (3d), the realization of H tone is optional:

(3)
a. L H — $CV+CV_{FIN}$ — ma 'horse'
b. L H — $CV+CV_{FIN}$ — ma 'horse'
c. L<u>H</u> HL — $CVCV+CV_{FIN}$ — m a l u horse-road 'highway'
d. L H — $CV+CV_{FIN}$ — ts o 'to go'
e. L H — $CV+CV_{FIN}$ — ts o l ə go-PERF 'went'

Minimal structure. The minimal size of a well-formed noun or verb in Italian and MC consists of a root followed by CV_{FIN}. More precisely, CV_{FIN} translates the right boundary of words and spells out the category-defining head, e.g. *n*, *v* (and *a*). The minimal templates of, respectively, a noun and a verb have the following structures (cf. Embick 2010 among others):

(4) a. $[[[\surd \quad n]_{nP} \quad num]_{numP} \quad D]_{DP}$ — CV.. CV_{FIN} (CV) (CV)
b. $[[[\surd \quad v]_{vP} \quad T]_{TP} \quad Asp]_{AspP}$ — CV.. CV_{FIN} (CV) (CV)

The realization of CV_{FIN} depends on language-specific parameters on the exponence of each functional morpheme.

Polish stress revisited: phonetic evidence of an iterative system

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Polish stress is considered a classic example of a bidirectional trochaic system with internal lapses in odd-parity words, e.g. *ˌprenumeˈrata* 'subscription' – *ˌprenuˌmeroˈwany* 'subscribed' nom.sg. – *ˌprenuˌmerowaˈnego* 'subscribed' gen.sg. It is classified as such both in traditional descriptions, based on early empirical research (Dłuska 1932, 1974), as well as theoretically oriented analyses (Halle & Vergnaud 1984; Rubach & Booij 1985; Franks 1985; Hammond 1989; Kraska-Szlenk 2003). However, its iterative nature was questioned in Newlin-Łukowicz's (2012) acoustic study, in which only one level of prominence, main stress on the penult, was detected. As a mater of fact, some prominence in word-initial position was also reported, but it was interpreted as a word-edge effect, unconnected to stress. The main argument was the apparent absence of clear acoustic markers of tertiary stress (word-internal subsidiary stress) in six-syllable words.

This conclusion has far reaching typological and theoretical implications: it puts into question the existence of bidirectional stress systems and, what follows, the adequacy of phonological tools designed to account for such systems. However, there are several reasons why the validity of the acoustic results on which the conclusion is based can be doubted. First, although linguistic stress is a relative category, the statistics were not based on dependent measures of acoustic parameters (F0, intensity, and duration) that make comparison across speakers and tokens possible. (One of the problems is that segments and syllables in longer words tend to be produced at a higher rate.) Second, focusing on vowel parameters might have hindered detection of a pattern which, according to an early empirical study of Dłuska (1932), hinges mostly on onset consonant duration. Third, the Polish rhythmic pattern is described as optional, which, if combined with the problems mentioned above, makes its detection even more difficult.

This paper reports on an acoustic study of paired five- and six-syllable words (e.g. *ˌpomidoˈrowy* 'tomato' Adj. nom. sg. – *ˌpomiˌdoroˈwego* 'tomato' Adj. gen. sg.), collected from 10 native speakers of Polish, living in Warsaw, in a word-list reading task. The list consisted of 68 words, randomized for all speakers to avoid order effects. The results indicate that the words differ significantly with respect to relative consonant duration (expressed as PVI; e.g. Low et al. 2000; Ballard et al. 2010, 2012; Arciuli et al. 2014) in the onset of the third syllable, depending on whether the syllable bears tertiary stress (as in six-syllable words) or remains unstressed (as in five-syllable words). A paired *t*-test shows that the consonant is significantly longer with respect to the preceding vowel in six-syllable words. This relative lengthening is often, but not always, a combined effect of lengthening of the consonant and shortening of the preceding vowel. Importantly, no such effect is detected in the onset of the second syllable which remains constantly unstressed. Thus, I conclude that Polish has iterative stress, with the third degree of prominence manifested acoustically by a decreased PVI value across the heterosyllabic -V.C- sequence. This makes the argument against bidirectional systems invalid. Also, the reanalysis of the Polish metrical system in terms of the undominated *FtFt constraint, proposed in Newlin-Łukowicz's study, cannot be correct. Needless to say, a more complete acoustic description of the lower degrees of stress in Polish and other bidirectional systems is still in order.

Implicit and explicit processes in phonological learning

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Research on non-linguistic pattern learning has found evidence for distinct implicit and explicit processes which have different computational architectures, are facilitated by different task conditions, and differ in sensitivity to specific pattern types. This study presents evidence that both systems are available for phonological pattern learning ("artificial language" experiments) as well, and that their use depends on both the experimental procedure and on the target phonological pattern.

Exp. 1: Both systems are used in phonological learning: In non-linguistic pattern learning, the implicit system learns gradually and unconsciously, and is modeled as incremental updating of weights on property detectors, while the explicit system can improve abruptly, learns consciously, and is modeled as serial hypothesis testing (akin to constraint-based vs. rule-based grammar models). P(articipants) are more likely to use the explicit system when they are trained with right/wrong feedback, when they are asked to look for a rule, and when the stimulus properties are easy to verbalize (Love, 2002; Kurtz et al., 2013). Exp. 1 aimed to elicit implicit and explicit learning using these manipulations.

Ps were asked to learn words in an invented foreign language. *Methods*: For each P ($N = 288$, L1=English), a unique set of 64 spoken nonce words was chosen that conformed to a pattern defined by one of 6 phonological properties (e.g., being trisyllabic), and 64 non-conforming words. Ps in Condition A were trained to choose 32 conforming rather than 32 nonconforming words as names for 32 pictured objects; they were told that finding a rule would help, and they got right/wrong feedback after every trial. Ps in Condition B simply saw each picture with its (conforming) name; they were asked not to seek a rule, and got no feedback. Ps in both conditions then did 32 test trials. On each, a new picture was presented with two new words, one conforming, one not, and Ps were asked to guess the name for the picture. No feedback was given. Ps then did a debriefing questionnaire. *Results*: Ps in Condition A were significantly more likely to report rule use, and to name the right property, than those in B. In A, only rule-users were significantly above chance on the test, whereas in B, both the user and non-user groups were. (χ^2 and mixed logit statistics omitted for space; largest significant p-value was 0.0136.) Rule-users learned more abruptly. Conclusion: A favored explicit rule learning, while B favored implicit learning.

Exp. 2: Different sensitivity to different patterns: In non-linguistic studies, the implicit system learns patterns with a family-resemblance structure (e.g., "at least 2 of: red, big, square") better than those with an exclusive-or (XOR) structure (e.g., "red XOR big"); the explicit system does the reverse (Ashby et al., 1998; Love, 2002; Smith et al., 2012). Exp. 2 added such patterns using the same phonological properties as in Exp. 1. *Results*: No one (of 185 Ps) stated a correct rule for either pattern type, and test performance was significantly better for the family pattern than the XOR in both A and B. Thus,

Discussion: Implicit and explicit processes are available in phonological learning and are sensitive to different patterns, just as in non-linguistic learning. This has implications for "artificial-language" experiments; e.g., do the systems differ in sensitivity to "phonetic naturalness"? It has broader implications for learning-model architectures (rule-based vs. constraint-based), for connections with explicit and implicit processes in real-world L2 morphosyntactic acquisition (Lichtman, 2012), and for commonalities between linguistic and non-linguistic learning processes.

Harmony as Iterative Domain Parsing

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Iterative Domain Parsing (IDP) is a new theory of vowel and consonant harmony that combines a Harmony Domain theory of representation (Cole & Kisseberth 1995, Smolensky 2006) with the Harmonic Serialist theory of computation (Prince & Smolensky 1993/2004, McCarthy 2006 *et seq.*). Featural domains are constructed by a small set of operations, whose application is controlled by a set of violable constraints. We show how IDP generates a range of attested patterns of spreading and blocking through constraint interaction. We also show that IDP avoids the 'licensing by spreading' problem raised by Wilson (2013) for McCarthy's (2011) Share constraint.

IDP assumes two widely used operations (see *e.g.* Pater's 2012 serial approach to syllable structure). Head Projection creates a domain consisting of one element as the head, while Dependent Adjunction adds an element to an existing domain as an adjunct. For example, in creating a domain for monovalent [nasal], the first step would be to establish the domain (shown with parentheses) with a head (shown with capitalization). The second step would add a (tier-)adjacent element to the domain, here a vowel that would be realized as nasalized as shown in (1).

(1) /ama/ → a(M)a → (ãM)a

We adopt Mullin's (2011) *Dependent-(Left/Right) constraints, which penalize adding a dependent to either the left or the right of the head: (ãM)a violates *Dp-L. That constraint must be ranked beneath all constraints better satisfied by competing representations (or have sufficiently low weight) if (ãM)a is to be chosen as the second step in the derivation. For example, *Dp-L must have a lower rank or weight than *Dp-R to eliminate the alternative of a(Mã), with rightward instead of leftward spreading (putting aside any other constraints preferring (ãM)a). As Mullin (2011) shows, the interaction of these constraints with other constraints banning particular Head-Dependent relations produces an interestingly rich and restrictive set of spreading patterns. Like Mullin (2011), we provide typologies generated with an implementation of our operation and constraint set in OT-Help (Staubs *et al.* 2010).

Mullin (2011) incorporates McCarthy's (2011) Share constraint as the motivator for harmony. Inspection of the typologies produced with that constraint show that it produces a pattern we call licensing by spreading, noted by Wilson (2011) as a problem for Share. In licensing by spreading, a marked feature is deleted, except when it can spread, and thus satisfy Share. For example, nasal vowels can be banned, except when they can spread onto an adjacent segment with the ranking Share » *Nasal-Vowel » Ident. This would predict a language in which nasal vowels never occur in isolation (*e.g* *[ã]), but can occur in sequences (✓[ãã]). When we add co-occurrence constraints, we get patterns in which instead of simply failing to spread onto the blocker, the marked feature deletes, somewhat reminiscent of the sour grapes problem (Wilson 2000 diss., McCarthy 2011). To our knowledge, this sort of pattern is unattested. Note that is different from attested 'spreading to license' patterns in which features spread into a licensing position, such as word edge or stressed syllable: here spreading into any position blocks marked feature loss. IDP does not generate this pattern because the first step is Head Projection, rather than spreading. Thus, Parse, which motivates domain construction, will prefer faithful parsing both on potential heads in isolation as well as those adjacent to a potential dependent. Share is just one of a number of constraints that generates licensing by spreading – the absence of this pattern, and its non-generation by IDP, should thus be of broad interest.

McCarthy (2011): Autosegmental spreading in Optimality Theory. • Mullin (2011): Strength in Harmony Systems: Trigger and Directional Asymmetries. • Pater (2012): Serial Harmonic Grammar and Berber Syllabification. • Wilson (2011): A Targeted Spreading Imperative for Nasal Place Assimilation.

The potential for expressing contrasts is greater in structural complements than in structural heads

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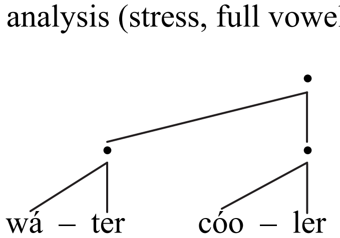
This paper argues for an alternative understanding of the notion of head-dependency. Traditionally, heads are seen as having a more central role than dependents in linguistic structure. Here, however, we propose a different view in which heads are important in structural terms but relatively unimportant for conveying linguistic information. Conversely, we claim that the main function of non-head categories is informational rather than structural.

Linguistic objects are represented using hierarchical structures in which categories combine via asymmetric relations comprising an obligatory head category and an optional dependent (e.g. complement), e.g. in morpho-syntactic structure a verb can take a noun phrase complement (*I drank wine*) while an adjective can be derived from a verb by affixing a complement (*drinkable*). Head-dependency is basic to phonological structure too. Iambic and trochaic feet are formed by combining a head syllable with a complement syllable, while in syllable-internal structure the 'coda' constituent is taken by some to be a complement of the syllable rhyme. In Dependency Phonology and its offshoots, head-dependency relations even operate in segment-internal structure to control the way melodic features combine.

As these examples show, head-dependent relations are integral to various components of the grammar. Moreover, at these different grammatical levels the main characteristics of heads and complements are fairly consistent. For example, heads are structurally necessary whereas complements are usually optional. And the properties of a head project up to the next structural level whereas those of a complement do not. In another sense, however, this consistency falters when we compare heads and complements in morpho-syntax with those in phonology. Heads in syntax (e.g. verbs, nouns, determiners) are often weak or recessive, in that their content is predictable or of low informational value. For instance, in *I drank wine* the verb *drank* is largely predictable from its complement *wine*, and in the determiner phrase *the people* the determiner *the* carries no lexical information. By contrast, heads in phonology have inherent strength or prominence and tend to be rich in information, e.g. the head of a foot may be stressed, or otherwise, may support a wide range of segmental contrasts.

To avoid this inconsistency, we propose that phonological structure be re-interpreted so that, to achieve a parallel with syntax, head categories are naturally weak (and linguistically impoverished) whereas complements are strong (and linguistically rich). So in the word *water* [ˈwɔːtə], for example, the traditional left-headed (trochaic) structure is recast as right-headed (iambic), consisting of a complement *wa–* [ˈwɔː] and a head *–ter* [tə]. As a head, [tə] is segmentally weak with a reduced vowel [ə] and an unaspirated/weakened stop [t]/[ɾ]. Yet it is structurally strong, sanctioning a complement *wa–* and projecting to the next level, as in (1). In contrast, the complement *wa–* [ˈwɔː] is segmentally rich (lexical stress, full vowel) but structurally recessive. The complement [ˈk^{h}uː] in *cooler* [ˈk^{h}uːlə] receives a similar analysis (stress, full vowel, aspirated stop).

(1)



On this basis we propose the generalisation that heads in phonology are, like those in morpho-syntax, necessary for structural well-formedness but relatively unimportant in terms of the linguistic (e.g. lexical) information they support. Our paper considers the consequences of this proposal for phonological representations.

Learning as a window on lexical versus grammatical representation of stress

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The proper division of labor between lexicon and grammar is a long-standing question in generative phonology (Chomsky & Halle 1968; McCarthy 1981; Tesar 2013). This question has been extensively studied for segmental phonology (Chomsky & Halle 1968, McCarthy 2005), but has received much less attention in the domain of stress (Tesar et al. 2002, Tesar 2006).

Yang's (2005, 2011) theory states that it is only the number of exceptions to a rule, relative to the total number of items to which the rule applies, that matters for a rule's being represented in the grammar. However, I argue that a potentially more insightful model of lexical versus grammatical representation of stress emerges from considering a fuller picture of learning stress patterns.

If the class of syllables that are heavy is language-specific (Hayes 1995, Gordon 1999), then at least some aspects of syllable weight must be inferred from the inconsistent distance between word edge and stress present in QS languages – and inconsistent distance between word edge and stress is also an attribute of lexical stress. This means that, as long as syllable weight has not yet been fully established, quantity-sensitive grammatical stress and lexical stress are competing explanations for the same data. In fact, this competition is even seen in linguistic analyses: what is usually seen as QS stress in Dutch (van der Hulst 1984) has also been proposed to be a lexical pattern (van Oostendorp 2012).

This competition can be modeled by treating syllable weight as a hidden variable (Tesar & Smolensky 2000) in learning, rather than as one that is immediately observable in outputs (as done by Tesar & Smolensky 2000; Jarosz 2013 and work cited there). By letting faithfulness interact with quantity-sensitivity, predictions can be made about the lexical or grammatical representation of a given stress system. To illustrate these predictions, I constructed a range of toy languages with the inventory /t, a, i/, CV syllable structure, and only three-syllable words. At one end of the spectrum, there is a QS stress language ((1)), with penult stress if the penult is heavy, and antepenult stress otherwise ([ta] counts as heavy). At the other end, there is a language with unpredictable stress ((2)).

(1) *QS stress (QSS) language: Latin stress pattern with [ta] as heavy*

ta.(ˈta).ta ta.(ˈta).ti (ˈta.ti).ta (ˈta.ti).ti ti.(ˈta).ta ti.(ˈta).ti (ˈti.ti).ta (ˈti.ti).ti

(2) *Lexical stress (LXS) language: forms inconsistent with Latin stress given in boldface*

ta.ˈta.ta **ˈta.ta.ti** **ta.ˈti.ta** ˈta.ti.ti **ˈti.ta.ta** ti.ˈta.ti ˈti.ti.ta **ti.ˈti.ti**

There are also 14 intermediate languages: versions of (1) with 1, 2, or 3 exceptional (boldface) forms taken from (2). These 16 languages were learned in a batch-style Maximum Entropy learner with hidden structure (Pater et al. 2012). The hidden structure included both footing and syllable weight. The simplifying assumption was made that all observed surface stress patterns are stored in underlying representations (URs) (see Pater et al. 2012, a.o., for a model of learning URs).

Prince & Smolensky's (1993) analysis of Latin stress was taken as a base, to which I added Ident-Stress, and constraints regulating Heavy/Light labels. Weights for these constraints were learned[1], and the resulting grammars were given a Richness-of-the-Base (Prince & Smolensky 1993) test on URs with underlying stress in places not encountered in the data. The results are summarized in (3).

(3) QSS	QSS w/ 1 exception	QSS w/ 2 exceptions	QSS w/ 3 exceptions	LXS
QS stress; no effects of UR stress	QS stress with limited lexical effects: 3 lgs Lexical stress: 1 lg	QS stress with limited lexical effects: 4 lgs Lexical stress: 2 lgs	**QI** stress with limited lexical effects: 1 lg Lexical stress: 3 lgs	Lexical stress (UR stress always preserved)

Languages with more exceptions are more likely to be learned as a lexical stress language, and QS systems are not learned beyond 2 exceptions. However, both lexical and grammatical stress are found for every number of exceptions. Thus, predictions of lexical or grammatical stress depending on the particular kind of exceptions, not just their number, emerge from an account that takes a fuller view of stress learning. If scaled up, this approach could be applied to a language like Dutch to assess the plausibility of the lexical and/or grammatical status of its stress pattern.

1 Learning was done with L2 regularization (variance = 100,000), and a Markedness-over-Faithfulness bias (Smolensky 1996) penalizing the objective function by .035 x the cumulative weight of Faithfulness. Initial weights were set to 10.

As Easy as A → B → C? Domain Restrictions on Synchronic Chain Shifts

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Competing descriptions of linguistic phenomena are driven not just by differing opinions on how specific processes should be represented, but also by deeper assumptions about the nature of the phonological grammar. An example comes from the opposing methods of modelling synchronic chain shift, in which an underlying form A surfaces as B in a particular context, whilst in the same context underlying B surfaces as a separate form, C. Different theories require differently oriented grammars. Whilst most theorists are agreed that an A → B → C mapping in the same environment is a minimum requirement for considering a process to be a chain shift, the precise nature of A, B, and C is open to interpretation.

Certain theorists state that chain shift should be restricted to the domain of the segment. For example, McCarthy (1999, p.364) describes chain shifts as 'counterfeeding-on-focus', separate to 'counterfeeding-on-environment' processes that involve multiple segments. In other analyses (e.g., Moreton & Smolensky 2002 (M&S), Łubowicz 2011), processes that involve segment sequences are also described as chain shifts. These competing ideas not only predict different kinds of possible chain shift, but also reflect different assumptions about the size of the domain to which the grammar can refer. I argue that many putative shifts that involve segment sequences do not actually form a coherent A → B → C chain, offering support to the idea of tighter domain restrictions.

M&S provide the following schematic for an interaction between cluster reduction and nasal harmony in Sea Dayak (analyzed in Scott 1957, Kenstowicz & Kisseberth 1979, Łubowicz 2011): /ŋga/ → /ŋa/ → /ŋã/. This A → B → C mapping is suspect for several reasons. First, the A form contains more segments than the B or C forms. Additionally, all forms include a segment, /ŋ/, that is a trigger for both processes, rather than an undergoer of either process. Finally, in the A form, the vowel /a/ is irrelevant to the cluster deletion process. If these non-alternating segments are removed from the schematic, any argument for an A → B → C mapping disappears: /g/ → [∅], /a/ → [ã]. This can be contrasted with M&S's schematic of a vowel raising effect in Nzɛbi, with the form: /a/ → /ɛ/ → /e/ → /i/. Despite there being a specific, consistent set of triggers for this effect, no information about the environment is included in the mapping schematic.

I have analyzed a sample of 66 putative synchronic shifts (based primarily on Moreton's 2004 collection) and found, after disregarding examples that have been miscategorized in other ways, no genuine A → B → C mappings that involve sequences of segments. Either the potential A → B → C mappings can be reanalyzed as only having a domain of one segment if environmental information is removed from the schematic, or the undergoer of the A → B process is part of the environment for the B → C process. This means that the A → B and B → C mappings have different environments, thus there is no coherent A → B → C mapping. This suggests that the set of synchronic chain shifts is smaller, and less diverse, than has previously been suggested. Narrowing this set is beneficial, as it means that theories of chain shift, predicated on explaining the lack of an A → C mapping, do not have to be powerful enough to account for effects that have a wider domain than the segment.

Vowel reduction: Sawing off the branch you're sitting on

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Problem. Eastern Catalan (EC; Wheeler 2005) and Brazilian Portuguese (BP; da Silva 1992) have seemingly identical 7-vowel systems, which, however, reduce differently in unstressed position (1). Within Government Phonology (GP; Kaye, Lowenstamm & Vergnaud 1985, 1990), vowel reduction is understood as the loss of elements in unstressed position (Harris 1997, Harris & Lindsey 1995, 2000). But while the BP merger of [e], where the element **I** is head and **A** non-head, i.e. **({A}I̲)**, with [i], where the sole element **I** is head, i.e. **({}I̲)**, can be modelled as the loss of **A**, it is unclear how a merger of BP [e/ɛ] as [e] is effected. Two interpretations are conceivable for [ɛ], **({I}A̲)** or **({I,A}_)**, the latter having no head. In order to go from one of the those two possibilities to [e], i.e. **({A}I̲)**, a rearrangement of elements is necessary, but no element is lost. **Problem 1 (P1):** Why do loss of an element and rearrangement of elements both "count" as the same, i.e. as reduction? Furthermore (**P2**), it is not clear why BP [e]/[ɛ] would merge as [e] and not as [ɛ] (a different rearrangement), also a problem in Italian or Slovenian. Lastly (**P3**), why do BP [i]/[e]/[ɛ] merge as [i] in parallel to [u]/[o]/[ɔ] as [u], while EC has an asymmetry with [e]/[ɛ] going to [ə] but [o]/[ɔ] going to [u]? This presentation tries to address all three problems in one fell swoop.

Proposal. Building on GP 2.0 (Pöchtrager 2006, Živanovič & Pöchtrager 2010, Pöchtrager & Kaye 2011), in particular the idea that old **A** is reinterpreted as more (empty) structure (Pöchtrager 2010), I argue for the following internal structure of vowels: [ɨ], GP's empty nucleus, is a simple nuclear head xN. [i/u/ə] involve an adjunction to the head with **I** [i], **U** [u] or nothing [ə]. [e/o/a] involve an additional projection up to N', [ɛ/ɔ] yet a further projection to N''. (The lack of a third vowel is yet unclear.) (2) illustrates this for [u/o/ɔ]. Roughly, the more open a vowel, the more empty structure there is. Reduction can now be uniformly expressed as the loss of structure: BP [ɔ] to [o] involves the loss of N'', [o] to [u] that of N'. EC simply combines both steps. **P1** and **P2** are solved. **P3** can be tackled in the following way: Assume that **I** sits high up in EC (3), while **I** sits in a lower position in BP (4). **U** is low in both languages. If tree pruning starts from the top, then EC **I** will be lost immediately, as the branch it sits on is cut off first. BP **I**, being low, is safe, as is **U** in both EC and BP. We derive the asymmetry in reduction patterns. Further evidence for the low position of **I** in BP comes from alveolar palatalisation (absent from EC, alas): BP [t/d] go to [tʃ/dʒ] before [i], but not before [e/ɛ]. All three vowels contain **I**, but in [e/ɛ] it is buried deep in the structure and thus has no effect on what precedes. **I** in [i] is not shielded off by structure in the same way.

Further issues. The microvariation between EC and BP is only a start, but the proposal leads further: **1.** Lowenstamm (1996) claims that in the templatic language Chaha [ə] acts as the smaller version of [a]. This follows as a corollary from my proposal. **2.** (Old) **A** (here: structure) has been claimed to underlie alveolars, too (Broadbent 1991). Thus, alveolars are bigger, explaining why *d/t* are lenited (tapping) in English rather than velars/labials. **3.** This also raises the more general question whether *all* lenitions are about structure. In GP 2.0, **A** is replaced by structure, but so are the old elements **ʔ** (stop) and **H** (voicelessness). Certainly stopness is a lenition target (Spanish, Catalan, Danish) and so is voicelessness (Danish).

