The Eighteenth Manchester Phonology Meeting

ABSTRACTS BOOKLET

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This booklet contains the abstracts for all the papers presented at the eighteenth Manchester Phonology Meeting, held at Hulme Hall, Manchester, in May 2010.

The abstracts are arranged in alphabetical order by the surname of the (first named) presenter.

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.

All sessions for papers listed in this booklet will take place in either the Old Dining Hall, the JCR (Junior Common Room) or the bar-dining-room area in Hulme Hall. The opening and closing addresses and the special session will be held in the Old Dining Hall. The parallel sessions for the oral papers will be held in the Old Dining Hall and the JCR, and the poster sessions will be held in the bar-dining-room area.

The Old Dining Hall is in the main Hulme Hall building, upstairs, and just through the bar area and the area where the meals are held (the dining room). The JCR is in the same building, to the left of the main entrance. It takes about half a minute to walk from one to the other. The final programme, included in your registration pack, gives the details of which papers are in which room, and at which times.

Oral papers

Order-independent laryngeal neutralization in Lakhota onset clusters

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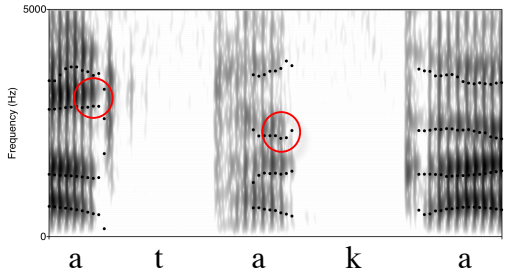
It is well known that laryngeal contrasts may be neutralized word-finally or before low-sonority consonants: *pa* ~ *pʰa* and *apra* ~ *apʰra* contrast, but not *ap* ~ **apʰ* or *apta* ~ **apʰta* ('coda neutralization'). Under a cue-based account, laryngeal contrasts are licensed by robust availability of cues such as voice onset time in pre-sonorant position, and neutralized where such cues are weak. In this talk, I consider a challenging and less familiar pattern, in which laryngeal contrasts are neutralized in clusters regardless of whether the consonant is C_1 (pre-C) or C_2 (pre-V). An example from Lakhota (Siouan) is given in (1): initial stops contrast in aspiration and ejection (1a), but aspirates and ejectives are mostly banned in clusters, resulting in neutralization to unaspirated stops (contextually voiced before sonorants) ((1b–c)). The restriction is order-independent, and neutralization occurs even pre-vocalically: *kʰa* but **skʰa*.

(1)	a.	Simple onsets	**k**a 'there'	**k**ʰa 'mean'	**k**'a 'dig'
	b.	Onset clusters: C_1	**k**sa 'separated', **k**ta 'expect'	***k**ʰs, ***k**ʰt	***k**'s, ***k**'t
			gla 'go home', **g**mũ 'twisted'	***k**ʰl, ***k**ʰm	***k**'l, ***k**'m
	c.	Onset clusters: C_2	s**k**a 'white', t**k**a 'scrape hide'	*s**k**ʰ, *t**k**ʰ	*s**k**', *t**k**'

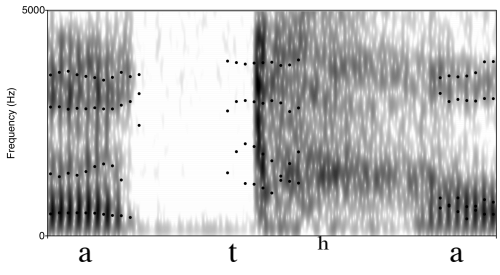
Why should preceding consonants affect laryngeal contrasts? One possibility is that clusters involve a single laryngeal gesture, which is too short to produce voiceless C_1 and aspirated C_2^h (cf. English *sC^h; Munhall & Löfqvist 1992). Long laryngeal openings are possible in Lakhota, however; CC^h clusters arise through reduplication (*kʰos-kʰoze*, *k'es-k'eze*), and even occur in a few exceptional morphemes (*sĩkpʰe* 'muskrat', *-tkʰa* 'but'). Thus, the coordination to produce CC^h is available phonetically, but such sequences are phonologically dispreferred.

I propose that the ban on CC^{h}V/CC'V stems not from the difficulty of producing or perceiving the laryngeal features of C_2, but rather, from the difficulty perceiving the <u>place</u> of C_2. As (2) shows, formant transitions for unaspirated /t/ vs. /k/ are most distinct in the preceding vowel (VC: high vs. low F3), and are weaker at the onset of voicing (CV). Nonetheless, analysis of (so far) 128 tokens of /t/ and /k/ in natural speech does show a significant difference in F3 in the following vowel, as well. By contrast, (3) shows that aspirated stops have extremely long velar frication in Lakhota—often >100ms—completely obscuring CV transitions. (Ejectives have similarly long VOT.) The main cue to coronal place in (3) is F3 in the preceding vowel. No significant difference between /t^h/ and /k^h/ is observed in F3 at the onset of voicing.

(2) F3 most distinct in VC transitions



(3) Aspiration obscures CV transition



This suggests that /VC$_1$C$_2$^{h}V/ is difficult to distinguish from /VC$_1$^{h}V/. Following Flemming (2007), I propose that this contrast is penalized by MINDIST constraints requiring a minimal difference in formant values between contrasting elements. In Lakhota, this has the effect of requiring aspirated stops to be intervocalic. The main exceptions are word-initial stops, which I hypothesize are protected by output-output faithfulness to phrase-medial realizations. Interestingly, truly exceptional morphemes often involve /Cp^h/, which is somewhat distinct from /Ct^h/ and /Ck^h/ in burst energy and visual cues, or clusters like /tk^h/ in which the place of C_2 is uniquely recoverable due to independent constraints on place combinations (*tp, *tt).

UP on STAGE: A lexical segmentation strategy based on phonotactics

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I present a segmentation model that combines a phonotactic strategy with a subsequent lexical strategy. The idea is that infants use phonotactic information to pre-segment the continuous speech stream into 'proto-words'. These proto-words in form of constraints build the basis for an initial lexicon and are subsequently used to segment new input by splitting off new proto-words from familiar ones. By defining proto-words and eventually words as constraints, a straightforward interaction with the grammar is enabled.

Language acquisition research suggests a variety of segmentation strategies that infants use to break up the otherwise continuous speech signal, in order to learn new words and eventually comprehend speech in a way adults do. It has been shown that children are able to e.g. use rhythmic information for segmentation (Jusczyk, Houston, Newsome 1999), statistical information (e.g. transitional probabilities, Saffran, Aslin & Newport 1996), phonotactic patterns (e.g. Mattys, Jusczyk, Luce & Morgan 1999), co-articulation (Johnson & Jusczyk 2001), and lexical information in form of familiar words (Bortfeld, Morgan, Michniek Golinkoff & Rathbun 2005). A combination of several strategies improves segmentation (Christiansen, Allen & Seidenberg 1998) and it is likely that infants indeed use more than one strategy.

In this talk I therefore want to explore a combination of two strategies, a phonotactic (bottom-up) and a lexical (top-down) segmentation strategy (not excluding the possibility of additional strategies). In this model, infants start out with learning the phonotactics of their language by using statistical information and a subsequent generalization mechanism, as employed in STAGE (Adriaans & Kager, in press). With STAGE, a reliable portion of word boundaries can be detected in continuous speech. The model makes only few mistakes, but it misses a number of word boundaries in cases where a boundary occurs over two segments that do not violate the phonotactics of the language. A lexical strategy ('Use Proto-words' or UP), where infants use the edges of familiar words to set boundaries, further improves segmentation. The procedure is as follows: unsegmented speech is used to train STAGE, with a resulting pre-segmentation of the data. The thus segmented but underparsed speech (the proto-words), is used as an initial lexicon. The proto-words are formalized as lexical constraints (cf. Boersma 1998, Apoussidou 2007) and used to segment new input by separating words already contained in the lexicon. The remainder is used as a new proto-word and entered in the initial lexicon. A possible-word filter (Norris, McQueen, Cutler & Butterfield 1997) prevents segmentations where single consonants will be splitted off as single words. Over-parsing can be handled by keeping the proto-words constraints: if the sum of the frequencies of the parts of a proto-word is bigger than the frequency of the word as a whole, then the proto-word is segmented into parts. If not, no word boundary is inserted. In contrast to previous proposals (e.g. Brent & Cartwright 1996, Brent 1997), the phonotactic constraints are induced, not pre-implemented. Moreover, the phonotactic learning component and the lexical segmentation strategy are applied subsequently, not simultaneously. This is more in line with language acquisition literature: infants seem to make use of phonotactic information to segment words out of the speech stream by the age of 7.5 months (Jusczyk & Aslin 1995), but show first comprehension of words by the age of approximately 15 months (Golinkoff, Hirsh-Pasek, Cauley & Gordon 1987). The results of three combinations will be compared with each other: a segmentation strategy based on phonotactics alone (bottom-up), one based on lexical segmentation alone (top-down), and the combined strategy.

Empirical evidence for laryngeal features: German vs. true voice languages

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Jessen & Ringen (2002) have presented empirical evidence for the position that, in German, stops contrast the feature [spread glottis], not [voice] with [∅], as has been assumed in many previous analyses. According to this analysis, the fact that German utterance-initial stops are either aspirated or voiceless unaspirated follows directly from the assumptions that aspiration is the phonetic manifestation of the feature [spread glottis] and that unspecified stops in initial position are voiceless and unaspirated. If, on the other hand, German stops are assumed to contrast for the feature [voice], the lack of voicing in word-initial position is mysterious. In languages like French, Spanish, Russian, etc., where the contrast is also assumed to be [voice], word-initial stops exhibit prevoicing; that is, they have negative VOT. So, on the voice analysis, the fact that German does not have systematic prevoicing has no obvious explanation.

According to the analysis of Jessen & Ringen, the variable intervocalic (or intersonorant) stops in German are voiced due to passive voicing, voicing that occurs because of the voiced environment and because vocal fold vibration is not actively avoided by speakers of German. The [spread glottis] stops do not undergo passive voicing in intervocalic position because speakers are actively spreading the glottis during their production, thereby blocking passive voicing. There is ample evidence that German intervocalic stops are not always *produced* with voicing (Jessen 2004, Jessen & Ringen 2002, Jessen 1998) and there is evidence that voicing is not important for the accurate *perception* of the unaspirated set of stops in German in intervocalic position (Kohler 1979; Jessen 1998, 2004).

The fact that German exhibits variable voicing is evidence that the feature of contrast is not [voice], that is, that speakers of German are not actively aiming to voice the intervocalic stops, just as they are not actively voicing the initial stops (Jessen 2004; Jessen & Ringen 2002). An implication of this analysis is that the intervocalic variable voicing that occurs in German should be different from the voicing that occurs in a language in which the feature of contrast is [voice], as in, for example, Russian or Hungarian. Since there has been little data on the relative amount of intervocalic voicing in these so-called voicing languages, however, it has been impossible to evaluate this prediction.

The purpose of this paper is to compare the voicing of intervocalic stops in German with new data on the voicing of intervocalic stops in Russian and Hungarian. An analysis of the raw data presented in Jessen (1997) reveals that the intervocalic stops of the German speakers in his study were fully voiced only 55% of the time. In contrast, in a study of intervocalic voicing in the Budapest variety of Hungarian (18 speakers), we found that 95.5% of the intervocalic stops were fully voiced. Similarly, in Russian, in a study of voicing with speakers from St. Petersburg (14 speakers), we found that over 97% of the intervocalic stops were fully voiced. These results provide strong support for the claim that the feature of contrast is different in German and the so-called voicing languages: In German, the feature of contrast is [spread glottis], while in Russian and Hungarian, the feature of contrast is [voice].

References

Jessen, M. (1997) "Tense vs. lax obstruents in German," Arbeitspapiere des Instituts für Maschinelle Sprachverarbeitung (AIMS), Universität Stuttgart, Vol 3, No.1.

Jessen, M. (1998) *Phonetics and Phonology of Tense and Lax Obstruents in German*, Amsterdam: John Benjamins.

Jessen, M. (2004) "Instability in the production and perception of intervocalic closure voicing as a cue to *bdg* vs *ptk* in German," *Folia Linguistica* XXXVIII/1-2.

Jessen, M. & C. Ringen (2002) "Laryngeal features in German," *Phonology* 19, 1-30.

Kohler, K. (1979) "Dimensions in the perception of fortis and lenis plosives," *Phonetica 36, 332-343.*

Labial palatalization in Zulu: dissimilation without the OCP

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Zulu (Bantu<Nguni; South Africa) has a pattern of 'labial palatalization', which turns labial stops and nasals in the verb root into (alveo)-palatals. This alternation is triggered by a labial glide, the passive suffix /-w-/, which suggests that it is a process of dissimilation for [Labial]. Most analyses of dissimilation appeal to a constraint that generally prohibits multiple segments which bear the same feature – the Obligatory Contour Principal (OCP) (Yip 1988, Myers 1997; see also similar constraints proposed in Alderete 1997). I show that theories of surface correspondence (Walker 2000, 2001; Rose & Walker 2004) can also be used to analyze dissimilation, and argue that this approach yields a better analysis of the pattern in Zulu.

The basic alternation in Zulu labials is illustrated below. The passive suffix /-w-/ induces non-initial labials in the root to surface as their respective palatal counterparts according to the mappings summarized in (1). This is shown in (2): the root /-gub-/ is [-guʤ-] when followed by [w]. Root-initial labials do not undergo this process, however, as (3) shows.

(1) {p⁽ʼ⁾, pʰ, ɓ, b, m, mpʼ, mb} → {tʃ, ʃ, tʃʼ, dʒ, ɲ, ᶯtʃʼ, ᶯdʒ}

(2)	uku-gu**b**-a	uku-gu**ʤ**-**w**-a	(/b/~[ʤ])
	INF-dig-IND	INF-dig-PASS-IND	
	'to dig'	'to be dug'	
(3)	uku-**ɓ**on-a	uku-**ɓ**on-**w**-a	(initial /ɓ/~[ɓ])
	INF-see-IND	INF-see-PASS-IND	
	'to see'	'to be seen'	

The pattern is non-local: dissimilation can occur when the labials in the root are separated from the triggering /w/ by another syllable (4a), or even by another morpheme (4b); (data from Doke 1927/1984, Khumalo 1987, Beckman 1993; intervening segments underlined).

(4) a.	uku-ᵍlo**b**oz-a	i-ja-ᵍlo**ʤ** <u>oz</u>-**w**-a	(intervening syllable)
	INF-dip-IND	3rd.sg.CL5-PRES-dip-PASS-IND	
	'to dip'	'it is being dipped'	
b.	uku-lu**m**-isis-a	uku-lu**ɲ**-<u>isis</u>-**w**-a	(intervening affix)
	INF-bite-EMPH-IND	INF-bite-EMPH-PASS-IND	
	'to bite hard'	'to be bitten hard'	

Roots with multiple labials pose an interesting challenge for an OCP-based analysis. Dissimilation is not triggered root-internally (5), but does occur in the passive form.

(5)	uku-**ɓ**o**pʰ**-a	uku-**ɓ**o**ʃ**-**w**-a	(*[-**ɓ**o**ʃ**-a]; *[-**ɓ**o**pʰ**-**w**-a])
	INF-tie-IND	INF-see-PASS-IND	
	'to tie'	'to be tied'	

To explain this pattern using Optimality Theory, OCP-[labial] must dominate faithfulness for [Place] in Zulu to produce dissimilation. But, if the OCP is formulated to apply globally and at the segmental level, this ranking wrongly predicts dissimilation root-internally as well in forms like /uku-ɓopʰ-a/. Changing the OCP to permit multiply-linked autosegments yields the reverse problem. The faithful root-initial [ɓ] in (5) entails that a labial autosegment is present; if the OCP assigns no violations for multiple-linking, it does not force the non-initial /pʰ/ to dissimilate to a non-labial.

Surface correspondence offers a solution to this quandary. A constraint demanding correspondence between labials, together with a constraint against correspondence across morpheme edges, serves to penalize all labial co-occurrence, but *only* when a labial suffix is present. Since surface correspondence constraints only refer to potential correspondences, the non-local nature of the pattern and the lack of blocking fall out automatically on this account.

Currently available data on English *t/d*-deletion fail to refute the classical modular feedforward architecture of phonology.

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In the classical modular feedforward architecture of phonology (Pierrehumbert 2002, Bermúdez-Otero 2007), there is no direct communication between morphosyntax and phonetics. All morphosyntactic conditioning, whether procedural or representational (Scheer 2008), takes place in the phonology. Morphosyntactic structure can therefore affect the application of gradient processes of phonetic implementation only indirectly, through categorical properties of the surface phonological representation (e.g. prosodic structure).

English *t/d*-deletion has been argued to raise difficulties for the classical architecture (Coetzee and Pater forthcoming). On the one hand, *t/d*-deletion displays morphological sensitivity: it applies with greater frequency to uninflected monomorphemic items like *mist* and *pact* than to homophonous regularly inflected past-tense forms like *miss-ed and pack-ed* (e.g. Labov et al. 1968, Guy 1980, etc). On the other hand, at least some instances of so-called 'deletion' have been shown to involve gradient gestural overlap and gesture reduction, rather than the categorical removal of a segment (Browman and Goldstein 1989, 1990).

As noted by Scobbie (1995), however, the classical modular feedforward architecture can easily cope with this state of affairs if, as usually assumed, categorical phonological processes need not be structure-preserving (in the sense of Kiparsky 1985): under this assumption, evidence of gradience is not evidence of absence of a categorical effect. Thus, a classical derivation of the facts of *t/d*-deletion will proceed in two steps. First, /t/ and /d/ undergo variable categorical reduction in the phonology, possibly by being tucked in under a skeletal position belonging to an adjacent segment (cf. Guy 1991a):

(1)

X	X	X		X			X	X	X		*dipp-ed* with categorical
|	|	|		|			|	⌈\⌉			prefortis clipping of /ɪ/
d	ɪ	p	-	d	→		d	ɪ	p	t	and tucking-in of /d/

In a stratal-cyclic model, the difference between *mist* and *miss-ed* now follows automatically if reduction is active throughout the phonology, as *mist* meets its conditions both at the stem and the word levels, whereas *miss-ed* becomes a target only at the word level (Guy 1991a, 1991b). Later, the phonetics interprets the output of (1) in terms of gradient adjustments of gestural timing and gesture magnitude.

This two-step derivation merely exploits the possibilities highlighted by Scobbie (1995). What is not usually acknowledged, however, is that the coexistence of cognate categorical and gradient versions of the same sound pattern in a grammar is the norm, rather than the exception. This reflects the fact that diachronic processes of stabilization, whereby a gradient rule of phonetic implementation climbs up to the categorical phonology, typically leave a gradient copy of the rule *in situ* (Bermúdez-Otero 2007). The result is that the sound pattern becomes SCATTERED (Robinson 1976) over more than one component of the grammar. Well-known instances of such rule scattering in English include the Scottish Vowel Length Rule (McMahon 1991, 2000), Philadelphia *æ*-tensing (Labov 1994), and pre-yod /s/-palatalization (Zsiga 1995). In the light of the prevalence of rule scattering, the coexistence of morphological sensitivity and phonetic gradience in English *t/d*-deletion appears not merely compatible with classical modular feedforward architectures, but entirely expected.

Unfortunately, one cannot at present compare the predictions of a classical derivation with those of nonmodular theories where phonetics can directly refer to morphosyntactic structure: sociolinguistic studies of *t/d*-deletion have hitherto only provided categorically coded data, and instrumental phonetic studies have not controlled for morphosyntactically conditioned variation. Even when the appropriate data become available, their mathematical interpretation will raise nontrivial challenges, for classical two-step derivations produce bimodal distributions only under certain narrow conditions (Schilling et al. 2002).