(1)

<table>
<tr><td>tonic</td><td>i</td><td>e</td><td>ɛ</td><td>a</td><td>ɔ</td><td>o</td><td>u</td></tr>
<tr><td colspan="8">Brazilian Portuguese</td></tr>
<tr><td>pre-tonic</td><td>i</td><td colspan="2">e</td><td>a</td><td colspan="2">o</td><td>u</td></tr>
<tr><td>post-tonic/ final</td><td colspan="3">i</td><td>ə</td><td colspan="3">u</td></tr>
<tr><td colspan="8">Eastern Catalan</td></tr>
<tr><td>atonic</td><td>i</td><td colspan="3">ə</td><td colspan="3">u</td></tr>
</table>

(2) (3) (4)

```
[u]        [o]        [ɔ]        EC [ɛ]         BP [ɛ]
                        N"           N"              N"
                       / \          / \             / \
           N'         N'  x        N'  x           N'  x
          / \        / \          / \  I          / \
 xN      xN  x      xN  x        xN  x           xN  x
 / \     / \        / \          / \             / \
xN  x   xN  x      xN  x        xN  x           xN  x
 U       U          U                             I
```

Capturing German *–ig*-alternations in a monostratal lexicon

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In some German nouns final unstressed /ɪç/ varies phonemically with /ɪk/ and alternates with /ig/ before vowel-initial suffixes (1a), while non-varying /ɪç/ and /ɪk/ do not alternate (1b,c):

(1)a.	/kǿn**ɪç**/ ~ /kǿn**ɪk**/	<König>	'king'	/kǿn**ig**ə/ 'kings'
b.	/kʀɑ́n**ɪç**/	<Kranich>	'crane'	/kʀɑ́n**ɪç**ə/ 'cranes'
c.	/plást**ɪk**/	<Plastik>	'sculpture'	/plást**ɪk**ən/ 'sculptures'

The gist of the generative rule-based analysis of the data in (1) is depicted in (2). Positing a voiced velar in UR for the stem-final obstruent in (1a), in contrast to (1b,c), along with ordering an (optional) spirantization rule applying after /ɪ/ before coda devoicing is said to account for the alternations (Wurzel 1970, Hall 1992, Buckler & Bermúdez-Otero (2012), Bermúdez-Otero (2014)). ([ç]-[x] allophony is ignored here, ‚EW' = ‚elsewhere')

(2) (1a) (1b) (1c)
UR [+voice] [-voice] [-voice]
/ \ [+cont] [-cont]
Stem level: /ɣ/ (/ɪ/-) /g/ (EW) | |
/ \ / \ | |
word level: /ç/ (coda) /g/ (EW) /k/ (coda) /g/ (EW) /ç/ /k/

The analysis in (2) is meant to demonstrate the natural emergence of the output alternations in (1) from an independent system of rules/constraints, which, crucially, indicate a specific ordering or stratal organization of grammar. The problem is that the relevant alternations are in fact isolated, restricted to words ending in unstressed /ɪç/ ~ /ɪk/ as in (1a). This holds for spirantization, a rule, which yields a segment which never surfaces in German (/ɣ/), makes little phonological sense, and nonetheless thrives (/kǿnɪç/ is gaining ground vis-à-vis /kǿnɪk/ (Kleiner 2010)). (1a) also illustrates the only stable vocalic tenseness alternation in German, where markedness constraints against tense vowels in closed syllables and against lax vowels in open syllables are active in simplexes, but violated to yield uniform stems (open syllable tenseness in *Kil*/o/, hence plural *Kil*/o/*s* (cf. simplex *Gyr*/ɔ/*s*); closed syllable laxness in *Bl*/ɔ/*ck*, hence *bl*/ɔ/*kieren* cf. simplex *m*/o/*kieren*). (1a) finally illustrates the only voicing alternation involving a true word-final coda obstruent (i.e. one preceded by a lax vowel) in German. (e.g *Fóku*/s/ - *foku*/s/*ieren*, *Fóku*/s/ - **foku*/z/*ieren* is not a possible alternation).

In OT, such complete absence of surface alternation indicates dominant OO-correspondence, raising the question of what exempts the ending in (1a). My analysis crucially refers to its classification as an affix, which is motivated by the very idiosyncrasy detailed above. Recurring irregular alternations per se motivate morpheme status (Aronoff 1976:15): /mɪt/ is a morpheme in *permit*, *admit* but not in *vomit*, by virtue of /mɪt/ - /mɪs/ (*permissive, admissory, vomitive*). Similarly, /ɪç/ is a suffix in /kǿnɪç/, not in /kʀɑ́nɪç/, by virtue of isolated /ɪç/ - /ig/. The validity of this criterion is supported by independent evidence (to be discussed) for the suffix-status of final /ɪç/~/ɪk/ across categories. Excluding affixes from OO-correspondence is supported by other data. The restriction of rounded front vowels to prominent position in German (/ɔpstˢǿn/ ‚obscene', /nɛʀv-ǿz/ ‚nervous') is ‚transfered' to non-prominent positions only in related stems, not in suffixes (/ɔpstˢøn-itét/,/nɛʀv-os-itét/).

The alternation in (1) has ist source in the necessary coda association of consonants not followed by a nucleus in the base forms. The coda association brings undominated markedness constraints into play, restricting dorsal obstruent phonemes to /ç/ and /k/ and restricting preceding front vowels in unstressed syllables to /ɪ/. The lack of alternation in (1b,c) is due to lower-ranking complete IO-FAITH to the dorsals in question. Both the variation and the alternation in (1a) are due to the fact that for input /Xig/ complete IO-FAITH is ruled out. The choice among the remaining candidates {/Xɪç/, /Xɪk/} is due to variable ordering of the still lower-ranked markedness constraint prohibiting *[-back][+back], which eliminates /Xɪk/, with respect to IO-FAITH([±continuant]), which eliminates /Xɪç/.

Underspecification and voicing: sibilant sandhi in European Portuguese

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In this talk, we propose that Portuguese contrasts sibilants specified as [spread glottis] ([sg] hereafter) with sibilants underspecified for laryngeal features. Traditional descriptions assume that Portuguese has all the phonetic hallmarks of a *true voice* language: this has motivated analyses of obstruent voicing contrasts based on [±voice]. Regarding the sibilants, /s, z, ʃ, ʒ/ occur freely in onset position (1a–d below), but place and voicing contrasts are suspended in coda position. Existing phonological accounts agree that preconsonantal coda sibilants are postalveolar and share voicing features with following consonants (1e–f & g–h). However, there has been little consensus about non-preconsonantal word-final sibilants: Portuguese has variously been argued to have only /s/ (Mateus & d'Andrade 2000), only /z/ (Herslund 1986), or only laryngeally underspecified /S/ (Cristófaro-Silva 1998) word-finally. This has consequences for analysing word-final neutralisation, as illustrated in (2), which allegedly restricts the occurrence of sibilants to [ʃ] phrase-finally and to [z] before vowel-initial words.

(1)	a. *caça* [ka.sɐ] 'hunting'	b. *casa* [ka.zɐ] 'house'	c. *caixa* [kɐj.ʃɐ] 'box'	d. *queijo* [kɐj.ʒu] 'cheese'
	e. *casca* [kaʃ.kɐ] 'shell'	f. *rasga* [ʁaʒ.gɐ] 'cheap'	g. *rapa**z** **c**ubano* [-ʃk-] 'Cuban boy'	h. *rapa**z** **g**alego* [-ʒg-] 'Galician boy'

			(Herslund)	(Mateus & d'Andrade)	(Cristófaro-Silva)
(2)	a.	*rapaz* 'boy'	/z‖/ → [ʃ]	/s‖/ → [ʃ]	/S‖/ → [ʃ]
	b.	*rapa**z** **a**lto* 'tall boy'	/-z#a-/ → [za]	/-s#a-/ → [za]	/-S#a-/ → [za]

With a view to shedding new light on the Portuguese sibilant contrasts, we conducted acoustic experiments with 10 speakers (5 female, 5 male) of Central European Portuguese. Fricative realisations in all contexts in (1–2) above were tested and analysed using multiple acoustic parameters (spectral moments, voicing ratio and intensity measurements). Our results confirm that /s/ and /ʃ/ in words like *caça* (1a) and *caixa* (1c) are never voiced. However, sibilant realisations in words like *casa* (1b) and *queijo* (1d) show characteristics of gradient passive voicing—i.e. they show overall low voicing ratio which is subject to large speaker-dependent and sex-dependent variation. We find that voicing ratio is in the range of 0.25–0.5 for female speakers whilst voicing levels for male speakers are significantly higher. Furthermore, voicing parameters are not significantly affected by positional factors: thus, *rapa**z** **a**lto* (2b) patterns with *ca**s**a* (1b).

Based on these findings, we propose a reanalysis of the Portuguese fricative system in which the crucial contrast is based on underspecification and *active devoicing* in the sense of Jansen (2004). Specifically, our results support an analysis in which the laryngeally underspecified sibilants /s$_{\varnothing}$, ʃ$_{\varnothing}$/ may undergo passive voicing in intervocalic contexts—either word-medially as in (1b,d) or across a word boundary in neutralisation context (2b). These sibilants contrast with /s, ʃ/ which are categorically specified as [sg] (Iverson & Salmons 1995; Beckman et al. 2011). Our key claim, therefore, is that contrastive specification for [sg] blocks any form of passive voicing. Moreover, *phonetic underspecification* (Keating 1988) of /s$_{\varnothing}$, ʃ$_{\varnothing}$/ for laryngeal features predicts greater amounts of passive voicing for males compared to females because of fundamental physiological differences (Jessen 2009).

In having a system of fricative contrasts based on [sg] and a system of stop contrasts based on [voice], Portuguese is the typological mirror image of a language like English. Additionally, our analysis of Portuguese supports the hypothesis that there is a close link between underspecification and the diachronic development of prevocalic voicing sandhi (Strycharczuk 2012; Bárkányi & Kiss 2012).

Underspecification of Voice Features in the Mental Larynx

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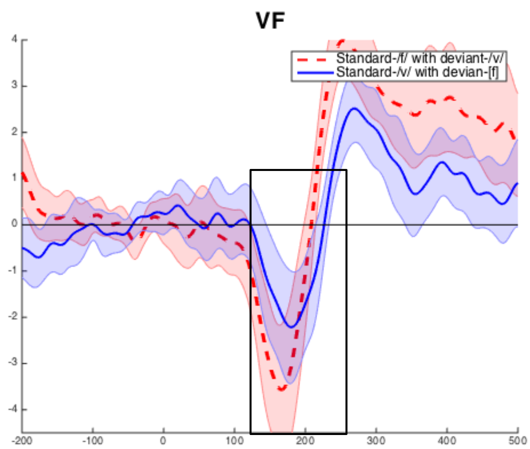
This paper investigates the specification of laryngeal features in English fricatives. Mismatch Negativity (MMN) has been used recently to investigate place features (Eulitz and Lahiri 2004) and is argued to support the Featurally Underspecified Lexicon (FUL, Lahiri and Reetz 2002, 2010) when asymmetric ERP components are detected. We investigated English laryngeal features using the fricatives /f/ and /v/, and suggest that voiced /v/ must be *underspecified* for laryngeal state much like coronals are underspecified for their place of articulation feature.

It has previously been argued that only a small number of privative features are required to account for all the possible laryngeal states (Lombardi 1994, et sqq.), such that a language with a three-way laryngeal contrast like Thai would contrast voiced, aspirated, and plain stops using only the features [SPREAD GLOTTIS] ([SG]) and [VOICE]. Using privative features of [VOICE] and [SPREAD GLOTTIS] (cf. Iverson and Salmons 1995, Honeybone 2005) predicts that in voicing languages (e.g. Spanish, Arabic) there is a contrast between [VOICE] and Ø, and in aspirating languages (e.g. English, German) the contrast is between [SG] and Ø. FUL supposes that a feature such as [VOICE] or [SG] may be specified when a contrast is present in the language, but the absence of the feature is not, in and of itself, a feature. We argue that privative features may be true at a phonological level, but there must be surface specification as well.

Using the MMN passive oddball paradigm (680 standards, 120 deviants) with a 32-channel EEG, we tested two blocks: standard-/f/ with deviant-[v] and standard-/v/ with deviant-[f] (alongside other comparisons not reported here). Each stimulus was presented without any vocalic context. Following the Laryngeal Realism, we assume /f/ will be specified for [SG] on an underlying and surface level. If /v/ is specified on the surface (but not underlyingly), we expect to see an asymmetric MMN pattern simmilar to those of [CORONAL] segments. This asymmetric pattern arises from the *mismatch* of underlying [SG] of /f/ with a surface feature such as [VOICE] on [v] in one case, and the *nomismatch* of underspecified /v/ with the surface [SG] of [f] in the reverse case. On the other hand, if /v/ is unspecified for laryngeal state at the surface, we should see a symmetrical ERP pattern because there is no feature of /v/ (surface or underlying) to clash with the [SG] of /f/. Alternately, if both are fully specified in English, we may also see a symmetrical pattern as [VOICE] and [SG] clash.

Preliminary results from 20 subjects suggest that there is an asymmetry between /f/ and /v/, such that a greater MMN is elicited when /f/ is the standard (p<.05). This asymmetry is consistent with /f/ being specified for [SG] and /v/ being lexically underspecified yet specified on the surface for a contrasting feature (such as [-SG], [VOICE], or [PLAIN]).



Difference waves with asymmetry at 190ms at Fz.

Stress-dependent height harmony in Nivkh

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A characteristic trait of many languages of Northeast Asia is retracted tongue-root harmony. Recent work has reconstructed Korean, Mongolic and Tungusic – all classified as Altaic by Poppe (1960) – with RTR harmony (Vaux 2009, Ko *et al*. 2014). Ko *et al*. argue that Nivkh, a genetic isolate of the Russian Far East, also shows vestiges of RTR harmony, which it may have inherited through contact with neighbouring Tungusic tribes (see also Comrie 1997).

While we do not rule out the possibility of a formerly active RTR feature, our data show that the synchronic co-occurrence restrictions on Nivkh vowels are better analyzed in terms of stress-dependent height harmony. (For the notion of stress-dependent harmony see Majors 1998, Barnes 2006, Delucchi 2013.) Nivkh permits each of the vowels /i ɨ u e o a/ in stressed syllables, but imposes various restrictions on vowels in unstressed syllables. Inspection of our own corpus of 305 disyllabic ($V_1 \ldots V_2$) Nivkh roots reveals a number of arguments that support a pattern of stress-dependent height harmony:

1) The three contrastive heights in the stressed V_1 position are reduced to two heights in the unstressed V_2 position. Of the two mid vowels, /e/ occurs in V_2 only sporadically and /o/ is found in V_2 primarily when V_1 is also /o/. In addition, /a/ in V_2 undergoes centralization in connected speech. Such asymmetries between stressed and unstressed vowels are not observed in Tungusic RTR harmony.
2) Nivkh diphthongs are restricted to V_1 position. Diphthongs in V_2 in loanwords are typically accommodated as monophthongs, e.g. *pʰenci* 'type of ship' (< Ainu *pencay*). Elimination of height and quantity contrasts is a characteristic property of languages with unstressed vowel reduction (Barnes 2006).
3) Nivkh has a preference for disyllabic roots with identical vowels in V_1 and V_2 (37.7% of the roots in our corpus). This preference is frequently observed in stress-dependent harmony systems (Barnes 2006).
4) An acoustic investigation (based on data collected from three Nivkh speakers) shows that the duration of unstressed vowels (in V_2) falls between 67 and 90% of the duration of stressed vowels (in V_1).

One interesting result of our analysis concerns the status of /ɨ/. Its distribution in V_1 position suggests that the vowel patterns as high (contrary to what is suggested by Ko *et al.*), since in such cases V_2 is restricted to a high vowel. However, inspection of the V_2 position suggests that previously observed cases of /ɨ/ in V_2 must in fact be re-interpreted as intrusive. There are two reasons for this. First, while /i u/ in V_2 can be preceded by all of /i ɨ u e o a/, /ɨ/ in V_2 occurs almost exclusively with a preceding /i/ or /ɨ/. Second, our corpus lacks minimal pairs of the type /$C_1VC_2C_3$ɨC_4/ ~ /$C_1VC_2C_3C_4$/ (where C_3 is a sonorant), and native speakers' spelling of the /ɨ/ in these forms is inconsistent, suggesting that the vowel is not lexical.

Experimental evidence for aggressive core-periphery phonology in Guaraní

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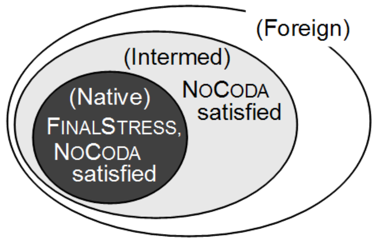
Overview. In a nonce-loanword experiment, Guaraní speakers exhibit **productive impossible-nativization effects** that provide evidence for core-periphery structure *beyond* what loanword patterns in the Guaraní lexicon would predict. The fact that Guaraní speakers induce at least some of their impossible-nativization effects in the absence of direct lexical evidence shows that not only is core-periphery structure productive, but speakers aggressively create it. Also, to our knowledge, this is the first report of experimental data on impossible nativizations.

Core-periphery phonology. Languages with loanwords may have a **stratified lexicon**, where the phonologies of Native and Foreign morpheme classes differ (Saciuk 1969). Ito & Mester (1999=I&M; 2008) argue that a stratified lexicon has a **core-periphery** structure: a core lexical stratum satisfies the most markedness constraints, and increasingly peripheral strata allow more and more of them to be violated. The Venn diagram in (1) represents a language where the core stratum (Native) forbids non-final stress and codas; an intermediate stratum allows non-final stress but still forbids codas; and the most peripheral stratum (Foreign) allows both non-final stress and codas.

(1)



I&M show that a *productive* core-periphery phonology is complex, with distinct faithfulness constraints for each stratum and limits on reranking across strata. They also propose a productivity diagnostic: **impossible nativizations**. In (1), if the core-periphery structure is productive, loans with non-final stress and a coda can never be nativized by repairing *only* the stress, because no stratum satisfies only FinalStress. (By contrast, repairing only the coda *is* possible, as in the Intermediate stratum.) I&M report (though do not verify experimentally) such impossible-nativization effects in Japanese, where alternations and morpheme combinatorics provide synchronic evidence for lexical strata. But Rice (2006) argues that apparent core-periphery structure in Norwegian is *not* productive: some morphemes have less-marked underlying forms than others, but there is no complex grammar with multiple rankings. What about **Guaraní** (G), with many Spanish loans, but potential evidence for strata coming mostly from static patterns in the lexicon? Do nativization outcomes in single-repair loans always satisfy the same constraints, showing productive impossible-nativization effects?

Experiment. We identified three markedness constraints that hold in G core phonology, but are violated in some Spanish loans: NoCoda, FinalStress, and *ComplexOnset. For each pair of constraints from this set, we created four "Spanish" nonce words that violate both, as in (2), giving 12 nonce words in all. For every nonce word, we then created two "nativizations," each satisfying just one of the two constraints. The nonce loans and their nativizations were presented orthographically (including accents for marking stress) to eight G speakers who were also bilingual in Spanish. Participants were asked to choose the nativization they preferred as a G form of each loan.

(2)	*Nonce loan:*	gól.de
	Violates:	NoCoda, FinalStress
	Nativizations:	gó.de, gol.dé

Results. Speakers were **consistent**: for each constraint pair, every speaker satisfied the same constraint at least 3/4 times in 23/24 cases (differs from chance: $p<0.001$, exact binomial test). Based on I&M's arguments, this is evidence for productive core-periphery structure as in (1).

But speakers **differed** *from each other*: all had NoCoda » *CplxOns, but diverged in how they ranked NoCoda~FinalStress and FinalStress~*CplxOns. Strikingly, a corpus of 300 Spanish loans in G provides ***no*** **lexical-statistical support** for any preference between FinalStress and *CplxOns, but *every* participant ranked them one way or the other. These facts show that individual G speakers **aggressively create** core-periphery phonology—suggesting that there is a learning bias in favor of core-periphery structure when loanwords are present (as Simonović 2009 proposes on theoretical grounds), even though this leads to a more complex grammar.

Constraints on contrast motivate nasal cluster effects Juliet Stanton, MIT (juliets@mit.edu)

Meinhof's Law (or the Ganda Law) is a phenomenon familiar from the Bantu literature, in which a nasal-stop sequence (NC) is realized as a plain nasal (N) when followed by another N or NC. Data from Kikuyu (Armstrong 1967) illustrate it in (1); addition of the class 10 nominal plural prefix /N–/ triggers the change. A related process, where NC is realized as a plain stop (C) when preceded by another NC, is illustrated in (2) (data from Herbert 1976).

(1) Meinhof's Law in Kikuyu			(2) The Kwanyama Law in Kwanyama		
ro-**r**e**m**e	> **n**e**m**e	'language(s)'	o**ŋg**a**d**u	(cf. Herero o**ŋg**a**nd**u)	
ro-**ɣ**ɛɛ**nd**ɔ	> **ŋ**ɛɛ**nd**ɔ	'journey(s)'	o**mb**a**b**i	(cf. Herero o**mb**a**mb**i)	

This paper argues that (1), (2), and other similar patterns are best analyzed as *contrast neutralization*, in response to the perceptually disfavored sequence NCVN(C). Following earlier work (Herbert 1986, Jones 2000), I argue that NCVN(C) is disfavored because anticipatory nasalization stemming from the second NC ([NCṼN(C)]), necessary for the second NC to remain maximally distinct from C, renders the first NC confusable with N (see Beddor & Onsuwan 2003). Attested responses to this problem are schematized below.

Outcome	***Target***	***Description***	***Example***
Nasalization	NC$_1$	/NC V N(C)/ > [N V NC]	Ngaju Dayak (Blust 2012)
Oralization	NC$_1$	/NC V N(C)/ > [C V NC]	Timugon Murut (Blust 2012)
Oralization	NC$_2$	/NC V N(C)/ > [NC V C]	Gurindji (McConvell 1988)

In the nasalization outcome, keeping NC$_2$ maximally distinct from C is prioritized over keeping NC$_1$ distinct from N, and N-NC$_1$ neutralization results. In the oralization outcome, the problem of N-NC$_1$ distinctiveness is bypassed entirely through neutralization of one of the C-NC contrasts. Whether oralization targets NC$_1$ or NC$_2$ depends on morphological facts, as predicted by Jones (2000): if NC$_1$ is created by a prefix-stem boundary, C-NC$_1$ is neutralized; if NC$_2$ is created by a stem-suffix boundary, C-NC$_2$ is neutralized. In other words, preservation of stem-internal contrasts is prioritized over preservation of others.

A fourth possible response to illicit NCVNC, NC$_2$ nasalization (/NCVNC/ > [NCVN]), is not reported in Herbert's (1986) considerable survey or any later work. NC$_2$ nasalization is absent because it does not solve the distinctiveness problem (see Jones 2000): N-NC$_1$ is still threatened by anticipatory nasal coarticulation from N. An analysis of all attested patterns in Dispersion Theory (Flemming 2002) correctly excludes NC$_2$ nasalization from the typology.

Further evidence: triggers and targets. A contrast-based analysis easily explains further generalizations about the triggers and targets of NC$_1$ nasalization. While there are languages where both NC$_2$ and N$_2$ trigger NC$_1$ nasalization (e.g. Kikuyu) and those where only NC$_2$ triggers NC$_1$ nasalization (e.g. Ngaju Dayak), there are no languages where only N$_2$ triggers NC$_1$ nasalization (see also Meussen 1963). I argue that this asymmetry is due to an asymmetry in anticipatory nasal coarticulation: pre-N anticipatory nasal coarticulation asymmetrically implies pre-NC (Herbert 1986). So while there are languages where NCVNC endangers N-NC$_1$ but NCVN does not, there are no languages in which the reverse holds.

In all nasalizing languages, ND$_1$ but not NT$_1$ sequences are targeted. I argue that this is because internal cues to N-NT are more robust than those to N-ND (see Kaplan 2008): NT's longer oral closure and louder burst is sufficient to differentiate it from N, even given the presence of a following nasalized vowel. Further evidence that strong internal cues can render N-NC sufficiently distinct comes from Ngaju Dayak (Blust 2012: 372ff). While NC$_1$ nasalization consistently targets /m-mb/$_1$ (63/65 possible targets) and /n-nd/$_1$ (2/2), it less consistently targets /ŋ-ŋg/$_1$ (16/25), and rarely /n-ndʒ/$_1$ (2/13) (see also Bridgeman 1961 on Kaiwa). Velar stops generally have longer VOTs than bilabials and alveolars (Cho & Ladefoged 1999), with affricates having longer VOTs still. The longer the release of NC, the more distinct it is from N. The more robust the internal cues to N-NC, the more likely it is to be licensed in contexts (i.e. NCVN(C)) where external cues to the contrast are compromised.

Revisiting coronal epenthesis

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[t]-zero alternations in Axininca Campa (Payne, 1981; Payne *et al.*, 1982; Spring, 1990) have served as a prime example of coronal consonant insertion (Itô, 1986; McCarthy & Prince, 1993; Lombardi, 2002; de Lacy, 2006; Morley, 2015 a.o.). Although the possible deletion account was previously discarded (Payne, 1981; Spring, 1990; Morley, 2015), I argue that a particular deletion analysis captures two previously unnoticed generalizations. The proposed account of Axininca is compatible with the assumption that coronals are relatively unmarked, and it supports a theory of epenthesis where epenthetic quality is always governed by similarity requirements (Steriade, 2008; Staroverov, 2014; Uffmann, 2014)

Data. The Axininca /t/-zero and /a/-zero alternations are summarized in (1a-b), alternating segments underlined. Before a vowel-initial suffix (second column) the stems showing /t/-zero alternation show up with a [t] (1b) while the other consonant-final stems are unchanged (1a). Before a consonant-initial suffix (third column), the alternating stems show up with no [t] while other consonant-final stems add [a].

(1) Axininca /t/-zero alternations: verbal stem-suffix boundary

Stem	/i-N-…-i/ 'he will …'	/i-N-…-pirot-i/ 'he will … well'	Gloss
a. tʃʰik	[iɲtʃʰiki]	[iɲtʃʰikapiroti]	'cut'
b. koma(t)	[iŋkomati]	[iŋkomapiroti]	'paddle'
c. *kapat	[iŋkapati]	[iŋkapatapiroti]	not attested

The epenthesis account treats both alternations as insertion, hence the UR for (1b) is /koma/. However, the new generalizations uncovered in this study show that this account suffers from two shortcomings. First, the insertion account imposes no apriori restrictions on verbal stems, and therefore it predicts the existence of 't-final' stems, patterning with (1a) and alternating as in (1c). However no such stems are attested.

Second, the insertion account has to appeal to additional stipulations to explain why purported [t]-insertion does not happen after nominal stems and between certain suffixes, which create potential hiatus environments. Most insertion accounts follow Payne (1981) in assuming that [t]-insertion is restricted to verbs, but this misses a generalization. The vowel-final verbal future/reflexivity markers fail to trigger [t]-insertion before another suffix even though they clearly only attach to verbs. Importantly, the hiatus alternations arising with these suffixes are the same as those found in the nominal domain with diminutives and nominalizers. By restricting purported [t]-insertion to verbs, the insertion accounts are forced to treat the same hiatus alternations as general with nouns but exceptional with verbs.

Analysis. On the deletion account proposed here, /t/ is deleted in a coda (the UR for (1b) is /komat/), while [a] is inserted in other consonant clusters. The selective deletion of /t/ in consonant clusters is accounted for by an extension of the notion of preservation of the marked (de Lacy, 2006) to the constraints against deletion (MAX). The relatively marked non-coronal consonants are protected by specific MAX constraints, but /t/ is not.

The deletion account assumes that all verb stems end in a consonant – a restriction arising within the phonology of the Stem level (see Black (1991); Spring (1992) and McCarthy & Prince (1993) on stratification in Axininca). The proposed restriction on verb stems provides an explanation for why there are no stems alternating as in (1c): /t/-final stems will alternate as in (1b) while vowel-final stems are principally excluded.

In contrast to verb stems, Axininca nouns tems are known to always end in a vowel (Payne, 1981). Therefore no /t/-zero alternations happen at nominal stem-suffix boundaries. On the other hand, the hiatus alternations arising between both nominal and verbal suffixes can now be correctly captured as a general phonological process.

The two accounts fare equally well with regard to other environments. Finally, a small set of suffixes has to be treated as exceptions on both accounts (Morley, 2015)

Containment as the key to the 'heavy-vs-long' geminate debate: typology and implications

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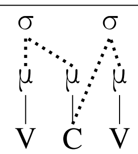
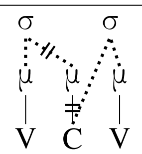
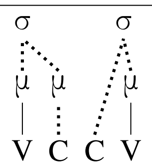
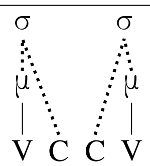
Main Claim After decades of research, opinions are still split as to whether geminates should be represented as long or as heavy. We argue that all geminates are underlyingly moraic but they might not emerge as such on the surface.

Background The two main competing theories for representing geminates are the syllabic weight analysis (=geminates are underlyingly moraic) (e.g. Hayes, 1989; Davis, 1999, 2003) and the segmental length analysis (=geminates are linked to two elements on the segmental timing tier) (Ringen and Vago, 2011, 156). Both theories face apparent empirical counterevidence (for an overview see Davis, 2011): contrary to the prediction of the length analysis, not all geminates behave uniformly as strings of two consonants. Similarly, unlike what the weight analysis suggests, not all geminates behave moraically on the surface.

Proposal We argue that geminates are always underlyingly moraic but that they do not necessarily contribute syllable weight in the phonological evaluation. This is predicted in a containment-based OT-theory where the input must be reconstructable from the output at any time and where neither elements (like segments and features) nor association lines can be deleted; they can only be marked as uninterpretable for the phonetics (Goldrick, 2000; van Oostendorp, 2006; Revithiadou, 2007; Trommer and Zimmermann, 2014). We show that such a containment-based model allows to predict that underlyingly moraic geminates can contribute to syllable weight (=phonetically associated to a μ) or can be irrelevant for syllable weight (=not phonetically associated to a μ). Comparable representations are drawn for underlyingly weightless singletons. The resulting situation, illustrated in (1), allows us to produce the full typology of geminate languages, namely where both geminates and singletons are (i) weightful (Latin) or (ii) weightless (Selkup), (iii) where geminates are heavy, but singletons are not (Koya; Davis (2003)), as well as the notoriously puzzling case of Ngalakgan (Baker, 1998, 2008) with (iv) heavy singletons and light geminates.

(1) *Syllable weight for consonants*

...can be	weightful	weight-less
Geminate: μ | C	a. 	b. 
Singleton: C	c. 	d. 

(dotted=epenth.; struck out=phonetic. uninterpret.)

Extension to asymmetric patterns Our system is also able to capture asymmetries with respect to geminates within a language. For example, we can produce languages such as Swiss German that exhibits geminates in all positions, but where medial and final ones are weightful whereas the initial ones are not.

Licensing Lowness: A unified element theory model of metaphony

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We aim to motivate the hypothesis that parametric microvariation in the licensing of lowness provides a unified account for the commonly attested metaphonic systems. This approach is different from the classic assimilation-by-spreading 'raising' accounts driven by [+high] (cf. Calabrese 2008). Our starting point will be to provide a reanalysis of the Ariellese dialect of Abruzzese (D'Alessandro & Oostendorp 2015) (hence D&O) in the light of Bresciano. Like Walker (2011), our analysis is predominantly based on the concept of licensing, though we use the Element Theory version of *Licensing Constraints* (Charette & Göksel 1998). D&O (2015) propose an account where the metaphonic trigger is a non-syllabically attached "|A|-hungry" mora that targets the most sonorous element of the most prominent position in the root. Consequently, the "|A|-eater" delinks |A| from the stressed nucleus thereby leading to its stray erasure. This analysis cannot be insightfully transported to other cases of metaphony and indeed fails to account for Bresciano, where the loss of |A| occurs in any mid-vowel preceding the trigger: [ozɛl] 'bird' vs. [**uzi**li] 'bird.DIM' (Sanga 1997:258). Moreover, this analysis does not explain why [a] is immune to raising: [abet] 'outfit' vs. [ab**i**ti] *[i/ebiti] 'outfit.DIM' (Melchiori 1817:26), or why [a] blocks raising: [ab**e**lazi] *[abilazi] 'adagio' (Melchiori 1817:25) (cf. Camuno: [b**o**kali] *[bukali] 'night pot.DIM' (Cresci 2014:133)).

Element Theory assumes that [a] is |A|, and that |A| may license I and U in [ɛ], [ɔ], while |A| is found, and licensed by, I and U in [e] and [o]. For us, metaphony is seen as a product of licensing constraints on either headed |<u>A</u>| on its own, headed |<u>A</u>| in combination with |I| and |U|, headless |A|, or (more generally) on all kinds of |A|. These conditions come in three related forms: (a) the place in the domain where |A| can be licensed *ipso facto* (i.e. in and of itself), (b) whether |A| must be licensed by an |A| to its right, (c) whether |A| must be licensed by an |A| to its right in order to license its operators |I| and |U|.

(1) **Bresciano**

<u>Licensing constraints</u>: (a) |<u>A</u>| on its own is licensed *ipso facto*, (b) any-|A| is licensed *ipso facto* in final (overt) nucleus, (c) any-|A| must be licensed by any-A to its right.

<u>Interesting consequence</u>: [a] is opaque and 'blocks' harmony.

/mortadel + ina/ → mortad**ili**na → [m**o**rt**a**dilina] *[murtadilina] 'boloney + DIM'

(2) **Ariellese** ([ə] from /i/ is empty | |, [ə] from [a, e, ɛ, ɔ, o, u?] are |A|)

<u>Licensing constraints</u>: (a) Any-|A| is licensed *ipso facto* in final nucleus. (b) No headed expressions at all in final nucleus, (c) Any-A must be licensed by any-A to its right.

<u>Interesting consequence</u>: Typically, final V surface as [ə]. Find [a] *iff* there is a [ə] |A|, or an [a] |A| to its right: cav**a**llə 'horse', capabb**a**llə 'downhill' (D&O 2015).

We conclude by demonstrating the parametric microvariation. For Grado (Walker 2005) |<u>A</u>| is licensed *ipso facto* everywhere, so protecting the |<u>A</u>| in [ɛ] and [ɔ] (preventing low-mid vowels from raising). Meanwhile, Foggia, Servigliano and Calvello share the same set of licensing constraints. They ban |<u>A</u>| from licensing operators it is not *itself* licensed by an |A| of any type to its right. Failure to meet this condition leads to variant outcomes: Deletion of |<u>A</u>| (Foggia), and two versions of head-switching, Servigliano where low-mid vowels raise to high-mid vowels and Calvello where low-mid vowels go to high-mid light-diphthongs. Though the mechanics are entirely different, these two different 'repairs' are generated as a response to the same set of constraints, thereby preserves the core insight of Calabrese (1985, 1995).

Lexical contrasts predict the direction of phoneme system change

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Since the early 20th century, it has been proposed that loss of a phonemic contrast should be less likely when that contrast does more "work" to convey meaning (e.g., Gillieron 1918, Trubetzkoy 1939, Hockett 1967, Silverman 2010). Recently, Wedel et al. (2013) showed that the number of minimal pairs distinguished by a phonemic contrast is a predictive measure of phoneme merger probability within a crosslinguistic database. Here we ask if the converse is also true: does functional load as measured by minimal pair count predict phonological changes that avoid lexical contrast loss?

We examine two phenomena that preserve lexical contrast despite sound change: chain shifts and phoneme splits. Chain shifts are concerted movements of phonemes within the same dimensional space (Labov 1994, Ch. 9, Gordon 2002). Phoneme splits are a merger of a contrast in one dimension accompanied by the generation of a new contrast in a different dimension (Labov 1994, Ch. 11). Shifts and splits have distinct effects on the phoneme inventory: in a shift, the mapping between phonetic space and the phoneme inventory changes, but the inventory stays the same. In a phoneme split, the inventory of phonemic contrasts changes as well. However, shifts and splits have the same consequence for the lexicon: changes in the phonological system are compensated such that existing lexical contrasts are preserved.

To test the hypothesis that a bias toward preservation of existing lexical contrasts plays a causal role in the trajectory of sound change, we obtained within-word-category lexical minimal pair counts for 714 phoneme pairs in nine different sound systems (American English, RP English, Dutch, German, French, Spanish, Hong Kong Cantonese, Korean, and Turkish), in which 55 mergers, and 28 shifts or splits have been reported in recent diachronic history. Counts of minimal pairs and other variables were collected from a standard corpus for each language. Linear Mixed Effects modeling indicates that the number of lexical minimal pairs distinguished by phoneme contrasts that have undergone a shift or split is significantly higher than the number of lexical minimal pairs distinguished by phoneme contrasts that have merged. In other words, when a phoneme contrast distinguishes many lexical items, a change involving that contrast tends to be of a type that preserves those lexical distinctions. This is a strong effect: within the set of phoneme contrasts that have undergone a change of some type in this dataset, the number of minimal pairs alone predicts with more than 80% accuracy whether that change was a shift/split on the one hand, or a merger on the other. The significant value of minimal pair count in predicting whether a phoneme-system change preserves lexical contrasts provides support for models in which relationships between existing lexical items influence diachronic sound change (e.g., Wang 1969, Bybee 2002, Phillips 2006, Wedel 2012, Hume et al. (in press)). Perceptual, articulatory, phonology-internal and social factors are all thought to play a role in initiating sound changes (see e.g. Labov 1994, 2001). In this dataset, we find that the distribution of minimal pair counts across the set of stable phoneme contrasts is statistically indistinguishable from that of those that have undergone a merger/shift/split. This suggests that patterns of existing lexical contrasts may not in fact play a strong role in initiating changes to the phoneme system, instead only influencing their course once begun.

Variable schwa realization in Canadian French: A MaxEnt grammar approach

James White (University College London) & Suzanne Robillard (University of Ottawa)

French has a well-known process of variable schwa realization (via deletion or epenthesis, depending on one's account; see Côté 2000). In this talk, we focus on strings that have multiple schwa sites in a row, where the possible realization (or not) of each individual schwa leads to considerable variation in how the string as a whole may be realized (e.g. *Je me rappelle…* 'I remember…' can be pronounced as [ʒəməʁapɛl], [ʒməʁapɛl], [ʒəmʁapɛl], or [ʒmʁapɛl]). The factors governing schwa realization are complex and well studied (e.g. Pulgram 1961, Anderson 1982, Tranel 1987, Côté 2000). However, most previous work has focused on accounting for when schwas are obligatory, forbidden, or optional, rather than accounting for the relative occurrence of the variants within a quantitative framework (but see Côté 2007, Pater et al. 2012).

Our goals in this talk are twofold. We will first provide a detailed quantitative description of the variability that occurs in strings of multiple schwas in French spoken in the Ottawa/Gatineau area of Canada. To this end, we extracted all strings containing two or more schwa sites in a row from the *Corpus du français de l'Outaouais au nouveau millénaire : milieu scolaire et milieu social* (Poplack & Bourdages 2005), a large corpus of spontaneously spoken French housed at the Sociolinguistics Lab at the University of Ottawa. Three native speakers coded each schwa site for several factors, including whether the schwa was realized, the surrounding phonological context, morphological factors, and word identity.

Our second goal is to test previous phonological accounts of French schwa realization by submitting the corpus data to a probabilistic phonological model. We use a maximum entropy grammar framework (Goldwater & Johnson 2003, Wilson 2006, Hayes & Wilson 2008). Previous accounts of schwa realization have mainly fallen into two camps: syllable accounts and sequential accounts (see Côté 2000 for an overview; but cf. Charette 1991). Syllable accounts (e.g. Pulgram 1961, Anderson 1982, Tranel 1987) focus primarily on parsing strings into ideal syllables. To test these accounts, we equipped the model with several constraints focused on syllable structure (e.g. *COMPLEX, NOCODA, and a syllable-based version of the Sonority Sequencing Principle (SSP), which requires sonority to rise moving towards the syllable nucleus). In contrast, sequential accounts (Côté 2000, 2007) require that consonants, particularly those with weak cues (e.g. stops), be positioned in locations where their cues are perceptible (in the sense of Steriade 1999). We tested this approach by adopting constraints from Côté: C ⟷ V (consonants must be adjacent to vowels), STOP ⟶ V (stops must be followed by vowels), and a modified version of the SSP that requires sonority maxima to correspond to vowels (rather than referring to syllable structure).

To compare the accounts, we measured the log likelihood of the corpus data under each of the learned grammars. The results suggest that the sequential analysis is better able to account for our data compared to the syllable analysis. The results provide further support for Côté's (2000) claim that the syllable approach is insufficient for accounting for the behavior of French schwa.

Finally, this work has potential implications for phonological learning. It is possible to have several schwa sites in a row in French (e.g. *Je ne te le redemanderais pas* 'I wouldn't ask you it again' has $2^6 = 64$ logically possible realizations). However, such sequences are exceedingly rare in natural speech; in our corpus, we found zero cases of more than four schwas. Thus, this appears to be a clear case of the 'poverty of the stimulus': despite being grammatical, learners have very little input dictating how these strings should be realized. The MaxEnt model makes predictions about long strings (based on its input from shorter strings); in future work, we plan to compare these predictions to native speaker intuitions.

SUBSEGMENTAL AFFIXATION AND THE EXPONENCE OF *a*-STEMS IN POLISH

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The phonological (Gussmann 1980, Rubach 1984, Szpyra 1995 etc.), and morpho-phonological (Dressler 1985, Gussmann 2007) approaches to Polish palatalizations assume that palatalizations follow exponence and are the consequence of the concatenation of particular affixes and desinences. On these assumptions the exponence of nominal declensions in Polish may be dictated by declension class features or phonological properties of stems. A situation in which ending X is selected if the stem-final consonant undergoes palatalization is predicted to be impossible by the two approaches.

The aim of this paper is to show that the exponence of the Dative and Locative of Polish *a*-stems (see Laskowski 1999: 273-277) must be expressed exactly in this fashion: *-e* /ɛ/ ending is inserted if the stems undergo palatalizations, while *-i/y* /i/ is selected elsewhere. I will argue that these facts can be explained in a straightforward way on following assumptions: (a) palatalizations are the result of the integration of pieces of autosegmental structure into the underlying structures of the stem-final consonants; (b) palatalizing autosegments are the phonological parts of the vocabulary items realizing particular inflectional categories in Polish; (c) the morpho-syntactic features realized phonologically are re-written and no longer available for the purposes of Vocabulary Insertion (see Bobaljik 2000). This approach allows to get round the opacity problem which has haunted phonological approaches to palatalizations. Palatalizations are encountered only before front vowels realizing some inflectional categories and are not triggered by all (and only) front vowels.

Polish *a*-stems terminating in dental stops and fricatives and all labial and velar consonants undergo I-Anterior and the 2nd Velar Palatalizations in the Dative and Locative singular. The relevant inflectional categories are realized as *-e* /ɛ/. On the other hand, the *a*-stems terminating in other consonants and vowels realize the Dat/Loc. as *-i/y* /i/. The account of the morpho-phonology of *a*-stems presented in Gussmann (2007) assumes that *-i/y* /i/ is selected if the stem terminates in a segment containing element I. Otherwise, *-e* /ɛ/ is inserted. Additionally, *-e* /ɛ/ is assumed to carry a set of diacritics which trigger the relevant palatalizations. On this account the exponence of the Dat/Loc. must precede palatalizations. This is the case as I-Anterior and the 2nd Velar Palatalizations result in segments which contain I-element but the palatalizing stems do not select *-i/y* /i/. Crucially, if it is element I that decides about the selection of the endings, the stems terminating in back vowels should select *-e* /ɛ/. This is not the case. The Dat/Loc. of items such as *Gen*/u/*-a* 'Genova', *Mant*/u/*-a*, 'Mantua', *Figuer*/ɔ/*-a* 'surname', *stat*/u/*-a* 'statue', *Arbel*/ɔ/*-a* 'surname' etc. are realized as *-i/y* /i/ and never as *-e* /ɛ/.

This is predicted by the subsegmental affixation approach. The Dat/Loc. ending of *a*-stems may potentially be realized by the following (simplified) vocabulary items:

(1a) {Dat/Loc.,*a*-stem,-Pl} /i/; (1b) {Dat/Loc.,*a*-stem,-Pl} [PLACE[A.I]] / [C[dor]]
(1c) {Dat/Loc.,*a*-stem,-Pl} [PLACE[I._]] / [C[ant]]; (1d) elsewhere /ɛ/

Items (1b,c) win the competition in their respective contexts: (1b) is inserted if a stem terminates in a velar and (1c) if a stem terminates in an anterior consonant. The features associated with items (1b,c) are re-written. Since in Polish inflectional nodes cannot be realized by subsegmental material, the autosegments are integrated into the consonants mentioned in their contexts. The inflectional nodes are realized as the default ending /ɛ/. If an *a*-stem does not terminate in a velar or anterior consonant, item (1a) is inserted. This happens in the case of the stems terminating in I-consonants and all the stems terminating in vowels.

A case for parallelism: reduplicative possessives in Maragoli

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Following research in H(armonic) S(erialism) (McCarthy 2000, a.o.), McCarthy (2013) puts forth the following question: for distinct primitive operations op_1 and op_2 and input x, does GEN produce composite candidates such as $op_1(op_2(x))$? True cases would be instances of *irreducible parallelism*, since multiple operations apply at once to the input. In this talk, I present data from Maragoli, a Bantu language spoken primarily in Kenya, that displays a rule-ordering paradox between prefix-copying reduplication and contextual repair. Higher-ranking markedness instantiates a dependency between the order of operations and the input: for one input, copying before repairing avoids a complex reduplicant onset, while for another input, repairing before copying maximizes word-internal self-similarity and avoids an onsetless reduplicant. The rule-ordering paradox translates into a constraint-ranking paradox in HS, but receives a natural analysis in Parallel O(ptimality) T(heory) (Prince and Smolensky 1993), which permits competition between composite candidates reflecting opposite order of operations.

Maragoli displays a rich interaction between contextual repairs and prefix-copying reduplication of noun-class prefixes in possessive modifiers.

/N.CL+STM/	/N.CL+aŋge/	/RED+N.CL+ɔ/	/RED+i+N.CL+e/
ɾi-gɔmja (‘banana’)	ɾj-aŋge (‘my banana’)	ɾi-ɾj-ɔ (‘your banana’)	ɾi-ɾj-e (‘her banana’)
tu-saɾa (‘twig’)	tw-ange	tu-tw-ɔ	tw-i-tw-e
i-suze (‘fish’)	j-aŋge (/i+aŋge/)	**jɔ-j-ɔ**	je-j-e

In certain 2sg possessives, the final vowel is copied if constraints on reduplicant structure are not satisfied after copying the noun-class prefix alone. This produces a rule-ordering paradox: in the data shown above, copying of a syllable must apply before gliding to generate [ɾi-ɾj-ɔ] but not *[ɾjɔ-ɾj-ɔ], while gliding must apply before copying to generate [jɔ-j-ɔ] but not *[i-j-ɔ]. Though it is unclear how the paradox could be dispelled using multiple strata, it can be accounted for elegantly on one stratum in Parallel OT: positing FAITH-σσ, which enforces self-similarity between coupled syllables (Zuraw 2002), and ranking *COMPLEX above FAITH-σσ yields [ɾi-ɾj-ɔ] > *[ɾjɔ-ɾj-ɔ] and [jɔ-j-ɔ] > *[i-j-ɔ]. In HS with Serial Template Satisfaction (McCarthy et al. 2012), all of these candidates are local optima and are prevented from competing in one stage, thereby producing a constraint-ranking paradox.

/RED+PREF+ɔ/	HD(σ)	*VV	/RED+PREF+ɔ/	*VV	HD(σ)
-ɾj-ɔ	*!		☹ ɾi-ɾi-ɔ	*!	
> ɾi-ɾi-ɔ		*	> -ɾj-ɔ		*
→ ɾi-ɾj-ɔ			⊘ ɾjɔ-ɾj-ɔ		
☹ -j-ɔ	*!		i-i-ɔ	*!*	
> i-i-ɔ		**	> -j-ɔ		*
⊘ i-j-ɔ			→ jɔ-j-ɔ		

The headedness constraint HD(σ) driving copying cannot be ranked against *VV to yield the global optima on the diagonal, [ɾi-ɾj-ɔ] and [jɔ-j-ɔ].

As possessives form a finite, closed set of data, concerns of synchronic productivity prompted administration of a wug test (Berko 1958) featuring wug noun-class prefixes. The results demonstrate that the data are not simply memorized, but rather reflect general grammatical knowledge.

Poster papers

Fewer grammars, more coverage for the English past tense

Blake Allen *(University of British Columbia)* and Michael Becker *(Stony Brook University)*

The first generative treatment of the English past tense assumed a symbolic rule only for /d/-suffixation (Pinker & Prince 1988, et seq.), with other patterns subject to analogical modeling. Then, Albright & Hayes (2003) argued persuasively that linguistic rules are needed for all verbs, even for less productive patterns. In this paper, we analyze the English past tense using the *sublexical* approach (Becker & Gouskova 2014), and show that we can improve over Albright & Hayes's results thanks to two aspects of our model: (1) its generalizations are product-oriented, allowing the model to express generalizations about optimal *output* forms, and (2) our model denies any probability mass to small, unproductive patterns, thus leaving more of the probability mass to bigger patterns, more closely mimicking speakers' treatment of nonce verbs.

We trained the model on the list of 4,253 real verbs from Albright & Hayes (2003), and tested it on the same 58 nonce verbs they used. For each verb, the model identified the observed change(s) between the present and the past form, e.g. [dæns ~ dænst] 'dance(d)' ⇒ "add [t] at the right edge", [sɪŋk ~ sʌŋk] 'sink/sunk' ⇒ "change [ɪ] to [ʌ] at the last nucleus".

Locations of changes are identified by generating multiple hypotheses, e.g. "change [ɪ] to [ʌ] at antepenultimate segment", "at second segment", etc., and then choosing generalizations with the broadest coverage. Similarly, changes can either mention both source and product ("change [ɪ] to [ʌ]") or mention the product only ("change any segment to [ʌ]"). Since product-oriented generalizations are broader, e.g. they unify the vowels of [sɪŋk ~ sʌŋk] and [snik ~ snʌk] 'sneak/snuck', they win over source-oriented generalizations. The 12 broadest generalizations we find ("sublexicons") are listed in the table below in their order of coverage of the lexicon.

For each sublexicon, the model creates a weighted constraint-based MaxEnt grammar, using an analyst-supplied constraint set. Given a nonce present tense verb, each sublexicon creates a past tense candidate, and the sublexicon's grammar predicts the candidate's wellformedness.

	Sublexicon's operation	Coverage		Prediction
1.	Add [d] at right edge	2104	ʤɑsəl, spɑɹ, vɪʒuəlaɪz, ...	
2.	Add [ɪd] at right edge	1146	hænd, koʊɹt, sʌfəkeɪt, ...	*bulk of*
3.	Add [t] at right edge	791	ɪŋkɹis, tɹɛspæs, mʌf, ...	*contribution to*
4.	Make last nucleus [oʊ]	30	wiv, stɹaɪv, fɹiz, teɪɹ, ...	*prediction*
5.	No change	29	lɛt, ʌpsɛt, bit, ɹisɛt, ...	
6.	Make last nucleus [ʌ]	20	spɹɪŋ, dɪg, dɹɪŋk, wɪn, ...	
7.	Make last nucleus [ɛ]	18	fɔl, fid, hoʊld, ...	
8.	Make last nucleus [æ]	15	ɹʌn, sɪt, ɹɪŋ, bɪgɪn, ...	*modest*
9.	Add [t] at right edge, make last nucleus [ɛ]	12	slip, kɹip, nil, fil, dil, ...	*contribution to prediction*
10.	Make last nucleus [u]	11	bloʊ, flaɪ, dɹɔ, aʊtgɹoʊ, ...	
11.	Make last nucleus [eɪ]	10	it, fɚgɪv, kʌm, laɪ, oʊvɚit, ...	*negative*
12.	Make last nucleus [ʊ]	8	mɪsteɪk, ʃeɪk, teɪk, pɑɹteɪk, ...	*contribution*

When we stipulate that each sublexicon must contain at least 20 real verbs, the model creates 6 sublexicons (1–6), which predicts a strong correlation with participants' responses (ρ=.82, same as Albright & Hayes 2003). Note that the goodness of [oʊ] and [ʌ] as past tense vowels is captured in sublexicons 4 & 6. Lowering the minimal lexicon size restriction to 11 (adding sublexicons 7–10) makes a modest additional improvement (ρ=.85). Adding sublexicons 11–12, however, causes the predictions to deteriorate (ρ=.82), as the model overfits smaller patterns that speakers don't generalize. Our model, then, is equipped to diagnose and prevent overfitting.

A corpus-based investigation of syllable variation in English dictionaries:

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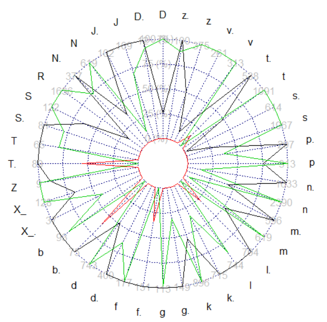
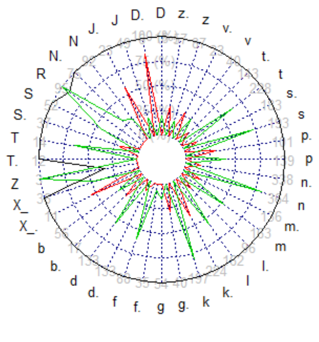
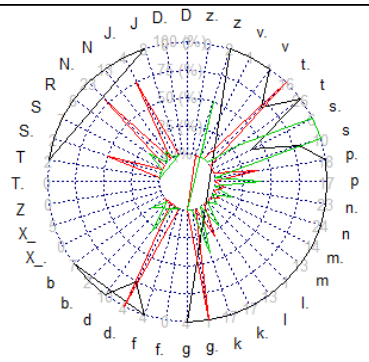
This talk will investigate the locus of variation in syllable boundaries in *Longman Pronunciation Dictionary* and the CELEX database to offer contemporary views for the variation of syllable boundaries indicated in pronouncing dictionaries. The variation of accepted clusters in word-internal boundaries will be compared with the frequency of licit clusters in onsets and codas for monosyllables (the legality principle, Goslin, J., & Frauenfelder 2001, Eddington et al. 2013).

Synchronically, the consonant clusters that can be found as onsets or codas have been perused using R to determine profiles of preference for syllabification. A systematic investigation of the CELEX database (Baayen et al. 1995) has yielded the most frequent onset and coda clusters for each syllable position and test the effects of primary, secondary and absence of stress for these clusters. Radar charts of the different consonant clusters have been produced for each syllable position and allow the ranking of consonants and clusters according to their frequency, in each syllable, according to stress and position (ult, penult, antepenult). This systematic plotting of clusters allows the investigation of frequency effects.