Perceptual differences in five-vowel systems reflect differences in feature structure

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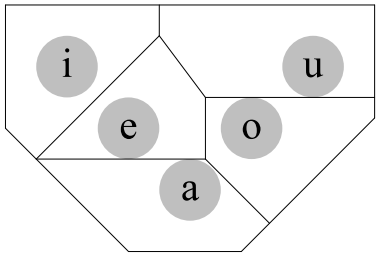
This talk provides perceptual, computational and phonological evidence that the seemingly similar Spanish and Czech vowels are in fact represented as different sets of feature bundles:

Spanish	a	e	i	o	u
height	low	mid	high	mid	high
place	**central**	**central**	front	back	back

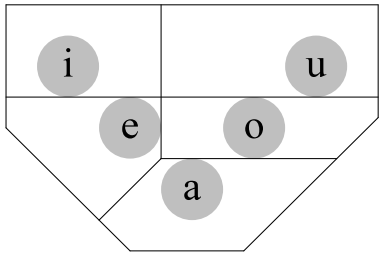
Czech	a	e	i	o	u
height	low	mid	high	mid	high
place	**back**	**front**	front	back	back

We first simulate by computer how learners with these two feature systems will come to divide up the F1-F2 space perceptually; we call the virtual baby with the lefthand feature system S, that with the righthand system C. We teach S and C an identical language environment, namely the distributions that are painted as grey disks in the pictures below. The grammar model is that of Boersma (1997, 2007), in which cue constraints form the interface between phonology and phonetics. The cue constraints employed here are special: instead of arbitrary and exhaustive, they are phonetically-based. That is, they do not, as usual, connect (all) values of all auditory continua (here, F1 and F2) to all phonological elements (here: low, mid, high, front, central, back), but they connect (all) F1 values only to the height features low, mid, and high, and (all) F2 values only to the place features front, central, and back. Examples of such constraints are */low/[F1=550 Hz], which militates against connecting a sound with an F1 of 550 Hz to the feature low, and */back/[F2=1100 Hz]. The acquisition procedure follows Boersma (1997): a learner is fed pairs of auditory form (F1 and F2 values) and phonological surface form (a height and a place feature), using Stochastic OT and the Gradual Learning Algorithm. Once S and C have learned from the data, their cue constraints come to be ranked in such a way that their perceptual behaviour comes to look like this:

S:



C:



The patterns of diagonal, horizontal and vertical boundaries are very different in the two virtual learners. These patterns turn out to correspond to the perception patterns that we find in an identification experiment with 38 real Spanish and 50 real Czech listeners. This provides evidence that S is Spanishlike and C is Czechlike, therefore that the table above is correct for Spanish and Czech. We additionally provide phonological evidence for the features in the table, from palatalization and umlaut (přehláska) in Czech, and from synchronic nonfossilized processes and loanword adaptation in Spanish.

We conclude that two phonetically similar vowel inventories, which have traditionally been transcribed as phonologically identical, in fact reflect strikingly different phonological structures. A more general conclusion is that if you detect non-optimalities in the perception of phoneme inventories (such as the horizontal boundary between /o/ and /u/ in both pictures; an optimal, i.e. confusion-minimizing, boundary would have been diagonal), you can draw inferences about the language's feature structure.

VARIATION AND VOWEL HARMONY: THE CASE OF HEBREW LOANWORDS

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Introduction: The paper will address variation in the adaptation of English vowels in Modern Hebrew (MH) loanwords. Vowel quality in loanwords is usually attributed to phonetic/category proximity or orthography. However, corpus and experimental data suggest that variation may occur between a form reflecting the above factors and a form reflecting vowel harmony. I attribute the *optional* application of vowel harmony to a universal principle affecting the periphery of a native grammatical system (Paradis and Lacharité 1997, Itô and Mester 1999), which itself bears little or no additional evidence for this principle (Shinohara 2004, Kenstowicz and Suchato 2006).

In MH, vowel harmony is not a native process, except for a handful of historically motivated exceptions (Schwarzwald 2002, Bat-El 1989, McCarthy 1994:35). However, vowel harmony may occur in MH in loanwords from English, both old and new (i.e. vowel harmony is productive).

I will present a formal model within OT (Prince and Smolensky 1993) accounting for vowel harmony in MH, with variation being attributed to Stochastic OT (Boersma 1998) or Noisy Harmonic Grammars (Boersma and Pater 2008).

The Problem: The phonological form of loanwords is subject to a productive grammar, with non-compliant words undergoing adaptation. 11 or so English monophthongs (Deterding 1997) are adapted in order to comply with MH's 5-vowel system (/ieaou/). Perception and orthography are by far the most common sources of MH vowels (Cohen 2009), accounting for ~95% of the data. However, a corpus-based study (Cohen 2009) and experimental evidence (Cohen in progress) reveal that in some cases the only way to account for vowel quality in adapted forms is vowel harmony.

For example, English [kæŋgə̱ɹu] is produced in MH as either [keŋge̱ʁu] or [keŋgu̱ʁu] 'kangaroo'. The MH vowel [e] is acoustically "closest" to English [ə], which explains [keŋge̱ʁu]. However, the [u] in [keŋgu̱ʁu] is only attributable to vowel harmony, as orthography would produce [a], and epenthesis would give us MH's standard epenthetic [e].

The Solution: Vowel harmony is a reflection of universal principles, outlining the unmarked state of affairs (TETU – McCarthy and Prince 1995, Shinohara 2004). Although there is no evidence of these in the core of the MH lexicon, they nevertheless surface in the periphery (in this case, loanwords).

Two kinds of constraint are relevant (Kitto and de Lacy 1999):

(a) Constraints requiring schwa adaptations and epenthetic vowels to be unmarked; e.g. M(V→e) is the set of constraints conspiring to produce [e] as the unmarked vowel.

(b) Constraints requiring the epenthetic vowel to correspond with some underlying vowel, i.e. to harmonise with an underlying vowel; e.g. 𝒜-𝔼 -IDENT-F is the set of constraints requiring the base vowel 𝒜 and the epenthetic vowel 𝔼 to have the same features F).

In a vowel harmony language, 𝒜-𝔼 -IDENT-F >> M(V→e), whereas in a non-vowel harmony language, M(V→e) >> 𝒜-𝔼 -IDENT-F. In MH, we generally get the latter, but in loanwords we witness variation resulting from fluctuation in the ranking of these constraints.

The variability in the behaviour of loanwords can be attributed to stochastic OT (Boersma 1998) or noisy Harmonic Grammars (Boersma and Pater 2008), which allow for fluctuations in the constraint ranking, preferring M(V→e) >> 𝒜-𝔼 -IDENT-F in ~98% of the cases, and 𝒜-𝔼 -IDENT-F >> M(V→e) in ~2% of the cases in MH. In the core of the lexicon, the vast majority of non-harmonising forms removes any chance of newly introduced harmony. It is not uncommon for core grammar to be regularised. Unmarked "irregular" grammar, therefore, emerges at the periphery of word formation, e.g. loanwords.

Conclusion: Vowel harmony is a reflection of universal principles which prefer harmonising vowels. Constraints on markedness (producing unmarked epenthetic vowels) and faithfulness (ensuring that input vowels do not change) prevent harmony in some languages. But even in these languages, the universal tendency to harmonise may surface when the effect of the markedness and faithfulness constraints is weakened, something which happens in the periphery of the lexicon.

The emergence of intervocalic sibilants

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This paper investigates the emergence of intervocalic sibilants which originate from a former sibilant-consonant sequence, such as in pa[st]a > pa[s]a *briefcase* in Brazilian Portuguese. It will be shown that exemplar models offer a comprehensive account for the phenomenon since it accommodates lexical frequency effects and fine phonetic detail in its implementation (Johnson 1997; Pierrehumbert 2001). It is suggested that the lexicon plays a major role in accommodating sound changes (Wang 1969, Bybee 2001). Additionally, structural generalizations related to stress and place and manner of articulation offer major paths for the phenomenon to spread within the lexicon.

Brazilian Portuguese presents a number of phonological changes in postvocalic consonants. Nasal in coda were deleted and the preceding vowel was then nasalized: s[an]to > s[ã]to *saint*. Laterals in coda were vocalized: sa[l] > sa[w] *salt*. Rhotics in many dialects are realized as a fricative and then deleted: c[ah]ta > c[a]ta *letter* or am[oh] > am[o] *love*. In all varieties of Brazilian Portuguese sibilants in coda are assumed to be stable and to remain as the only consonant to occur in postvocalic position. Postvocalic sibilants may be either alveolar (in the states of Minas Gerais, São Paulo) or alveopalatal (in Rio de Janeiro). However, recent studies indicate that sibilants in coda are not systematically stable since there have been undergoing sound changes. In Rio de Janeiro, for example, it has been reported that alveopalatal consonants in coda become a glottal fricative: me[sm]mo > me[hm]o *same*, a phenomenon that has been observed in other languages such as Spanish (Lipsky, 1984; Kingston 2008) and Gondi (Krishnamurti, 1998).

In the dialect we are considering in this paper, which concerns the state of Minas Gerais, it was briefly reported that alveolar sibilants followed by a consonant may be realized as a single sibilant: pa[st]a > pa[s]a *briefcase*, a phenomenon also observed in Italian (Barry and Andreva 2001). Nevertheless, in this dialect of Brazilian Portuguese there was a demand for further investigation concerning the nature of the consonants involved, as well as sociophonetic features related to the phenomenon. The results presented in this paper intend to fulfill this gap.

The study comprises data from 32 Brazilian Portuguese speakers (16 males and 16 females) from two different age groups (under 25 years old and older than 40) equally distributed according to their education level (elementary school and university). The type of consonants (stops, fricatives, nasals and liquids) involved in the former sibilant-consonant sequence, stress placement, manner and place of articulation were considered. Frequency effects were investigated by evaluating high and low frequency words. The data were evaluated by acoustic analysis in order to investigate fine phonetic properties for each token. Quantitative analysis was also carried out. Results showed that men and younger speakers favor the phenomenon. Unstressed positions favor the phenomenon, as well as place and manner of articulation. More frequently used words show a higher rate of the phenomenon rather than less frequently used ones. A careful acoustic examination of the data indicated that the phenomenon has a gradual phonetic implementation where intensity and duration are relevant features.

In order to investigate whether subjects were sensitive to the observed phonetic gradualness, investigation proceeded to a perceptual test. Speakers were exposed to pairs of words such as pa[s]a *raisin* /pa[st]a > pa[s]a *briefcase* and po[s]o *pond* /po[st]o>po[s]o *post*. The experiment evaluated whether speakers could distinguish intervocalic sibilants which originated from a former sibilant-consonant sequence, such as in pa[st]a > pa[s]a *briefcase* from a general intervocalic sibilant as in pa[s]a *raisin*. Results, in general, indicate that the lexicon has an important role to play in the implementation of the phenomenon investigated. Additionally, perceptual results suggest that the study of sound changes may benefit from subjects interpretation of data. Thus, to incorporate perceptual analysis into the study of phonetics and phonology offers a challenging and interesting research program for the next years to come.

Dialect Contact & Phonological Change at the Variety and Speaker Level

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Dialect contact raises many questions regarding the dynamics of sound change at both the geographical and individual level. For any single variable, is the direction of change uniform across the area of contact? Across variables within the region of contact, is there a general tendency towards homogeneity or differentiation? Finally, do variables pattern together in the speech of individual speakers, with a particular change in Variable A predicting a particular change in Variable B?

We address these questions with data from the Accent and Identity on the Scottish-English Border (AISEB) project, which examines phonological variation and attitudes in four border towns: Gretna and Eyemouth (Scotland) and Carlisle and Berwick (England). Here we consider coda (r) and the Scottish Vowel Length Rule (SVLR). ScE typically retains coda (r), while most varieties of EngE are r-less; SVLR is characteristic of ScE, while vowel length in most varieties of EngE is subject to a general voicing effect. Rates of coda (r) use and degree of SVLR (calculated as in Watt & Yurkova 2007) were determined for 32 speakers (distributed evenly across the 4 towns) based on interview and word list speech. The two variables were first analyzed separately in terms of their usage in apparent time in each of the 4 towns to identify broad patterns of change at the dialect level. We then examined the individual speaker data to see to what extent these variables are correlated in individual phonologies.

We find that (r) use is not uniform along the length of the border, particularly on the Scottish side. While young Gretna speakers use less coda (r) than older Gretna speakers, young Eyemouth speakers use more coda (r) than their older counterparts. This divergence can be related to differing attitudes towards national identity: those speakers who more strongly identify as 'Scottish' use more coda (r) (Llamas et al 2009). In contrast, we find that change in SVLR has occurred in a more uniform manner, with young speakers from both Scottish localities less likely to exhibit SVLR than older speakers in the same communities. We therefore find that while the borderlands show increased heterogeneity in (r), there is increased homogeneity with respect to SVLR. These dialect-level patterns are reflected in the individual-speaker data, which show that the relationship between these variables has weakened in apparent time.

Phonology-Syntax Edge-Alignment is Relative

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Phase-based syntax has provided new ways of formalizing the relation between syntax and prosodic domains. In work like Kratzer & Selkirk (2007), Piggott & Newell (2006), Newell (2008), Pak (2008), and Selkirk (2009), phases – *v*P and CP, perhaps DP – define 'cyclic' spell-out domains. In this approach, phases form prosodic islands: they are phrased separately from what precedes and follows them. Other work (An 2007, Cheng & Downing 2007, 2009, Kandybowicz 2009) incorporates phases into asymmetrical Edge-based alignment theory (Selkirk 1986, 1995; Truckenbrodt 1995, 1999, 2007), proposing that phases provide a type of constituent edge for prosodic domains to align with. In this approach, phases are potentially prosodic 'peninsulas': they can be phrased together with material at one edge while phrased separately from material at the other edge. In this talk, I show that the prosodic phrasing of different relative clause types in English and other languages is problematic for the prosodic island approach, and thus provides a strong argument in favour of the asymmetric Edge-based approach.

Relative clauses (RCs) provide an ideal testing ground for comparing these theories, as they optimize distinct prosodic phrasings. RCs are contained in a CP phase. In a standard Kaynian analysis, a restrictive RC is in the spell out domain within this CP, while the head and complementizer are outside the spell out domain. Prosodic island theories predict, then, that RCs should be preceded and followed by a prosodic phrase break (||), as both edges of a spell-out domain must symmetrically match those of a prosodic phrase, as shown in (1a). (The spell out domain is bolded.) The prosody in (1a) is not correct for an English restrictive RC, however. The most natural phrasing, in English and other languages, is for the head and RC to phrase together, as in (1b). (Except, in certain very long and/or recursive RCs like the well-known children's rhyme, "This is the cat || that ate the rat || that lived in the house that Jack built.") This is exactly the phrasing optimized by the asymmetric Edge-based approach. Only one edge (in this case, the right edge) of a prosodic phrase need by aligned with a CP phase. This optimizes a break following the RC, while phrasing the RC with the preceding head (and any other preceding material):

(1a) "We invited [$_{DP}$ the [$_{CP}$ students [$_{C'}$ that [$_{IP}$ || **Tracy taught to ski**]]] || to visit the Alps." – *Match*

(1b) "We invited [$_{DP}$ the [$_{CP}$ students [$_{C'}$ that [$_{IP}$ **Tracy taught to ski**]]] || to visit the Alps." – *AlignR*

In short, the prosodic island approach faces the problem that, in general, it optimizes phrasing phasal heads (in specifier position) separately from their complements (in the spell out domain). As work like Pak (2008) notes, one cannot easily resolve this problem, if one assumes that spell out domains are necessarily cyclic prosodic islands.

The asymmetrical Edge-based approach also appears to have problems. An ALIGNR constraint alone optimizes the same prosody for restrictive and non-restrictive RCs: namely, a prosodic break only following the RCs. Non-restrictive RCs are, though, preceded and followed by a prosodic break in English and many other languages (Nespor & Vogel 1986; Burton 2005; Truckenbrodt 2005): e.g., "We invited the students || who Tracy taught to ski || to visit the Alps." The analysis can be easily modified, though to account for the prosodic difference. Non-restrictive RCs are syntactically distinct from restrictive RCs. They are syntactically independent adjuncts to the main clause, not selected by their heads like restrictive RCs are. An analysis which ranks the ALIGNR constraint below a left-edge alignment constraint sensitive to this syntactic difference straightforwardly accounts for the difference in phrasing.

Avoiding multiple complexities in the prosodic word: Minimization in Colloquial Bamana

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Colloquial Bamana (CB), a variety of Bamana (or Bambara) spoken in Bamako, Mali, is undergoing processes of Vowel Syncope and Velar Consonant Deletion that have a net effect of minimizing or reducing the number of syllables in a word (Green & Diakite 2008, Green, Davis, Diakite, & Baertsch 2009). While these two processes satisfy an overall drive towards minimization in this language variety, both processes generate marked syllable shapes in a language that has been considered generally to permit only maximal CV syllables (Standard Bamana (SB) is a CV language). Specifically, Vowel Syncope generates CCV and CVC syllables and Velar Consonant Deletion generates CVV syllables within the bounds of the language's phonotactics, as illustrated by the examples below in (1) and (2), respectively.

	Standard	Colloquial		Gloss		Standard	Colloquial		Gloss
1a.	[ka.bi.la]	[ka.bla]	*kbi.la	'tribute'	c.	[si.la.mɛ]	[sla.mɛ]	*sil.mɛ	'Muslim'
b.	[mà.ri.fa]	[mar.fa]	*mri.fa	'gun'	d.	[ca.pa.lo]	[ca.plo]	*cpa.lo	'millet beer'
2a.	[si.ki]	[sii]	*ski	'to sit'	c.	[sa.ga]	[saa]	*sga	'goat'
b.	[mɔ.kɔ]	[mɔɔ]	*mko	'person'	d.	[du.ku]	[duu]	*dku	'village'

A striking fact about CB minimization is observed in compounds (e.g 3a) and other longer words (e.g. 3c), where the types and co-occurrence of complex syllables (CCV, CVC, or CVV) as a result of minimization are restricted in a given prosodic word. In words where both Vowel Syncope and Velar Consonant Deletion have potential targets for minimization, only one process is permitted to apply. Only those words with two targets for Vowel Syncope, creating adjacent CCV syllables, permit multiple instances of minimization. Consider the forms below.

	Standard	Colloquial		Gloss
3a.	[se.li#sa.ga]	[se.li.saa]	*sli.saa/*sel.saa	'sacrificial sheep'
b.	[mɔ.gɔ#tɔ.rɔ]	[mɔɔ.tɔrɔ]	*mɔɔ.trɔ	'domestic abuse'
c.	[bi.la.ko.ro]	[bla.kro]	*bal.kro/*bla/kor	'young boy'
d.	[kɔrɔ#mu.so]	[kɔ.rɔm.so]	*krɔ.mso/*kɔrm.so/*krɔm.so	'fame'

The CB forms (3a-b) are representative of instances where words surfacing with a derived long vowel do not allow another complex syllable in the same word. The constituent nouns of (3a) showcase that, in isolation, both nouns ([seli] → [sel] 'pray', [saga] → [saa] 'sheep'), are free to undergo minimization via their respective processes, but when compounded, the generation of complex syllables is limited to one CVV to the exclusion of an additional CCV or CVC within the prosodic word. (3d) represents instances where, even when multiple domains are potentially available for Vowel Syncope, only a single CCV or CVC syllable is permitted. This further illustrates the impermissibility of CCVC or CVCC syllables in the language. (3c) represents a unique case of permissible multiple complexity within a prosodic word. Multiple deletions in CB are only permitted in instances where phonotactics permit the deletion of two vowels to yield a CCV.CCV prosodic word where the second consonants of each CCV are non-identical sonorants.

Drawing upon recent work discussing limitations on prosodic complexity (e.g. Albright 2008, 2009) and cumulativity effects in phonology (e.g. Farris-Trimble 2008), this paper showcases restrictions on multiple complexities in the Colloquial Bamana prosodic word. Our analysis formalizes the interaction between constraints driving Vowel Syncope and Velar Consonant Deletion alongside those demanding faithfulness within the prosodic word in Harmonic Grammar (Smolensky & Legendre 2006) and illustrates that the violation of higher-weighted constraints on segmental markedness is harmonically favored in comparison to multiple violations of lower-weighted constraints against syllable complexity.