If a syllable has a triple coda, it has the following distribution of consonants as simple onset according to the stress hierarchy:	If a syllable has a triple coda, it has the following distribution of initial consonants as double onsets according to the stress hierarchy:	If a syllable has a triple coda, it has the following distribution of consonants in onset position according to the stress hierarchy:
		

As evidenced on these spider charts, phonotactics vary for secondary stress (red), primary stress (black) and unstressed syllables (green) for the first variant.

N	_	T	D	S	Z	J	C	P	H	F	R
ŋ	dʒ	θ	Ð	ʃ	ʒ	tʃ	ŋ̩	l̩	n̩	m̩	dangling linking r

Consonants represented by small letters have their expected IPA values Consonant followed by a dot or an underscore correspond to word internal boundaries. The rest of the paper will compare the frequency of occurrences of consonant clusters as word-internal boundaries or word boundaries. Beside the legality principle, are some clusters more frequent than others at junctures? The same methodology has been applied to the 1990 edition of *LPD*, showing that some of Wells' proposed syllable boundaries are not congruent with the existing licit coda clusters for monosyllabic words. Typically, Cr clusters appear at internal boundaries as coda clusters for words like *petrol*.

Then, the inventory of discrepancies between syllable divisions has been established between CELEX and LPD. The list of words has been sorted according to the kinds of intervocalic sequences that can be found. The typology of problematic boundaries has been compared to disagreements between experts for syllable-division (see Rogiva et al. 2013 for English).

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Eddington, D., Treiman, R. & D. Elzinga (2013): Syllabification of American English: Evidence from a Large-scale Experiment. Part I, *Journal of Quantitative Linguistics*, 20:1, 45-67

Goslin, J., & Frauenfelder, U. H. (2001). A comparison of theoretical and human syllabification. *Language and Speech*, 44(4), 409–436.

Rogova, K., Demuynck, K., & Van Compernolle, D. (2013). Automatic syllabification using segmental conditional random fields. In *Computational Linguistics in the Netherlands*, 3, 34-48.

Wells, J. C. (19990) *Longman Pronunciation Dictionary*. Longman. [=LPD]

A study of cross-dialectal Greek palatalization
Phonetics, phonology and typological implications

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Our goal. This paper aspires to contribute to our knowledge of the phonetic and phonological typology of palatalization (PAL). We explore the extensive variation of palatalization processes within and across dialects, with Greek as the empirical basis. To achieve these goals, we offer a cross-dialectal survey of palatalization using published studies and recordings from four dialects (Standard, Cretan, Kozani & Peloponnese Greek; SMG, CreG, KozG, PelG respectively).

The main patterns. SMG presents two types of PAL (Baltazani & Topintzi 2012). In *simple* PAL, velar obstruents /k g x / become palatal [c ç] before the front vowels [i e], but remain velar before the back [a o u], e.g. [ce í] 'candle' but [kopéla] 'girl'. In *extreme* PAL, velars turn into palatals before a glide trigger that subsequently merges with the consonant (Bateman 2007). Consequently, surface contrasts between velars and palatals emerge, such as /xoni/ > [xóni] 'stick in-3SG' VS. /xjoni/ > [çóni] 'snow'.

Issues under consideration. *Similar phonology-Different phonetics, and vice versa*. The above instantiations of PAL are ubiquitous across Greek dialects, but their specifics in terms of phonology and phonetics are not. For instance, while SMG and CreG share a similar phonology of PAL, differences arise in phonetic realization: the CreG palatals typically emerge affricated, i.e., [t d] (Syrika et al. 2011). Conversely, other dialects have comparable phonetics but distinct phonology, thus while the PelG and SMG palatals are phonetically similar, the triggers and targets of *simple* PAL are not: Peloponnesian (but not SMG) sonorants /l n/ get palatalized before /i/ (Pantelidis 2001). We explore these and other differences across dialects.

New type of PAL. In addition to the above inventory of possible triggers and outputs, Greek enriches the typology of PAL as proposed by Kochetov (2011) through the addition of a new pattern dubbed *Strengthened PAL* (S-PAL). This arises in words like /máti/ → [mát^{+}] 'eye' or /kunáv-i/ → [knáv^{+}] 'ferret' in KG, as well as other Northern Greek dialects, whereby deletion of the high unstressed vowel leaves a trace on the preceding consonant (indicated by the superscript $^{+}$). This pattern was traditionally treated as secondary PAL, but we claim that the term is inaccurate given the way it is understood in the literature (Kochetov 2002, 2004; Ní Chiosáin & Padgett 2012; Takatori 1997) and exemplified by Russian, Kashmiri, Irish, and other languages with true secondary-PAL consonants. At the phonetic level, frication, aspiration or lengthening of the target consonantal element are the attested phonetic cues. At the phonological level, the set of affected consonants varies among dialects (e.g., KozGr: DOR, COR, LAB, sibilants, liquids, nasals; Siatista Gr: same set without LAB) but it is a common thread among dialects that rhotics are unaffected. What adds to the uniqueness of the process is that S-PAL spreads to preceding sibilants, laterals and COR nasals (but never stops), e.g. KozGr [vrí c^{+}] (/vríski/) 'find-3SG', thus revealing finer-grained hierarchies on the elements that are likely to act as PAL attractors.

PAL as the result of glide strengthening. S-PAL acoustically exhibits noise, a feature shared with another pattern, found in all Greek dialects, namely *glide strengthening* (GS). GS occurs instead of extreme PAL, when the targets are underlyingly non-velar obstruents and /r/, as in /áðja/ → [áð a] 'empty-FEM.SG' or /pjáno/ → [pçáno] 'I touch'. The glide trigger is retained and strengthens into a palatal fricative. While GS phonetically involves an extra step of hardening when compared to S-PAL, phonologically it is the equivalent of extreme PAL for consonants that may not undergo PAL. Thus, we treat GS and PAL as related processes, as also suggested by Kochetov (2014).

Conclusions. Illustrations of the above mentioned points are provided using acoustic analyses and examples from recordings of four dialects. Ultimately, we demonstrate that Greek and its dialects shape a complex picture for PAL that adds to our understanding of the phenomenon in the language itself, but also more broadly, by refining the typology of PAL.

Devoicing in Intervocalic Position?

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Devoicing in intervocalic position (D → T / V__V) is widely assumed to be impossible as a synchronic process. This systematic gap is explained in terms of "P-map": the perceptual difference caused by devoicing in intervocalic position is greater than the perceptual difference caused by other processes, which rules out the possibility of voiced stops becoming voiceless (Steriade 2001, Kaplan 2010). Intervocalic voicing (IVV: T → D / V__V), on the other hand, is a well-attested and well-motivated synchronic process. Speakers produce passive voicing of voiceless stops intervocalically even in languages without phonological IVV, which indicates IVV is a natural and universal phonetic tendency.

Despite its unnaturalness, intervocalic devoicing (IVD) has been reported in at least three languages, primarily as a sound change: in Kiput and some Berawan dialects (both Austronesian; Blust 2002, 2005, 2013), and in Tswana (Bantu; cf. Gouskova et al. 2011). If IVD has indeed taken place, this would mean that either (a) sound change *can* operate against natural phonetic tendencies or (b) that IVD has to be phonetically motivated.

This paper shows that IVD did not, in fact, occur as a sound change in any of the cases listed above. I argue that apparent IVD (e.g. *agem > akəm) resulted from the co-occurrence of three independently motivated sound changes: (i) fricativization of voiced stops in intervocalic position (D>Z/V_V), (ii) devoicing of fricatives (Z>S), and (iii) occlusion of fricatives (S>T).

A closer look at the cases of apparent IVD reveals a common pattern: in all three cases, clear evidence can be found that, at some earlier stage of development, original voiced stops surfaced as voiced fricatives intervocalically, but remained voiced stops word-initially. Development of pre-Berawan *d shows exactly this distribution: *d surfaces as d word-initially, but as r (< *ð) intervocalically.

	#__	V__V
*b	b	k
*d	d	r
*g	g	k

We can assume that *b and *g underwent the same change: intervocalic fricativization to *ß and *ɣ. At this point, another well-motivated and well-attested sound change occurred: unconditioned devoicing of voiced fricatives. Because voiced fricatives surfaced only intervocalically, the result is the seeming IVD. Apparent IVD was blocked from affecting *d by a secondary shift of *ð (< *d) to r, which effectively eliminated the target for fricative devoicing. Additional evidence for this new explanation comes from the fact that *b not only loses its voicing intervocalically, but also undergoes change in place of articulation. Such a change is much more easily motivated if we assume that *b first fricativized to *ß: ß > ɣ is phonetically more grounded than b > g.

In Kiput and in Tswana, the same explanation can be employed. In Tswana, neighboring dialects offer strong evidence for a stage with complementary distribution. In some neighboring systems, voiced stops surface as fricatives intervocalically, but remain stops elsewhere (see table below, cf. Gouskova et al. 2011). The unconditioned devoicing of voiced fricatives was then followed by occlusion of fricatives, giving rise to apparent IVD.

	#__	V__V
*b	b	ß

This paper shows that the combination of three sound changes can yield a system with apparent, but not actual IVD. I propose the following diachronic model: (i) a set of segments enters complementary distribution; (ii) a sound change occurs that operates on the changed subset of those segments; (iii) another sound change occurs that blurs the original complementary distribution. The study also bears synchronic implications: I examine how a set of three well-motivated and well-attested natural sound changes can yield a phonological system that violates phonetic naturalness; I conclude with a discussion of the stability of such systems.

Aspirate Mutation in Welsh and Iaai as Fortition with |$\underline{H}$|

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Initial Consonant Mutations (ICM), in which the initial segment of a word is phonologically altered in certain morphosyntactic contexts, are often thought of as a peculiarity of the Celtic languages. Moreover, the phonological implementation of these processes is a well-known challenge for phonological theory. This paper presents a refined analysis of one specific type of ICM, *Aspirate Mutation* (AM), in Welsh and Iaai. In Welsh the most basic form changes the voiceless plosives /p, t, k/ into corresponding fricatives, as exemplified in (1).

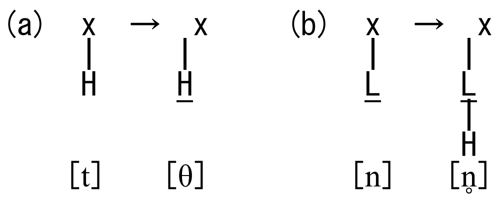
(1)	*ci*	[kiː]	'dog'	→	*(â) chi*	[χiː]	'with dog'
	tŷ	[tiː]	'house'	→	*(ei) thŷ*	[θiː]	'her house'

Note that the triggers (*â*, *ei*) can also be realised as enclitics to a preceding word, e.g. in *o'i thŷ* 'from her house'. This means the effect is not contained by a clitic group (cf. Pyatt 2003). Previous element-theoretic work on AM by Buczek (1995) and Cyran (2010) has achieved much simplification over previous feature-theoretic work by reducing ICM patterns to the (de)composition of single elements. It has however also been documented that some speakers of Welsh extend AM to apply not only to the voiceless plosives, but also to the nasals /m, n/, which are altered to their voiceless counterparts [m̥, n̥] in this context (King 2003), as in (2).

(2)	nain	[naɪn]	'grandmother'	→	*(ei) nain*	[n̥aɪn]	'her grandmother'
	ni	[niː]	'us'	→	*(â) ni*	[n̥iː]	'with us'

While it is widely agreed that voiceless nasals (and nasal mutation) involve dependent |H| (Buczek 1995, Botma 2004, Cyran 2010, Backley 2011, Breit 2013b, *et alii*), the lenition-based accounts in Buczek (1995) and Cyran (2010) cannot account for the extension of AM to nasals. This relates principally to the common assumption that headed |$\underline{L}$| represents voicing and dependent |L| nasality (Nasukawa 1999, 2000, 2005; Botma 2004). This paper shows how the opposite assumption, i.e. headed |$\underline{L}$| for nasality and dependent |L| for voicing, enables us to take a fortition-based approach (note the strong word-initial environment), by composing headed |$\underline{H}$| (representing frication) in the AM environment. Since the Single Optional Headedness Condition (cf. e.g. Breit 2013a:5) rules out the doubly-headed representation *|$\underline{L}$, $\underline{H}$| for the targeted nasals, |H| can only be composed as a dependent, leading to realisation of a voiceless nasal. Loss of edge (|ʔ|) in plosives is due to an inability to license |ʔ| in the context of |$\underline{H}$|. This is illustrated in (3a) for plosive → fricative and (3b) for voiced → voiceless nasal (neglecting place and edge).

(3)



Moreover, the exact same fortition-based analysis can be applied to Iaai, an Oceanic language which shows alteration of the initial consonant from voiced to voiceless nasals in certain morphosyntactic contexts such as object incorporation, as shown in (4).

(4)	[naŋ]	'brandish'	→	[n̥aŋ]	'brandish (incorp. obj.)'	
	[an]	'eat'	→	[han]	'eat (incorp. obj.)'	(Maddieson & Anderson 1995)

This refined analysis thus unifies the alteration between plosives and fricatives, and voiced and voiceless nasals under AM in both Welsh and unrelated Iaai, for which such an analysis has not previously been proposed. The new analysis is also advantageous in positing that AM is fortition (i.e. addition of elemental content), consistent with the strong word-initial environment, rather than a form of lenition (i.e. loss of elemental content).

Phonemic overlap in Canarian Spanish – the case of postvocalic voicing

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Spanish is notorious for its vast array of leniting sound changes – its consonants are not particularly stable and undergo a series of processes analysed jointly under the umbrella term 'weakening'. By the well-known process of aspiration, *s* is debuccalised and even elided in syllable-final position. Spirantisation forces *b d g* to become weaker spirants or approximants [β ð ɣ] with a variable degree of aperture (Harris 1969). Syllable-final fricatives tend to undergo voicing, while word-final consonants are devoiced, spirantised or lost. All of these changes have led to an uneven distribution of sounds: most Spanish dialects lack a contrast in fricatives, voiceless *f s x* being the only phonemic units. Voiced variants of these emerge only as context-dependent allophones. At the same time, spirantisation weakens the contrast between voiced and voiceless stops, which is maintained only phrase-initially (*dos* 'two' vs. *tos* 'cough') and word-medially after a homorganic sonorant (*manda* 'commands' vs. *manta* 'blanket'). All other instances of underlying *b d g* turn into [β ð ɣ]. Interestingly, the resultant distributional gap is 'filled' in at least one Spanish dialect.

In this paper, I present novel data from a dialect spoken in Galdar on Gran Canaria, which show postvocalic voicing of *p t k*. Most importantly, the data cannot be analysed as intervocalic or intersonorant voicing due to the asymmetry between the left-hand and the right-hand environments. It appears that a consonantal sonorant on the left (including glides) does not trigger voicing while the same context on the right does not inhibit the process as long as there is a vowel to the left.

a.	a[**b**]asionado	'enthusiastic'	b.	im[**p**]ortante	'important'
	fone[**d**]ica	'phonetics'		en[**t**]onces	'so / then'
	la fre[**g**]uencia	'the frequency'		en un ban[**k**]o	'in a bank'
	tengo una [**b**]rima	'I have a cousin'		un [**p**]ueblecito	'a small village'
	juntos y [**d**]al	'together and so on'		el [**t**]riple	'three times'
	otra [**g**]lase de	'other type of'		super [**k**]ómodo	'very convenient'

The process applies both inside words and across word boundaries, in the same token as spirantisation (except that the latter extends to post-[r l] contexts). Voicing is blocked after vowels which become adjacent to the stop as a result of elision (both *r* and *s* can be deleted word-finally). Thus: *e(s)tas son la(s)* ***c**aracteri(s)**t**ica(s)* 'these are the features' does not present voicing of the stop (in bold) after deleting coda *s*. Neither does the phrase *die(z)* ***p**rimo(s)* 'ten cousins' or *por pensa(r)* ***t**ontería(s)* 'for thinking about silly things' after eliding *s* and *r,* respectively. Moreover, voicing is blocked if a voiceless segment stands to the right (*cara[**k**]terísticas* 'features'). Coda obstruents undergo other types of weakening in this position, e.g. spirantisation, lack of plosion or elision.

Interestingly, the process described here very much resembles historical changes. In French, lenition started with the spirantisation of voiced stops, followed by the voicing of obstruents, and the resultant sounds were then spirantised and lost completely (except [β] > [v]). The context for voicing was exactly the same as in modern Canarian: *aprilem>avril* 'April' *fratre>frère* 'brother' but *rumpere>rompre* 'to break' (Bichakjian 1972). In Spanish, voiced stops were spirantised and then lost (*credo* > *creo* 'I think'), while voiceless stops were voiced and then spirantised (*lupum*>modern Spanish *lo[β]o*, Lloyd 1987), and tend to be elided (*habla(d)o* 'spoken'). It seems, therefore, that we have come full circle with the lenition process, at least in some part of the Spanish-speaking world.

The treatment of lenition in generative phonology ranges from autosegmental feature spreading and underspecification, through positional markedness in OT, to articulatory-, effort- and perception-based analyses (e.g. Harris 1969; Mascaró 1987; Lubowicz 2002; Alber 2014; Gurevich 2014; Kirchner 2001; Piñeros 2002; Kaplan 2010). The main problem is how to incorporate various types of phonetic and functional grounding into a formal phonological framework. Looking at the whole of the apparent chain shifts observable as lenition patterns from the contrast-preserving perspective, I will discuss the systemic consequences of sound change in Canarian Spanish: phonemic overlap (Bloch 1941) and the narrowing of perceptual distinctness between sounds. My OT analysis of these facts presents articulatory, perceptual and functional factors consequentially, without incorporating them into the tableaux in the form of (non-categorical) constraints.

Elements on the borders
a 'colored' approach to vowel reduction in Lunigiana dialects

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Based on new data from Lunigiana dialects, this paper offers new evidence on the way morphophonological processes get lexicalized, and argues for an OT approach to this over accounts in terms of Distributed Morphology or nanosyntax.

Background. Geographic variation is argued to synchronically show the diachronic stages of language change. An interesting area is Lunigiana (Italy), in which unstressed vowels/nuclei (henceforth uNs) underwent reduction. Lunigiana dialects vary in the reduction degree of uN's melodic content: the closer to the southern border, the milder the effects of the reduction. Assuming elements theory (Backley 2011) and an universal markedness hierarchy whereby complexity is defined in terms of number of elements and headedness, this process can be formalized as a gradual decrease in uN's melodic complexity. For instance, complex [e] |$\underline{\text{I}}$ A|, it is first reduced to [ə] |A| and then to [ ] | | (Cavirani 2015).

Interaction with morphosyntax. Interestingly, when the process targets word-final uNs, i.e. the ones that in Romance carry inflectional information, it appears to be conditioned by Spellout constraints on morphosyntactic feature expression: while word-internal uNs are consistently (though diatopically gradually) deleted, word-final uNs display a higher resistance. Word-final [e], for instance, i.e. the phonological exponent of FEM.PL, never reaches the final stage of the complexity reduction process, which stops before the complete deletion of the elemental content. As expected, a great variation can be observed. This is shown in 1), where the forms for 'women' are given as occurring in three Lunigiana dialects:

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1)                 a) Carrarese          b) Colonnatese          c) Ortonovese
    phonetics      [ˈdɔn-e]              [ˈdɔn-j-a]              [ˈdɔn-a]
                         |                    | |                      |
                         x                    x x                      x
    phonology           / \                  /   \                     |
                    |I̲|PL |A|FEM           |I̲|PL |A|FEM            |A̲|PL.FEM=SG.FEM
                     |     |               |     |                    / \
    syntax         [ N[ PL[ F]]]         [ N[ PL[ F]]]           [ N[ PL[ F]]]
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OT analysis. As shown, FEM and PL are spelled out *autonomously* and *syncretically* in Carrarese and *autonomously* but *analytically* in Colonnatese, while in Ortonovese they are spelled out by the very same phonological form that encodes SG.FEM (in the three dialects). This variation can be accounted for in terms of reranking of OT Structural constraints (*(N |STR|)$_{\mu}$), which aims at simplifying element structures in lexical uNs, Phonological Recoverability constraints (EXPRESS-|X|$_{\mu}$), which favor the expression (in the phonological representation) of morphological information (adapted from van Oostendorp 2005) and a morphosyntactic simplicity constraint favoring a one-to-one mapping between features/heads and structural positions: *SYNCRETISM (adapted form Longobardi 2001). Furthermore, notice that, under this approach, the x's of 1) can be thought of as representing both autosegmental skeletal slots and syntactic structural positions.

Comparison to other models. This approach allow us to do away with both the DM Fusion rule (Manzini&Savoia 2005) and the Lexical entry restructuring needed by the nanosyntactic analysis of Taraldsen (2009), in which Colonnatese differs from Carrarese (and Standard Italian) in as far as it lacks the (Carrarese) lexical entry <*e*, N[PL[F]]], female>. Furthermore, it allows to claim that the change under analysis didn't necessarily reach (at least in Colonnatese) the highest level of Bermúdez-Otero (2011, in press)'s grammar.

Syllable well-formedness:
Accounting for innovations in learning French vocalic nasality

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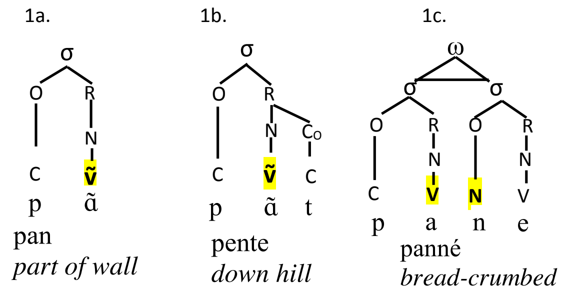
The link between distribution of French vowels, particularly nasal vowels, and syllable well-formedness, as shown in (1a-c), represents a well-known challenge for second acquisition (L2) learners from various first languages (L1).



Typically, as illustrated in (2a-c), L2 learners produce [ṼN] for /Ṽ/ in pre-consonantal or pre-pausal contexts (Detey et al. 2010, Berri and Pagel 2003, Cichocki et al. 1997) - a pattern also well attested cross-linguistically (universally, for example in English, and dialectally, for example in Southern French, (Durand 1995)). Less well-known, however, are more innovative patterns, so far unreported, applying vowel nasalisation across prosodic domains, including illegal ones, as shown below in (3a-c):

(2): **Typical** L2 Ṽ patterns

	Ṽ.C → * ṼNC				
	bæ̃ŋ / bæ̃ŋk		**bæ̃nd**		**ʒɑ̃mb**
2a	banc/banque	2b	bande	2c	jambe
	bench / bank		*gang*		*leg*

(3): **Innovative** L2 Ṽ patterns

	Ṽ# →* ṼN/VN.V		V.N→* Ṽ		V.N →* Ṽ.NV
	basɛ̃navag		**sømɛ̃**		**ɛ̃nevitabl**
3a	bassin à vagues	3b	semaine	3c	inévitable
	wave basin		*week*		*unavoidable*

These innovations, that is, patterns found neither in L1 nor in L2 target data, point to the implications of higher prosodic constituents, such as the syllable, for learning French nasal vowels and their alternations - a consideration crucially missing from earlier research. Across the learning ages, the gradual change from *ṼNC to Ṽ (2a), over-generalising Ṽ to non-alternating environments (3b) in later stages, indicate that learners *can* learn vocalic nasality alternation but do not do so in relation to prosodic constituency.

The present study therefore investigates how current approaches based on learning biases can account for this L2 data, asking more specifically if the observed patterns are a case of preference for O-O faithfulness constraints (Hayes 2004), featural simplicity (Moreton and Pater 2012) or uniformity of paradigm (Albright and Do, 2014/15). Since learners do produce alternations, albeit innovative ones, it seems that O-O faithfulness constraints are not the most unified way to account for the data observed. However, the over-generalisation of Ṽ(N) to all prosodic domains, once the substantive bias *ṼNC > Ṽ is dispreferred, indicates that learners seek regularity or simplicity among the variety of alternation contexts. The predictions of featural simplicity vs. uniformity of paradigm in accounting for these patterns are discussed. Particularly, the role of featural complexity in learning, or the difficulty in learning, alternations of French nasal vowels (ie. [+/-nas] co-occuring with a place of articulation [+/- round / back / low]) is assessed in the light of the data.

On the emergence of complex syllables

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This paper discusses the emergence of complex syllables in Brazilian Portuguese (BP). Exemplar Model is the framework adopted and we will focus on the gradient implementation of phonological phenomena (Johnson 1997; Pierrehubert 2001; Foulkes and Docherty 2006). Several historical phenomena have led the vast majority of syllables in BP to be opened. Two major processes have contributed to syllables being open: lenition of postvocalic consonants and epenthesis. Lenition affected the postvocalic consonants /N, l, R/ but postvocalic /S/ tends to resist weakening processes. Nasal consonants in coda were deleted and the preceding vowel was nasalized: /laN/ [lã] *lã* 'wool' or /saN.to/ [ˈsã.tu] *santo* 'saint'. Postvocalic laterals were vocalized as in /sal/ [saw] *sal* or /bɾazil/ [bɾa.ˈziw] *Brasil* 'Brazil'. Rhotics which present various postvocalic realizations – as [ɾ, h, x, ɣ] – are weakening and being deleted at the end of syllables: /pɔRta/ [ˈpɔ.ta] *porta* 'door' or /maR/ [ma] *mar* 'sea'. The only other consonant that may occur at the end of syllables in BP is a sibilant that may be alveolar or alveopalatal depending on regional varieties: /mes/ [mes] ~ [meʃ] *mês* 'month' or /ˈpas.ta/ [pasta] ~ [ˈpaʃ.ta] *pasta* 'pasta'. The sibilant tends to be resistant to weakening processes. Lenition in sibilants is reported in some few lexical items - /mes.mo/ [ˈmez.mu] ~ [ˈmeʒ.mu] ~ [ˈmeɦ.mu] or [ˈme.mu] *mesmo* 'even' – or when in word boundary: *mês passado* 'last month'. Thus, there has been a general tendency for closed syllables to become open due to lenition processes although sibilants tend to be resistant to it. Besides postvocalic lenition BP also presents epenthesis as a phenomenon that promotes open syllables. Epenthesis occurs word internally when two obstruents meet as in /af.ta/ [ˈaf.ta] ~ [ˈa.fi.ta] *afta* 'mouth ulcer'. Epenthesis also occurs word-finally in loan words: [ĩ.tɛh.ˈnɛ.tʃi] *internet* 'internet'. Both, lenition of postvocalic consonants and epenthesis are claimed to be processes that could lead BP to having mostly open syllables (Bisol 2005). In this paper we argue that recently attested phenomena promote the emergence of new closed syllables leading, thus, to a new direction in syllable typology where closed syllables are recurrent. We suggest that sibilants, which are stable postvocalic consonants, contribute to the emergence of new syllable patterns, which are favoured in word-final position (Leite 2006, Barbosa 2013). Recent work has reported the devoicing and deletion of high vowels when adjacent to a sibilant (Napoleão 2010, Menezes 2012). High vowels may be deleted word-internally - as in [mis.ˈtɛ.ɾjo] ~ [ˈmstɛ.ɾjo] *mistério* 'mystery' or [bus.ka.ˈdoh] ~ [bska.ˈdoh] *buscador* 'search engine' – and also in word-final position - as in [ˈʃɛ.kis] ~ [ˈʃɛks] *cheques* 'cheques' and [ˈpa.tus] ~ [ˈpats] *patos* 'ducks'. High vowel devoicing and deletion occurs only in unstressed positions and is a phenomenon reported also in other languages such as Japanese (Kondo 2005). High vowel devoicing and deletion may be associated with the fact that high vowels tend to be shorter than non-high vowels (Beckman, 1996). The point to be made at this stage is that high vowel devoicing and deletion, when adjacent to a sibilant, promote the emergence of complex syllables. We will focus on the deletion of unstressed high front vowel in word final position followed by a sibilant as in [ˈʃɛ.kis] ~ [ˈʃɛks] *cheques* 'cheques'. We considered all combinations of (BPconsonant+high front vowel+sibilant). Our contribution is to show that high front vowel deletion and the shortening of primarily stressed vowels are related phenomena which are implemented gradually, as predicted by Exemplar Models. We also show that word final (consonant+sibilant) promotes an emergent tendency in BP which accepts closed syllables.

Non-coronal lenition in American English

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The traditional account of English phonology holds that only coronal stops lenite in the word-medial intervocalic position when unstressed vowels follow, as in *ladder, latter, lighter*, etc. In such environment both voiced and voiceless coronal stops are realized as alveolar flaps in some varieties of English, including American English. Non-coronal stops, labials and velars, are believed to be exempt from the effects of lenition in this context apart from, possibly, some loss of aspiration in the voiceless members of the pair. Moreover, a widely-cited Lisker (1986) paper suggests that intervocalic environment is especially suitable for demonstrating the distinction between voiced and voiceless stops in English since in this context phonetic voicing reliably differentiates the two. In addition to voicing, Lisker (1986) lists no less than 16 acoustic properties which participate in distinguishing voiced stops from voiceless ones in trochees such as *rabid-rapid*. Among those is onset *f*0 – fundamental frequency at the onset of the vowel immediately following the stop consonant – which has been shown multiple times to be acoustically robust and perceptually salient in cuing voiced-voiceless contrast in word-initial position (Kingston & Diehl, 1994; Idemeru & Holt, 2011): Onset *f*0 after voiced initial stops is systematically lower than onset *f*0 after voiceless initial stops.

The study reported here examined onset *f*0 and duration of laryngeal voicing in intervocalic non-coronal stops in post-stress position in words such as *backing*/*bagging* and *swapping*/*swabbing* in the speech of 18 native speakers of American English (Midwestern dialect). The results demonstrate that while voiced stops were pronounced with a significantly greater amount of laryngeal voicing than voiceless stops, a large number of voiceless stops (over 50%) had some voicing during closure. In these partially voiced stops, the voiced portion occupied on average over 60% of the total closure duration. Thus, more than a half of all [-voice] stops were actually voiced more than half-way through. In addition, some of the [+voice] stops appeared to be lenited to approximants – they showed a presence of energy in higher frequency regions and a clear formant structure. Finally, the onset *f*0 correlate of voicing, so reliable in word-initial position, did not co-vary with voicing in medial position. Onset *f*0 was higher in medial voiceless stops than in voiced ones, but not significantly so. When partially voiced stops were excluded from the set of medial [-voice] stops, the onset *f*0 difference approached, but did not reach significance.

Thus, in the word-medial intervocalic position, the same position where coronal stops lenite to flaps, labial and velar stops are also losing their prototypical voicing characteristics: voiceless stops are partially voiced, the closure is weakened for voiced stops resulting in the approximant-like production, and the onset f0 difference does not systematically co-vary with voicing distinction. These findings suggest that lenition in unstressed context is more pervasive in American English phonology than previously believed. At the same time, absence of previous accounts of non-coronal lenition in English suggests that the present data may be indicative of the sound change in progress. These finding may also bring new evidence in favor of the hypothesis that English is, or is changing towards, an aspiration language, where voicing is passive in obstruents and may occur in fortis stops when aerodynamic conditions are favorable for voicing (i.e. between sonorants).

Underlying moraicity or geminate consonant phonemes? The lexical basis of Swedish quantity

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One of the most complex phenomena in Swedish phonology is quantity. The choice of analysis significantly affects how we describe many other phonological facts in the language as well as its morphology. In Swedish, like in Norwegian, Icelandic and Faroese, quantity has (a) a rule-governed suprasegmental (prosodic) and (b) an underlying segmental (lexical) basis.

Phonetically, Swedish has complementary length, meaning that in a stressed syllable either the vowel or the following consonant, if any, exhibits increased duration as compared to corresponding short segments. Contrary to prevailing earlier views (Malmberg 1968, Elert 1964, 1970, Sigurd 1965), it was shown in the early 1970s that Swedish vowel quantity is actually *predictabl*e, a finding that conclusively reduced the system of vowel phonemes from eighteen to nine (Eliasson & La Pelle 1973). In this analysis, consonant phonotactics, the morphophonemics of dental obstruents as well as syllabification preferences (Eliasson 1978) provide evidence for treating fully long consonants as underlying geminates. Morpheme-internal geminates, in turn, exactly like heterogeneous morpheme-internal clusters, enable the prediction that a preceding stressed vowel is short. While accepting the bulk of this analysis, some interesting recent work in Swedish phonology proposes to analyze phonetically fully long consonants ([C:] as in [tak:]), not as phonological geminates (/CC/), but as moraic consonants (/C$^{\mu}$/) (Riad 2014). In contrast, half-long consonants in heterogeneous clusters (as in [takˑs], [tasˑk]) are considered to represent weight by position.

In this talk, we examine the arguments for choosing between the geminate and the moraic approach. From a theoretical and typological perspective, the mora approach conveniently aligns discussions of Swedish quantity with those of languages, in which a pervasive moraic organization of sound is more palpable than in Swedish. Yet, the solution has several undesirable effects. It substantially enlarges the inventory of underlying segments, nearly doubling the number of consonant phonemes (from 18 to 34). Phonotactically, it causes unexpected systematic distributional gaps in the core category of root morphemes by admitting the shape /taks/, /task/ with different cluster members postvocalically, but excluding the possibility of the type /takk/, /tass/ with identical cluster members. From a morphophonemic point of view, it complicates the account of phonological alternations by adding an intermediate derivational step as in /t+t/ → |t$^{\mu}$| → [t:]. Finally, it splits up the effect of the uniform Stress-to-Length Rule (= stressed syllables are lengthened) by positing an underlying consonantal mora for the type /tak$^{\mu}$/, /tas$^{\mu}$/ as opposed to the second mora in long vowels, which is rule-derived.

The geminate approach avoids all these drawbacks. Most significantly, it retains the generality of the two paramount factors that govern the occurrence of Swedish length. First, it maintains the unity of the simple Stress-to-Length Rule, deriving length from stress without exception. Secondly, it preserves the generalization that — excepting two well-defined sub-regularities — the precise positioning of length ([V:] or [Cˑ]) is decided by the absence or presence of postvocalic clustering within the morpheme ([tɑ:], [tɑ:k], but [takˑs], [tasˑk]). Hence, full-length in [tak:] (< intermediate |takˑk|) mirrors an underlying mora no more than half-length in [takˑs], but both rather reflect length by position. Insofar as the mora in Swedish is not seen merely as a notational variant of length, it therefore emerges as an epiphenomenon of the Stress-to-Length Rule and the cluster-sensitive Positioning of Length within morphemes.

The featural content of phonotactic restrictions

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The results of two nonce word tasks suggest underlearning of two phonotactic restrictions by speakers of Cochabamba Quechua: the restriction on aspirates in [h] initial words (e.g., *[hap^{h}u]) and the restriction on ejectives in glottal stop initial words (e.g., *[ʔap’u]). On these same tasks, speakers’ show strong evidence of restrictions on pairs of aspirates or ejectives (e.g., *[k^{h}ap^{h}u] and *[k’ap’u]). The results support the presence of OCP restrictions that uniquely target laryngeally marked stops, definable using the acoustic feature [long VOT], as opposed to the articulatory features [spread glottis] ([sg]) and [constricted glottis] ([cg]) assumed in previous work (Parker & Weber 1996; Gallagher 2011).

Background: Cochabamba Quechua contrasts plain [p t tʃ k q], ejective [p’ t’ tʃ’ k’ q’] and aspirated [p^h t^h tʃ^h k^h q^h] stops. Ejectives and aspirates are found in onset position in roots, and are subject to several combinatorial restrictions. Generally, both ejectives and aspirates may occur in root initial or root medial position (1a). Roots with two ejectives or two aspirates are unattested (1b). Additionally, aspirates are unattested in [h] initial roots and ejectives are unattested in [ʔ] initial roots (1c).

(1) a.	k^{h}utʃuj	‘to cut’	p’akij	‘to break’	b. *k^{h}utʃ^{h}u	c.	*hutʃ^{h}u
	suk^{h}a	‘dark’	rit’i	‘snow’	*p’ak’i		*ʔak’i

These restrictions suggest OCP restrictions on [cg], which groups together ejectives and [ʔ], and [sg], which groups together aspirates and [h]. Two experiments were conducted to test whether speaker behavior is consistent with this analysis.

Repetition: In the repetition task, 23 speakers were presented auditorally with a nonce word and were asked to repeat the word as precisely as possible. There were three types of critical test stimuli: (i) *control* items, phonotactically legal forms with a medial ejective or aspirate (e.g., [ɲap^{h}u], [ʎap’u]), (ii) *double* items, phonotactically illegal forms with two ejectives or aspirates (e.g., [k^{h}ap^{h}u], [k’ap’u]) (iii) *glottal* items, phonotactically illegal forms with an h-T^h or ʔ-T’ combination (e.g., [hap^{h}u], [ʔap’u]). Filler items were also included, and all stimuli were cross-spliced from recordings of phonotactically legal nonce words. Accuracy on nonce words with *double* violations is significantly lower than *control* ($p <$ 0.0001 for both ejectives and aspirates), but accuracy on words with *glottal* violations is not different from *control*.

Forced Choice: In the forced choice task, 19 speakers were presented auditorally and orthographically with minimal pairs of nonce words contrasting a medial ejective/aspirate and a plain stop. Forms with *double* violations were chosen infrequently: *[k^{h}ap^{h}u] prefered to [k^{h}apu] 34%, *[k’ap’u] prefered to [k’apu] 26%. Forms with *glottal* violations were chosen more often: *[hap^{h}u] prefered to [hapu] 59%, *[ap’u] prefered to [apu] 73%. Importantly, *glottal* trials did not differ from *control*, which revealed a general preference ejectives/aspirates: [sap^{h}u] prefered to [sapu] 63%, [sap’u] prefered to [sapu] 74%.

Discussion: While both tasks support a strong restriction on cooccurring ejective and aspirate stops, no evidence is found for parallel restrictions on glottals. While previous findings of underlearning have been attributed to structural complexity or phonetic naturalness (Hayes et al. 2009; Becker et al. 2012; Hayes & White 2012), the current example may derive from the featural content of restriction. The phonotactic grammar of Quechua favors restrictions on the acoustically salient properties particular to laryngeally marked stops, as opposed to their articulatory properties.

Markedness and syllable contact in Kazakh internal sandhi

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Across syllable boundaries in Kazakh, the set of permissible onsets is determined by the preceding coda. 'Desonorizing' repairs are then consistently applied after stem-final consonants (stem-*internal* exceptions are consistent with high-ranking root faithfulness):

			/-lar/ PLURAL		/-ma/ INTERROGATIVE		/-ni/ ACCUSATIVE	
	alma	'apple'	alma.	**lar**	alma.	**ma**	alma.	**nɯ**
	taw	'mountain'	taw.	**lar**	taw.	**ma**	taw.	dɯ
	kijar	'cucumber'	kijar.	**lar**	kijar.	**ma**	kijar.	dɯ
	køl	'lake'	køl.	der	køl.	**me**	køl.	di
(1)	kelin	'bride'	kelin.	der	keʲin.	be	kelin.	di
	adam	'man'	adam.	dar	adam.	ba	adam.	dɯ
	qɯz	'girl'	qɯz.	dɯr	qɯz.	ba	qɯz.	dɯ
	bult	'cloud'	bult.	tar	bult.	pa	bult.	tɯ

Similar data, absent /n/ onsets, has previously been discussed within the broader context of syllable contact (Gouskova 2004) – in which the output is treated as a function of onset-coda sonority distance. This account is thus predicated upon the assumption that the precise nature of the coda and the onset are irrelevant to the operation of the observed process – only the degree of relative sonority rise or drop is operationally significant. This does not, however, appear to adequately account for the observed behaviour of Kazakh onset /n/. Sonority distance-based constraints, on their own, predict that /n/ must behave identically to /m/, and that both must be less often repaired than /l/ – but /n/ is unexpectedly prevented from surfacing after all consonant codas, including those that permit a following onset [m] or [l]. If this is interpreted as an anomalous place on the sonority hierarchy for /n/, and the scale is somehow re-ordered to allow n > m (setting aside the specifics of that re-ordering), a distance-based analysis would incorrectly predict [n.m], which never arises.

I suggest a partial reanalysis, in order to reconcile the machinery of syllable contact with the previously unexamined data for suffix-initial /n/. The preference for surface [m] versus surface [n] might be encapsulated as an instance of the 'preservation of the marked' (de Lacy 2006 etc.) reflecting the place hierarchy dorsal > labial > coronal; modifications must then be made to associated output constraints to account for the involvement of *both* place and manner features. To this end, I propose here a domain-restricted set of conjunctive constraints (after the 'Local Conjunction' of Smolensky 1993, 1995): a complex constraint, $C_1 \Lambda_d C_2$, is derived from constraints C_1 and C_2 within the domain *d* (here, the single segment), such that $C_1 \Lambda C_2$ is violated in *d* if and only if both C_1 and C_2 are violated in *d*. In the case of constraints on particular features, *[F_X] or IDENT[F_X], it seems notationally equivalent and expedient to write e. g. *{[+F_1] Λ [+F_2]} ("avoid segments positively specified for both [F_1] and [F_2]") or IDENT{[F_1] Λ [F_2]} ("input and output segments should agree for both features [F_1] and [F_2]") . The preservation of /m/ may then be modelled by incorporating IDENT{[nasal] Λ [labial]} >> IDENT{[nasal] Λ [coronal]} (>> IDENT{[nasal]}) into the detailed ranking for sonority-distance constraints *DIST–X ("avoid a sonority distance of X across the syllable boundary"):

		*DIST +1	*DIST +0	IDENT{[nas]Λ[lab]} / all other IDENT[F]	*DIST −1	*DIST −2	*DIST −3	IDENT{ [nas]Λ[cor]}	IDENT[NAS]
/taw-ma/	☞taw.ma						*		
	taw.ba			*!					*
/taw-ni/	taw.nɯ						*!		
	☞taw.dɯ							*	*
/kol-ma/	☞kol.ma				*				
	kol.ba			*!					*
/kol-ni/	kol.nɯ				*!				
	☞kol.dɯ							*	*

This allows an account of a process which appears to be partially feature-sensitive, but still largely governed by relational information. A larger utility is in considering an approach to phonological operations assumed to be markedness-driven, in which the feature assessed for markedness ('place') and the feature modified in the output ('nasality') are independent – the more marked value of a feature [F_1] drives the preservation of a *distinct* feature [F_2].

Pre-aspiration and glottalisation in Aberystwyth and Manchester English

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This study maps the relationships between pre-aspiration and glottalisation in two varieties of English: Aberystwyth (AE) and Manchester English (MA). Five patterns are found in 18 speakers of AE, whilst 5 speakers from ME show yet another pattern.

The distribution of the two phenomena is analysed in terms of the segmental and prosodic conditioning to answer whether pre-aspiration and glottalisation are mutually exclusive or co-occurring, and, if they can co-occur in the same tokens, whether they do so successively (resulting in sequences of e.g. creaks and pre-aspiration) or simultaneously (resulting in whispery creaks).

The analyses include tokens containing fortis plosives in word-final – monosyllabic – and word-medial – disyllabic – positions (*bat* and *batter* respectively) and tokens containing fortis fricatives in word-final position (such as *mass*). The place of articulation of the fortis obstruent includes /p/, /t/, /k/, and /f/, /θ/, /s/, and /ʃ/. In the AE plosive data, the plosives are combined with /a/, /e/, /ɪ/, /ɒ/, and /ʌ/ in both prosodic conditions and with /ʊ/, /aː/, and /oː/ in monosyllables. In the AE fricative data, the obstruents are combined with /a/, /e/, /ɪ/, /ɒ/, and /ʌ/. In the ME data, the consonants are combined with /a/, /ɪ/, /ɒ/, and /ʊ/ in both prosodic conditions in case of plosives, and in monosyllables in case of fricatives. In total, 410 and 8,400 tokens were obtained for ME and AE respectively.

The results show that, in ME, a clearly phonological pattern emerges in the plosive environment: the word-medial plosive is obligatorily pre-aspirated (*batter* [pa^{h}t^{h}ə]), while the word-final plosive is obligatorily glottalised (*bat* [pa^{ʔ}t$^{(h)}$] ~ [pa^{ʔ}]). Within the fricative data, however, only pre-aspiration is obligatory, and, if glottalisation occurs, it therefore always co-occurs with pre-aspiration, and it does so in a sequence of glottalisation + pre-aspiration.

The AE data present a more diverse picture. Five patterns have been identified within the plosive context. For some speakers, pre-aspiration co-occurs with glottalisation and the latter always precedes the first. For other speakers, the two phenomena are mutually exclusive, but not necessarily in a traditionally allophonic way as observed in ME. Some respondents only pre-aspirate and some neither pre-aspirate nor glottalise. Finally, one respondent pre-aspirates word-medially and always glottalises word-finally, but approximately ¼ of these word-final glottalisations co-occur with pre-aspiration simultaneously (i.e. as whispery creaks).

It has been put forward that glottalisation may historically arise from pre-aspiration, or the other way round, but agreement has not been reached regarding which scenario is more plausible (Kortland 1988: 355; Page 1997: 179 & 185-6; Pentland 1977: 155). This study shows that the two phenomena can co-exist in multiple ways and that it is not the case that one would have to develop from the other. The suggestions in the literature would seem to assume predominance of whispery creaks if the development of one from the other was the most usual course of events, but whispery creaks occur in one respondent only, and I conclude that although it is possible for one to develop from the other, it may not be the only scenario.

A representational solution to the derivational problem of Grassmann's Law

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1. Overview. In this presentation, we examine the root alternations resulting in Classical Greek (CG) from the diachronic change known as "Grassmann's Law". We show that previous solutions in the literature face either a derivational problem, or posit a rule which does not apply everywhere its context is satisfied. We propose to account for the phenomenon by distinguishing between features linked to a segment and features linked to the root as a whole.

2. Aspirate alternation in roots. CG has a phonotactic restriction against roots with two aspirations. This phonotactic restriction does not apply across root/suffix boundaries: a root with an aspiration can be concatenated with a suffix with an aspiration.

(1) imper. *p*^{h}*a-t*^{h}*i* "speak"

In CG, laryngeal features in obstruants are neutralized before another obstruant. The roots which display final aspiration (C...C^h-) in front of a vowel-initial suffix can behave in two different ways when the vowel-initial suffix is replaced with an obstruant-initial suffix. In some roots, the root-final aspiration is neutralized and nothing else happens.

(2) *teuk*^{h}*-ō* fut. *teuk-s-o-mai* "I (will) produce"

In others, the root-final aspiration is neutralized and root-initial aspiration appears instead.

(3)	*trep*^{h}*-ō*	fut. *t*^{h}*rep-s-ō*	"I (will) cause to grow"
		aor. pass. *e-t*^{h}*rep-t*^{h}*ēn*	"I was caused to grow"
	C...C^h-V	C^h...C-C$^{(h)}$	

3. Previous accounts. To our knowledge, two analyses have been proposed to account for the alternation. 1/ Sommerstein (1973), Kiparsky (1973a) and Steriade (1982) propose that the roots in (3) have an underlying representation of the shape /C^h ...C^h-/, and undergo a cross-linguistically well-grounded process of regressive dissimilation (MacEachern 1999, Gallagher 2010). This process is similar to the diachronic change that brought the alternation, and is called after it: "Grassmann's Law" (Grassmann 1863).

(4) **t*^{h}*rep*^{h}*-ō* > *trep*^{h}*-ō* **t*^{h}*rep*^{h}*-s-ō* > *t*^{h}*repsō*

This solution faces a derivational problem: the dissimilation depends on the segmental content of the suffix, but applies only within the root (cf. *e-t*^{h}*rep-t*^{h}*ēn*). This is a problem if phonology cannot see morphological boundaries.

2/ Kiparsky (1973b) and Miller (1974), among others, argue that the original *C^h...C^h- roots have been restructured as /C...C^h-/, and undergo a process of "Aspirate Throw-Back" (ATB) when the final aspiration feature is neutralized (the rule can be translated into OT as a faithfulness constraint).

(5) /trep^h-s-ō/ → [t^{h}repsō]

But the rule does not apply everywhere its context is satisfied. The only solution to account for the distinct behaviour of *trep*^{h}- and *teuk*^{h}- is then to mark *trep*^{h}- in the lexicon with a "[+ATB]" feature.

4. A representational solution. We propose to solve this problem by allowing roots to be marked as a whole by a given feature: /(C...C)^h-/ (in the spirit of Gouma 2013 for emphasis in Moroccan Arabic, Carvalho 2004 for Portuguese metaphony). When the root+suffix domain is computed, the floating feature attaches to the rightmost voiceless stop whose laryngeal feature is not neutralized. In roots like *teuk*^{h}- on the other hand, the aspiration feature is lexically linked to the second stop: /C...C^h-/. It may be delinked under neutralization, but not displaced.

(7)	/(trep)^h-oo/	→	[trep^{h}ō]	(8)	/teuk^h-s-oo/	→	[teuksō]
	/(trep)^h-s-oo/	→	[t^{h}repsō]				
	/e-(trep)^h-t^{h}een/	→	[et^{h}rept^{h}ēn]				

Refining the underlying representation thus allows us to distinguish the roots in (2) from the roots in (3) in the lexicon with only purely phonological material. The morphological boundary, on the other hand, remains invisible to the phonology: the two components can be kept separated.

Epenthetic vowels and lexical ordering in Valencian Catalan clitics

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In Catalan, clitic pronouns exhibit a considerable amount of contextual variation in their phonetic realization, mostly depending on the host to which they attach. In Standard Valencian Catalan, for instance, the first person singular pronoun *em* 'me' /m/ is generally realized as [em] before consonants: *em compra* [emˈkompɾa] 's/he buys me'; [me] after consonants: *comprar-me* [komˈpɾaɾme] 'to buy me', and [m] both before and after vowels: *m'assalta* [maˈsalta] 's/he mugs me', *compra'm* [ˈkompɾam] 'buy me' (for the sake of clarity, epenthetic vowels are underlined in the examples). Previous works have focused on the arguments in favor of asyllabic underlying forms such as /m/ and on how to account for the site of the epenthetic vowels which are required to properly syllabify these units; according to the references, the site of the epenthesis is mainly derived from the interaction between syllabic well-formedness conditions and constraints demanding that morphs are adjacent to each other, i.e., alignment constraints between the host and the underlying part of the clitic (see, among others, Bonet & Lloret 2005 & Wheeler 2005).

Our presentation will be devoted to discuss another important issue related to clitic pronouns: the nature of the support vowel in a case in which more than one solution is available. As the example *em compra* shows, in Standard Val. the default vowel in epenthesis is usually [e], the same segment that appears in nouns or verbs under the same circumstances, as in *centre* /sentɾ/ [ˈsentɾe] 'center'. However, [e] is not the only option for some pronouns such as the masculine accusative and dative plural clitics. In the proclitic forms of these pronouns, the vowel [e] is inserted, when needed, as epenthesis, as shown by the masculine accusative plural in *els compra* [elsˈkompɾa] 's/he buys them MASC'. In enclisis, the same vowel is added after another clitic ending in a consonant: *comprar-vos-els* [komˈpɾaɾvozels] 'to buy them MASC to you PL', but after a host ending in a consonant the form [los], with a labial vowel, appears: *comprar-los* [komˈpɾaɾlos] 'to buy them MASC'. When the clitic does not require a vowel to be syllabified, i.e., following a host ending in a vowel, no additional vowels are inserted: *compra'ls* [ˈkompɾals] 'buy them MASC'.

Following Bonet, Lloret & Mascaró (2007), we will assume that the accusative an dative plural pronouns have two allomorphs ordered in the lexical entry: the regular asyllabic form /l+z/ and a second allomorph with a gender marker /l+o+z/; for ex., in Standard Val. the masculine accusative plural would present the two allomorphs ordered as {/l+z/ > /l+o+z/}. The selection of the first allomorph, the unmarked one, is enhanced by the PRIORITY constraint, which demands faithfulness to the lexical ordering (cf. Mascaró 2007). As we will demonstrate, the interaction of PRIORITY with other constraints in the ranking (namely, alignment constraints and DEP-V) gives rise to a whole typology of varieties differing in the extension of the full forms, i.e. the forms with /o/ (see Todolí 1992). The scale contains varieties similar to Standard Val., in which pronominal clitics reduce their form to the minimum, and full allomorphs such as /l+o+z/ solely appear when they are the only way to align the host and the clitic, as in *comprar-los* [komˈpɾaɾlos] (the options [komˈpɾaɾels] and [komˈpɾaɾles], with an inserted [e], misalign either the host and the clitic or the clitic stem /l/ and the plural morph /z/). The other extreme of the scale is represented by some conservative varieties in which the clitics retain part of their primordial morphosyntactic independence, with the presence of the gender marker /o/ even when the addition of a vowel is not necessary for syllabification purposes: e.g., after a host ending in a vowel, as in the form *compra-los* [ˈkompɾalos] 'buy them MASC', from the Val. variety of Palmera.

Consonant clusters in casual speech in Polish: testing the predictions of NAD and Beats-and-Binding phonology

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Net Auditory Distance (NAD) (Dziubalska-Kołaczyk 2014) is a way of quantifying the dissimilarity between neighboring sounds. In addition to including manner of articulation (in common with the sonority hierarchy) it also takes into account place of articulation. Consequently, it is able to capture finer-grained differences between consecutive consonants than the sonority hierarchy; e.g. the NAD in /pr/ is greater than in /tr/, whereas these two clusters are treated alike by the sonority hierarchy (as both are sequences of a plosive and an approximant). To quickly calculate the value of NAD for a given sequence of sounds, NADCalc – an online phonotactic calculator has been developed (Pietrala 2014, http://wa.amu.edu.pl/nadcalc/).