Rotuman Metathesis: Establishing Order

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The proposed reconceptualization of Rotuman metathesis as a purely phonological process by Hale & Kissock (1998) has met with a variety of responses in the linguistic literature. McCarthy explicitly adopts the approach advocated in Hale & Kissock (1998) in his revised OT account (contrast McCarthy 2000 with McCarthy 1995). Kurisu (2001), whose morphological approach is adopted by Anderson (2005), accepts certain aspects of McCarthy's later analysis, but rejects the phonological basis for the well-known alternations, asserting that a morphological foundation provides better conceptual and empirical coverage. Finally, den Dikken (2003) argues against the phonological approach to some, but not all, observed instances of the alternations, favoring instead a 'syntactico-semantic' one.

In this paper, we assess the issues regarding Rotuman metathesis that have been raised in response to Hale & Kissock's (1998) paper. First, we survey McCarthy's (2000) analysis, generally parallel to that of Hale & Kissock, showing that such a monostratal OT approach suffers from an internal formal inconsistency: the Output-Output constraints which generate the so-called Incomplete Phase forms must reference structural properties of the Complete Phase forms, while the Output-Output constraints needed to generate Complete Phase forms must reference structural properties of the Incomplete Phase forms. Thus neither form is in fact generable from the analysis presented.

We then show that the Kurisu-Anderson approach suffers these same flaws, since it carries over from McCarthy (2000) the circular Output-Output correspondences problem. More importantly, however, we argue from the data that any explicitly morphological approach will not be able to account for the observed phenomena without missing fundamental descriptive and empirical generalizations.

Finally, we consider the implication of the proposals of den Dikken (2003) for the architecture of the grammar and conclude that these proposals are undesirable, presumably even to den Dikken himself (given the other claims of his monograph).

We conclude with a quick sketch of the necessary properties of any grammar which is to insightfully provide an account for the Rotuman phenomena. Since the phonological analysis of Rotuman requires some degree of abstractness, and since, as we have argued, no non-phonological analysis can provide an insightful account of the data, it follows that at least the degree of abstractness required to maintain the phonological analysis is a necessary property of any phonological theory. Any theory of phonological acquisition must therefore license that much abstractness.

Anderson, Stephen. 2005. *Aspects of the Theory of Clitics*. OUP.

den Dikken, Marcel, 2003, *The Structure of the Noun Phrase in Rotuman*, Lincom Studies in Austronesian Linguistics 05, LINCOM Europa.

Hale, Mark and Madelyn Kissock. 1998. The Phonology-Syntax Interface in Rotuman. *Recent Papers in Austronesian Linguistics*, Matthew Pearson (ed.), UCLA Occasional Papers in Linguistics No. 21, UCLA Department of Linguistics, pp. 115-128.

Kurisu, Kazutaka. 2001. *The Phonology of Morpheme Realization*. UCSC Dissertation [ROA].

McCarthy, John. 2000. The prosody of phase in Rotuman. *NLLT* 18. 147-97.

_____. 1995. Extensions of faithfulness: Rotuman revisited. ROA-110.

Labial consonants in Mohawk

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1. The dubious ubiquity of labial consonants Roman Jakobson, in his exploration of the connections between acquisition, aphasia, and phonological typology, claimed that the most basic place contrast in consonants is between dentals and labials, and that this contrast "cannot be lacking anywhere, provided that there is no mechanical deformity of the speech apparatus (dyslalia labialis)" (1968: 48). Indeed, even the systematic presence of such a deformity need not eliminate the contrast entirely; Jakobson (1968: 48) mentions that in Tlingit, whose speakers traditionally wore "a large and heavy labret" in the lower lip, the labials are realized as "velar consonants with an accompanying *u*-sound: in this way, e.g., *yāk* ('shell fish') and *yāk*^{u} ('canoe') are distinguished." An obvious challenge to Jakobson's generalization is posed by Iroquoian languages such as Mohawk, which appears to have no consonantal labial segments at all. While Mohawk does have labial consonants in words borrowed from French and English (e.g., *raparoét* 'wheelbarrow' < Fr. *la brouette*; Bonvillain 1984: 320), the language as it was before the arrival of Europeans remains an evident counterexample.

2. /p/ as in Postal However, Postal (1964, 1968) proposes that Mohawk does have /p/ natively in underlying representations. The primary evidence for this claim comes from the existence of surface [kw] sequences that behave as though they were single segments. Stressed vowels lengthen in open syllables; a stressed vowel followed by a [kw] sequence derived from underlying /ko/ remains short (1a), but before a [kw] sequence derived from what Postal analyzes as /p/, it lengthens (1b).

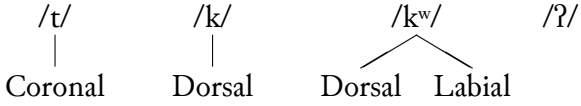
(1) a. /hra+ko+as/ ['rakwas] 'he picks it' (Postal 1968: 247, 258)
b. /rupeh/ ['ru:kweh] 'man' (Postal 1968: 247)

Postal identifies Mohawk /p/ with the Proto-Siouan-Iroquoian *p reconstructed by Chafe (1964), and uses comparisons between Mohawk and Oneida to show that while earlier consonant-sonorant clusters, including *kw, were subject to epenthesis in Mohawk (but not Oneida), monosegmental *p gave rise to modern surface [kw] with no epenthesis (in both languages):

(2)		Mohawk	Oneida		
a.	*kw	[kewistos]	[kwistos]	'I am cold'	(Postal 1968: 247)
b.	*kr	[onutakeri?]	[onutakli?]	'beer' / 'sugar'	(Postal 1968: 246)
c.	*tw	[tewanû:we?s]	[twanû:wehse?]	'we several like it'	(Postal 1968: 246)
d.	*p	[ru:kweh]	[lukwe]	'man'	(Postal 1968: 247)

3. Another interpretation While Postal makes a good case that this /p/ is monosegmental, it is less obvious that it is indeed /p/. If Mohawk already had an underlying /p/ and a rule converting it to [kw], then why did contact with French and English prompt it to develop new surface bilabials, rather than simply assimilating foreign p/b as instances of native /p/ [kw]? Suppose instead that the native segment was /k^{w}/, and that features are assigned in a contrastive hierarchy (Dresher 2009), with Dorsal taking scope over Labial, yielding the representations in (3):

(3)



Given these native representations, it would be fairly easy for Mohawk to create new segments specified with only Labial place (a subset of the specifications of /k^{w}/). The system in (3) is also similar to that of Wichita (Rood 1975), which also has /k^{w}/ contrasting with /t, k, ʔ/ while lacking both bilabial consonants and other examples of contrastive secondary labialization. The Wichita and Mohawk systems—together with the Tlingit example mentioned above—suggest that Jakobson may have been right that contrastive labial place is a universal, but with the proviso that in some languages, the only contrastive labials may be dorsals.

Place assimilation changes its triggers

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In Articulatory Phonology (Browman & Goldstein 1986 et seq), a segment is characterized not simply as a temporally unordered collection of features, but as a representation with intricate timing relationships between its components. In OT instantiations of AP, timing relations are specified by a family of ALIGNMENT constraints (Gafos 2002), which ensure that a particular point in one gesture coincides with a particular point in another gesture. The ALIGN constraints are output-oriented, thus their presence predicts that processes manipulating a single gesture will have consequences for other gestures whenever the alignment point between the gestures is affected. In this paper I argue that such consequences are found in Bantu nasal place assimilation (NPA) phenomena: ALIGN causes the trigger of assimilation to be modified as well as the target.

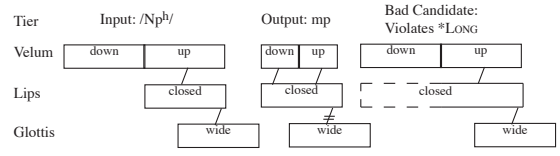
The C's which trigger Bantu NPA suffer various modifications: laryngeal neutralization; hardening; voicing; deletion (1). These changes are directly linked to NPA: a comparison of assimilating and non-assimilating NC clusters demonstrates that only Cs in clusters subjected to place assimilation are the targets of these secondary changes (2). I propose that C in NC changes when it triggers NPA because ALIGN causes the other gestures of C to extend leftwards, dragged along by the leftward extension of the oral constriction, in order to preserve their required alignment points. The result is that these gestures now too overlap N. I will refer specifically to effects involving laryngeal and voicing specifications of C in various Bantu NC clusters to discuss this overlap.

The overlap of non-oral-constriction gestures from C onto N is straightforwardly illustrated in Pokomo (Huffman and Hinebusch 1998), where the glottal lowering gesture of a voiceless C in an assimilating N$\underset{\circ}{\text{C}}$ cluster overlaps N, causing the the nasal to become voiceless (3). The voiceless nasal that results from such overlap is crosslinguistically marked (Ladefoged and Maddieson 1993; Silverman 1997). The range of common N$\underset{\circ}{\text{C}}$ assimilation strategies we find in Bantu appear to be means of preventing this overlap. In Yao (Kerremans 1980) the overlap is avoided by voicing $\underset{\circ}{\text{C}}$ (1d); in Cokwe the nasal itself is lost (1e); while in Mabiha $\underset{\circ}{\text{C}}$ is lost altogether (1c) (Ibid.).

Elsewhere in Bantu, as shown in Zulu, the triggers of place assimilation lose their laryngeal features (1a). I attribute this to the joint effect of ALIGN, markedness constraints on voiceless/glottalized nasals and a constraint *LONG (4): *LONG causes the oral constriction of C to shift onto the preceding nasal without lengthening; ALIGN causes the other features of C to move to stay aligned with the oral constriction; *$\underset{\circ}{\text{N}}$, *Implosive-N (*$\tilde{\text{ɓ}}$) causes the loss of these features (5). While this distribution is unexpected if only the oral closure gesture is implicated in NPA, a system that invokes ALIGN and *LONG forces the glottal gesture to overlap the nasal.

The patterns we see in Bantu result from various rankings of these constraints with respect to faithfulness and markedness (6-8). This study provides new evidence that the AP representations must be interpreted as induced by violable constraints on alignment and duration: the constraints and representations interact in explaining the effect of place assimilation on its triggers.

(1) a. iN+**ɓ**ali→im**b**ali (Z) b. iN+**ʃ**a→in**tʃ**a (Z) c. diN+**p**embe→dimembe (M)
d. N+**p**eta→m**b**eta (Y) e. N+**k**aambi→**k**aambi (C) (2) unassim: um+ɓala→u**mɓ**ala (Z)
(3) Pokomo: a. N+**p**anya→m$\underset{\circ}{\text{p}}^{\text{h}}$anya b. ALIGN, MAX(glottis open) MAX(velum down) ≫ *$\underset{\circ}{\text{N}}$
(4)*LONG: The duration of oral constriction must not exceed the target duration for that gesture.



Zulu	**unassim.:** /um+p$^{\text{h}}$/→[mp$^{\text{h}}$]	**NC:** /iN+p$^{\text{h}}$/→[mp']	**C:** [p$^{\text{h}}$]
Dur.	427ms	270ms	237ms
StDev	36ms	38ms	34ms
n=	15	16	14

(5) Zulu: *LONG, ALIGN, *$\tilde{\text{ɓ}}$, *$\underset{\circ}{\text{N}}$/*N$^{\text{h}}$, MAX(vel) ≫ MAX(glottal spreading)
(6) Yao: *$\underset{\circ}{\text{N}}$ ≫ MAX(glottis open) (7) Cokwe: MAX(glottis open), *$\underset{\circ}{\text{N}}$ ≫ MAX(velum down)
(8) Mabiha: MAX(vel down), *$\underset{\circ}{\text{N}}$, IDENT(glot open) ≫ MAX(glot open), MAX(vel up)

Coronal phonology and phonetic grounding – New electromagnetometry (EMA) evidence from Wubuy (Australia)

Mark Harvey (Newcastle) and Brett Baker (New England)

In this paper, we offer an improved understanding of coronal place phonology. Our model draws on new Electromagnetometry (EMA) data (Best et al 2010), which provides for the first time a dynamic articulatory grounding for analyses of the characteristic phonological properties of coronals.

The maximal coronal place opposition is four-way (Hall 1997) – alveolar vs retroflex vs dental vs palatal. The standard analysis of coronals is from SPE (Chomsky & Halle 1968), in terms of two features [±anterior, ±distributed] resulting in the classifications alveolar [+ant, -dist], retroflex [-ant, -dist], dental [+ant, +dist], and palatal [-ant, +dist]. The SPE model faces a number of problems, including satisfactorily accounting for typical interactions between vowels and coronals, as in the following data from the Australian languages Yankuntyatyara (Goddard 1985) (1) and Ngiyambaa (Donaldson 1980) (2).

1.	paca-ɳu	'bite-PST'	uɳu-ɳu	'push-PST'	witi-nu	'hold-PST'
2.	mura-ʈul	'spear-DIM'	muru-ʈul	'road-DIM'	miri-cul	'dog-DIM'

In (1), the PST suffix is –nu after /i/ and –ɳu elsewhere. In (2), the DIM suffix is -cul after /i/ and –ʈul elsewhere. Under an SPE analysis, these typical patterns involve the high front vowel /i/ conditioning both [+anterior] (alveolar), as in (1), and [-anterior] (palatal) as in (2).

We show that characteristic interactions, such as (1) and (2), can be understood with an improved description of the articulatory dynamics of coronal constrictions. To date, the only articulatory models, based on electropalatographic data, have been indirect (Anderson 2005, Butcher 1990, 1995, 2006). EMA offers direct, dynamic data on tongue movement. We recorded data from two speakers of Wubuy (aka Nunggubuyu), an Australian language with the maximal set of coronal oppositions.

The results offer novel evidence supporting the traditional apical-laminal distinction, and new perspectives on the place distinctions within these classes. Overall tongue dynamics differentiate laminals (forward thrust of the whole tongue) from apicals (tongue body [TB] stabilization, tongue tip [TT] extension + lever action).

Within apicals, retroflexes are distinguished by forward sublaminal movement of the TT against the alveolar ridge. This requires raising and retraction of the TT in the retroflex onset. This is difficult to achieve with a high front TB, which is the TB required by /i/. Consequently, coordinating /i/ with a following retroflex is problematic (Steriade 2001). Alveolars involve a simple leverlike action of the TT, which can be achieved with a range of stable TB positions. Therefore, /i/ is more easily coordinated with a following alveolar, than with a retroflex. This motivates the allomorphy in (1).

Within laminals, the forward thrust for dentals is characterized by a low TB and a raised TT. The forward thrust for palatals is characterized by a raising and fronting of the TB towards the front palate and a lowered TT. The pattern in (2) is motivated by the fact that both /i/ and palatals involve a raised and fronted TB motion, whereas dentals involve a different TB motion. The /i/ vowel is therefore more compatible with palatals than dentals.

We translate these articulatory observations into an OT model, which follows general place theory (Sagey 1990), in involving only gestural features and gestural coordination rankings. The EMA data supports replacing [±distributed] with the gestural features [apical] and [laminal] (Flemming 2003, Gnanadesikan 1994, Hamilton 1993). It also supports Flemming's model of coordination, through specification of coronals for preferential TB front/backness. However, as (2) shows, coordination models must also include TB height, which distinguishes amongst laminals. We show that this model, based directly on the dynamic articulatory properties of coronals, provides a better account of the observed phonological patterns than the standard SPE model.

Variations in Squliq Atayal Morphologically-Induced Vowel Syncope

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This paper investigates a case of morphologically-induced vowel syncope in Squliq Atayal (Austronesian), an endangered language spoken in northern Taiwan, showing its age-correlated variation patterns and presenting the analysis within the framework of Optimality Theory (Prince and Smolensky 1993, 2004). It is argued that the identified vowel syncope results from a morpheme-specific alignment constraint, and that the variable rankings of this alignment constraint with respect to other constraints in the grammar lead to the observed sub-dialectal variations.

Squliq Atayal does not tolerate non-final closed syllables except in forms with the realis marker *in*-, which surfaces as an infix due to the onset requirement. *In*-affixation leads to the presence of a non-final coda by deleting the vowel immediately following the affix, but the vowel cannot be syncopated if it is parsed into a foot. The analysis is built on the assumption that the language contains a single bimoraic iambic foot at the right word edge. (The data are based on the author's own field notes; unparsed vowels undergo reduction.)

(1) a. /mV, in, ŋilis/ [min.ŋi.lis] 'cry, realis, agent voice'
b. /in, quriq, an/ [qin.ri.qan] 'steal, realis, locative voice'
c. /in, biru, an/ [bin.ruan] 'write, realis, locative voice'
d. /Vm, in, snuliŋ/ [sə.mə.nu.liŋ] 'burn, realis, agent voice' (*[sə.min.liŋ])

In the proposed OT analysis, a high-ranking Align-R-*in* constraint demands that the right edge of the morpheme *in* align with the right edge of a syllable, which leads to vowel syncope in *in*-affixed forms. Vowel deletion in (1d) is blocked by the requirement that feet must be binary and do not include prefixes.

The data (1) are characteristic of the pronunciation of younger speakers. Among older speakers (above 70 years of age), however, vowel syncope takes place in (a) but not in (b,c,d); the four representative examples are therefore pronounced as [min.ŋi.lis], [qə.nə.ri.qan], [bə.nə.ruan], and [sə.mə.nu.liŋ]. This variety of speech is accounted for by ranking a root-specific Max-V constraint (Max-V-Rt) above Align-R-*in*. Max-V-Rt protects root vowels, but not affix vowels, from being deleted, which is responsible for the different patterns between (a) and (b,c). Some old consultants state that they used to hear [mə.nə.ŋi.lis] for (1a), suggesting that in an even more conservative speech variety, none of the forms in (1) undergoes syncope. Retention of the affix vowel standing to the right of *in* is actually found in the conservative Mayrinax Atayal dialect spoken in neighboring areas, which appears to support the existence of the no-syncope variety in Squliq Atayal. The factorial typology of the proposed OT constraints correctly predicts the three age-stratified varieties, showing that morphological information plays a crucial role in Squliq syncope data.

Feature geometry meets contrastive specification: incomplete neutralization reloaded

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In this talk I present some cases of incomplete neutralization in "final devoicing", and argue for a representational interpretation. I propose that (some cases of) "final devoicing" are best represented as loss of contrast along a particular dimension rather than the surfacing of some "less marked" segment. To formalize this insight, I propose that loss of contrast is best represented as the elimination of the organizing node, rendering the segment invisible on the relevant tier.

In this talk, I concentrate on cases where (underlying) laryngeal contrasts are recoverable even when final devoicing applies. Van Oostendorp (2008) collects several such cases, but in the majority of the languages that he considers, vowel length—which often cues the underlying laryngeal contrasts—either is non-distinctive or does not interact with laryngeal phonology in the language at large. Here I concentrate on two languages where vowel length is both phonological and relevant for the distribution of laryngeal features.

In Friulian (Baroni & Vanelli 2000), stressed vowels are lengthened in final syllables before underlyingly voiceless consonants (2), despite the general absence of stress-to-weight effects.

(1) a. [ˈlat] 'milk'
b. [laˈta] 'to breastfeed'

(2) a. [ˈlaːt] 'gone (masc. sg.)'
b. [ˈlade] 'gone (fem. sg.)'

Baroni & Vanelli (2000) show that the neutralization is incomplete and that the devoiced final obstruents in (2) are in fact phonetically distinct from the lexically voiceless ones in (1), and thus that (2a) is more accurately [ˈlaːt̥]. This is also reflected in the phonology, where the representationally impoverished final obstruents cannot license a mora.

Trégorrois Breton (Jackson 1960) presents a similar case, except that the representational difference does not seem to be reflected in the phonetics of the obstruents in a manner as direct as observed in Friulian. Nevertheless, the phonological difference exists, since devoiced obstruents tolerate preceding long vowels, while true voiceless obstruents can only be preceded by short vowels. This leads to minimal pairs such as those in (3) and (4).