NAD has been used to assess the markedness of consonant clusters within the Beats-and-Binding model of phonology (Dziubalska-Kołaczyk 2002). An unmarked double initial cluster, for example, is one in which the NAD between the two consonants is greater than the distance between the second consonant and the following vowel. A double initial cluster for which this does not hold is marked. Importantly, markedness considerations are expected to play a greater role for clusters in morphologically simple, underived forms (phonotactic clusters), than for clusters in morphologically complex forms ("morphonotactic clusters"). Clusters in complex forms fall under the aegis of morphonotactics (Dressler & Dziubalska-Kołaczyk 2006), and the markedness of a morphonotactic cluster might in fact be its strength, as it signals morphological complexity of the form in question. A classic example is /md/, which, in English, appears exclusively across morpheme boundaries. Hence, it can be seen as a clear, reliable signal for hearers that they are dealing with a morphologically complex form.

Dziubalska-Kołaczyk (2014) has found that predictions following from the markedness, as measured by NAD, of phonotactic and morphonotactic clusters are to a large extent borne out when confronted with the Polish lexicon, both for types (dictionary data) and tokens (corpus data). In general, the proportion of marked to unmarked clusters has been found to be greater for morphonotactic than for phonotactic clusters.

Since this notion of markedness of clusters is embedded in Natural Phonology (Stampe 1979, Donegan & Stampe 1979) and Natural Linguistics (Dressler 1996), performance data are seen as a legitimate testing ground for the theory. Specifically, morphonotactics and cluster markedness make predictions about consonant cluster reduction, a common casual speech process in Polish (Madelska 2005). With regard to the distinction between phonotactic and morphonotactic clusters, the prediction is that clusters in morphologically simple forms should be reduced more often than clusters in morphologically complex forms. Further, for clusters in underived forms, marked consonant clusters (as measured by NAD) should be reduced more often than unmarked consonant clusters.

For the present paper, both hypotheses are tested by means of an empirical investigation of data from spoken Polish. 30 interviews, each at least 10 minutes in length, with native speakers of Polish (28 female, 12 male) have been recorded. All double and triple clusters appearing in them will be annotated with regard to morphological complexity (phonotactic vs. morphonotactic [concatenative and non-concatenative]) and with regard to position in a word (initial, medial, final). Each cluster will then be identified as either reduced or not. A statistical analysis of the results will enable testing both hypotheses presented above.

Laal rounding harmony: The case for subfeatural representations in phonology

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1. Overview & Data. This paper proposes to enrich phonological representations with phonological distinctions below the featural/phonemic level, on the basis of cumulative effects found in multiple-trigger processes. The unusual case of Laal (unclassified, Chad) is presented, in which rounding harmony requires two triggers which can either be on the same side of the target or on opposite sides. As can be seen in (1), a non-round vowel is rounded if it is followed by a round vowel of identical height and backness, AND if it is also adjacent to a labial consonant, which may be before (1a) or after (1b) the target.

(1) Laal doubly triggered rounding harmony

a.	/ɓɨ̀r-ú/	→	**ɓù̱r-ú**	'hook-pl'		c.	/ɓə̀r-ú /	→	ɓə̀r-ú	'plant-pl'
b.	/tə̀b-ó/	→	**tò̱b-ó**	'fish(sp.)-pl'		d.	/ɓɨ̀r-à /	→	ɓɨrà	'hook-sg'
						e.	/gɨ́n-ù/	→	gɨ́n-ù	'net-pl'

2. Previous approaches. Flemming (2002) points out the difficulty to account for such processes with autosegmental representations. Classic Optimality Theory (Prince & Smolensky 1993), based on strict ranking, is also at a loss, unless one extends the theory, either by allowing Local Constraint Conjunction (Smolensky 1997, a.o.), as in Suzuki's (1997) analysis of Woleaian, or by enriching phonology with scalar phonetic representations, as in Flemming's (1997, 2002) account of other multiple-trigger assimilations.

3. Analysis. I argue that this harmony constitutes evidence in favor of a subfeatural level of representation in phonology: /ɨ,ə/ in (1)a-b are subphonemically rounded [ɨᵒ,əᵒ] due to the coarticulatory effect of the labial consonant. [ɨᵒ, əᵒ] and [ɨ, ə] are contextual allophones, but are featurally identical: all are [-round]. To capture this distinction, I propose a new phonological category: subfeatures, which capture fine-grained, subphonemic distinctions between categories that are not distinct featurally, but are visible to phonology as separate categories on the basis of subphonemic differences, mostly resulting from phonologized (but not phonemicized) coarticulatory effects. [ɨᵒ] and [əᵒ] have a [0.5rd] subfeature. The doubly triggered rounding harmony can thus be analyzed as a case of parasitic rounding harmony targeting the natural class of [0.5rd] vowels only.

The analysis is couched in Hansson's (2014) modified version of Agreement-by-Correspondence Theory, and makes use of targeted Markedness constraints (2) which may refer to subfeatural categories, and stand in a markedness hierarchy (3). The relative ranking of these constraints and other faithfulness and markedness constraints is shown to account for the Laal data.

(2) ***[0.5rd][+rd]/[αheight, βfront]**: A round vowel may not be preceded by a subphonemically rounded vowel in an output string if both segments agree in height and [-front]. Assign one violation for each pair of neighboring segments that meet the criteria but fail to correspond.

(3) **Markedness hierarchy:** *[0.5rd][+rd]/[αheight, βfront] >> *[0.5rd][+rd]/[αheight] >> *[0.5 rd][+rd] >> *[-rd][+rd] etc.

Subfeatures, which do not pose the same overgeneration problem as Local Constraint Conjunction (Pater et al. 2007; Pater forth.; a.o.), can be viewed as a representational reification of phonetic knowledge (Kingston and Diehl 1994, Hayes and Steriade 2004:1), which is at the basis of phonetically driven models of phonology such as Flemming's (2002) model or or Steriade's (2009) P-map. This proposal thus follows these models' insight that auditory or perceptual representations are needed in phonology, while eschewing the problematic need for direct reference to gradient and ever-varying phonetic information (Hayes and Steriade's (2004:14) "stabilization problem").

Syllable Frequency Effects in Loanword Adaptation

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The present paper aims at examining the role of frequency in loanwords. It particularly investigates the way frequency of syllable structure can account for such adaptations. The focus will be on French loanwords into Moroccan Arabic (MA).

Unlike French, the onset in an obligatory constituent of MA syllable. When a loanword lacks an onset in the source language, it presents a challenge to the host language. Loanword data show that this is repaired in different ways resulting in a great deal of asymmetry. Consider the following examples:

	MA	French	Gloss		MA	French	Gloss
a-	**g**risa	**a**grese	To agress	b-	**T**obis	**o**tobys	Bus
	saja	**e**seje	To try		**l**astik	**e**lastik	Rubber
	Skanta	**e**ski˜te	To wreck		**k**uri	**e**kyri	Stable (n)
	Kraza	**e**kraze	To mash up		**s**tafet	**e**stafet	van
c-	**l**abilans	**a**byla˜s	Ambulance	d-	**z**alamit	**a**lymet	Matches
	lasorans	**a**syra˜s	Insurance		**z**ufri	**u**vrije	Worker
	lardwaz	**a**rdwaz	slate		**z**tazen	**e**tazuni	USA
	lotil	**o**tel	hotel		**z**migri	**i**migre	immigrant

The initial syllables of all French words in the data above lack an onset; however, when borrowed into MA they satisfy the ONSET requirement. This is done differently in different words. In sets (a) and (b) the initial vowel is deleted altogether. In (c) and (d) *–l* and *–z* function as onsets, respectively. What triggers such an asymmetry? I will argue that frequency effects in the donor language (the input) play a role in the adaptation of the ill-formed syllable. In other words, occurrence frequency of these words with preceding morphemes, hence, sounds, in the source language has an influence on phonological patterns in the adaptation data.

There is a growing body of research interested in the role that frequency effects play in grammar. It has been applied to different areas of linguistics, in general, and to phonology, in particular. They have been used to model intra-language and inter-language phonological variation (Antilla, 1995, 1997). Also, scholars have studied the way frequency of words' occurrence has an impact on undergoing or resisting phonological change (Bybee, 2001, 2006; Pierrehumbert, 2002). Moreover, psyhololinguistic studies have demonstrated the relation between frequency and phonology in word recognition (Conrad & Markus, 2007; Mathey & Zagar, 2002; Conrad & Jakobs, 2004). In addition, other researchers (Sloos, 2013) have proved that frequency effects play a significant role in loanword adaptation.

Adopting the Optimality Framework (OT), this paper will base its analysis on the existing literature to shed light on how syllable frequency effects can demystify the irregularities manifested in the data in hand. I will attempt to provide a model that incorporates frequency effects. More precisely, I will introduce some preference constraints and show how they interact with faithfulness to the input in order to generate the optimal output. The strength of my account lies in its ability to (i) generate the different outputs in the data, (ii) predict the output for new loanwords in MA, (ii) account for variation in the loanword data, and (iv) show the flexibility of OT to incorporate certain non-linguistic yet significant generalizations about language.

Effects of stress-based rhythm on unstressed syllables

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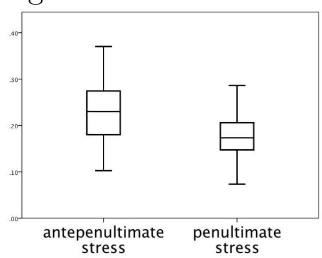
The fact that "stress timed" languages like English have rhythmic durational differences between adjacent syllables has been linked to syllable complexity and stress-related vowel reduction (Dauer 1983). Prieta et al. 2012 show that a duration-based rhythmic pattern separates languages like English from "syllable-timed" languages like Spanish even apart from these phonological factors. They conclude that there are differences in durational planning, due to the use of duration in stress and the degree of final lengthening (FL). They show that these durational phonetic effects are weak in Catalan, which explains why it has timing similar to Spanish, despite having vowel reduction. We look within English, at the word-level, and find that this duration-based rhythmic pattern extends beyond factors of stress and FL. This finding is replicated in Norwegian, a language without (much) vowel reduction but which also uses duration in the realization of stress and has FL (Kristoffersen 2000, Lunden 2010).

Word-final syllables often avoid stress, e.g. are extrametrical (Hayes 1995) which can result in words in which the otherwise rhythmic pattern does not continue throughout the entire word, as in the pattern σ́σσ̀σσ. We investigate whether word-final syllables in this position exhibit a degree of increased duration that nevertheless continues the rhythmic pattern. If the rhythmic pattern is continued, rhymes of unstressed final syllables that are adjacent to an unstressed penult are expected to be significantly longer than those coming after a stressed penult.

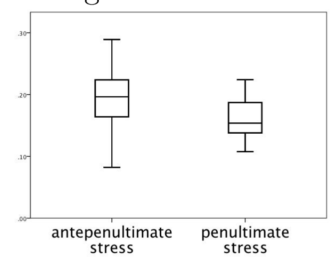
Participants were 24 native speakers of Norwegian (in Norway) and 20 native speakers of English (in the US). Words were selected for final syllables that could be paired for rhyme structure and vowel quality between words with penultimate stress and those with antepenultimate stress, i.e. *assáss**in***, *móccas**in*** in English and *safár**i***, *brókkol**i*** 'broccoli' in Norwegian). These were read in carrier phrases. The duration of the final syllable rhyme was divided by the duration of the word (as it was not possible to match all aspects of paired words) and the resulting ratios from paired final syllables were compared. One quarter of the Norwegian data has been measured (33 word pairs total, 7 subjects), and the English data has been gathered but not measured. The English data shown is from the pilot experiment (23 word pairs total, 4 subjects). For both languages, a linear regression found that the word-final unstressed syllables were significantly longer when the stress was antepenultimate rather than penultimate ($p = 0.002$ for English; $p < 0.001$ for Norwegian).

Unstressed final syllable rhymes:

English



Norwegian



We find significantly higher duration among unstressed word-final syllables depending on whether the length would continue the duration-based rhythm of the word or not, indicating that duration-based rhythm extends beyond phonological stresses, in languages both with and without stress-based vowel reduction.

Is there Phonology without Meaning?

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Phonology has been called ‘linguistic phonetics’ (Ladefoged, 1971), and most accounts of phonology emphasize the contrastive function of phonology. Current models of phonology, whether theoretical or psycholinguistic, also have meaning as central to phonology.

In certain types of disordered speech semantic content appears to be missing. So, can such speech be described phonologically; is there phonology without meaning? In this presentation we describe two examples of jargon aphasia. The first example consists of non-perseverative non-word jargon, produced by a Louisiana French-English bilingual woman with aphasia. The second is an example of partly perseverative non-word jargon produced by a British English speaker with aphasia. It should be noted that speakers with jargon aphasia generally have no comprehension difficulties. We present a phonetic analysis of two short speech samples from the speakers.

Ms H’s jargon has internal systematicity: There are clear preference patterns in terms of segment frequencies, and sequential properties (preferred syllable structures, and stress assignment in di- or multisyllabic strings). These systematic properties show overlaps with both the French and English phonological system and structure. Therefore, while she does not have access to the lexicon of either language, it would seem that she accesses both the French and English phonological systems.

Mr WS used a limited set of syllable shapes and foot structures; he used many of the vowels expected for British English, though some seemed to differ. Also, WS was able to use a selection of plosives (including glottal stops), affricates, fricatives, and nasals in his jargon. Although at the system and structure levels Mr WS’s speech differs from that of the target phonology, at the prosodic level this is not so marked. Mr WS uses a variety of appropriate pitch patterns during his speech that give the impression of the use of the target intonation system.

The authors have previously discussed the importance in clinical phonetics and phonology of considering the perspective of both the speaker and the listener. In the cases presented here, we argue that both speakers access (at least parts of) their phonology and from their perspective they are intending to signal meaning contrasts. The listeners though fail to perceive the intended meanings. Our answer to the question posed in the title, therefore, is that there is (at least partial) phonology for the speaker, if not for the listener. Therefore, such speech is amenable to analysis by the clinical phonologist, as well as by the clinical phonetician.

Reference

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From voice to aspiration

Voicing distinctions in the Dutch-German dialect continuum

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It is well-known that many dialects spoken in the Netherlands exhibit a voicing distinction, while many dialects spoken in Germany exhibit an aspiration distinction. But what kind of systems do we find in the transition zone between these dialects? How is the change between the two systems implemented, and how does this affect phonology?

Background. At the western end of the Dutch-German dialect continuum we find voicing, and at the eastern end we find aspiration. Phonetically, the difference between these two systems is (among other things) one of Voice Onset Time (VOT) for word-initial plosives (Lisker & Abramson 1964), and percentage of voicing during closure for word-internal plosives (Beckman, Jessen & Ringen 2013). Laryngeal Realism assumes a phonological difference between the two systems: [voice] vs [Ø] in voicing systems and [Ø] vs [spread glottis] in aspiration systems (a.o. Iverson & Salmons 1995).

Issue. Even though the behaviour of linguistic varieties at the ends of the continuum may be clear, it is not known how linguistic varieties in the transition zone between the two systems behave. Since speakers always adjust their language to the language of other speakers (e.g. Labov 2010), and since VOT and percentage of voicing are continuous variables, we might expect a phonetically gradual change between the two ends of the continuum. Phonologically this gradualness cannot be expected, since we are dealing with discrete phonological features; the expectation is thus that there exists a clear phonological boundary between the two systems.

The strong interplay between phonetics and phonology gives us different possible scenarios. A first possibility is that there is a very strong correlation between phonetics and phonology. This would falsify the hypothesis of a phonetical continuum between the two systems. Another option is that there exists a mismatch between phonetics and phonology, so that some phonological voicing systems would show phonetic characteristics of aspiration languages or vice versa.

Analysis. Using data from dialects spoken in the Netherlands and Germany, I show that a lot of phonetic variation is found, especially for the fortis plosives. All fortis plosives show both short-lag and long-lag VOT values, and a gradual increase in VOT values can be found for the fortis alveolar plosive. Lenis plosives show a much more stable behaviour, most of them being clearly prevoiced. Intervocalically, the fortis plosives also show more variable behaviour than lenis plosives, with both partial and full voicing for fortis plosives but mostly full voicing for lenis plosives. Based on these distributional data an underlying [voice] analysis is argued for these dialects, which is supported by data on voice assimilation and past tense formation.

Implications. The data show that while phonetics is variable, the underlying phonological system is much more stable: while many fortis plosives show long-lag VOT values, they cannot be characterised as [spread glottis] underlyingly. This implies that while speakers may adapt their phonetics to another speaker's phonetics, underlying phonological systems cannot easily be transferred (contra Thomason & Kaufman, 1988). The data therefore also show that the assumption made by Laryngeal Realism, that one of the plosive series is unmarked, is on the right track.

WHAT VOWEL ACQUISITION TELLS US ABOUT VOWEL HARMONY AND VOWEL RAISING IN BRAZILIAN PORTUGUESE

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Brazilian Portuguese (BP) has seven stressed vowels /i, e, ɛ, a, ɔ, o, u/ which neutralize to five in pre-tonic position /i, e, a, o, u/ (Câmara Jr 1970[1999], Wetzels 1992). This position is also the locus of instability for being affected by phonological processes, including vowel harmony of height (VH) by which /e, o/ optionally assimilate to [high] when either /i, u/ are in the immediately following syllable (me'nino ~ mi'nino, koruʒa ~ kuruʒa, bo'nito ~ bu'nito) (Bisol 1981). However, studies suggest that /e/ and /o/ raisings occur for different reasons: while /e/ raising results solely from phonological assimilation, /o/ raising is also highly conditioned by surrounding velar and labial consonants and may even dispense with the presence of a high vowel (mo'dɛrna ~ mu'dɛrna, go'vernu ~ gu'verno, bo'laʃa ~ bu'laʃa) (Yacovenco 1993, Viegas 2001, Callou et al 2002). This study compares the acquisition of vowels in tonic and pre-tonic positions based on Miranda (2013) according to which children are sensitive to the instability of pre-tonic vowels in BP. It also investigates the acquisition of pre-tonic raising and verifies its effects on the acquisition of pre-tonic vowels. Finally, it examines whether the children's productions of /e/ and /o/ in pre-tonic position can shed light on the difference between /e/ and /o/ raising. Our hypotheses are: given that the pre-tonic system is affected by phonological processes, it will stabilize later than the tonic system; however, assuming that only /e/ raising is affected by a phonological process, the acquisition of pre-tonic /e/ will take place later than the acquisition of pre-tonic /o/.

Data are from three children acquiring BP from 1;0 to 2;11 (year;month). Two corpora were formed for each child: one including vowels in the tonic position and another in the pre-tonic position. The data totaled 6,911 productions with tonic vowels and 4,381 with pre-tonic vowels. The methodology proposed by Ingram (1981, 1989) was used to determine when vowels had been acquired.

The results for /e/ show that this vowel in pre-tonic position is acquired later than its counterpart in tonic position by the first two subjects and it is still not acquired by Subject 3 at 2;11 (Table 1). We have also noticed that deviant productions of pre-tonic /e/ come to an end once the conditions that govern VH in BP are mastered by Subjects 1 and 2, suggesting that its acquisition is correlated with the acquisition of a phonological rule by which affects it is affected. As for tonic and pre-tonic /o/, results show that they are acquired simultaneously by Subjects 1 and 3, and with a one-month difference by Subject 2 (Table 2). We have also seen that overgeneralizations of /o/ raising persist even after vowel harmony is mastered, affecting strictly forms with labial or velar consonants.

This suggests that (a) /e/ and /o/ do indeed behave differently regarding their raising in the pre-tonic position in BP as pre-tonic /e/ is acquired later than pre-tonic /o/ and (b) segments affected by phonological processes take longer to be acquired.

Table 1: acquisition of /e/ in tonic and pre-tonic position:

	Tonic	Pre-tonic
Subject 1	1;7	2;7
Subject 2	1;8	2;0
Subject 3	1;11	-

Table 2: acquisition of /o/ in tonic and pre-tonic position:

	Tonic	Pre-tonic
Subject 1	1;8	1;8
Subject 2	1;6	1;7
Subject 3	2;4	2;4

English /l/-darkening in Element Theory

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The lateral approximant in General British English (GB) is realised as light (with a front vowel resonance) when it precedes a vowel or [j] (1a–b), and as dark (with a back vowel resonance) when it occurs before a consonant or phrase-finally (1c–d), or when it is syllabic (regardless of what follows) (1e). In addition, dark [ɫ] can be increasingly vocalised to [ʊ], also outside of London (Cruttenden 2014).

(1)	(a)	[l] / __ (#) V	*look, ugly, feeling, all over*	(2)	(a)	[j]	|**I̲**|
	(b)	[l] / __ (#) [j]	*volume, feel you*		(b)	[w]	|**U̲**|
	(c)	[ɫ] / __ (#) C	*help, feel them*		(c)	[ɹ]	|**A**|
	(d)	[ɫ] / __ #	*feel*		(d)	[ɥ]	|**U̲ I̲**|
	(e)	[ɫ̩] / [syllabic]	*fiddle, fiddling, fiddle it*		(e)	[l] |**A I**|	[ɫ] |**A U**|

The contexts in (1c–d) (preceding a consonant or a pause) suggest that darkening can be regarded as lenition. Lenition has been insightfully analysed in Element Theory as decomposition in weak positions (e.g. Harris 1990, 1997). However, it is not clear how velarisation can be characterised as element loss. In (2), the representations of approximants in English (and French [ɥ]) are given, based on Backley 2011. They are all analysed as glides, containing solely resonance elements in a non-nuclear position. By itself, a headed |**I̲**| is interpreted as palatal (2a), a headed |**U̲**| as labial-velar (2b), and a non-headed |**A**| as alveolar (2c). Elements may also combine. |**U̲ I̲**| defines a labial-palatal glide (2d). Laterals are also complex glides (2e), |**A**| standing for the alveolar closure, combined with non-headed |**I**| or |**U**|, giving front or back vowel resonance: light [l] is thus purely coronal, while dark [ɫ] is a velarised coronal. The problem then is that darkening of /l/ to [ɫ] cannot be represented without element substitution lacking a local source, a device explicitly forbidden in this approach. In fact, another problem is also posed by treating darkening as lenition. Honeybone 2005 proposes that by default lenition applies across the board, however, it can be inhibited by positions sharing some melody with an adjacent position. This predicts that lenition cannot apply to shared structures without also affecting non-shared structures. However, this prediction is refuted by the behaviour of syllabic [ɫ̩], which is darkened even if a vowel follows (*fiddling* (1e)), whereas non-syllabic [l] is light in this context (*feeling* (1a)). Syllabic consonants are analysed as branching on a preceding V position in Government Phonology (Scheer 2004), thus constituting a shared structure, as opposed to the intervocalic singleton.

To solve these problems, I propose to represent laterals in GB as |**A I U**| underlyingly. As there are no front rounded vowels in English, |**I**| and |**U**| share the same line and they cannot combine in a compound segment. Therefore, underlyingly they float in the lateral. Association of |**I**| or |**U**| takes place at the phrase-level, resulting in the variants in (2e). I propose that the choice of which element is realised in which position is determined by the apophonic path, defined by Guerssel & Lowenstamm 1996 as |**I**| → |**A**| → |**U**| → |**U**|. |**A**| is attracted to the nuclear position, whereas |**I**| to the prevocalic and |**U**| to the postvocalic position. This division is not strict, as |**A**| also occurs in non-nuclear positions, but it predicts not only the distribution of light and dark /l/, but also the position and type of vocalisation found. Backley does not utilise the combination |**A I U**| in the representation of consonants, but there is no principled reason for its absence, as it does occur in the realm of vowels (e.g. French [ø]), and all other combinations exist for consonants too (2d–e).

Darkening thus does not involve lenition of /l/, but partial interpretation in all positions. In contrast, vocalisation of dark [ɫ], involving loss of |**A**| (the tongue tip contact) in weak positions, is still analysed as lenition. Accents of English showing uniform realisation of /l/ do not require the abstractness proposed here for GB, and have the light or dark representation given in (2e) (e.g. Tyneside vs. Standard Scottish English). Gradient variation exhibited by some accents (e.g. American English) will be shown to be a variant of the GB pattern.

Geminate onsets in Dutch interjections – consequences for syntax and phonology

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In the standard grammatical tradition, interjections are taken to reside outside the core grammar: interjections have deviant syntax (e.g. they resist *merge*) and have deviant phonology (e.g. they allow lax vowels word-finally in Dutch), e.g. /hɛ↗/, /bɑ↘/, /ɣɔ↘/, etc. We will report on a novel deviant aspect of interjections: they systematically start with an onset geminate in Dutch, e.g. /b:ɑ↘/, which had thus far remained unnoticed.

In the core grammar of Dutch, underlying geminated onsets do not occur. We do not take this fact, as a contrast between core-grammar and periphery, but show that the two deviant facts are related: the reduced minimal word length of a one-mora coda is compensated by a moraic onset. This is in line with Dingemanse *et al.* (2014)'s claim that interjections are inside the phonological system. The compensatory effect comes about by copying coda material to the onset.

First, we will provide phonetic evidence. Voice Onset Time (VOT) values for the initial /b/ in the minimal pair *bak* 'container' – *bah* 'interjection of disgust' are measured and compared. We expect that prevoicing (negative VOT) for /b/ in *bah* is longer than in *bak.* In order to account for differences in speech rate, VOT was normalized. We will discuss several ways to compute normalized VOT (VOT divided by word length or by vowel length). Normalized VOT for *bak* was divided by normalized VOT for *bah* (gemination factor). By computing the gemination factor as in column 1 and 4 (see table), most speakers have values around two, which means that their /b/ is about twice as long in *bah* as in *bak*. Absolute as well as normalized (as in column 1 and 4) VOT values show that there is significantly more prevoicing in *bah* than in *bak*. There is no significant difference in word length between *bak* and *bah*, which means that /b/ is not just longer because interjections are longer in duration.

Gemination factor in *bah*		**VOT / word** bak/bah	**VOT / vowel** [ɑ]/[ɑ]	**VOT / vowel** [ɑ_]/[ɑh]	**VOT / vowel** [ɑ_]/[ɑ]
1	0.5-1.5	4	**11**	**10**	1
2	**1.5-2.5**	**10**	4	4	**6**
3	2.5-3.5	1	0	0	**5**
4+	3.5+	0	0	0	3
	Mean	1.6	1.2	1.3	2.8
	s.d.	0.51	0.55	0.56	1.22
	Total	15	15	14	15

Then, we will present various pieces of phonological evidence: length is present in the phonological representation (geminates are not just phonetically longer). For example, this is shown by the existence of minimal pairs:

(1) a. bbah! [b:ɑ] (or [b:ɑħ]) physical or moral disgust
b. baah! [bɑ:] physical disgust only

Further phonological evidence is that some speakers do not geminate the onset, but devoice it to [p]. Devoicing is one of the ways of realizing geminates (Topinzi 2005:213). We will provide a model in Moraic Theory that captures both the gemination and the devoicing, i.e. copying the [sg] feature in the coda to the onset.

Finally, we will discuss the nature of the copying to the onset. We will argue that this copying is not phonological (though its consequences are), but is driven by syntax. This can be modelled if we assume that the two interacting modules, phonology and syntax, do not have a pre-defined or fixed interface level: when syntax and phonology interface at word level, a sentence composed of words arises; if syntax and phonology interface at segmental level, interjections are created: elements that do not exceed the word level. It accounts for the deviant syntactic status of interjections: their apparent resistance to merge.

Contradictory effects in prominent positions? Evidence for the separation of levels.

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„Phonologically prominent positions“, usually refer to stressed syllables and the left margin of all, especially higher, prosodic constituents. Such positions are commonly associated with both phonetic strengthening (e.g. enhanced duration, more aspiration) and a higher potential for contrast. Psycholinguistic reasons have been invoked to explain the latter connection: speech processing is thought to be more efficient when positions especially important for word recognition are associated with maximal phonological contrastiveness (Nooteboom (1981), (Taft 1984)). In OT, these effects are modeled by ranking positional faithfulness constraints linked to prominent positions above markedness constraints (Beckman 1998). Phonetc strengthening is described by singling out a special class of markedness, so-called "augmentation constraints", which, linked to those same prominent positions, crucially dominate faithfulness constraints (Smith 2004). These coinciding positions suggest reference to a single level of abstractness, where the increased potential for contrast is linked directly to the salient perceptual cues resulting from prosodic prominence (Steriade 1995).

The problem with this picture is that it is factually incorrect, at least for English and German. While phonetic strengthening is indeed correlated with the prominent positions indicated above (see below), the evidence from contrast indicates the opposite patterns in initial positions. Examples, including common patterns of loan word adoption seen in the corpus *Deutsch Heute*, are given in (1a). English examples are given in (1b). (The foot-initial position, omitted here, exhibits somewhat similar patterns as the pword-initial position)

(1)	**Unstable/no contrast in pword-initial position**	**Stable contrast foot-internally**
a.	{/p^{f}/, /f/} -> /f/ (homophony *Pfahl* 'stake' - *fahl* 'pale', both /f/*ahl,* for 50% of German speakers)	*Hár.*/f/*e* - *Kár.*/p^{f}/*en* (distinct for all)
	{/s/, /z/} -> /z/ (Span. [s]iesta → G. [z]iesta)	*Mú.*/s/*e* - *Mú.*/z/*e*
	{/t^{ʃ}/, /ʃ/} -> /ʃ/ (Eng. [t^{ʃ}]ips → G. [ʃ]ips)	déu./t^{ʃ}/en - táu./ʃ/en
	{/ç/, /k/} -> /k/ (/k/, instead of /ç/, for 30% of speakers (/k/ina 'China', /k/emie 'Chemie')	*síe.*/ç/*en* - *píe.*/k/*en* (distinct for all)
	{/ʒ/, /ʃ/} -> /ʃ/ (French [ʒ]elatine → G. [ʃ]elatine)	*Prestí.*/ʒ/*e* - *Ní.*/ʃ/*e*
b.	{/θ/, /ð/} -> /θ/ pword-initial (/θ/*únder*), /θ/*ick*) -> /ð/ function word initial (/ð/*is*, /ð/*ough*)	*áu*/θ/*or* - *fá*/ð/*er*
	{/ʒ/, /d^{ʒ}/} -> /d^{ʒ}/ (French [ʒ]*enre* → E. [d^{ʒ}]*enre*)	*léi.*/ʒ/*ure* - *lé.*/d^{ʒ}/*ion*
	(Jap. [t^{s}]*unami* → E. /s/*unami*, Afr. [t^{s}]*é*[t^{s}]*e* → E. /t/*é*/t^{s}/*e*, Yidd. *má*[t^{s}]*e* → E. *má.*/t^{s}/*ah*	

The contrast patterns hence support the association of the word-initial position with neutralization suggested by Trubetzkoy (1958:212), as opposed to the foot-internal syllable position. Phonetic strengthening in German (or English), however, clearly favors the left edge of the pword, to be documented with the results of new acoustic studies of aspiration and glottalization in pword-initial unstressed position (e.g. [t^{h}]*ermín*, [^{ʔ}ɔ]*rchéster*), compared to the lack thereof in foot-internal syllable-initial position (*Stá.*[t]*ik*), *Ché.*[ɔ]*ps*). The study is based on 400 speakers from the corpus *Deutsch Heute*.

The disparity documented here supports the Structuralist separation of a phonemic level from phonetic implementation. The connection between phonetic strengthening and specific prosodic positions can then be explored and possibly explained as target overshoot of phonemically encoded features in the relevant contexts (aspiration of voiceless plosives: [-voice] → enhanced widening of the glottis), glottalization of vowels: [+voice] → enhanced adduction of the vocal folds). Glottalization is clearly not contrast enhancing in German.

Neutralization in word- or foot-initial onsets indicates the linking of regular markedness constraints to these positions at the phonemic level. It further indicates the need to restrict positional faithfulness to onsets and stressed syllables, to the exclusion of the (left) margins of higher constituents. Once restricted to the phonemic level, dominating markedness necessarily yields neutralization, dominating faithfulness necessarily yields contrast.

Word Order Restrictions and ‘Heaviness’ in Japanese

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As a typical ‘free word order’ language, the word order among modifiers of nouns (i.e. adjectives, demonstratives, relative clauses, possessors) is free in Japanese. However, they do show a word-order restriction depending on the ‘heaviness’ of the modifiers.

(1) a. [Rondon-kara kita sensei]-no [atui] hon
London-from came teacher-GEN thick book

b. *?[atui] [Rondon-kara kita sensei]-no hon
thick London-from came teacher-GEN book
‘[the teacher who came from London]’s thick book’

A similar phenomenon is observed in (sentence-level) scrambling; the heavier constituent tends to be scrambled to the front position (e.g. Yamashita & Chang 2001). In the literature, the notion of ‘heaviness’ (or ‘length’) relies on the number of morae. However, I argue that this is not the only factor that affects ‘heaviness’. In this paper, I investigate a Mismatch Condition on the word order in Japanese and the notion of heaviness. As a condition for successful foot-assignment, van der Hulst (1984) proposes the Mismatch Condition.

(2) $[\sigma_s\ \sigma_w]_{Foot}$ Mismatch Condition: $\sigma s \geq \sigma_w$

I propose that this condition can be extended to the case in question. Given two modifiers of nouns, the phonological prominence structure would be: $[[[\text{Mod1}]_s\ [\text{Mod2}]_w]_w\ [\text{Noun}]_s]$ (cf. the Nuclear Stress Rule; Chomsky & Halle 1968, the Rhythm Rule; Selkirk 1984). The Mismatch Condition requires that the ‘heaviness’ of Mod1 and Mod2 be Mod1≥Mod2. In addition to the number of morae, I suggest that at least two factors are relevant to ‘heaviness’.

(3) a. Branching Intonational Phrases count as heavy. b. Focused constituents count as heavy.

In fact, (1b) improves by increasing the number of phonological words in Mod1, or focusing Mod1 (*siroi*), in addition to (1a). Even when the number of morae of Mod1 is the same, there is a contrast as below.

(4) a. ??$[_{Mod1}$ kowareta/ayamaru] $[_{Mod2}$Rondon-kara kita tomodachi-no] omotya
broke/apologize London-from came friend-GEN toy
‘the friend who came from London’s toy that broke/apologizes’

b. $[_{Mod1}$ ki-o kiru] $[_{Mod2}$Rondon-kara kita tomodachi-no] omotya
tree-ACC cut London-from came friend-GEN toy
‘the friends who came from London’s toy that cuts trees’

In (4), Mod1 constitutes an Intonatinal Phease (cf. Akasaka & Tateishi 1991). The contrast in (4) can be explained by (3a); Mod1 (=one IntP) in (4b) is branching, so this counts as heavy, while Mod1 in (4a) does not. It should be noted that the Mismatch Condition with (3) seems to hold cross-categorically and cross-linguistically; e.g. word order restrictions on adverbial phrases in Japanese and adjectival phrases in Korean obey (5).

(5) In the liner sequence $[_{XP}\ \alpha\ \beta\ X]$ where α and β modifies the head X, α≥β in heaviness (in head final languages).

Regarding head-initial languages, English has ‘short before long’ preference of word order (Yamashita & Chang 2001), which can be considered as a ‘reversed’ version of (5).

The initial CV has done its work, the initial CV may go

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In Israeli Hebrew (IH), initial clusters are allowed if they are of rising sonority or obstruent-obstruent (**kr**ica 'winking' **kt**iša 'crushing'). If C_1 is a sonorant, the cluster is broken by an epenthetic [e] regardless of the identity of C_2 (n**e**tiša 'abandoning', l**e**mida 'learning'). This epenthetic vowel is further subjected to optional external sandhi: it may be deleted if the preceding word ends in a vowel (ha-ntiša ~ ha-n**e**tiša 'the abandonment). Epenthesis subsists if the preceding word ends in a consonant (*tox ntiša 'while abanding').

This talk investigates the motivation for this state of affairs. It begins with an account of initial clusters in isolation, within a strict CV approach. We follow the claim in Lowenstamm (1999) and Scheer (2004) that languages which restrict initial clusters are endowed with extra syllabic space (an empty CV unit) that marks the beginning of the word and occurs in this location. The empty V-slot of this initial CV needs to be governed, and with illicit initial clusters this can only be achieved by realizing the nucleus between the two C's of the initial cluster (/Cø-CøCV…/ → Cø-CeCV…).

But the sandhi effect mentioned interferes with this account: the fact that the vocalization of sonorant-initial clusters may be (optionally) undone in case the preceding word ends in a vowel means that there is no empty nucleus to the left of the cluster anymore that provokes epenthesis (/…V - CøCV…/ → …V - CCV…). Hence the initial CV must be present when the word is computed in isolation (it triggers epenthesis), but absent when the input to computation are several words. We submit that the presence / absence of the CV unit marking the beginning of the word is a function of phases (cycles): the initial CV is phase-initial (rather than word-initial). That is, it is the phonological exponent of the (left edge of) phases (Scheer 2012). It follows that it is present upon the computation of the phase it is the exponent of, and absent otherwise. If the word phase in IH is headed by an initial CV, then the phase structure [B[A]] spells out as /CV-A/ in the inner phase, and as /CV-BA/ in the outer phase: the initial CV is only present to the left of B in the latter (because it heads the [BA] phase). In absence of the initial CV to the left of A upon the computation of external sandhi [BA], then, the epenthetic vowel has no governing duties if the preceding word is vowel-final. The vowel following the cluster (the i in net**i**ša) can govern it and it may therefore drop. By contrast, when the preceding word ends in a consonant, the epenthetic vowel is called to govern the final empty nucleus of the preceding word and therefore needs to be realized (/…Cø - CøCV…/ → C - CeCV…).

Any analysis of such facts will need to appeal to the presence of the left word boundary in order to account for epenthesis, but this boundary then must be present (or visible) when external sandhi is computed. The traditional means to do that is to either allow rules/constraints to individually make reference to morpho-syntactic information (rule X "sees" the boundary, but rule Y does not), or to devise distinct computational systems according to chunk size (rule X is part of word-internal phonology, but absent in cross-word, i.e. post-lexical phonology). The former option is not workable in the IH pattern because the vowel-zero alternation has identical conditioning within a word and in external sandhi (preceding clusters), hence hinting at a single phonological process. The latter option will produce the correct result, but we wish to show that there is an alternative where only one computational system is responsible for phonological patterns within and across words. We argue that this more restrictive system allows us to better understand the interaction between representational (initial CV) and derivational (phases, cycles) means of carrying morpho-syntactic information into phonology: the former hooks on the latter.

Time permitting, we discuss clusters with historical gutturals in C_2. These also trigger epenthesis (š**e**(ʔ)ila 'loan'), but one which cannot drop in external sandhi (*ha-š(ʔ)ila 'the loan'). We show that gutturals in IH branch onto preceding non-high vowels, preventing their deletion.

Rhotic relationships: diachrony vs. synchrony in representing /r/

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The phonetic diversity of *r*-sounds, or rhotics, both cross-linguistically and within many languages, e.g. Spanish (Lipski 1994), German (Ulbrich 1972), and Swedish (Muminovic and Engstrand 2002), presents a challenge for phonologists. If there are no *phonetic* features that are shared by all rhotics (Lindau 1985; Ladefoged and Maddieson 1996:244), it is hard to assign them a shared featural representation that accounts for their similar patterning across and within languages, and does justice to their variable nature. Phonologists have attempted to characterise rhotics in highly abstract ways, as featurally (almost) empty (e.g. Harris 1994; Giegerich 1999; Wiese 2001), or by assigning them an abstract feature [rhotic] (Hall 1997) or a shared structure (Walsh Dickey 1997). Such top-down approaches, however, are inevitably ad-hoc, largely circular, and sometimes not even descriptively adequate (Gąsiorowski 2006). Lindau's (1985) solution is to characterise rhotic unity in terms of "family resemblance" (see also Magnuson 2007 for an expanded version). That is, while it is not true that all *r*-sounds share some phonetic property, it is true that every *r*-sound shares something with *at least one other*: rhotics form a network of speech sounds with overlapping features. However, while less arbitrary than the top-down approaches, it is equally unrestrictive: many other speech sounds share properties with some rhotics, but do not function as rhotics themselves. Without a theory of which sounds can be in the rhotic set, "family resemblance" fares no better than calling rhotics "empty" or "[+rhotic]". Ladefoged and Maddieson in fact suggest giving up the search for unity among rhotics altogether, as it "seems to rest mostly on the historical connections between these subgroups and the choice of the letter r to represent them all" (1996:245), a solution dubbed "shockingly informal" by Gąsiorowski (2006).

I propose a formalisation of Ladefoged and Maddieson's suggestion, by characterising rhotics not in terms of family resemblances, but family *relationships*. This is more restrictive, in that relationships between *r*-sounds are not established on the basis of phonetic similarity, but a diachronic link between two variants. Such links can be established by examining languages with extensive *r*-variation and inspecting very closely the phonetic detail of *r*-sounds, their linguistic distribution over contexts, and any sociolinguistic variation. The primary data in this talk come from a large-scale corpus of urban-accented Standard Dutch containing over 20,000 *r*-tokens from ~400 speakers from six Dutch and four Flemish cities. The realisation of /r/ in Dutch is notoriously variable across speakers and linguistic contexts, and in line with recent studies (Smakman 2006) the corpus distinguishes between some twenty *r*-variants. Age-related and geographical patterns in the data enable establishing the *origin* of specific variants in others. Specifically, this origin often lies in what happens to particular *r*-sounds in casual speech processes. For example, in casual speech, an alveolar trill may fail to be realised as such, given that it requires very precise articulatory settings in combination with narrow aerodynamic margins (Solé 2002). The result can be an alveolar approximant or fricative, which may subsequently come to function as an *r*-variant itself.

This approach anchors the unity among *r*-variants within a theory of sound change, but locates it *outside* the phonology. I suggest that this is where it should be, and that top-down featural approaches to *r* are best replaced by a bottom-up one. Instead of requiring, a priori, that *r*-sounds form a category /r/ within a language, such a category is formed by speakers on the basis of multi-level evidence, including phonological alternations and sociolinguistic variation. For example, when speakers encounter two apparently phonetically unrelated phones, such as [ʁ] and [ɹ], in an allophonic relationship, as is the case for many Dutch speakers in the corpus, they may set up representations at multiple levels in a hierarchical system (as per Ladd 2006), reflecting both their phonetic differences and their phonological identity. In other words, while the phonetic unity between such different *r*-sounds is one that can be traced diachronically (as a family relationship), their phonological unity (in representation) need not refer to this relationship, but is forged synchronically by speakers.

Against Sonority-driven Stress in Gujarati

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Introduction: This talk presents new evidence about word-level stress placement in Gujarati. On the basis of an acoustic analysis, I argue that Gujarati stress is not sonority-driven, contra de Lacy (2002), and many others (Cardona 1965, Adenwala 1968, Doctor 2004, Schiering & Hulst 2010). I report the results of an experiment that [a] does not attract stress away from the default position. This study is the first to examine the acoustic realization of stress in Gujarati, and possibly the first to extensively acoustically analyze a putative case of sonority-driven stress.

Methodology: Four male and two female native Gujarati speakers (19-24 years old) participated in the experiment. Disyllabic words with the shape [Ca.Ca], [Ci.Ci], [Co.Co], and [Cu.Cu] were used to establish baselines for the acoustic realization of stressed and unstressed vowels. There were 10 tokens for each type. Other word types had the form [Ca.CV] and [CV.Ca] (where V ranges over [o, u, i, ə]). There were 5 tokens for each type. The pairs allowed direct comparison of vowels in both putatively stressed and unstressed states. Each word was placed in two frame sentences to control for phrase-final lengthening and focus. Three repetitions were collected, yielding a total of 420 tokens per speaker. Acoustic correlates of stressed/unstressed vowels were measured, including intensity, duration, F0, F1 and F2.

Results and Discussion: According to previous descriptions, the penult is the default location for stress. In [Ca.Ca] words, there was no evidence of an F0 or intensity difference between the vowels. However, the first vowel was found to be significantly longer than the second (Mean of first V=102 ms, second V=80 ms, $p<0.01$), and the first was found to be significantly lower than the second (F1 of V_1=898 Hz, V_2=675 Hz, $p<0.01$).

Previous descriptions have reported that the final syllable in [CV.Ca] (where V is not [a]) is stressed – this is essential to the claim that Gujarati has sonority-driven stress. However, this [a] had the same quality as the ‘unstressed’ (i.e. final) [a] in [Ca.Ca] (F1=715 Hz), and its duration was significantly shorter than the stressed [a] in [Ca.Ca] (Mean =91 ms, $p=0.02307$).

I will provide a variety of other measurements involving [a] and other vowels, along with results from a binary logistic regression model, to support the claim that the [a] in [CV.Ca] words is not stressed, and that therefore Gujarati does not have sonority-driven stress.

I then review other putative evidence from stress-sensitive phonological processes from de Lacy (2002) and Cardona (1965), and argue that the processes either have no objective support, or were misinterpreted as stress-sensitive. Finally, I examine the implications of these results for evidentiary support for theories of prominence-driven stress.

The representation of [w] in West Germanic: evidence from West Germanic Gemination

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Generative phonology traditionally analyses glides [j w] as the corresponding high vowels [i u] in syllable margin function (Chomsky & Halle 1968: 302; Sagey 1986: 74; Hayes 1989: 256; Prince & Smolensky 1993: 12). However, the reconstruction of such a representation for West Germanic makes it impossible to account for West Germanic Gemination, see sample data below, where dots mark syllable divisions (after Ham 1998; Murray & Vennemann 1983; Cleasby & Vigfusson 1874).

Proto-Germanic	West Germanic	West Germanic languages	East and North Germanic languages
**skap.jan* 'create'	**skap.pjan*	OE *scieppan*, OHG *skepfan*, OS *skeppian*	Goth. *skapjan*, ON *skapan*
**hel.ja* 'hell'	**hel.lja*	OE *helle*, OHG *hella*, OS *hellia*	Goth. *halja*, ON *hel* (gen. *heljar*)
**fraw.jō* 'lord'	**fraw.wjō*	OHG *frouwe*	Goth. *frauja*, ON *Freyr* (proper name of a god)
**war.jan* 'defend'	**war.jan*	OE *werien*, OS *werian*	Goth. *warjan*, ON *verja*

After a short stressed vowel, a consonant was geminated if followed by [j w r l], according to standard descriptions. Crucially, both the geminating consonant and the sonorant inducing the process participated in WGG depending on a set of sonority-based conditions. Thus, [j] caused gemination of all consonants excluding [r], which was never geminated, but including [w]. The liquids [r l] (not shown above) induced only voiceless stops to geminate, e.g. WG **ap.pl-* 'apple', while consonants of higher sonority did not undergo the process, e.g. WG **leθ.ra-* 'leather'. It is uncertain if [w] ever triggered gemination, because little relevant data can be found. Classical phonological explanations for WGG, Murray & Vennemann (1983) and Bermúdez-Otero (1999), see the process as improvement of faulty syllable contact inherited from PrGmc.

However, two issues still remain with regard to the process. First, earlier analyses do not account for how it is possible for [w] to act as if it were less sonorous than liquids. Indeed, some degree of consonantal stricture has been repeatedly suggested for early Germanic [w], both in pre-generative grammars (e.g. Grimm 1818: 248; Kaluza 1901: § 79; Luick 1940: § 666; Campbell 1959: § 15) and in studies couched in generative phonology (Lass & Anderson 1975: 13; Hogg 1992: § 2.75). Strikingly, the grammarians posit fricative stricture for [w] far more confidently than do the phonologists. This is a result of the phonological tradition for the representation of glides mentioned above. My research suggests that early Germanic [w] ought to be represented as [+ consonantal] on the surface. In the paper, I will describe this representation in detail and show how it helps to present an Optimality Theoretic (Prince & Smolensky 1993; McCarthy & Prince 1995) analysis of WGG.

The second issue to be discussed in the paper concerns accounting for WGG itself in OT. Bermúdez-Otero (1999) considers the change to be an example of opacity, where the results of Weight-by-Position – obtained on the lexical level, but invisible on the surface – influence the post-lexical evaluation. The present paper offers an alternative, monostratal analysis, basing on the interaction of a different set of markedness and faithfulness constraints than posited earlier. The most important constraint used here may be called **DEP**$_{\mu\text{-V}}$ or **IDENT**$_{\text{O-I}[\mu]}$, and militates against mora-vowel attachments in the output which are absent from the input. The same constraint has already been used, e.g. by Suh (2001: 71-72), in the analysis of a Modern Icelandic process that is highly reminiscent of WGG. Indeed, my research suggests that **EVAL** constructed around such a constraint can, with minimal changes, account for other early Germanic processes, such as Sievers' Law or the Proto-Germanic Verschärfung.

<u>Structural Interference in Language Contact Phonology</u>

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While phonetic transfer between two (or more) languages during periods of intense language contact is to be expected, the mechanisms which drive systematic interference within the phonological grammars of the languages in contact is less well understood (Thomason & Kaufman 1992). Even more opaque is indirect structural inference: features in the contact variety which are not present in their exact form in any of the input of the varieties (van Coetsem 1988). In this presentation, I present the results of a production experiment which suggest that short-/ɪ/ allophony in White South African English (WSAE; Bowerman 2008) is the result of two different Afrikaans phonemes (/ï/ and /ə/) serving as "perceptual magnets" (Iverson et al. 2003) for English short-/ɪ/.

WSAE's most salient feature which distinguishes it from other varieties of English is the KIN-PIN split (Lanham 1968; Wells 1982; Lass 2002). In this variety, it is said that "kin" and "pin" do not rhyme: the initial velar in "kin" conditions a high, front [ï] while the bilabial in "pin" conditions a more centralised [ə]. A debate has arisen as to whether this is the result of interference from Afrikaans, with which WSAE has been in close contact for nearly 200 years. Early descriptions of WSAE assumed Afrikaans influence, due to the presence of phonemic vowels pronounced [ï] and phonemic [ə] in Afrikaans, without a corresponding phoneme with the acoustics of [ɪ] (Lanham & Macdonald 1979). This is, however, vehemently disputed in Lass & Wright (1986) and Lass (1997), as impossible for several reasons: 1) Afrikaans has no phonotactic constraint on either vowel based on consonantal context, so there is reason for the genesis of allophony in WSAE's phonological structure; and 2) the lack of a categorical split between the two allophones based on context alone, as there are high number of ideosyncracies and lack of systematicity, suggesting a low-level phonetic process.

In the present experiment, speakers of WSAE underwent a production in task which elicited over 6,000 tokens of English words containing short-/ɪ/. Acoustic analysis failed to show systematic allophony based on context alone. However, when subsequent analysis was undertaken after isolating cognates and excluding them from the data, a very clear pattern emerged in which context conditioned the split. Analysis of the cognates showed a very different pattern: those words which had an Afrikaans cognate in which the Afrikaans vowel was [ə] also contained [ə] in English, regardless of context ("ink", Afk. [əŋk]) while those with an Afrikaans cognate containing any other vowel contained [ï], also independent of context ("pink", Afk. [pïŋk]; fill, Afk. [fœl]). Statistical analysis of both the English and Afrikaans lexicon indicated entrenchment of the schema set in place by the cognates: most cognates containing velars contain [ə] in Afrikaans whilst bilabials either have [ï] or a non-English vowel ([œ], [ɛɪ]).

These experiments thus settle what has been long-standing problem for the phonemic analysis of WSAE (Lass & Wright 1986; Taylor 1991; Bekker 2011) by identifying a truly predictable and systematic process for WSAE short-/ɪ/ allophony. Additionally, it provides a plausible explanation for the genesis of structural properties which are not due to direct genetic or typological inheritance. This is then discussed within the larger context of the WSAE and Afrikaans English phonology (Watermeyer 1996; Lass 2002; Bowerman 2008), as well as the relationship between the phoneme inventories and phonological grammars of bilinguals (Bosch & Sebastián-Gallés 2003).

WHENCE THE FUZZINESS? MORPHOLOGISATION OF ONGOING SOUND CHANGES IN STANDARD SOUTHERN BRITISH ENGLISH

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According to recent reports, speakers of Standard Southern British English (SSBE) have developed a contrast in the degree of /uː/-fronting in words such as *rul-er* (=‘leader of a country’) and *ruler* (=‘measuring device’). Whereas the vowel undergoes fronting when it is followed by /l/ within the same morpheme, the presence of a morphological suffix triggers the use of a back allophone of /uː/. Instances of such ‘fuzzy contrasts’ have been previously observed in English by Harris (1994), *inter alia*. The case of *rul-er*∼*ruler*, however, is somewhat exceptional, as it potentially involves the morphologisation of not one, but two ongoing sound changes: /l/-darkening and /uː/-fronting. This paper considers two possible phonological interpretations that play a role in the morphologisation of these changes. The competing hypotheses are evaluated using ultrasound data from six speakers of SSBE.