(3) a. [ˈkaːs] 'cat'
b. *k*[aːz]*ez* 'female cat'

(4) a. [ˈkasː] 'send!'
b. *[ˈkas]

I argue that cases like these are to be explained as loss of contrast, implemented as elimination of the Laryngeal node. This explains why devoiced obstruents are different (phonetically and/or phonologically) from lexically voiceless ones, but raises further questions. In a theory based on privative features, there is potential for a phonological difference between segments with no Lar node and segments with a bare Lar node (Lombardi 1995), both of which have no features and are potentially indistinguishable.

I propose that bare nodes are useful. First, since nodes define autosegmental tiers, segments with a bare node differ from node-less segments by being potential landing sites for features on the relevant tier. This explains final devoicing in languages like Turkish (Kallestinova 2004), where neutralization is complete and where both types of obstruents participate in assimilation. Thus, Turkish exhibits final fortition (Iverson & Salmons 2007) rather than structure-destroying devoicing (cf. Harris 2009). Second, I propose that the appearance of bare nodes can be understood in the light of contrastive specification theories based on successive division (Hall 2007; Dresher 2009), and this device allows to capture the insight that only segments *contrastively* (un)specified for a feature can participate in processes involving that feature. Third, if bare nodes are admitted as licit representations, the stringent constraint violations of de Lacy (2006) emerge as a direct consequence of the formalism, and allow to capture de Lacy's insights on markedness reduction, preservation, and conflation without stipulations regarding universal substantive hierarchies.

Variation of consonant-final nouns in Heritage Korean in Toronto: Default preference or statistical knowledge

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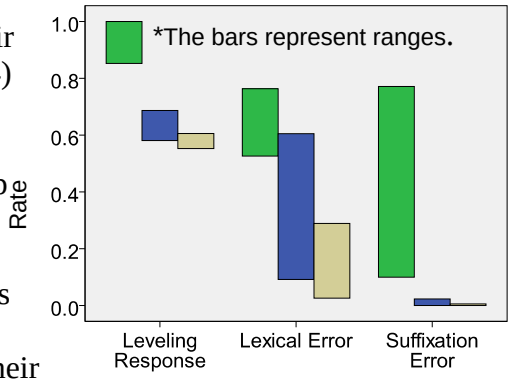
Introduction: In Korean, due to various neutralization rules that target coda, underlying contrast of noun-final consonants is neutralized in unsuffixed forms of nouns: e.g., /nas/ [nat] 'sickle', /nac/ [nat] 'day', and /nac^h/ [nat] 'face'. This led to various reanalyses of the UR of nouns, resulting in diachronic and synchronic variation. The pattern of the reanalysis closely mirrors the statistical distribution of the nouns in the existing lexicon (cf. Zuraw 2000, Albright 2002, Ernestus and Baayan 2003), sometimes giving rise to (new) alternation (/p^{h}at^h/>/p^{h}as/: [p^{h}a**t̲**]~[p^{h}a**s̲**-ɨn]~[p^{h}a**s̲**-e]) and other times leveling the alternation (/hɨlk/>/hɨk/: [hɨk̲]~[hɨk̲-ɨn]~[hɨk̲-e]) in the paradigm (Kang 2003, Jun and Lee 2007, Albright 2008 among others). In this study, we examine the production of consonant-final nouns by heritage Korean speakers in Toronto. Heritage language is characterized by limited access to learning data, incomplete acquisition and regularization or overgeneralization (cf. Polinsky & Kagan 2007). A main question posed is whether heritage speakers show similar sensitivity to the statistical distribution of existing lexicon or use a more general strategy of leveling (paradigm uniformity), the latter of which is purported to be the innate default preference (McCarthy 1998, Hayes 2004, Tessier 2006).

Methodology: Data were gathered from 13 heritage Korean speakers in Toronto (6 female & 7 male) and 12 native Korean speakers (4 female & 8 male). The test items included 85 consonant-final nouns representing a range of possible noun-final consonants in Korean (/m n l p p^h, k, k^h, k', s, c, c^h , t^h, lk, ps, ks/). Each noun was presented in isolation form (where the final contrast is neutralized) and the subjects were prompted to use the noun in two frame sentences, one with a subject marker (/i/) and another with a topic marker (/ɨn/), resulting in 170 responses from each subject (85 nouns * 2 suffixes). The subjects were also asked to translate 74 Korean words of different frequency of occurrences in order to measure their lexical knowledge in Korean. The subjects also completed questionnaires about language background, level of Korean usage and self assessment of Korean language competence.



Findings: The heritage speakers fell into two groups in their response patterns. Low-fluency group (LH, Green bar, N=4) strongly preferred the "leveling" strategy and high-fluency group (HH, Blue bar, N=9) showed a balance of "leveling" and "alternation" strategies, comparable to the Native group (N, Beige, N=12). While on average the LH group lagged behind the HH group in most measures of competence in Korean, what distinguished the two groups most clearly was not their lexical knowledge (middle column) but their error rate in the suffixation task (right-most column)—namely, their ability to form noun+suffix combinations without error. Errors attested in the LH group included wrong suffix, wrong allomorph, suffix stacking, and pause between the noun and the suffix.

Implications: The result of the study is compatible with the assumption that a default preference for paradigm uniformity plays a role at the early stage of acquisition, i.e., before the rules based on lexical statistics are established. At the same time, the "leveling" preference was employed only by the speakers who haven't fully mastered the noun + suffix formation, regardless of their level of lexical knowledge. This suggests that the statistical information in the learning input is registered by the learner only when the grammar has the relevant structure in place, in agreement with the view that learner pays selective attention to the aspects of learning data relevant for the particular stage of acquisition (Dresher 1999).

Doubly Marked Lags with Exacerbation

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This talk offers a treatment of the doubly marked lag problem in phonological acquisition (Levelt et al., 2000; Albright et al. 2007). Our exacerbation model is shown to overcome difficulties of the Split Additive Model presented by Albright et al. (2007). Doubly Marked lags refer to phenomena where violations of low ranked markedness constraints gang up against satisfaction of a high ranked constraint. They occur in the acquisition of Dutch syllable structure, and disappear in adult Dutch phonology. The following attested stage of acquisition illustrate this phenomenon:

(1) CV CVC V *VC

In this stage, CV, CVC and V are allowed, but not VC. In Classical Optimality Theory with the standard syllable structure constraints, this state of affairs never arises. That is, any constraint ranking that allows CVC and V necessarily allows VC. Note that using local conjunction of markedness constraints could predict the gap, but it would also open space for adult grammars that have such lags, which is undesirable since such grammars seem to be unattested. Albright et al. address this issue with a Split Additive Model (SAM) of phonology. In SAM, faithfulness and markedness penalties are tallied separately and candidates are assigned the greater of the two as its total penalty. This model of evaluation is coupled with an aggressive error driven model of learning (Jäger 2007). Markedness constraints start with high weights and faithfulness constraints start with low weights. Every time a learner notices that its grammar predicts a non adult form, the relevant markedness constraints are lowered and the relevant faithfulness constraints are raised. In an aggressive version of this model, this process of weight adjustment is continued until the grammar of the learner predicts adult forms with a probability approaching 100%. This guarantees that faithfulness constraints end up with a weight high above that of markedness constraints. In a simulation, Albright et al. show that SAM with an aggressive error driven learning model predicts the emergence of doubly marked lags in early stages of acquisition, and their disappearance in adult grammars.

Although this model can account for doubly marked lags, it fails to deal with ganging up of markedness constraints with faithfulness constraints. Reviewing work by Łubovicz (2002) and Itô and Mester (2003), we argue that such cases are attested and that an alternative to SAM is needed: our exacerbation model. In this model, the penalty incurred by a candidate for the collective violation of several constraints $C_1, \ldots, C_m$ is higher than the sum of the penalties incurred for the independent violation of each constraint. In this way, we can maintain both that $F(n) > M_1(n)$ and $F(n) > M_2(n)$, while $M_1(n) + M_2(n) > F(n)$, where $C_1(n) > C_2(n)$ means that the penalty incurred for n violations of C_1 is greater than the penalty incurred for n violations of C_2. We implement this intuition formally by defining groups of constraints, and by postulating that whenever a candidate violates n constraints from the same constraint class, the number of violations of each constraint is multiplied by a factor that is proportional to n. Apart from this minimal modification, our model is a rather standard form of stochastic harmonic grammar in which the winning candidate for a given input is defined as the one with the highest probability (Boersma and Hayes 2001). We call our extension of harmonic grammar the 'exacerbation model'. We show with a computer simulation of learning that if Markedness constraints and Faithfulness constraints form two classes of constraints, the exacerbation model together with an aggressive error driven learning model predicts the appearance of doubly marked lags in the acquisition of the syllable structure of Dutch, and their disappearance in adult Dutch grammar. Furthermore, if we assume that the set of all classes of constraints does not partition the set of all constraints, we show that the ganging up of Markedness with Faithfulness in adult grammars observed by Łubovicz (2002) and Itô and Mester (2003), can be accounted for using an exacerbation model.

Positivity, Serialism, and Finite Goodness

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Within Optimality Theory (OT) (Prince and Smolensky, 1993/2004), commonly used constraints motivating spreading processes like vowel harmony suffer from a number of known pathologies (Wilson, 2004). AGREE (Lombardi, 1999, 2001) suffers from the Sour Grapes problem — because it assigns violations to a disharmonic sequence, it is not possible to improve performance on AGREE unless the entire word can be harmonized. If an opaque segment prevents complete harmony, no spreading is predicted (/mawa/→[mãw̃ã], but /mawasa/ → [mawasa]).

(1) **Epenthesis blocking**

	ALIGN	*CC#	DEP
a. nãw̃ãkast ∼ nãw̃ãkasət	W	L	W
b. tawakasət ∼ tawakast		W	L

Gradient feature alignment constraints also make pathological predictions. A constraint like ALIGN can, for example, block epenthesis in words where a harmonizing feature is unable to reach the edge of its domain (1a) but not in other words (1b). Similarly unattested effects are predicted with affix positioning, reduplication, allomorphy selection, and truncation. The reason gradient alignment constraints predict these pathologies is that they assign violations to non-harmonized segments, and therefore are sensitive to the number of segments there are in a word.

In this paper, I propose that spreading is motivated by a positively-defined constraint, which assigns rewards rather than violations (2). Like ALIGN, this constraint is evaluated gradiently, and does not suffer from the Sour Grapes pathology. Unlike ALIGN, it makes no reference to non-harmonized segments, and cannot block epenthesis; both (3a) and (3b) perform equally well on SPREAD. This property extends beyond epenthesis, and resolves many of ALIGN's pathologies.

(2) SPREAD(F): Assign +1 for every pair of adjacent segments linked to the same feature F.

(3) **No epenthesis blocking**

nawakast	SPREAD	*CC#	DEP
a. nãw̃ãkast	+3	W-1	L
b. ☞ nãw̃ãkasət	+3		-1

In the framework of parallel OT, a positive constraint like SPREAD has a serious drawback: the Infinite Goodness problem (Prince, 2007). A candidate can improve its performance on SPREAD by epenthesizing and linking additional segments, and infinite epenthesis improves performance infinitely. However, in a serial version of OT like Harmonic Serialism (HS) (McCarthy, 2000, 2007), positive constraints no longer predict infinite goodness.

(4) **Gradualness**

mãŋ	SPREAD	DEP
a. ☞ mãŋ	+3	
b. mãŋə	+3	W-1

With parallel evaluation, it is possible to epenthesize and link to an autosegmental feature at the same time. In HS, however, GEN is restricted to producing candidates that differ from the input by a single change. Epenthesis and autosegmental linking are distinct operations, and cannot be done simultaneously — [mãŋ̃ã] is not a member of the candidate set in (4).

Motivating autosegmental spreading with a positive constraint within a serial framework avoids the pathological predictions of AGREE and ALIGN. Because it does not count non-harmonized segments, SPREAD cannot block epenthesis or force the selection of a shorter allomorph. Because GEN can only perform one change at a time, SPREAD is unable to look ahead and trigger epenthesis or force the selection of a longer allomorph in order to spread further.

The Semantics of Phonological Features

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In this paper it is argued that phonological features are articulator-independent features imported from other modules of grammar. Phonological features indicate event types and spatial relations between the participants of these events, i.e., the articulators, in a predefined area. Event types are the same as those used cross-linguistically in the classification of verbs and the spatial relations are the same as those expressed in adpositions and in deictic particles. This conception of features differs substantially from previous and current theories of phonological representation, which employ signal- or channel-dependent features, that directly refer to the articulatory and/or acoustic or auditory properties of segments.

The fundamental distinction between continuants and non-continuants parallels the distinction among event types and verb classes between atelic and telic events or processes and performances (cf. event classifications by Vendler 1957, Mourelatos 1978, Dowty 1990). The active and passive articulators correspond to Talmy's (1983) Figure and Ground, respectively. Place of articulation can thus be analysed as the spatial relations between Figure and Ground that are expressed cross-linguistically by adpositions. Further degrees of opening among the continuant segments are analysed as proximity categories as they are common in deictic expressions.

The set of features derived this way is assumed to be organised in the fashion of Autosegmental Phonology (Goldsmith 1979) / Feature Geometry (Clements & Hume 1995), reflecting class behaviour and locality effects.

The use of features that are also linguistically relevant concepts in syntax and semantics is more parsimonious than in theories that use completely different concepts in the different linguistic modules. Encoding of segments as events renders representations modality-independent, that is, the same features are used in spoken and signed language. Abstract events can be implemented either visually or acoustically, the latter either by producing sound that represents the event or, as proposed here, by enacting the event and information on spatial relations between participants in the event with the oral tract, producing a characteristic noise.

Some of the fundamental aspects of regularly observed correlations between phonological structure and meaning, as in onomatopoeia, phonaesthemes or mimetics can be explained via the parallel between phonological properties of segments and semantic properties of events and entities.

The assumption that phonological features have a deeper connection with syntax and semantics than previously thought is supported by recent psycholinguistic studies. For example, in Nygaard et al's (2009) study, participants were asked to choose between the actual meaning, the opposite or a random meaning for words from a language they were entirely unfamiliar with. Participants scored very well at picking the correct or opposite meaning but less often picked the random meaning. This suggests that the connection between sound and meaning is closer than generally thought and phonological features thus have to have a broader semantics than commonly assumed channel-specific features such as [labial] or completely substance-free features or features grounded directly in the acoustics of speech.

Time permitting, I will illustrate the approach with language data both from signed and spoken language.

Phonetic cues to loanword adaptation

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French have vowels that Moroccan Arabic (MA) lacks. This paper reports on the adaptation patterns employed to accommodate these vowels in loanwords in Moroccan Arabic (MA). The focus is on the front unrounded vowel /ü/.

Whether loanword adaptation is phonologically or phonetically motivated is a highly debated issue. Some argue it is purely phonological (e.g. LaCharite and Paradis, 2005); others claim that it lies in perception (e.g Peperkamp & Dupoux, 2003); and others adopt an in-between position and argue for the interaction of phonetics and phonology (Yip, 2006).

Although several models have been put forward to account for loanword adaptation, very few tackled the adaptation of /ü/. Previous research shows that the vowel /ü/ is repaired either as [i] or/and [u] in languages that lack front unrounded vowels. Paradis & Prunet (2000) argue that such repair is evidence for the monophonemic nature of /ü/. However, to my knowledge, no other explanation is provided to why it is repaired as [i] and [u] in such languages as MA, where the adaptation of /ü/ displays irregularities. Consider the following examples:

French	**French (IPA)**	**MA (loans)**	**Gloss**
Costume	/kost**ü**m/	k**u**stim	Suit
Minute	/min**ü**t/	Min**u**t	Minute
Figure	/fig**ü**r/	Fig**u**ra	Figure
Fourrure	/fur**ü**r/	Fur**i**r	Fur
Buffet	/b**ü**fe/	B**i**fi	Buffet
Confiture	/kõfitür/	Kufit**i**r	Jam
Bermuda	/berm**ü**da/	bərm**i**da	Bermuda
Ambulance	/ãb**ü**lãs/	lab**i**lans	Ambulance

The data presents a challenge for phonology based approaches to loanword adaptation.
I will propose an analysis that views this asymmetry as resulting from phonetic cues present in the input. Precisely, when French /ü/ has lower F2 value than the vowel occurring in its vicinity, it is adapted as /u/ (e.g. minute). On the other hand, when it has a higher or intermediate F2 value (e.g. buffet, confiture, respectively), it is adapted as /i/. The borrower seems to preserve the falling or raising slope in F2 values of /u/ and the other vowel(s) occurring in the same word. I shall conclude by presenting a model that shows that the adaptation under investigation is purely perceptual.

Eliminating precedence relations from phonology

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Something which sets phonology apart from other linguistic modules is the fact that it alone requires the encoding of precedence or ordering relations in representations. Although individual theoretical positions do vary, there is general agreement that these relations should hold between segments — or, more precisely, between structural positions. These have been variously described as timing units, CV units, and skeletal positions (Clements & Keyser 1983, Lowenstamm 1981, Kaye 1989, Hayes 1990, Harris 1994, Brockhaus 1995). But in addition, the notion of precedence has also been applied to the description of contour segments such as affricates and prenasalised obstruents, where linear ordering relations are assumed to hold between units smaller than a segment — for example, units such as [±continuant] and [±nasal] (Sagey 1986). What this indicates is that precedence plays a central role in relations between segments at the skeletal level and also within individual segments. On the other hand, it appears to have no bearing on another important domain within phonology, that of syllabic/prosodic structure.

Prosody refers to the network of relations holding between phonological units above the skeletal level such as onset, rhyme, foot and phonological word. And when it comes to representing these prosodic relations it is conventional to employ the notion of dependency. A point which is often overlooked, however, is the fact that the term 'dependency' actually defines a more general structural property which is present in other modules of the grammar too. In some theoretical frameworks this even includes melodic structure, where the internal structure of a segment is represented through dependency relations between intra-segmental units (Clements 1985, Anderson & Ewen 1987, McCarthy 1988, Harris 1994, Clements & Hume 1995, Harris & Lindsey 1995, Kula 2002, Botma 2004, van der Hulst 2005).

During the last decade, however, some researchers (Lombardi 1990, Takahashi 1993; Schafer 1995; Scobbie 1997, Scheer 2003, Nasukawa & Backley 2008) have argued that the precedence relations (i.e. timing differences) which characterize contour segments should be seen merely as a natural outcome of the way speakers interpret these structures, rather than as a phonologically encoded structural property per se. According to this view, the role of precedence is limited to encoding only the relations which hold between skeletal positions. In order to justify this approach, however, we need to explain why this kind of special status is exclusive to skeletal positions.

This issue will be addressed here by evaluating the variety of different relational properties currently used in linguistic representations, and attempting to collapse these into a single established notion of dependency. This will allow us to exclude precedence relations even from the melodic (intra-segmental) component of phonology. It will be argued that precedence is merely the natural result of computing and interpreting the dependency relations which hold between units in a structure. By adopting this approach, the competence side of the language faculty (which includes intra-segmental structure) gains the advantage of being able to maintain a greater degree of representational coherence throughout derivation, right up to the level at which it interfaces with the articulatory-perceptual facilities.

There Is No 'Duplication Problem'

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Many languages exhibit a phenomenon where a 'static' generalization about roots also applies to polymorphemic words, resulting in a 'dynamic' pattern of phonological alternations. For example, in a language with vowel harmony, roots may be harmonic (a static pattern) and a productive vowel harmony rule may also apply to affixes (a dynamic pattern). The 'duplication problem' (DP) refers to the fact that in traditional rule-based phonology, it is not always possible to capture both the static and dynamic patterns with a single rule; many analyses of such languages involve a Morpheme Structure Constraint (MSC) to account for the pattern in roots and a rule to generate alternations. Their surface effect is the same (words are harmonic), but the rule and the MSC are stated separately. Some researchers (e.g., McCarthy 1998, 2002, Kager 1999) claim that the DP provides a strong argument for Richness of the Base (ROTB; Prince & Smolensky 1993, Smolensky 1996), the assumption in Optimality Theory (OT) that there are no restrictions on underlying forms. In OT-ROTB there are no MSCs, and surface markedness constraints account for both static and dynamic patterns, thereby solving the DP.

In this paper I argue that there is no DP to be solved. The existence of the 'problem' hinges on the assumptions that (1) Morpheme Structure Constraints are a psychologically real part of mental grammar, and (2) the explanation for phonological patterns must be captured in the formal analysis of the grammar, so that perceived functional unity of two or more phenomena observed in a language corresponds to unity in their analysis. Assumption (1) has been questioned previously (see, e.g., Clayton 1976, Hale & Reiss 2008), and I argue that (2) is incorrect. If we accept the diachronic domain as a possible locus of explanation for phonological patterns, as in Evolutionary Phonology (Blevins 2004), and if we can explain the similarities between static and dynamic patterns diachronically, then there is no reason to insist on encoding an explanation for them in the grammar. Anderson (1974: 292) argued that in languages exhibiting duplication '[b]oth the constraint and the rule… have the same explanation, where an explanation in phonological terms is often provided by our substantive empirical knowledge of the physics and physiology… of speech' (see also Vaux 2008: 58-59). I extend this argument with the observation that not only are dynamic and static patterns influenced by the same extralinguistic factors, but in cases of duplication they may arise at the very same moment in history, *due to a single historical sound change*. In the hypothetical language mentioned earlier with both productive vowel harmony and harmonic roots, a single coarticulatorily based sound change could have simultaneously created the alternations (in words comprising multiple morphemes) and the static generalization (in monomorphemic words). Identifying the sound change responsible for both patterns explains their coexistence.

This evolutionary approach makes different typological predictions from OT-ROTB, and the empirical results seem to favor the evolutionary approach. For example, there are languages with closely functionally related MSCs and alternations that differ just enough to require separate rules/constraints (e.g., English), as well as languages exhibiting MSCs with no corresponding productive alternations (e.g., Armenian) and vice versa (e.g., Turkish). As I discuss, each of these types of languages is problematic for OT-ROTB, but makes perfect sense in an approach where rules and MSCs may have a shared origin but can easily change independently later on if they are not governed by a single constraint. Therefore, I argue, the DP can be eliminated without ROTB.

Prosodic manipulation in child-directed speech: an integrated, cross-linguistic study

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A widely documented characteristic of child-directed speech (CDS) is the modification of certain phonetic parameters of prosody (e.g. higher and greater range of pitch; longer duration/slower speech rate; more prominent final lengthening; higher amplitude; more even rhythm). A little studied question is the extent to which certain aspects of prosody may be prioritized (or suppressed), or undergo structural modification. In other words, does CDS merely exaggerate the marking of prosodic structure to be found in adult-directed speech (ADS), or do more structural changes occur? Furthermore, how are different parameters of prosodic marking integrated?

As an initial foray into this issue, this paper examines prosodic lengthening and the timing and shape of pitch contours in English and Catalan CDS, and compares them with adult-direct speech (ADS) performing a similar task. It asks the following research questions: i) is there evidence of greater prosodic lengthening in CDS?; ii) are certain prosodic structures highlighted more than others?; iii) are different pitch contours employed?; and iv) how do any differences in prosodic lengthening affect the realization of pitch contours? We looked at the CDS and ADS of 3 Catalan-speaking and 3 English-speaking female adults, interacting with their 2-year old children and an adult interviewer. The material consisted of semi-structured dialogues elicited through short, animated clips shown on a computer.

Prosodic lengthening was investigated first. Using Praat, the material was segmented into syllables, and the two most common syllable types, CV and CVC, were extracted and labelled according to level of prominence (lexically unstressed; lexically stressed but not accented; lexically stressed and accented; nuclear accented). Intonational phrase boundaries and word boundaries were also identified, and syllables labelled according to phrase position (initial, medial or final) and word position (initial, medial or final). A total of 1170 syllables were labelled, across language and speech style. Syllable durations, together with all other prosodic and word boundary information, were extracted using a Praat script.

A comparison of speech styles for each language suggests language-specific modifications in the parameters of lengthening for CDS. Specifically, unlike English, Catalan shows less durational variability as a function of syllable structure types in CDS than in ADS. Also, while in English syllables are longer in CDS roughly to the same degree across the word, in Catalan, they are longer in CDS specifically when word-final in a polysyllabic word, suggesting greater exaggeration of word-final lengthening in Catalan. Lengthening patterns in ADS and CDS were then compared, for each language. In both languages, CDS presented a less *variegated*, more selective system of prosodic marking by duration than ADS. Specifically, English CDS appears to suppress phrase-initial lengthening and the distinction between stressed and unstressed syllables (away from the nuclear accented syllable), while prioritizing phrase-final lengthening. Catalan CDS appears to suppress lengthening of nuclear accents, while also prioritizing phrase-final lengthening. One result of this is that there is greater uniformity of syllable duration, which provides a probable explanation for the more even rhythm we observed for English and Catalan CDS.

In addition to investigating the shape and timing of intonational contours in CDS, analysis of pitch contours, currently underway, will also help determine whether the suppression of durational signals reflect true systemic modifications, or if pitch movement cues are still present. It will also determine whether

Default Place Assignment and Phonetic Underspecification in Spanish Nasal Codas

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Background. Traditional accounts of Spanish morpho-phonology contend that all dialects exhibit a prevocalic /m, n, ɲ/ contrast that is subject to neutralisation in other contexts. According to Harris (1984), categorical assimilation eliminates nasal place contrasts preconsonantally (see 1); yet prepausal/prevocalic neutralisation to [n] in 'Alveolarising' Spanish (AS), and to [ŋ] in 'Velarising' Spanish (VS), obtains through the application of place default rules (see 2): in all word-final contexts, AS inserts a [coronal] place feature whereas VS inserts [dorsal]. Assuming that [dorsal] place is marked, however, Baković (2000) claims that word-final nasals neutralise to a placeless *anusvara* in non-alveolarising dialects. De Lacy (2006), likewise, proposes that word-final neutralisation yields an unmarked [glottal] nasal stop in VS dialects.

(1)	Precons. codas:	[ˈgam.ba] 'prawn', [ˈkaɲ.t̪o] 'chant', [ˈgaŋ.ga] 'bargain'
(2)	Wrd-final codas:	AS:[kan], VS: [kaŋ] (Harris), [kaN] (Baković), [kaʔ̃] (de Lacy) 'dog'

However, in this paper, I present the findings of new acoustic and articulatory experiments which challenge these analyses. In accordance with the default place analysis, I argue that there is a categorical distinction between word-final [n] in AS dialects and the robustly velar [ŋ] in VS (see 4). Nevertheless, empirical investigation reveals that it is *preconsonantal*, rather than word-final, nasal codas (cf. 3) which are underspecified for place on the surface.

(3)	Preconsonantal codas:	[ˈgaN.ba] 'prawn', [ˈkaN.t̪o] 'chant', [ˈgaN.ga] 'bargain'
(4)	Word-final codas:	AS: [kan], VS: [kaŋ] 'dog'

Experimental Findings. Results from experimental work employing simultaneous electropalatographic (EPG) and acoustic measurements show, firstly, that speakers of AS realise an apico-alveolar [n] word-finally. In the same context, the presence of a 'velar pinch' pattern (Stevens 1998) in the spectra of word-final [VN] realisations coinciding with excitation of posterior palate-electrodes points to the formation of oral occlusion at the velum for VS speakers. Yet in putatively place-assimilated preconsonantal codas, EPG contact patterns and the corresponding acoustic profiles are sporadic and highly variable. That these realisations are subject to a range of articulatory implementation strategies thus provides a crucial grounding for my analysis: preconsonantal nasals lack place target specifications because they are 'phonetically underspecified' (Keating 1988) for place.

Analysis. Recent accounts of place neutralisation in OT rely on a universal place markedness hierarchy which is assumed to generalise over all manners of articulation. They further rely on positional licensing conditions (e.g. CODACOND-Place), assimilation requirements (AGREE-Place), and/or positional faithfulness constraints protecting onsets. Contrary to these analyses, however, my experimental findings from VS speakers indicate that [dorsal] can function as an unmarked place feature for nasals, *pace* Baković (2000) and de Lacy (2006): cf. Nevins & Plaster (2008: 775-777) and Rice (1996). This fact can be explained in perceptuo-articulatory terms: not only do [n] and [ŋ] share a high degree of perceptual similarity (cf. Steriade 2001; Narayan 2008) but velarisation also permits the generation of a robust percept of nasality with minimal articulatory exertion.

In addition to the word-final default to [n]:[ŋ], the occurrence of anusvaras in preconsonantal position is problematic for analyses based on AGREE-Place and CODACOND-Place. I claim, therefore, that the phonetic facts argue for an alternative constraint, *[nasal, PLACE]/__C, specifically requiring surface underspecification of preconsonantal nasals. Again, this constraint is straightforwardly grounded on the articulatory and perceptual facts: acoustic cues to place in preconsonantal nasals are poor, favouring a strategy of gradient gestural interpolation over the oral constriction targets of nasals in this position.

What the initial CV is initial of

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Overview. The initial CV is found to always head a computational domain: it is therefore phase-initial (rather than word-initial). Given the diagnostic for phasehood provided by the initial CV, the comparison of phonological and syntactic footprints of phases shows that both sets do not match. It is therefore argued that syntactic phase structure defines a skeleton whose units may leave a phonological trace by projecting a CV unit. Hence the relationship between syntax and phonology is the same as what we know from the interaction of morphology and phonology: morpho-syntactic boundaries are *selectively* visible to the phonology.

The initial CV (Lowenstamm 1999) is a representational means of carrying morpho-syntactic information into phonology that is specific to Government Phonology (it is thus a competitor of hash marks # and the like, and of prosodic constituents). The initial CV is usually thought of being word-initial. It has the advantage of being non-diacritic: its presence automatically bears on the surrounding phonology because an additional empty nucleus needs to be taken care of. By contrast, hash marks or prosodic constituents are "sleepers" that have no phonological effect by themselves: they only produce an effect when a rule/constraint refers to them, and anything and its reverse can happen in the vicinity of a # or a PrW. It is a fact, though, that the left edge of the word does not produce just any phonological phenomenon: if it is any specific with respect to word-internal phonology at all, it has cross-linguistically recurrent properties: 1) clusters of falling sonority are prohibited, 2) the first consonant of words is strong (rather than weak), 3) the first vowel of the word cannot alternate with zero. All three properties are a direct consequence of the presence of the initial CV (Ségéral & Scheer 2008). In case the initial CV is absent, the left word margin does not impose any specific restrictions.

Phonological footprints. The existence of relevant processes in external sandhi in a language enforces the absence of the word-initial CV. In Belarusian for example, CVC-roots that appear in zero grade (CøC-V) occur with an i-prothesis in case 1) they are quoted in isolation or are utterance-initial (*lev* "lion Nsg" vs. *i-lv-a* "id., Gsg") or 2) preceded by a C-final word (*brat i-lv-a* "the brother of the lion"). No prothesis is observed after V-final words (*śastra lv-a* "the sister of the lion"). The i is an epenthesis into an ungoverned empty nucleus (in response of two empty nuclei in a row): into the initial CV in case 1) above /CV-løv-a/, into the final empty nucleus of the preceding word in case 2) /bratV løv-a/. Hence the existence of a word-initial CV would provoke epenthesis also in /śastra løv-a/, which is not the case. We thus face a pattern where morpho-syntax does distribute an initial CV, which however is not word-, but utterance-initial. There are thus languages where the word is headed by an initial CV, while in others the utterance is. In all cases, the CV unit heads a computational domain, i.e. is phase-initial.

(Mis)match. While Chomsky's (2000) initial proposal is to grant phasehood only to CP and vP, smaller and smaller pieces are held to be phase heads as phase theory unfolds: TP, DP, and even DP-internal phases are proposed (e.g. Matushansky 2005, den Dikken 2007). While the CP and the utterance are a fairly good (although not a perfect) match, there are certainly no languages on record where a phonological footprint is observed at, say, the DP boundary, but not at the AP boundary (or at the vP boundary, but not at the DP boundary). On the other hand, the typical phonological footprint that the word boundary leaves has no echo on the syntactic side: the word is not a relevant syntactic unit, and is certainly not known to act as a phase head.

Conclusion. Syntactic and phonological phases are not isomorphic, and there does not appear to be any hope (with a better theory or more accurate data) to make syntactic and phonological evidence for phasehood coincide. Prosodic Phonology knew that phonological and syntactic domains may be non-isomporphic, but the dramatic amount of non-coincidence is only revealed in the light of modern phase theory. This leaves us with a situation where phase structure is defined in (morpho-)syntax, but where phases do not automatically leave a phonological footprint. Which phases exactly are armed with an initial CV unit and hence produce a phonological effect is decided on a language-specific basis.

Onset Prominence, loanword epenthesis, and the phonetics-phonology interface

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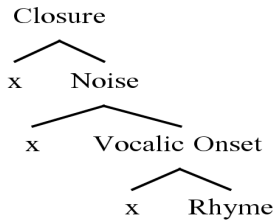
In "phonetically-based" phonology we find a striking contradiction. On the one hand, Wright (2004) discusses the importance of a perceptual boost at stimulus onset. On the other hand, in Hayes *et al* (2004:23) we read that "[n]othing about perception, articulation, or processing leads us to expect any licensing asymmetries among syllable positions". Indeed, citing the failure to find perceptual correlates of the syllable (e.g. Krakow 1999) this tradition has largely eschewed the possibility that constituent structure may be a phonetic object. The onset boost is seen as facilitating the perceptibility of segmental cues, rather than as a marker of structure. This approach has fanned the flames of the cue vs. prosodic licensing debate that has smouldered in the literature for well over a decade. However, there is no reason to assume that cue licensing and prosodic licensing are incompatible. Speech does indeed contain prosodic cues (Maddieson 1985). If these cues do not correspond with traditional representations of structure, it is the representations that must be refined.

Onset Prominence is a theory of segmental specification that incorporates constituent structure on the basis of auditory properties observable in initial positions. The theory posits the structure in (1) as a universal from which all representations are derived.

(1) – Onset-Rhyme structure



The top three layers of structure represent the inherent sequencing of specific auditory properties associated with onset articulations. Closure allows for auditory recovery enabling the onset boost, which aligns temporally with aperiodic Noise and Vocalic Onset (housing CV formant transitions). Rhymes correspond with auditory saturation (Wright 2004: 44; Figure 2.4) and tend to be sonorous in order to be perceptible. A "coda" is a pruned onset structure that is submerged under the Rhymal layer. Manner of articulation is defined in this theory on the basis of structure (Golston and Hulst 1999, Pöchtrager 2006), producing a non-arbitrary portrait of strength and lenition, and capturing both place restrictions (e.g. the rarity of initial /tl/ clusters) and sonority-based generalizations in the area of phonotactics.

The empirical focus of this presentation will be epenthesis in loanword adaptation. Our approach unifies strategies for avoiding both codas and illicit consonant clusters. Most epenthesis is analyzed as listener-induced restoration (Ohala 1981) of onset specification, rather than the insertion of a lexical vowel (Davidson 2007). Prothesis in ST clusters results from auditory ambiguity associated with sibilants (Blevins and Garrett 2004). Asymmetries in cluster resolution (Fleischhacker 2001) fall out naturally from these structures.

Onset Prominence eliminates the need for alignment constraints, unifying segmental and prosodic phonology in a way that makes useful predictions for future phonetic studies. Phonetic features associated with onsets produce identifiable boundaries in the speech signal, providing a speech-based link with the defining property of phonology: discreteness.

Frequency effects interact with phonological grammar

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Frequency effects and phonological grammar are usually treated as separate: frequency effects are regarded as belonging to the performance area and grammar to the realm of competence. In this paper I show that frequency effects and grammar interact and argue for a combined approach. Pretonic schwa in Dutch is subject to reduction, leading to full-fledged schwa deletion or a reduction of its length. This reduction rule is highly sensitive to the frequency of the word concerned. We refer to this as a frequency effect. On the grammatical side, deletion results in a complex consonant cluster, which may be phonotactically well-formed (illustrated in (1) below) or ill-formed (see (2)). This paper investigates the relation between these two factors: is it the case, for instance, that the ill-formedness of the resulting cluster inhibits deletion, and is there a difference in this respect between high-frequency and low-frequency words?

(1)	Deletion resulting in well-formed onset clusters				
	/bəˈlɑŋrɛɪk/	→	[ˈblɑŋrɛɪk]	‘important’	/bl-/
	/χəˈledən/	→	[ˈχledən]	‘ago’	/χl-/
(2)	Deletion resulting in ill-formed onset clusters				
	/bəˈnedən/	→	[ˈbnedən]	‘down’	*/bn-/
	/dəˈzɛlvdə/	→	[ˈdzɛlvdə]	‘the same’	*/dz-/

I will report on an experiment that was carried out in order to investigate the role of both frequency effects and resulting cluster type. It turns out that *deletion* occurs regardless of frequency and cluster type, without significant differences. However, if we measure *reduction* there is a clear difference between the cluster types; well-formed target clusters allow for significantly greater reduction than ill-formed target clusters. Although there is no main effect of frequency, an interaction between frequency and cluster type is attested: for low-frequency words there are smaller differences in duration due to cluster type and for high-frequency words the differences in duration due to cluster type are larger.

This interaction calls for a hybrid model in which both frequency effects and the grammar play a role. The differences in the production of schwa in the two contexts suggest that there are differences in lexical storage and selection. As for the ill-formed target clusters, we hypothesize that after perception of a form with an ill-formed onset cluster, a schwa is reconstructed by the listener (cf. Ernestus 2009). Both the reconstructed and the phonetic form are stored in an exemplar-type lexicon. As for well-formed onset clusters, no such reconstruction is necessary. This difference can be accounted for by a combination of Exemplar Theory and a perception grammar (following Boersma & Hamann 2009). The duration of schwa *in production* is accounted for if we assume, following Pierrehumbert (2002), that a *group* of exemplars is selected from an exemplar cloud: the output consists of a computed average of these forms. I suggest that because of the differences in composition of the clouds of words like *belangrijk* and *beneden* (see (1,2) above), there are output differences according to resulting cluster type.

References

Boersma, Paul & Silke Hamann. 2009. Loanword adaptation as first-language phonological perception. In: Andrea Calabrese & W. Leo Wetzels (eds.), *Loanword Phonology*, 11-58. Amsterdam: John Benjamins.

Ernestus, Mirjam. 2009. The roles of construction and lexical storage in the comprehension of regular pronunciation variants. *Interspeech.* Brighton.

Pierrehumbert, Janet. B. 2002. Word-specific phonetics. In: C. Gussenhoven & N. Warner (Eds.), Laboratory Phonology, Vol. VII. 101-137. Berlin, Mouton de Gruyter.

What's in a word? Prosody in Polish voicing

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Voice assimilation across word boundaries brings about the question of whether 'word' is best analysed as grammatical word, Prosodic Word, or word-level cycle. Bermúdez-Otero (forthcoming) discusses this problem with reference to opaque voice assimilation in Quito Spanish, providing evidence that the pattern requires a cyclic analysis. This paper presents data on voicing in Poznań Polish which point in an entirely different direction, supporting a prosodic analysis.

A production experiment examining the realisation of word-final coronal stops in a variety of contexts in Poznań and Warsaw Polish yielded the following results:

1. A word-final voicing contrast is optionally realised in Poznań Polish in front of an initial sonorant in the following word. The same contrast is neutralised in Warsaw Polish;

2. Voice assimilation between stops across word boundaries is always categorical in both dialects, and consists in regressive spreading of voicing or voicelessness.