In SSBE, /l/ has long been reported to undergo darkening in canonical coda position (e.g. in *rule*), and it has also been observed that darkening blocks the fronting of /uː/. While /uː/ generally undergoes fronting (e.g. *r*[ʉː]*t*), the back /uː/ allophone is found in *r*[uː]*le*. It is not immediately clear, however, whether the lack of fronting in /uː/ is directly conditioned by the presence of a dark [ɫ], or whether, as proposed by Uffmann (2012), fronting is blocked by the presence of tautosyllabic /l/, independently of darkening. The former generalisation directly connects the darkness of /l/ to the (non) frontness of /uː/, so it could be said to be more ‘natural’. However, the data presented in this paper provide support for a more indirect formulation, showing that /l/-darkening applies in a different morphological domain than the blocking of /uː/ fronting of vowels before /l/.

Six speakers of SSBE were recorded reading items of /uː/ + /l/ and /ʊ/ +/l/, in a range of environments systematically varying in morphological structure. The speakers’ tongue movements were captured using a high-speed ultrasound system, at the rate of 121.5 frames per second. Two types of articulatory measures were extracted: 1) tip delay (time lag between the achievement of the dorsal and the apical target in /l/ production), and 2) midsagittal tongue contour shape at the vocalic target, and at the dorsal and apical targets for the /l/.

The tip delay data show that the degree of /l/-darkening is affected by the morphology *and* by the identity of the preceding vowel. In the context of /uː/, there is a gradient morphological effect, with increasingly more /l/-darkening in the direction: *hula*<*fool-ing*<*fool it*<*fool*. However, in the context of /ʊ/, increased darkening is binary, with *pull* being dark, and no contrast in darkening being seen within the group *bully*, *pull-ing* and *pull#it*. The darkening of /l/ in *fool-ing* but not in *pull-ing* prevents us from generalising that /l/-darkening applies at the end of a morpheme. Instead, the fronting of /uː/ is blocked in the context of /l/ in the same syllable, assuming that syllabification observes morphological boundaries (*f*[uː]*l.ing* vs. *h*[ʉː]*.la*) at some point in the derivation. The /ʊ/ vowel is not subject to a similar morphosyntactic rule, hence the same vowel allophone is found in *bully* and *pulling*. The darkening in the following /l/ is conditioned by progressive coarticulation from the preceding vowel, therefore we find a dark /l/ following back /uː/ in *fool-ing*. This interpretation is supported by the data from tongue contours, which confirm a vowel fronting contrast in *hula*∼*fool-ing*, but not in *bully*∼*pull-ing*. The vowel-to-consonant coarticulation scenario is further reinforced by large differences in the average tongue contour for /l/, depending on the preceding vowel.

Is there a structural difference between homorganic and heterorganic clusters?

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Epenthesis in homorganic clusters (e.g., [st]one > [sət]one) is relatively rare across languages (Kenstowicz, 1994). Constrastingly, epenthesis (or the insertion of an excrescent schwa) optionally occurs in heterorganic clusters due to the possibility of gestural mis-timing or mis-coordination (e.g., [sw]ine > [səw]ine) (Gafos, Hoole, Roon, & Zeroual, 2010). Consequently, allophonic variation does not encompass epenthesized forms in homorganic clusters, but does so in heterorganic clusters. This stable cross-linguistic pattern suggests that homorganic and heterorganic clusters may be represented differently in the mental lexicon: Possibly, homorganic consonant clusters behave more as a unit than heterorganic ones. To test this hypothesis, we ask whether listeners are better equipped to detect the epenthesis when it occurs in an incongruent context, i.e., in homorganic clusters than in a congruent context, i.e., in heterorganic clusters. In order to determine how early such asymmetrical representations emerge, if at all, we study this question with 30-month-old children and adults. We use pupillometry, a method suited for assessing the amount of cognitive effort in both young children and adults, by exploiting pupil dilation, a psycho-sensory reflex (Höhle & Fritzsche, 2013). Previous work has established pupil dilation to be associated with cognitive load in general (Karatekin, 2007) and incongruency detection in particular (Hochmann & Papeo, 2014). Apart from our theoretical aim, we also address a methodological issue by testing whether pupillometry can be a viable tool in studying lexical representations. Half of our stimuli contained homorganic clusters, half heterorganic clusters. Each word was naturally produced with and without epenthesis (e.g., [ʃw]ein, 'pig' and [ʃəw]ein). In each trial, the participants were presented with an easily identifiable image (e.g., that of a pig) along with a corresponding auditory label, which was either produced correctly or with epenthesis. After the collection of pupil data, participants were invited to produce the lexical items in question. If there was indeed a structural difference between the two types of cluster representations, listeners would be more likely to perceive the epenthesis in homorganic clusters than in heterorganic clusters due to its incongruency, which should induce a larger difference in pupil dilation between epenthesized and correct forms than that in heterorganic clusters. We found that adults exhibited a pattern consistent with our prediction: Epenthezised homorganic clusters were associated with a significantly larger degree of pupil dilation than their correct forms, whereas pupil dilations were comparable across epenthesized and correct heterorganic clusters. This result suggests that, in line with the typological asymmetry, homorganic and heterorganic clusters are represented in a different manner in the mental lexicon: consonants in homorganic clusters form a closer bond than those in heterorganic clusters. Thus, we establish the use of pupillometry in studying lexical knowledge. Children's pupil size change, on the other hand, did not differ either in the homorganic or in the heterorganic condition. A possible reason for such a pattern is that children may be more tolerant towards structural deviations due to their lexical representations being less stable than the adults'. Alternatively, it may reflect task complexity: Processing complex syllabic structures may have produced a ceiling effect, resulting in a close-to-maximum pupil size change. In order to adjudicate between the possible explanations, further analyses are underway to explore the role of phonetic (e.g., vowel length, aspiration) and lexical factors (e.g., word frequency, familiarity, phonological processes in production). Importantly, we expect children's production to complement their pupil data in interpreting the result: Coupled with their pupil dilation patterns, observing phonological processes are going to be informative in modeling the development of different types of cluster representations.

Branchingness Constraints in Corca Dhuibhne Irish Stress

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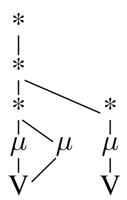
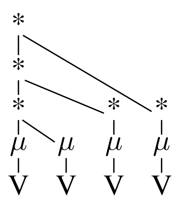
The empirical focus of this research is stress assignment in Corca Dhuibhne Irish (CDI) (Ó Sé 2000, 2008). Primary stress in CDI is usually aligned to the left word edge and a secondary stress falls on the first heavy syllable after primary stress as long as stresses are not adjacent (ˈLLL, ˈHLL, ˈHLˌH) (L=light; H=heavy). Nevertheless, initial primary stress is disrupted in a specific set of contexts. On the one hand, if the first two syllables of a word are H, stress always falls on the second H syllable (HˈH, HˈHL, HˈHH). On the other hand, if the first two syllables of the word are L and the third syllable is H, primary stress falls on the H syllable and the initial L syllable receives secondary stress (ˌLLˈH). Interestingly, the metrification ˌLLˈH contrasts with ˈLLLˌH, with three initial L syllables, initial primary stress and secondary stress on the H syllable. The question why metrifications like *ˈHH or *ˈLLˌH are ill-formed in a system that otherwise assigns initial primary stress has proven challenging for metrical stress theories (Doherty 1991, Rowicka 1996, Gussmann 1997, Green 1997, Iosad 2013).

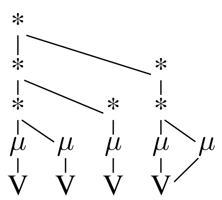
We propose a solution to the problem of CDI stress that situates itself in the tradition of branchingness conditions (Dresher and van der Hulst 1998) on three-level metrical tree structures (Liberman and Prince 1977, Hayes 1981, Hammond 1984). Branchingness constraints state that heads license structural complexity, that is, branching nodes, as opposed to non-heads, which require non-branching nodes. Moreover, we introduce one innovative aspect in our representations: not only higher level prosodic units conflate prominence with constituency, but also "syllables" (comparable to Halle and Vergnaud 1987). This allows for a mismatch between "phonetic" syllables—sequences of nuclei of high sonority—and "phonological" syllables. Any grid mark at the first prosodic level can optionally branch to take any adjacent mora as its dependent. If so, a CVCV sequence can be parsed into one unit. The apparatus we propose is independently motivated because it can derive ternarity effects, as in ternary rhythm.

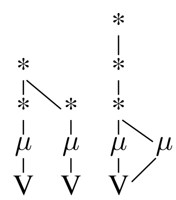
Our analysis of CDI stress rests upon the following generalizations: (i) heads of main feet must branch, (ii) non-heads must not branch and (iii) stress is aligned to the left word edge as long as branchingness constraints are satisfied and stress clashes are avoided. As shown in (1), we accept the existence of "uneven trochees" (ˈHL), a controversial foot type also defended in Mellander (2003) and Hyde (2007) (*pace* Hayes 1995). In the absence of H syllables, a sequence of two light "phonetic" syllables is parsed as the head of a main foot to comply with branchingness requirements, as illustrated in (2) and (3). Interestingly, LLH words (4), as opposed to LLLH words (3), have initial secondary stress and displaced primary stress. This metrification is optimal because it satisfies the constraints against branching dependents (5) and against clashes (6). Stress is also not initial in HH words (7) as this would violate the constraint against branching dependents (8). Leaving the second H syllable unparsed is not an option because in CDI the alignment constraint requiring the main stress constituent to be right-aligned takes precedence over the constraint requiring the main foot to be left-aligned.

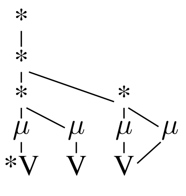
In the latest Optimality Theoretic account of CDI stress, Iosad (2013) proposes that (i) the location of foot's heads and stress, conceived as a feature, do not coincide and (ii) syllable recursion is used to render a bimoraic syllable weightless for the purpose of stress. The analysis proposed here, however, transparently accounts for CDI stress without the need to resort to "stressless heads" and highly complex and heterodox recursive structures.

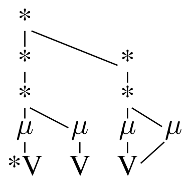
(1) 

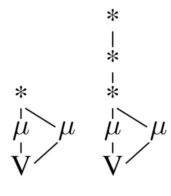
(2) 

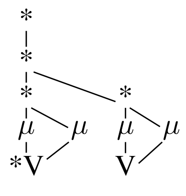
(3) 

(4) 

(5) 

(6) 

(7) 

(8) 

Tonal Overwriting as Circumfixation

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Summary: Affix-triggered overwriting in Hausa has been adduced as a major case of a phonological process governed by morphological constructions in Sign-based Morphology and Phonology (Inkelas 2014). In this talk, I show that tonal overlays can be captured in a strictly concatenative approach where overlays are tonal circumfixes that result in overwriting to ensure morphophonological contiguity. This captures the cyclic overwriting patterns discussed by Inkelas, but also extends to countercyclic overwriting where inner affixes block effects of outer affixes – predicted to be impossible by the sign-based approach. **Data:** In Hausa, some morphological constructions replace the underlying tone of a base by a fixed tonal melody (e.g. by LH in the imperative: kwáːná ⇒ kwàːná 'spend the night!', káràntáː ⇒ kàràntáː 'read!'), while others *add* a specified tone to the base melody (e.g. suffix L in verbal nouns: ʃáː ⇒ ʃâː 'drink'). As Inkelas (1998) shows, both patterns, overwriting and concatenation, cooccur with affixation of identical grammatical tone melodies (e.g. overwriting LH plural -ai: máːlàm 'teacher' ⇒ màːlàm-áí 'teachers' vs. additive participial LH -waː: kóːmóː ⇒ kóːmôː-wáː'returning here'), hence depend idiosyncratically on morphological constructions. **Circumfix Analysis:** Under the circumfix analysis, additive tone effects are triggered by floating tonal suffixes or prefixes (e.g. verbal noun -L) while overwriting tone is the consequence of floating tone *circumfixes* (e.g. imperative L- -H) corresponding straightforwardly to the edge alignment of the single tone patterns. Overwriting is the cooperative effect of the undominated constraints σ ← τ which enforces association of floating tones and the $\text{C}\textsc{ont}_\tau$ demanding that tautomorphemic tones should form a contiguous melody, i.e. be associated to adjacent TBUs:

Input: = c	σ ← τ	$\text{C}\textsc{ont}_\tau$	MAX |
☞ a. L H L H H / ka ran ta			***
b. L H L H H / ka ran ta		*!	**
c. L H L H H / ka ran ta	*!*		

Thus the contrast between additive and overwriting tone results not from construction-specific phonology, but from different underlying representations. **Cyclic Overwriting:** A main argument for the sign-based approach is that (non-)overwriting directly mirrors cyclic morphology: an additive tone construction adds to the tone melody created by an overwriting one (e.g. káràntá 'read' + overwriting LH agent suffix ⇒ káràntá-ǐː⇒ kàràncíː+ additive nominalizing H prefix ⇒ má-kàràncíː'reader' (masc.)), whereas an overwriting construction overwrites the output of an additive construction (e.g. mákàràncíː+ overwriting HLH fem. suffix ⇒ mákàràncíː-îjáː⇒ mákáráncìːjáː'reader' (fem.)). In the circumfix approach, these patterns follow from the positional faithfulness constraints MAX-[τ and MAX-τ] enforcing realization of first and last tone of a word (Jurgec 2011) (the outermost overwriting tone melody) and $*\tau\ \tau\ \tau$ against discontinuous deletion (Landman 2002) extending the preference for edge tone realization to combinations of overwriting and additive tone melodies. Cycle effects thus follow from the cyclic (edgemost) positioning of affixes and positional faithfulness for edges (Beckman 1997). **Counter-Cyclic Overwriting:** In contrast to the circumfix approach, the sign-based approach excludes countercyclic overwriting where more inwards morphological constructions systematically prevail over more outwards constructions in the overwriting of a base or have effects on affixal material introduced by outer constructions. In the final part of the talk, I show that both patterns are attested: In Kwa languages, inner tense inflection typically overwrites outer subject agreement (see Paster 2000, 2003 on Gã), and in Western Nilotic there are several cases where derivational overlays block inflectional overlays (Andersen 1995,Trommer 2011 on Dinka).

Phonology vs. morphology: How auditory lexical decision in Maltese resolves the conflict

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Samantha Wray (University of Arizona)

Maltese, a Semitic language notable for its mixed lexicon (Borg and Azzopardi-Alexander 1997, *inter alia*), exhibits the typical Semitic hallmark of root-and-pattern morphology, whereby related words may share their consonantal root (e.g. *ktb* in *kiteb* 'he wrote', *ktieb* 'book', *miktub* 'written) or their word pattern (e.g., *mi-u* in *miktub* 'written', *misruq* 'stolen', *mitluf* 'lost'). In both the formal and the psycholinguistic literature, the morphological status of the root is uncontroversial, but there is disagreement among theoretical linguists about whether the word pattern is morphological (Borg and Azzopardi-Alexander 1997) or phonological (Fabri 2009) in nature.

A similar scenario presents itself in the psycholinguistic domain. While relatively little work has examined lexical retrieval in Maltese, the research that has been carried out in both the visual and auditory domains supports models of the mental lexicon in which the consonantal root plays a central role in the recognition of Semitic words in Maltese. At the same time, the role of word patterns is less clear. Twist (2006) reports no effect of pattern facilitation in visual word recognition in a lexical decision task using visual masked priming, and Ussishkin et al. (2015) come to similar conclusions for auditory processing with both audible and masked primes. However, Galea (2011) reports facilitation effects for word pattern priming in visual word recognition using visual masked priming. That is, for prime-target pairs sharing either the same vowels (e.g., *kiser* 'he broke'-*libbes* 'he dressed), the same prosodic structure (e.g., *nasab* 'he entrapped'-*giref* 'he scratched'), or both (e.g., *gerrex* 'he scared away'-*xekkel* 'he impeded), reactions time were significantly faster compared to the control condition in which prime-target pairs do not share any structure.

Here, we report on two further experiments using the same stimuli as Galea (2011), but in the auditory domain. In Experiment 1, 53 native-speaking Maltese subjects performed a lexical decision task on fully audible prime-target pairs; in Experiment 2, 83 additional native-speaking Maltese subjects performed a lexical decision task in which primes were masked using the subliminal speech priming technique first reported in Kouider and Dupoux (2005) in which primes are durationally compressed and masked using reversed speech.

While Galea's (2011) visual study found a facilitatory priming effect for pairs sharing vowels, prosodic structure, or both, our auditory studies revealed a very different pattern of results: our priming conditions induced inhibition. In other words, word recognition is slower, not faster, when patterns are shared between primes and targets. Using linear mixed effects modeling, a significant inhibitory effect was found in Experiment 1 for prime-target pairs sharing their prosodic structure, while in Experiment 2 significant inhibition was found for prime-target pairs sharing their vowel patterns.

These slow-down effects pose problems for models that treat the word pattern as a morphological unit, since morphological structure typically induces facilitation in spoken word recognition. We interpret these effects as directly implicating phonological structure and similarity, which must therefore inform our model of word recognition for Maltese. Such an interpretation is consistent with models of spoken word recognition in which phonologically similar units compete at early stages of speech processing (e.g., the Neighborhood Activation Model; Luce and Pisoni 1998), and this competition is the source of the inhibition effects found in both of our experiments.

Anchoring and Alignment in syllable-based language games

Barbara Vogt (Università di Trieste), Martin Krämer (University of Tromsø)

In secret languages, word games, language games or ludlings (Laycock 1972) (henceforth LGs) existing words of a given language are concealed by inserting, exchanging, switching or repeating phonological material (see the examples below). LGs are often used in linguistic analysis as they are considered to use specifically linguistic, not "meta-linguistic", tools and units. (Compare e. g. Bertinetto 1987 on a LG in Italian, Piñeros 1998 on LGs in Spanish as well as Bagemihl 1995, Vaux 2011, Borowsky 2012 for overviews). The hypothesis is that LGs "extend, modify, or exaggerate attested natural language processes" (Bagemihl 1995) which is demonstrated among others by the fact that not all conceivable language disguises are found over the world. There are clear limits in variation and these limits are shaped by constraints relying on specifically linguistic representations and processes: For example, there is no LG requiring the breaking of the subsyllabic constituents onset, coda or nucleus, there are no "rules" based on a count of single sounds or of syllables.

In this talk we will provide a typology of LGs. Our data are taken from a corpus covering 42 different types of LGs, spread over 12 languages, extracted from (the linguistic) literature and our own research, which were tagged according to syllable size and structure, processes and segmental make-up. We will concentrate on the processes involved (reduplication, affixation and truncation) and analyze possible locations for inserted and/or reduplicated strings in the derived (manipulated) form. On this extensive tagged corpus we apply the proposal of Alber (2010, 2012), Alber & Arndt-Lappe (2012) with regard to anchoring in truncation: In their analysis ANCHOR-L, the constraint responsible for anchoring a truncation morpheme to the left edge of the base, is best defined as an alignment constraint while ANCHORSTRESS, the constraint responsible for anchoring the truncation morpheme to the stressed syllable of the base, should be defined as a faithfulness constraint. The analysis of the data in language games by and large confirms this approach to anchoring: at the left edge typical alignment effects are visible, while in stress anchored LGs the manipulations are analyzable as a form of stress-preservation.

Consider the data in (1-5): The affix with invariant material in (1) is infixed obeying ALIGN-L (AFFIX, PRWD) which positions it as close to the left edge as possible (cf. **Daar-ep*) while the markedness constraint ONSET triggers infixation. Example (2) shows that there is a high ranked ANCHOR-L-constraint requiring the base (*und*) to be aligned at the left edge with the derived form (*und -> u-lewu-nd*),[1] leading to infixation also in the presence of affixes with reduplicated material ANCHOR-L(BASE, DERIVED WORD) >> ALIGN-L (RED, PRWD).

Some LGs do not target the left edge of the prosodic constituent, but the stressed syllable (4,5). As in truncation or reduplication in natural languages it is observed that the stressed nucleus of the base has a stressed correspondent in the derived form (4). Even if the vowel in the derived form is overwritten by an invariant segment/feature, stress is preserved in at least the same position (5); both examples are analyzable as a phenomenon of faithfulness between the base and its derived form, but not as alignment.

(1)	Dutch	*Daar op straat*	→	*D-ep-aar ep-op str-ep-aat*
(2)	German	*und ich bin*	→	***u**-lew**u**-nd **i**-lew**i**-ch b**i**-lew**i**-n*
(3)	Swedish	*människa*	→	*m**ä**-dev**ä**-nn**i**-dev**i**-sk**a**-dev**a***
(4)	Spanish	*C**ó**rdoba, colect**í**vo*	→	*C-**o**gas-**ó**rdoba,colect-**i**gas-**í**vo*
(5)	Swiss German	*Drṍtschgeler, Kàmerád*	→	*ítschgelerdre, ímeke ídre*

[1] Here and in the examples below, reduplicated vowels are underlined and in bold letters, the vowels in the base are in bold letters only.

Special session

Syllables

The relationship between syllabification judgments and segmental processes

Marie-Hélène Côté (Université Laval, Quebec City)

The relationship between syllabification judgments and segmental processes has remained unclear. Phonologists have focussed on defining the syllable that is taken to trigger or motivate phonological processes. Ideally, this syllable should be reflected by syllabification judgments, obtained from speakers' introspection or experimentally. But this is only partially the case. The gap between phonological syllables and speakers' judgments has been interpreted in various ways, the main idea being that extra-phonological factors prevent judgments from being a true reflection of the syllable considered phonologically relevant. In that respect, syllabification judgments have largely fallen outside the realm of phonological theory.

I discuss the relationship between syllabification judgments and segmental processes, suggesting that judgments and processes are both partially explained by common perceptual or articulatory factors, This accounts for the strong degree of correspondence between the two data sets and, indirectly, for the success and popularity of syllabic analyses of segmental processes. But this also leads to a conception of the syllable as a surface epiphenomenon rather than an abstract phonological object. Syllabification and segmental processes are indirectly related by their common explanatory factors, but the former does not directly determine the latter.

Time, order, structure

Adamantios Gafos (University of Potsdam)

The talk pursues an analysis of the relation between qualitative syllable parses and their quantitative phonetic consequences. To do this, the statistics of a symbolic organization corresponding to a syllable parse are expressed in terms of continuous phonetic parameters which quantify the arrangement in time of the consonants and vowels that make up syllables: consonantal plateau durations, vowel durations, and their variances. These parameters can be estimated from continuous phonetic data. This enables analysis of the link between symbolic phonological form and the continuous phonetics in which this form is manifest. Pursuing such analysis, we illustrate the predictions of different syllabic organizations and derive a number of previously experimentally observed and simulation results. Specifically, we derive the canonical phonetic manifestations of different syllabic organizations but also the result that, under certain conditions we can make precise, the phonetic indices of one organization can change to a range of values characteristic of the other, phonologically distinct organization. Finally, I present results on the behavior of phonetic indices for syllabic organization by progressively increasing the size of the lexical sample and concomitantly diversifying the phonetic context over which these indices are taken.

Strings or syllables?

Bridget Samuels (Pomona College)

Cross-linguistically, syllables show a wide range of variation. While the unmarked syllable shape is taken to be CV, several possibilities exist beyond this: onsetless syllables, branching onsets, simple codas, branching codas, superheavy syllables, and appendices. So far, we have been a loss to explain why this variation exists. Phenomena that seem to refer to parts of syllables raise a related problem: what is the internal structure of a syllable? On the basis of different diagnostics, several groupings have been proposed: onset, nucleus, body, peak, coda, rime, mora, etc. Indeed, some authors (many in the Government Phonology tradition; Aoun 1979, Harris 1994) have argued that subsyllabic constituents obviate the need for a syllable node. Additionally, psycholinguistic experiments have led others to conclude that syllables are not encoded in the grammar (Ohala & Kawasaki-Fukumori 1997, Steriade 1999). In short, the syllable is full of contradictions, if it is not just a mirage.

I suggest that these contradictions dissolve when we look at what syllables are not: though they have been compared to syntactic phrases (see e.g. Levin 1985), syllables are quite different in that they are not well-defined (discrete) domains, and they do not have recursive structure. I propose what is in some sense a return to the SPE conception of syllables: they belong in the domain of performance (PF in the broad sense), not competence (PF in the narrow sense). In particular, lexical representations take the shape of linear strings with only precedence relationships defined among the segments (following Raimy 2000), but some phonological processes, such as stress assignment, can utilize the sonority profile of a word. In this way, like representations in the visual system, phonological representations have different levels with different numbers of dimensions: in this case, a one-dimensional linear string and a two-dimensional sonority profile. Furthermore, speech planning may occur on a level that resembles syllables, using CV units.

I argue that sine wave-like sonority profiles are not the result of grammatical constraints such as the Sonority Sequencing Principle, but rather stems from a combination of perceptual and processing factors. The peaks—typically marked by a closed class of segments, i.e., vowels—are inherently simpler to locate than the troughs. Therefore, phonological processes cannot normally rely on the accuracy of trough location, hence why syllabification is never contrastive (Hayes 1989, Blevins 1995) and why ambisyllabicity is widespread.

Viewing lexical representations as having this dual 1-D/2-D nature makes interesting predictions about the range of possible phonological operations, as recent investigations into the "flatness" of phonology have begun to show (Neelman & van de Koot 2006). For example, though it is widely claimed that infixation and reduplication make reference to syllables (Ultan 1975, Moravcsik 2000, Nevins & Vaux 2003, Yu 2007), unambiguous cases of syllable boundaries as "pivots" for these processes are vanishingly rare. This hole in the typology is difficult to explain if discrete syllables exist, but is expected if they do not. I argue that the handful of languages that manage to target these pivots can only do so because they have properties that engender unambiguous parsing of the 2-D sonority profile. In this vein I show that languages employ a number of strategies that make the task of finding the peaks & troughs easier, thus enabling easier identification of word/morpheme boundaries. Onset/coda asymmetries are among these strategies, and are best understood in this way rather than as consequences of syllabic structure.

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Syllables are not structure

Péter Szigetvári (Eötvös Loránd University)

If the speech signal is to be divided into portions called syllables two fundamental questions arise: (i) are all segments associated with a syllable? (ii) are all (parts of) syllables associated with a segment? On a first approach both answers appear to be yes. This yields a situation in which practically anything can be a syllable, at least the constraints are so vague that one begins to wonder if the notion makes sense at all. This has led to giving up at least one of the yeses to the above two questions.

It cannot be maintained that the speech signal — or to put it more simply, a word — is made up of a whole number of syllables: there appear to be cases when the end of a word does not behave like the end of a syllable, or the beginning of a word does not behave like the beginning of a syllable. Even within words we might find sequences that do not behave like the end of a syllable followed by the beginning of another one. These offending bits may be claimed to be extrasyllabic, ie not associated to a syllable, or they may be associated with syllables some other part of which is not associated with any segment. We will show that if we go for the second option we inevitably end up with only CV syllables, which are not syllables in the traditional sense.