A prosodic account of these facts is the following: [±voice] undergoes delinking from the Laryngeal node in front of another Laryngeal node, the assumption being that only obstruents can be specified for laryngeal features. Delinking is followed by spreading of the [voice] feature value from the following segment. Delinking and spreading apply across the board, which results in a categorical voice assimilation in stop clusters, regardless of whether a word boundary intervenes. In addition, there is an optional delinking process in front of a Prosodic Word boundary, hence the optional voice contrast preservation in the stop#son context.

The prosodic account is further supported by an analysis of the Pol'n'Asia Maptask Corpus, which contains data from 20 speakers, mostly from Poznań and the surrounding area, engaging in spontaneous, task-oriented dialogues. The evidence is twofold. First, final stops in prepositions do not undergo devoicing. While the speakers were found to vary with respect to pre-sonorant voicing across word boundaries, they consistently voiced their final obstruents in prepositions followed by a sonorant. This confirms earlier claims by Booij and Rubach (1987) who propose a prosody-based solution: final devoicing takes place Prosodic Word-finally, and prepositions do not project the Prosodic Word node. In addition to the behaviour of prepositions, the corpus data show a further prosodic effect: there is obligatory obstruent devoicing phrase-finally (in front of a pause).

While being able to accommodate most of the present voicing effects at the prase level, the cyclic approach can offer no insights of its own. Word-final [voice] delinking in the word-level cycle must be optional, leaving the possibility of feeding, for example, a word-final fully specified [d] to the next stratum. For a [d] to assimilate to a following [p], the [voice] feature value must be delinked at the phrase level. Failure to do so would either block spreading, producing an unattested surface [d#p], or leave the [d] with two conflicting [voice] values. Similarly, phrase-final devoicing must be implemented via a delinking process separate from the optional word-level delinking. In addition, the analysis would need a proviso for blocking prepositions from triggering a word-level cycle.

While none of the suggested phrase-level operations are at odds with the assumptions that underlie the theory of the cycle, the evidence for there being a cyclic effect is crucially missing. The abundance of prosodic boundary effects, on the other hand, give strong support to the prosodic analysis and its associated theoretical tools.

Clitics in Middle Dutch

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Clitics, constraints on phonological phrasing, and non-isomorphic mapping between syntactic and prosodic words go hand in hand. In this paper, we endeavour to trace the development of phonological phrasing and cliticisation in Dutch. In this attempt, we chose to closely examine the distribution of personal pronouns and definite articles in the 14th century manuscript Marshall 29, which is kept in the Collection Marshall in the Bodleian, concentrating on 2,200 lines of rhyming verse attributed to the poet Hein van Aken and to the author Jan van Boendale (1279 – 1351). The middle of the 14th century is an interesting period to look at because it marks a transitional stage from the Early to the Late Middle Dutch period. The manuscript was composed in the centre of the area where Middle Dutch was written and spoken at the boundary between different dialect areas (Flanders, Brabant and Holland).

Middle Dutch poetry is a good source for studying phonological phrasing and cliticization, because it was written down following regular conventions (Mudrow 1994:110). Function words in isolation and as clitics are common in 14th century texts. Pronouns are generally written together with a preceding host (e.g. *mochtic (mocht-ic)* 'might I'). The clitic *t* has two sources: it could be the reduced form of the pronoun or the neuter definite article. As a pronoun, *t* occurred as a proclitic only before a verb that begins with a strong syllable and initiates a phonological phrase (e.g. *twaren* 'it were'). In other environments, pronominal *t* was encliticized onto verbs, conjuncts (e.g. *Dant was* 'then it was'), prepositions, adverbs (e.g. *alsoe-t*, als-t), relative pronouns and other personal pronouns (*datict* < *dat-ic-t* 'that I it') with which it forms one prosodic constituent. Definite articles most often encliticized onto conjunctions or monosyllabic prepositions that carried stress, again initiating a phonological phrase (*int boek* 'in the book'). Exceptions occur when following word starts with a vowel (presumably to provide an onset), in which case the article was transcribed as a voiced stop (e.g. *in doude* < *in t-oude* 'in the old one'). In other environments, articles were proclitics and written together with their host word. When the neuter definite article *t* was a proclitic, added to adjectives and nouns, it was either subject to regressive voicing assimilation when a voiced stop followed (e.g. *t + boeke* > *dboeke* 'the book') or a trigger of progressive voicing assimilation when a voiced fricative followed (e.g. *t + volk* > *tfolk* 'the people'). The same pattern of voicing assimilation is also found in compounds (e.g. *jonc + vrouwe* → *joncfrouwe*), indicating that proclitics and following lexical items are prosodified similarly to two stems. These patterns of assimilation are still found in Modern Dutch (cf. Booij 2003 and references therein).

Some clitic combinations in our manuscript can only be used as full forms in present-day Dutch and the direction of cliticisation is not always the same. We will argue that phonological cliticisation is often non-isomorphic with syntactic phrasing and furthermore, trochaic cliticised prosodic units are more the norm than the exception. We will show that the differences noted in the two stages are related to constraints on cliticisation; in the earlier stages, cliticisation allowed asymmetric trochees, while modern Dutch is more inclined to moraic trochees. A simple constraint change, leading to important consequences.

Pull poor Paul out of the pool: The antics of /l/ in the English South-East

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It is still an unresolved question in phonological theory how the categorical nature of phonological representations and phonological processes can be squared with fine-grained social and individual phonetic variation and gradual historical change. In order to shed light on this question, we will look at two innovations occurring in younger South-Eastern English speech involving rhymal /l/, pre-/l/ mergers and some complications involving /l/-vocalisation. Rather than enriching phonological representations with phonetic detail to account for such variation, we will, however, argue for more abstract, minimally and contrastively specified phonological representations (e.g. Morén 2007, Dresher 2008) that remain underspecified at the surface (Keating 1988), shifting some of the burden from phonological computation to phonetic implementation.

The first innovation concerns the highly variable realisation of the high/back vowels /uː, ɔː, ʊ/ before /l/, exemplified, for example, by the triplet *pool, Paul, pull*. Some speakers keep all three forms distinct, although they may be phonetically quite similar. This similarity is due to the backing of /uː, ʊ/ before /l/, which front or centralise in all other contexts. Other speakers display quantitative and/or qualitative neutralisations or mergers of these distinctions, with a considerable degree of inter-speaker variation. While neutralisers lose the distinction of /uː/ and /ɔː/ before coda-/l/, such that *fall=fool*, this distinction re-emerges when /l/ is resyllabified into the onset of a following syllable (*falling≠fooling*). Others may neutralise the contrast completely, leading to a lexical merger (*falling=fooling*); in addition, this merger may be lexically diffusing, such that only some pairs are affected by it while contrast is kept in others. Further variation is introduced by the possible quantitative neutralisation/merger of /uː/ and /ʊ/, independent of the qualitative neutralisation/merger of /uː/ and /ɔː/. A question that follows from these observations is how we can model these neutralisations phonologically and how we can account for the variable lexicalisation of these neutralisations as mergers.

We will argue that a second innovation can shed light on this, the variable vocalisation of /l/ in syllable rhymes. This process has already been noted in the literature (see e.g. Johnson & Britain 2007, and references therein), but two questions have not been explored: Firstly, what is the phonetic outcome of /l/-vocalisation? Secondly, how does vocalisation interact with the possible resyllabification of /l/ before vowel-initial words (*feel* vs. *feel it*)? Regarding the first question, we find that vocalised /l/ generally neutralises with /ɔː/, especially when syllabic (as in *bottle*). Regarding the second question, we find considerable variation. Interestingly, however, there are some speakers who do not resyllabify /l/ and therefore create hiatus in forms such as *bottle up*. This creates a complication since [ɔː] otherwise triggers epenthesis of [r] in this position (*law[r] enforcement* but *bottle*[r] opener*). /l/-vocalisation thus counterfeeds [r]-insertion, although, derivationally speaking, it should precede it (word-level vs. postlexical process).

This talk will provide a descriptive account of all this variation, which will feed into a phonological analysis that relies upon minimal segmental specifications, taking into account other dimensions of variation in the South-Eastern vowel system. Essentially, we will argue that /uː/ is specified only as [high] (because of considerable variation along the backness dimension, as [ʉː∼yː∼i̟i̟]) while /ɔː/ is specified as [back] (because of variation along the height axis). As rhymal /l/ acquires a [back] specification across English dialects (velarisation), the merger with /ɔː/ under vocalisation is thus expected. Crucially, however, /l/ still retains its [consonantal] specification phonologically, thus explaining both lack of [r]-insertion (phonologically there is no hiatus) and the allophonic raising of /ɔː/, which occurs regularly in closed syllables in this variety, and which causes the neutralisation with /uː/ (uː/ itself having acquired a [back] specification from rhymal /l/, hence explaining its backing). We will argue that such an analysis is more elegant and empirically superior to analyses that rely on full feature specifications and thus require a range of stipulations regarding these processes as well as having to address the aforementioned counterfeeding opacity problem derivationally, rather than representationally.

One-to-Many Relations

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This paper presents evidence for one-to-many relations in vowel harmony and explores their implications for locality and the nature of constraints that drive such harmony systems.

Baiyinna Orochen (BOr) has progressive unbounded round harmony among nonhigh vowels triggered by short /o ɔ/ (1a), but not long /oː ɔː/ (1b) (Li 1996). Nevertheless, [oː ɔː] can be produced by round harmony and propagate it onward (1c). ATR harmony also occurs.

(1) a. somsok-jo ‘pasture (INDEF ACC)’ ɔlɔ-jɔ ‘fish (INDEF ACC)’
cf. urə-jə ‘mountain (INDEF ACC)’ bɪra-ja ‘river (INDEF ACC)’
b. boːl-jə ‘slave (INDEF ACC)’ gɔːl-ja ‘policy (INDEF ACC)’
c. ɲoŋo(xo)-xoːn-mo ‘bear (DIM, DEF ACC)’
dʒɔlɔ-xɔːn-mɔ ‘stone (DIM, DEF ACC)’ cf. bɪra-xaːn-ma ‘river (DIM, DEF ACC)’

This pattern indicates that the final suffix in (1c) is round by virtue of a relation between its vowel and a short round vowel in a nonadjacent syllable. A short root vowel thus stands in a one-to-many relation with vowels that harmonize with it, including the long vowel in the DIM suffix and the short vowel in the DEF ACC suffix, as in (2a). It cannot be attributed to an imperative that drives harmony between round vowels in adjacent syllables, e.g. AGREE(F) (Baković 2000), nor can it be driven by a chain of corresponding elements where identity for [round] is evaluated locally for adjacent corresponding elements, as in (2b) (Hansson 2007).

(2a) a. One-to-many relation: V1•V2•V3•V4 b. Successive chain: $V1_x$•$V2_{x,y}$•$V3_{y,z}$•$V4_z$

Wilson (2003) has characterized unbounded harmony as “myopic” in the sense that whether harmony spreads from V1 to V2 does not depend on whether it proceeds to V3 or later. While round harmony in BOr is myopic in Wilson’s sense (ex. [ɔlɔ-ŋɪ] ‘fish’ *[ɔla-ŋɪ]), it shows long-range vision with respect to target scope, referring to the scope of assessment for identifying possible targets for harmony from a trigger. Nonetheless, the assimilation proceeds locally among adjacent syllables, that is, a syllable is never skipped (e.g. [boloboxi-wə] ‘wild duck (DEF ACC)’, *[boloboxi-wo]. Harmony in BOr thus reveals that locality for target scope is i) distinct from that of feature associations (the latter enforced using *SKIP or a similar measure; Uffmann 2004), and ii) distinct from “myopia” in harmony.

One-to-many relations support the existence of a certain type of imperative for harmony. The trigger for round harmony in BOr is a *short* vowel, i.e. it is perceptually weak (Kaun 2004). Weak triggers can be characterized using F/weak, referring to a given feature that is inherently perceptually weak or that occurs in a perceptually weak context. LICENSE(F/Weak, Strong-Pos) constraints, which promote association of F/Weak with a prominent position, such as a stressed syllable, have been proposed to produce certain bounded harmony patterns with nonlocal target scope (Walker 2005, 2010). Weak trigger patterns like that in BOr support extending LICENSE constraints to unbounded harmony with weak triggers (see also Jiménez & Lloret 2007 on Andalusian). The argument here is that such patterns necessarily arise from an imperative that enforces a relation between a weak trigger and all other vowels in a word. This is formalized as a “word-maximal” licensing constraint, LICENSE(F/Weak, ∀V), which penalizes every vowel to which F/Weak in a word is not associated (in line with McCarthy 2003). The constraint for round harmony in BOr is LICENSE([round]/short, ∀V).

In conclusion, BOr shows that one-to-many relations are attested in vowel harmony; a second case will be demonstrated in Jingulu (Pensalfini 2002, Nevins in press). Further, the case of BOr supports separating locality for the dimension of target scope from that of feature association and “myopia”. These findings have implications for the constraints that shape different harmony systems. Building on this last point, harmony in Yakut (Krueger 1962) will be exhibited as a case that shows local target scope, a property proposed to arise from constraints that restrict certain gestural transitions in vowel sequences in the language.

Templates, spreading and palatal patterns in the acquisition of English and French

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The nature and the size of the first production units are important issues in research on the acquisition of phonology. It has been claimed that phonological representations such as phonemes and syllables cannot be acquired before and without words, and that segmental and syllabic complexity is achieved progressively by the way of a «whole word» unit : more precisely, by way of « templates » (Vihman & Croft, 2007). This « template hypothesis », supported mainly by Vihman & colleagues, refers to a production behavior of children frequently observed across languages. From the 25 /30 word-stage, and whatever the input language, each child seems to begin with a few systematic structural shapes built on the basis of a small features' inventory, as if s/he had to map incomplete segmental content onto a template of prosodic (perhaps syllabic) positions.

Three case studies in English and French are reported in the literature in which children systematically use palatal patterns, i.e. yod, in their templates. For English, Priestley (1977) and Vihman et al. (1994) provide data for Christopher and Alice respectively. Christopher exhibits a strong tendency towards [CVjCV] patterns, and both selects and adapts adults' target words to fit them to this template. Alice exhibits three types of palatal patterns: [jV] (from 9 to 11 months), [VI] with a diphtong (*hi)* (from 10 months), and [C_oVCI] (*baby, mommy)* (from 13 months) that she combines from 14 month ([dœIji] : *daddy)*

Wauquier (2009) provides French data from Claire supporting a 'yod stage', following the first 'stops stage' and preceding the rise of fricatives. During this period the yod is a default consonantal melody, spreading on consonant slots mainly to replace the fricatives.

Though the data come from two typologically different languages, English and French, the three cases share three salient characteristics : first the palatalization and /or the yod apparently do not proceed from the segmental context (they can appear in the absence of any palatal content in the adult target); second, the palatalization seems to behave as an autosegmental melody and third, the yod and / or palatal patterns fade after this templatic stage during which they are heavily used.

In this paper, I will critically compare these three sets of data in order :

- to establish whether we are in position to state a relevant generalization that covers the data from these two different languages.
- to evaluate the respective weight of the factors motivating the systematic use of palatalization in the grammars of these three children: (articulatory) phonetics, input and frequency, structure (shape of the templates), and markedness.

Indeed, certain phenomena involving yod and palatalization that are also observed in adult phonologies provide arguments supporting the claim that yod and / or palatalization patterns in children's data are not constrained by phonetics or frequency but rather exhibit a templatic learning-path constrained by markedness.

Generalized Mora Affixation

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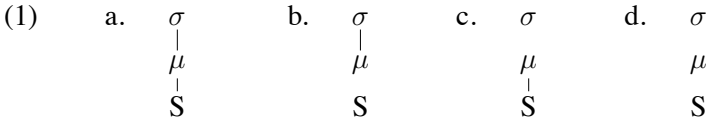
Main Claim In this talk, we argue that subtractive morphology (Horwood 2001, Kurisu 2001) is triggered by affixation of a morphemic mora which is only partially prosodically integrated. Our basic observation is that an affixal mora may be (non-)integrated into the prosodic structure of its base in different ways: In (3-a), it is fully integrated leading to lengthening or epenthesis (Davis and Ueda 2006), in (3-b) the mora is dominated by a syllable node, but does not dominate a segment: this results in opacity (van Oostendorp 2005) or shortening effects (Seiler 2008). We argue that (3-c) is the structure characteristic of morphologically triggered subtraction. Following Classical Containment Theory (Prince and Smolensky 1993), we assume that a segment which is not dominated by a prosodic word node is by definition not pronounced phonetically (thus the mora in (3-d) is fully 'deleted').

(1)



Data In contrast to instances of morphological truncation where a segmental string is mapped onto a fixed template, subtraction deletes some well-defined portion of a phonological string (in virtually all cases of morphological subtraction either the rhyme of the final syllable as e.g. in Koasati (2) or the final coda consonant as in e.g. Tohono O'odham (3)) in order to mark a morphological category.

(2) *Koasati* (Martin 1988, Kurisu 2001)

pitáf-fi-n	pít-li-n	"to slice up the middle"
ataká:-li-n	aták-li-n	"to hang sth.

(3) *Tohono O'odham* (Fitzgerald 1997, Horwood 2001)

Impf.	Perfect	
ʔí:ɨ	ʔíɨ	"drinking"
ɲɨ́ok	ɲɨ́o	"speaking"

Analysis Following the Coloured Containment version of OT (van Oostendorp 2006) we assume that underlying elements are distinguished from epenthetic material by morphological colour. We argue that the exponent of a subtractive morpheme is always a morphological mora that associates to segmental material of its base. This segmental material cannot be (phonetically) dominated by an underlying mora due to the constraint 1ROOT requiring that segments are dominated by maximally one node that is not dominated by another node. Subtraction results since the morphological mora is not parsed into prosodic structure due to DEPS-μ, penalizing the insertion of a colourless association line that links morphologically coloured elements. Other constraint rankings result in the standard morphological lengthening/gemination pattern (e.g. in Alabama, Grimes 2002) or catalexis (e.g. the morphological shortening pattern in Eastern Franconian, Seiler 2008). Additional markedness constraints lead to cases of apparent vowel length polarity as exhibited e.g. in Western Nilotic (Wolf 2005, Reh 1993).

Discussion There are three substantial advantages of our analysis over approaches invoking arbitrary morphological operations (Anderson 1992) or paradigmatic output-output constraints (as Horwood 2001): *First,* the mora affixation account explains the fact that subtractive morphology never targets onset consonants since moraic onset consonants are impossible (or at least extremely marked crosslinguistically, cf. Topintzi 2008). *Second,* it accounts for the local adjacency of subtraction to morpheme edges. *Third,* it allows to derive the fact that subtraction might lead to phonotactic patterns which are otherwise excluded in the language (e.g. morphological subtraction of a final vowel in Icelandic deverbal action noun formation leads to consonant clusters which are impossible in non-truncated words in Icelandic).

Poster papers

Learning morphophonemic alternations: Effects of Naturalness and Frequency

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Morphophonemic alternations are a considerable and difficult step in phonological acquisition. Learning alternations takes a long time, since children have difficulties up to the age of 7 (Kerkhoff, 2004). It is therefore worthwhile discussing two supporting factors: the naturalness of an alternation and its frequency. We found that naturalness is more important than frequency.

A natural pattern is grounded in phonetics and taps universal features of perception and/or production, as opposed to an unnatural one. Naturalness has been taken to mean that there is both a learning and a processing advantage for natural patterns over unnatural ones. Whether this is true is currently under debate (Becker et al., submitted; Hayes et al., to appear). Some research indicates that natural patterns are learned with more ease by children (Cristià & Seidl, 2008; van de Vijver & Baer-Henney, 2010) and adults (Wilson et al., 2003; Peperkamp et al., 2006). Other research indicates that unnatural rules can be learned as well (Peperkamp & Dupoux, 2007). We show that adults learn natural alternations more easily than unnatural alternations.

The second factor that we discuss is probability of occurrence. There is evidence that there is both a learning and a processing advantage for frequent patterns over infrequent ones (Hayes et al., to appear; Szagun, 2001; Tomasello, 2003).

Previous studies concerning processing and acquisition of alternations suggest that naturalness is more important than frequency (Coetzee, 2008; van de Vijver & Baer-Henney, 2010; Wilson, 2006). Are natural frequent alternations easier to learn than natural infrequent ones? Are unnatural frequent alternations easier to learn than unnatural infrequent ones?

We conducted an Artificial Grammar experiment in which 80 adult native speakers of German participated. Two artificial languages were constructed, each with a particular alternation. In one language there was a natural alternation (vowel harmony); in the other language there was an unnatural alternation (a vowel alternation that depends on the sonorancy of the first consonant of the stem). Participants were divided in two groups. One group was exposed to the natural alternation and the other group was exposed to the unnatural alternation. Each of these groups was further divided into two subgroups. One subgroup was presented with material in which the alternation occurred frequently and the other subgroup was presented with material in which the alternation occurred infrequently. After an exposure phase we asked each participant to inflect new words in order to to measure how well each participant had learned the alternation. Knowledge about the artificial language-specific alternation was needed to produce the forms correctly as the phonological context of each test item required a certain alternation pattern.

The effects of naturalness and probability of occurrence were compared in the groups. We found an effect of naturalness but not of probability of occurrence: In line with previous research, the natural rule was learned more easily than the unnatural one, irrespective of the frequency with which the participants were exposed to an alternation. Participants did not learn the unnatural rule at all, whether this rule was presented frequently or infrequently. There was a tendency that the natural rule was learned more easily if presented frequently than if presented infrequently, but the effect was not significant. Our findings suggest that naturalness is more important than frequency in the acquisition of morphophonemic alternations.

Naughty or nice? or:
Why Swedish and Dutch are well-behaved Germanic languages

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The paper takes as its point of departure the distinction between two subtypes of binary laryngeal obstruent systems, [voice] languages (such as Hungarian, Slavic, Romance, Yiddish) versus [spread glottis] (henceforth [sg]) languages (such as English, German, Welsh). Following Honeybone's (2005) "laryngeal realism", it argues that the difference between, e.g., initial plosives in [voice] languages (where they are voiceless unaspirated vs. prevoiced) and [sg] languages (voiceless aspirated vs. devoiced/voiceless unaspirated) does not simply lie in the phonetic manifestation of an underlying voiceless vs. voiced distinction, as has been commonly held since the beginnings of Generative Phonology, but is of phonological relevance as it has serious consequences for the patterning of the whole system of obstruents. Namely, while in [sg] systems no true laryngeal activity is attested (esp. there is no voice assimilation of obstruents), in [voice] languages voice assimilation is a very strong tendency (if not a rule). That is, "distinctive [voice] implies regressive voicing assimilation" (the title of van Rooy & Wissing 2001), whereas in [sg] languages the notion *voice* is not relevant at all as it is totally inactive.

Within such a setting, Romance and Slavic languages are generally classified as [voice], while Germanic languages belong to the [sg] type, with a handful of notable exceptions: (a) Yiddish (Iverson & Salmons 2008, etc.), upon arising from a Slavic background, took up the [voice] nature of the substrate, and as such, it exhibits plosive prevoicing and the expected pattern of voice assimilation; (b) Dutch (Booij 1995, Iverson & Salmons 2008, etc.), as a result of contact with Romance, also developed into a [voice] system, has voice assimilation (an untypical pattern thereof, though) and prevoicing but no aspiration[1]; (c) Swedish (cf. Ringen & Helgason 2004, Petrova et al. 2006) has aspiration and no assimilation but considerable prevoicing in initial plosives; (d) certain varieties of Scots/Scottish English (Wells 1982: 412-413, Iverson & Salmons 1999: 22-23) have no aspiration but instances of regressive spread of voicing and sometimes even prevoicing.

Out of these, Dutch and Swedish have recently received considerable attention as mixed systems of [sg] and [voice] features (see references above). The present paper looks in detail at the phonetic correlates of aspiration (sonorant devoicing, phonetic difference between voiceless fricatives in [sg] and [voice] systems, etc.), voice and voice assimilation, and evaluates the relevance of phonetic evidence in phonology. It argues that what appears to be the Dutch/Swedish-type constellation of [sg] and [voice] is not only theoretically unappealing but is also incompatible with a sufficiently constrained phonological theory. It attempts to eliminate these apparent counterexamples to the strict reading of the [voice]/[sg] typological bifurcation by introducing what may be dubbed "the [voice] fallacy of [sg] languages", i.e., the optical illusion of phonetic realization (for both Swedish and Dutch) as well as by filtering the minority, "irregular" segment of the phonological patterning out of the general, "regular" pattern (for Dutch "assimilations").

The major conclusion is that neither Swedish nor Dutch are "naughty" by nature – in fact, they are "nice", [sg]-type Germanic languages.

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[1] Also: Afrikaans and West Flemish.

Acquisition and the Complexity of Phonemes and Inventories

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The first question in a computational simulation of phoneme acquisition is, what is a phoneme, and what structure is placed on the phoneme space. It might be as simple as a discrete set. Or, as in de Boer's (2001) well known work on the evolution of vowel systems, it might be a two or three dimensional continuous space, with a metric, within which phonemes are points, clusters, or distributions. For consonants, it is less obvious what to do, as the mapping between articulatory, acoustic and perceptual space is complex and far from one–one. As there is some evidence that infants recognize and generalize some features better than others, one might place consonant phonemes in feature space. On the other hand, the ability to generalize over features appears to degrade, perhaps contributing to the difficulty of acquiring new phonemes later in life, which suggests that at some point the mental phoneme space becomes less structured.

The structure of phoneme space becomes especially interesting for languages with highly complex inventories, such as the Caucasian languages and the San languages – particularly since those inventories are usually rather neatly structured when laid out in IPA style charts. The San language !Xóõ has perhaps the world's most complex vowel inventory. According to Traill (1985), the phonetic vowel space comprises a five-vowel system combined (with some restrictions) with any combination of three distinctive voice qualities and also nasalization. Some simplification occurs on a plausible classical phonemic analysis, but there still remain 37 distinct vocalic phonemes, some of which are so rare that they may well not be encountered for some years, if at all. A similar problem arises with the better known click inventory.

In a recent conference presentation, Bradfield (2009) suggested that even in adulthood, the !Xóõ vowel inventory is better understood as being structured into concurrent 'phonemes', with each 'voice quality' being a 'phoneme' (in the style of autosegmental phonology, but less drastic). He suggested that it would ease the otherwise challenging acquisition problem, but supported this suggestion only with intuition. In this presentation, we present a first attempt to produce some quantitative information to check this idea.

We set up a simulation in the style of de Boer, with a single 'adult' speaker (representing a population of similar adults), and 'learners' trying to acquire the adult's inventory. De Boer, following Steels (1997) and others, uses 'imitation games' – the learners try to match a vowel said by the adult, and receive extra-linguistic feedback on whether they succeeded; if not, they adjust their phoneme inventory by shifting a vowel or adding a new vowel, depending on various criteria.

Our previous experience with replicating de Boer's work has suggested that his relatively detailed modelling of articulation and acoustics is not crucial to the trend of the results, and moreover we are concerned only with the single issue of the topology of the phoneme space. We therefore cut down the model by mapping articulatory space directly into acoustic and perceptual space. We then set up three models: (1) a simple 2-D 5-vowel system; (2) a 40-vowel system comprising 5 vowels together with any combination of 3 voice qualities, where the learners do not structure the phoneme space (i.e. they are simply learning 40 vowels in a 5-D space), which corresponds to a simplified version of Traill (1985)'s phonemic analysis; (3) the same number of phonetic vowels, but with learners who identify voice qualities independently of vowel quality. We then measured the average number of interactions required for a learner to acquire fully the adult inventory.

The results provide significant support for the suggestion that a structured inventory is much easier to learn. Interestingly, the agents take nearly twenty times as long to learn the 40-vowel model (2) as the base 5-vowel model (1). But the structured 40-vowel model (3) takes only four times as long as the 5-vowel model to learn.

Is There Incomplete Neutralization in American English Flapping?: Aaron Braver (Rutgers)

Introduction: Flapping, the process by which intervocalic /t/ and /d/ shorten in American English, has been used to argue both in favor of and against the existence of incomplete neutralization. In *complete* neutralization, two underlyingly distinct segments merge to the same output segment, and are produced identically. In *incomplete* neutralization, however, segments that have merged phonologically are produced with slight phonetic variation (see, e.g., Port and O'Dell 1985). While some studies of flapping in American English report that the process completely neutralizes underlying /t/ and /d/ to [ɾ] (e.g. Joos 1942), others report that the underlying voicing status of a flap—that is, whether it originated from a /t/ or a /d/—can be determined from the phonetic output (Fisher and Hirsh 1976, among others).

This paper attempts to reconcile these conflicting reports by answering the following questions: (i) is flapping an instance of incomplete neutralization? (ii) if so, what trace of the underlying distinction between /t/ and /d/ remains in the phonetics? (iii) does the degree of neutralization vary depending on the task a speaker is performing?

Method: The experiment described in this paper had two tasks. In the minimal pair reading task, speakers were shown nonce-word minimal pairs differing only in whether they contained intervocalic /t/ or /d/.

In the morphological paradigm completion ('wug') task, speakers were shown 30 nonce words—15 with word-final /t/ and 15 with word-final /d/. Each nonce word was shown in a frame sentence that unambiguously identified it as a verb. Speakers were then shown a second frame sentence with a blank into which they were instructed to insert the '-ing' form of the verb—thus making word-final /t/ and /d/ word-medial, thereby placing them into a flapping environment. This task minimizes the likelihood of hyperarticulation (and thus, lack of flapping), as well as the influence of orthography associated with minimal pair reading tasks.

In each task, the duration of flapped segments and that of the preceding vowel was measured.

Results and discussion: The table at right shows the results of a mixed linear model analysis (Baaeyen 2008) with vowel and flap durations regressed against a model with underlying voicing status, task, and vowel quality as fixed facts, and speaker and item as random factors. (i) The duration of /d/ flaps and that of /t/ flaps was significantly different ($p<0.01$), suggesting that the neutralization in flapping is, indeed, incomplete. (ii) While flap duration, then, serves as a trace of the underlying voicing distinction, no significant effect was found on the duration of the preceding vowel, contrary to previous studies (Fox and Terbeek 1977). (iii) Further, the results show a significant ($p<0.05$) effect of the interaction between task and underlying voicing status on flap duration, suggesting that the task a speaker is performing—here a minimal pair reading task compared to a wug task—affects the degree of neutralization—/d/-flaps were more distinct from /t/-flaps in the minimal pair reading task than they were in the wug task.

Effect of	*On*	*t*	*p*
Underlying voicing	flap dur.	-2.485	<.01
	vowel dur.	-0.429	*n.s.*
Interaction: underlying voicing and task	flap dur.	2.012	<.05
	vowel dur.	-0.029	*n.s.*

These findings suggest that incomplete neutralization is, in fact, observed in flapping. Additionally, the existence of a task effect may explain the discrepancy among earlier studies, which did not have identical experimental procedures. Further, these results add to the growing body of work (e.g., Fourakis and Iverson 1984, Warner et al. 2006) which seeks to determine whether putative examples of incomplete neutralization are truly characteristic of the interface between the phonetic and phonological modules, or whether outside effects—such as orthography—play a role.

"Divorce" in the history of German

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Background – It is traditionally assumed that Modern Standard German – that is, German as it is spoken today – is the direct descendant of Middle High German (MHG [1050-1350]), i.e. the direct output of the changes which affected MHG. These include phonological changes like Open Syllable Lengthening (OSL) and Closed Syllable Shortening (CSS) which had a levelling influence on vowel quantity (cf. Paul [1884]) – as well as diphthongisation, monophthongisation and diphthong lowering which only affected vowel quality (cf. Paul, Wiehl & Grosse [1998:77ff]). It is therefore assumed that the phonological characteristics of Modern Standard German are the direct consequence of the evolution of the MHG phonological system. In other words, it is taken for granted that the modern quantity of German vowels is a consequence of OSL and CSS.

Aim(s) – This paper shows that the phonological system known as Modern Standard German cannot be considered as the (direct) output of the evolution of the MHG phonological system. Rather, it constitutes another phonological system which – of course – has inherited certain specificities from the evolution of the MHG phonological system and which also exhibits a number of characteristics on its own (which could not have been inherited from the previous stages of the language but which arose thanks to borrowing etc.). In fact, when comparing the evolution of the MHG system and the modern system, one may observe that the modern language exhibits some patterns which could not have arisen because of regular diachronic rules. For instance, **i)** long vowels (monophthongs) do occur in internal closed syllables in Modern Standard German (e.g. *Z*[i:]*rde* "ornament") whereas such vowels were eliminated (CSS) or simply could not arise (OSL) in this environment between MHG and the modern language (cf. **P7** below); **ii)** stress made it possible for (short) vowels to lengthen from MHG to NHG whereas stress only prevents long monophthongs to be realized as short in the modern language (**P1**); **iii)** stressed had effects on the (tonic) vowel and it now has effects on a preceding consonant (**P2**)...

Results: Seven parameters – Thanks to the comparison of synchronic and diachronic data (taken from an electronic panchronic corpus containing roughly 15000 entries), it was possible to identify 7 theory-independent parameters which make it possible to differentiate between the (direct) output of OSL and CSS (pre-New High German [pre-NHG]) and the modern system (New High German [NHG]).

Parameters		pre-NHG	NHG
P1	Interpretation of stress	segmental	diacritic
P2	Position of stress	right	left
P3	Correlation btw. C-voicing and V-quantity	yes	no
P4	Correlation btw. C-voicing and C-quantity	yes	no
P5	Synchronic device deriving V-quantity	yes	no
P6	Complementary distribution of V_s and $V:_s$ (peripheral vocabulary)	yes	no
P7	$V:_s$ need external support	yes	no

Vowel raising in pretonic mid-vowels in Brazilian Portuguese

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This paper deals with the phonological phenomenon of vowel raising in pretonic mid-vowels of nouns and verbs in Brazilian Portuguese (BP), especially in the variety of the inland of São Paulo state (FAPESP – 2009/09133-8). Through this phenomenon, the mid-vowels /e/ and /o/ are realized, respectively, as the high vowels /i/ and /u/, in words like the nouns *m[i]nino* (*boy*) and *alg[u]dão* (*cotton*) and the verbs *pr[i]ciso* (*I need*) and *t[u]ssindo* (*coughing*).

In our research, nouns and verbs are considered separately, based on: (i) the works by Silveira (2008) and Carmo (2009), which describe the phonological behavior of pretonic mid-vowels in nouns and verbs, respectively; and (ii) the works by Harris (1974), Quicoli (1990), Wetzels (1992) and Lee (1995), among others, which give evidences of differences between lexical categories in relation to other phonological processes in BP. As an example, the relations between flexional suffixes and stress rules can be mentioned: the flexional suffixes of non-verbs do not affect the application of the stress rule (e.g. *fatór* (*factor*) – *fatóres* (*factors*)), while the flexional suffixes of verbs can change the placement of the stress (e.g. *coméça* (*he/she starts*) – *começámos* (*we start*)). Lee (1995), based on the Prosodic Lexical Phonology (INKELAS, 1989, 1993), proposes, therefore, the existence of two rules of primary stress in BP: one for non-verbs – occurred in the level α –, and another one for verbs – occurred in the level β.

The *corpus* of this research is formed of sixteen interviews with spontaneous speech samples of the *Banco de Dados IBORUNA*, a result of the ALIP Project (UNESP/IBILCE – FAPESP – 03/08058-6) and available at *www.iboruna.ibilce.unesp.br*. The analyses were made under the perspective of the Theory of Linguistic Variation and Change (LABOV, 1972), by using the statistical package VARBRUL. The rates of vowel raising in nouns and in verbs were relatively low and similar: 13% for /e/ and 14% for /o/ in nouns, and 16% for /e/ and 10% for /o/ in verbs. For both, nouns and verbs, two phonological processes were shown to be extremely relevant to the application of vowel raising: (i) vowel harmony, through which the vowel is raised by the influence of a high vowel presented in the following syllable, as in *v[i]st**i**do* (*dress*), *g[u]rd**u**ra* (*fat*), *s[i]g**u**rar* (*to hold*), and *pr[u]c**u**rando* (*searching*); and (ii) vowel reduction (ABAURRE-GNERRE, 1981), through which the vowel is raised by the influence of the point of articulation of an adjacent consonant, as in *fu[ʧi]bol* (*football*), *[ku]lher* (*spoon*), *[ʤis]crever* (*to describe*) and *[ku]nversam* (*they talk*). Nevertheless, there is an important difference between nouns and verbs related to the most relevant process that favours the application of vowel raising: in nouns, it is vowel reduction, while, in verbs, vowel harmony. Two possible and non-excluding explanations can be mentioned: (i) the verbal suffixes with high vowel /-i/ and /-ia/, as in *p[i]d**i*** (*I asked for*) and *p[i]d**ia*** (*I/he/she was asking for*), which occur only in second and third verbal conjugations, influence the application of vowel raising through the process of vowel harmony (CARMO, 2009); and (ii) in some verbs of third conjugation, there is a categorical process of vowel harmony in the verbal root, through which the stressed vowel of the root harmonizes its height features with the subjacent thematic vowel /i/, as in *s**e**nt**i**r* (*to feel*) – *s**i**nto* (*I feel*) and *d**o**rm**i**r* (*to sleep*) – *d**u**rmo* (*I sleep*). This morphological information may influence the variable application of vowel raising in the pretonic mid-vowel of words of the same verbal paradigm, as in *s[e]ntia ~ s[i]ntia* (*I/he/she was feeling*) and *d[o]rmia ~ d[u]rmia* (*I/he/she was sleeping*). This research supports, therefore, the point of view that relations between nouns and verbs are important and must be considered in order to refine and advance phonological analyses of Brazilian Portuguese.

Phonotactic learning: phonology or phonetics?

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Phonological features have been attributed the role of building blocks of language, as they allow parsimonious descriptions of sound inventories and phonological patterns and alternations (Chomsky & Halle, 1968; Hall, 2001). For example, the realization of the English Saxon genitive *s* can be predicted as follows: "the suffix agrees in **the feature [voice]** with the preceding (non-sibilant) sound", e.g., *cat*[s] and *dog*[z], and even *Ba[xs] music* (according to Halle, 1964). While abstract **phonological** features are useful theoretical constructs, psycholinguistic evidence for them was virtually non-existent (e.g., Wickelgren, 1965), when two studies on adults' generalization of sound patterns on classes of sounds have recently been used to support their existence (Wilson, 2006; Finley & Badecker, 2009). However, the evidence they provide remains rather weak, as in both studies participants' patterns of generalization could not be easily explained from a phonological viewpoint. For instance, in F&B, participants exposed to vowel harmony generalized from low and mid vowels to high ones, but not from high and mid vowels to low ones, which cannot easily be explained if *abstract phonological features* are involved. On the contrary, these results could suggest that *phonetic* features are the basis for adults' phonotactic learning, a hypothesis we explore here by comparing the performance of two language groups, English and French, in their generalization of a constraint on voicing.

Obstruent [voice] is an active **phonological** feature in both languages: it is contrastive (e.g., English *pin-bin*; French: *bas* /ba/ "low" - *pas* /pa/ "step") and recruited in phonological patterns (e.g., English: plural suffix voicing assimilation; French: obstruent voicing assimilation). These two languages differ crucially in the **phonetic** implementation of these phonological classes. In French, syllable-initial voicing in both fricatives and stops is produced with vibration of the vocal cords concomitant to the closure. In English, by contrast, syllable-initial voiced fricatives are produced with vocal cord vibration, but voiced stops are not. Hence, in French, but not in English, voiceless and voiced obstruents form natural classes from a phonetic point of view. Therefore, if **phonological** features are recruited in phonotactic learning, both language groups should exhibit comparable performances. In contrast, if phonotactics involves **phonetic** features, only French speakers may succeed.

Stimuli were designed to be comparable across the two languages, and recorded by one native speaker of each. There are two phases to this study: exposure and test. During exposure, participants hear a total of 180 non-word tokens, with 5 different onsets of the same voicing (e.g., /p,t,k,s,S/), and are asked to rate them for well-formedness. During test, participants are asked to rate novel non-words in terms of how frequently they had been presented during exposure. None of the test words was part of the exposure set; however, their *onset* fell into one of three categories: (1) *Trained*: used during exposure – in the example above, e.g. /p/; (2) *Legal*: not used in exposure non-words, but belongs to the same class – another *voiceless* obstruent, e.g. /f/; (3) *Illegal*: neither used in exposure nor belonging to the same class – a *voiced* obstruent, e.g. /b,v/. Results show that the 12 French adults tested readily generalized, as their frequency rating for legal non-words was significantly higher than that for illegal non-words, $F(1,11) = 5.08$; $p < .05$. We are currently gathering the English data, which provides the crucial piece of evidence on this debate. If English adults also rate legal items higher than illegal ones, this would strongly suggest that abstract **phonological** features could be involved. However, if they fail to do so, **phonetic** features would remain the most parsimonious explanation for adult phonotactic learning. While unsupportive of the classical view of features (e.g., Comsky & Halle, 1968), the latter result would not be entirely unappealing to phonological theory, as it would provides important evidence on how phonetics can shape phonological features (Mielke, 2008).

Why a constraint *_rj_ is not enough

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Several languages avoid word-internal sequences of rhotic and high front vocoid such as [rj ri] or the reverse [jr ir] (henceforth: *rj*). Two examples are given in (1) and (2) (data from Hall & Hamann to appear).

(1) Jita

Base infinitive	*Causative*	*Agentive*	*Gloss inf.*
[oku-saɾ-a]	[oku-sas-j-a]	[omu-sas-i]	'to go mad'
[oku-koɾ-a]	[oku-kos-j-a]	[omu-kos-i]	'to work'

(2) Norwegian

a) *[l] – [ɽ] alternation*		b) *no alternation*			c) *no restriction on [iɾ, jɾ]*	
[su:l] ~ [su:ɽ]	'sun'	[mi:l]	*[mi:ɽ]	'10 km'	[diɾ. ɾə]	'to tremble'
[da:l] ~ [da:ɽ]	'valley'	[fæjl]	*[fæjɽ]	'error'	[læjɾ]	'camp'

The cross-linguistic avoidance of *rj* is phonetically motivated: speakers avoid elaborate tongue movements from a position of lowered tongue mid and retracted tongue back (for an alveolar or velar rhotic) to an antagonistic position for a high front vocoid (e.g. Kristoffersen 2000 for Norwegian and Gussenhoven 2009 for Dutch). This phonetic motivation has been formalised as markedness constraint **rj* in Optimality-theoretic accounts of several languages (e.g., Hall 2003 for English, Hamann 2003 for German, Downing 2001, 2007 for Jita).

While a formalization with a markedness constraint **rj* and interacting faithfulness constraints can account for the observed typological variation, it conceals the fact that the constraint **rj* does not always operate on the phonological level and therefore functions as a kind of cover constraint. Two languages illustrate this point.

In Jita, see the data in (1), the rhotic tap is only spirantised (i.e., *rj* is avoided) when certain morphemes (causative and agentive) starting with /i/ or /j/ are added (Downing 2001, 2003). Other morphemes with /i/ or /j/ do not trigger spirantisation, and morpheme-internally the sequence /ri/ can occur unrestricted. Diachronically, the initial vowels in morphemes triggering spirantisation all stem from superhigh vowels in Proto-Bantu, where they always caused spirantisation. Present-day Jita is thus an example where **rj* applies on the morphological level.

In Norwegian, see the data in (2), the retroflex rhotic cannot occur after high front vocoids, while there are no such restrictions on the occurrence of the rhotic tap (Kristoffersen 2000). Norwegian can be argued to have a phonetic restriction **rj* that tackles only the retroflex rhotic, which is articulatorily more complex than the apical tap.

The present study proposes to make a principled distinction between the phonetic, phonological and morphological level of representation and to split up the cover constraint **rj* into an articulatory constraint on the phonetic level and a phonotactic constraint on the phonological level. Groups of morphemes behaving similarly are marked in the lexicon, thus a separate morphological constraint is not necessary. This proposal is modelled in Boersma's (2007) Bidirectional Phonetics and Phonology, which provides a framework with the necessary levels of representations and respective constraints. Such a formalization is not only able to capture the synchronic stages of several languages but can also account for diachronic changes, or the "moving up" of a once articulatorily motivated **rj* to a phonologically motivated restriction and further on to a morphological process, as it occurred for instance in Jita and Polish. By this, the present proposal will be illustrated to be superior to alternative accounts with a single markedness constraint **rj*.

Can we ever say assimilation is categorical?

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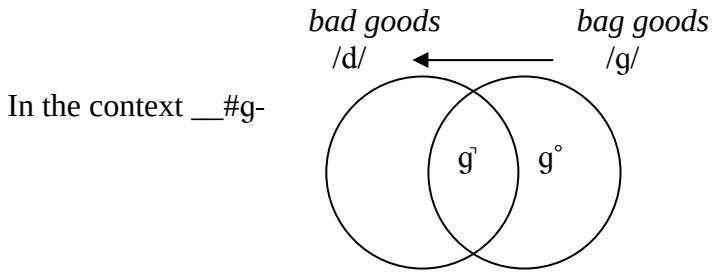
It is now widely accepted in light of instrumental phonetic evidence (e.g. Nolan 1992, Ellis & Hardcastle 2002, Kochetov & Pouplier 2008) that assimilation can be gradient. But these studies have also observed instances where there is no evidence of gradience, in which case the assimilation is taken to be complete. Complete assimilation is often interpreted as a change of category. For example, in *bad goods* produced as [bag gʊdz], if there is no trace of the original /d/, then a category change from /d/ to /g/ is said to have taken place. Complete assimilation is therefore qualitatively, not merely quantitatively, different from gradient assimilation. But a question that needs to be asked here is what counts as a change of category? The usual criterion for categorical assimilation is that if an assimilated version of *bad goods* is identical to *bag goods* (token-to-token variation notwithstanding) then there must be a change of category. But is this not driven by a rather crude form of biuniqueness? This paper argues that attention needs to be paid to the fact that an assimilated stop cannot be released and that this is enough to distinguish between *bag goods* and *bad goods* even when the latter is completely assimilated. For the sake of argument, let us assume that complete assimilation is obligatory in some variety of English. In this hypothetical variety *bag goods* can vary optionally between [bag̚ gʊdz] and [bag˚gʊdz] (˚ = audibly released) but *bad goods* can only be [bag̚ gʊdz]. The situation can be represented in a Venn diagram as:



If phonological analysis were to focus on sets of realisations (represented by the circles), rather than on individual realisations, then complete assimilation need not entail a category shift. The set of possible realisations of the final consonant of *bad* in *bad goods* is not the same as the possible realisations of the final consonant of *bag* in *bag goods*. We therefore do not have a category shift from /d/ to /g/. But neither do we have a fully bidirectional opposition between /d/ and /g/. Rather, we have a unidirectional opposition in which /g/ is distinct with respect to /d/ but not vice versa (indicated by the arrow in the figure).

In a language such as Korean which has assimilation of final coronals in casual speech (Kochetov & Pouplier 2008), and where final stops are obligatorily unreleased (IPA 1999), an analysis of category shift might be justified. However, even in Korean, can the sets of realisations ever be identical if final open juncture is possible in one case but not the other? It is thus not specifically release of consonants that is the issue, but juncture type.

The paper concludes that complete assimilation is only quantitatively different from incomplete assimilation, being one endpoint of a continuum that may contain indefinitely many intermediate assimilations. Rather than recognising two types of assimilation, phonetic assimilation which is gradient and phonological assimilation which is categorical, only phonetic/gradient assimilation need be set up. It is simply a matter of how much accommodation to the phonetic properties of the trigger category the articulators make when realising the assimilated category – maximum accommodation or less than maximum. Under this approach, assimilation is seen to be always and entirely a realisational matter. The conclusion is similar to the position of Articulatory Phonology (Browman & Goldstein 1989) but arrived at via a very different theoretical route.

The special status of the coronal in the explanation for variation

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In a number of different phonological theories, the coronal place enjoys a special status (see for example papers contained in Paradis & Prunet 1991). For many of these theories the coronal is the default place and is left unspecified. Front vowels, on the other hand, are specified for [-anterior] coronal (see for example Hume 1992).

In particular the coronal stop /t/ in many standard and non-standard varieties of English is prone processes of lenition and, in particular, in a non-salient position will be replaced by the placeless glottal stop: perhaps the most likely position for such glottalisation to occur is in syllable final (either word- final or word-internal) position when the following segment is a consonant. Thus we expect to find the /t/ of *atlas* or *button* glottalised as well as that in *what* as in *what do you want?* Indeed, to some extent this could be considered to be almost categorical. Indeed, in a sociolinguistic study of the speech of an informant from 'the south-east of England', Baker (2007) found that glottalisation occurred 97%of the time in pre-consonantal position. Although considered to be less standard, intervocalic glottalisation, especially word-finally but also word-internally, is very prevalent. The condition on word-internal glottal replacement is that the affected /t/ must be foot internal – *better* [bɛʔə] *vs attempt* [ətɛmpt] *[əʔɛmpt]. Word finally the /t/ will glottalise regardless of the relative stress on the following word – *get off* [gɛʔ ɒf] *vs get an…* [gɛʔən].

The aim of this paper is to shed light onto, and provide a phonological explanation for the variability that occurs across the relevant sites of possible glottalisation. Bearing in mind that word-internal intervocalic glottalisation, even where the above conditions are present, there is a lower instance of such glottalisation than in any other position, it is shown that the nature of the following vowel has a significant influence on the manifestation of underlying /t/. Baker's findings indicate that a following [ɪ], as in the form *waiting* [weɪtɪŋ] would be very much more likely to inhibit glottalisation than, for example, a following schwa (say [weɪtən]) by a margin of 86:14 as opposed to 72:28. In word-final prevocalic position, where glottalisation was more favoured than that word internal, the following vowel had a similar although less dramatic effect. Here the highest instance of the coronal manifestation of the sound emerged when the following word had initial /i ɪ/.

We suggest that the explanation of these findings is that a following coronal vowel induces a coronal place of articulation in the underlying placeless consonant position.

The phonological status of epenthetic vowels: insights from crosslinguistic experiments

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We explore the phonetic and phonological status of epenthetic vowels as they occur in the production of non-native consonant clusters and investigate the component of the grammar at which phonotactic constraints give rise to epenthesis. Previous studies have established that speakers of English tend to insert a schwa-like vocalic elements between consonants when producing non-native word-initial clusters. The quality of this epenthetic material was shown to be different from corresponding lexical schwas in terms of length and formant values (Davidson 2006, 2007). This was taken to suggest that when producing phonotactically illegal sequences in their first language (L1), English speakers are not epenthesizing a schwa but rather a transitional vocoid due to a failure to adequately coordinate the two consonantal gestures of the target language. This line of argumentation entails that irrespective of the L1, epenthetic segments should arise as a by-product of gestural misiming in the production of phonotactically illicit clusters. However, in loanword adaptations, the quality of epenthetic vowels varies across languages (e.g., Japanese: [u/ɯ] or [o], Korean: [i] or [ɯ], Thai: [a]), suggesting that epenthetic vowels may also emerge to *repair* ill-formed clusters in an attempt to comply with the L1 phonotactic constraints. Furthermore, evidence from perceptual studies in Japanese and Korean suggests that speakers insert illusory vowels into illicit clusters, which correspond to the same epenthetic vowels that emerge in loanword adaptations (e.g., Dupoux et al. 1999; Kabak & Idsardi 2007). In light of this crosslinguistic variation and perceptual evidence, it remains to be seen in how far the gestural explanation can account for the emergence of epenthetic material in production with speakers of languages other than English.

Here we extend and replicate Davidson's findings to German and Turkish in an attempt to investigate whether the same transitional schwas also emerge in consonant clusters by speakers of both languages and compare lexical vowels with epenthetic ones. Numerous German words contain schwa, the phonemic status of which is controversial (Wiese 1996) and the language employs a different array of consonant clusters than English. Turkish has a more conservative syllable structure and lacks schwa. The language epenthesizes high vowels to break up consonant clusters in loan words, the quality of which can be influenced by "epenthetically-driven vowel harmony" (Kaun 1999). If epenthesis arises exclusively due to gestural misiming, we would expect both language speakers to exhibit identical epenthetic segments albeit with varying probabilities depending on the permissibility of the cluster in their L1.

The present study tested the production of 135 aurally-presented pseudo-Russian CCVC and CVCVC sequences by native speakers of German and Turkish (n=10 for each). The first vowel of the non-cluster condition was one of [i, u, a, ə] (see the appendix for a complete list). Our results suggest that there are multiple ways of producing illicit clusters for both groups. We only focus on those cases where a vowel could be detected between the clusters. The quality of the vowel is drastically variable and gradient, and is subject to cross-linguistic variation, which cannot be explained by gestural misiming alone. More specifically, for both language groups, we observe (i) transitional vowels that are crucially different from lexical vowels including schwa, and (ii) vowels whose formant movements correspond to lexical vowels, some of which, for Turkish speakers, are occasionally in harmony with the second vowel in the word. While vowels of type (i) are on a par with Davidson's observations for English speakers, those of type (ii) require a phonological explanation. To account for variability and gradience as well as for the phonological factors in the data, we propose an interface model where phonological encoding and phonetic implementation are separated and their processes are executed in different stages. At the phonological level, epenthetic vowels arise from adherence to the L1 syllable structure constraints, where other language-specific rules such as harmony may also apply. On the phonetic level, however, the faithfulness to the original input results in gestural misiming creating transitional vocoids. What on the surface appears to be epenthesis is actually the product of two different processes. We compare this to regressive place of articulation assimilation facts, which also either result in gradient assimilation patterns or lead to complete neutralization (e.g. Zimmerer 2009).

Lexical diffusion of gradual phonetic changes: evidence from Forest Enets

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In Wang (1969) it was first suggested that sound changes may be irregular and may involve only a part of the lexicon, cf. 'lexical diffusion'. Elaborating the view of Labov (1994: 421-543), Blevins (2004: 268-278) proposed that lexical diffusion may operate in the case of abrupt sound changes only, while both abrupt and gradual sound changes may spread over the whole lexicon at once. However, our field data from Forest Enets (FE; Uralic, Samoyedic) provide four examples of gradual sound changes that are in fact spread by lexical diffusion, not by regular sound change. Three of them are changes where a vowel is replaced with another vowel adjacent to it in the vowel space (ɔ>u, e>i, a>ɔ), and one is a change where the final vowel is reduced to zero through schwa. All these changes are still ongoing and illustrate the same general scenario, though at different stages: a handful of morphemes involved (stage 1) > a few more (stage 2) > many more (stage 3) > all morphemes in the relevant contexts (stage 4). At each of the first three stages morphemes displaying variation/change do not form a natural class, i.e. no phonological or functional criteria can be formulated that would differentiate them from other words of the language.

1. ***e > i***. Our field data show that in modern FE the variation *e* ~ *i* is common in non-initial syllables (e.g. [kare], [kari] 'fish', the [i]-variant is more frequent), while in initial syllables it is attested only in some exceptional morphemes (e.g. [nexuʔ], [nixuʔ] 'three', the [e]-variant is more frequent). The morphemes with the variation are reported in the earliest sources on FE with /e/, and later sources provide some evidence for variation in the non-initial syllable. So the change /*e*/ > /*i*/ is now generalized to 'stage 4' for non-initial syllables, but initial syllables are only starting to be involved, i.e. for them 'stage 1' holds.

2. ***a > ɔ***. Our field data show a dozen morphemes where /a/ varies with /ɔ/ e.g. [badu], [bɔdu] 'tundra'). Generally, these morphemes are attested with /a/ in the literature. But Castrén (1854: 59) already gives a single example of *a* ~ *ɔ* variation in FE (*jaxa* ~ *jɔxa* 'river'), and it is noteworthy that exactly this word is reported with /ɔ/ in all later sources. So this is 'stage 2' of the sound change /*a*/ > /*ɔ*/, for a handful of exceptional cases it is already finished.

3. ***ɔ > u***.. The oldest FE descriptions document only 2 back rounded vowel phonemes, /ɔ/ and /u/. Some of the later sources report a 3-term back rounded vowel system for the FE of the 1960-1970s: /ɔ/ - /o/ - /u/ (with the /o/ spelling for some of the former /ɔ/ morphemes). Our field data show that there are now 3 classes of morphemes with back vowels: /u/-morphemes pronounced only with [u] (e.g. [muzu] 'liver'), /ɔ/-morphemes pronounced only with [ɔ] (e.g. [kɔza] 'nail'), and the so-called '/o/-morphemes' pronounced with free variants [o], [u] or [ɔ] (e.g. [moga], [mɔga], [muga] 'forest'). The corpus of '/o/-morphemes' increases as we analyze more data. '/o/-morphemes' from the literature are a subset of the modern '/o/-morphemes', while the other modern '/o/-morphemes' were earlier attested with /ɔ/. Some of the modern /u/-words were earlier attested with /ɔ/. So this is 'stage 3' of the sound change /*ɔ*/ > /*u*/, in some morphemes the sound change has already finished.

4. ***Final vowel loss***. In modern FE, many lexemes can be pronounced as [CV]-final, [Cə]-final or as [C]-final, e.g. /nadu/ [nad], [nadə], [nadu] 'antler'. The process of final vowel loss is especially frequent in words ending with a back rounded vowel (/ɔ/, /o/, /u/). Individual words ending in a back rounded vowel vary significantly in the frequency of their attestations with or without the final vowel, while for a few words no pronunciations without the final back rounded vowel have been attested in natural speech (though they are possible in elicitation). So this is 'stage 4' of the sound change $CV_{/ɔ/,\ /o/,\ /u/}$# > C#, and 'stage 3' for a more general CV# > C#.

Phonological Variation from Constraint Demotion: Vestige Theory

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The field of sociolinguistics has demonstrated that external factors (gender, age, style, register, and social class) are almost always involved in linguistic behavior. Yet, most approaches to variation in Optimality Theory (OT) do not take external factors into account (McCarthy 1993, Nagy & Renolds 1997, Anttila & Cho 1998, Coetzee 2006). Because traditional OT is not adept at integrating external factors into the model, accounting for variation in OT remains a challenge.

In this paper I propose Vestige Theory (VT). VT claims that language change is always the result of constraint demotion and that the demotion of a constraint leaves behind a vestige of itself in its original position. To illustrate, imagine the following crucial ranking of constraints: $C_1 >> C_2$. The demotion of C_1 below C_2 then results in the following: $\text{VESTIGE}(C_1) >> C_2 >> C_1$. The constraint called $\text{VESTIGE}(C_1)$ is the phantom of C_1, the constraint which was demoted. This vestige constraint is a kind of output-output constraint and therefore differs from the "true" constraint that was demoted. As an output-output constraint, a vestige constraint acts as a sort of receptacle for variants uttered in a linguistic community. As variants are on (used) or off (avoided) within the community surrounding an individual, the vestige constraint receives these on-off messages giving it a blinking quality between states of activity and states of dormancy. Given that the $\text{VESTIGE}(C_1) >> C_2$ ranking selects some output X and that the $C_2 >> C_1$ ranking selects some output Y, the blinking of the vestige constraint between active and dormant states results in variation between outputs X and Y.

The VT approach to variation is based on an OT model of underapplication. Blinks of the vestige constraint result in a contextualized resistance to change. Every archaic utterance constitutes positive evidence that reinforces the presence of the vestige constraint. Some demographics present with higher uses of archaic forms than others. This means there is more positive evidence for (i.e. more blinking of) the vestige constraint within these demographics. An individual with relatively low usage of an archaic form will elevate his or her frequency of archaic utterances when situated in a demographic that commonly utters archaic variants. The individual's vestige constraint, as a receptacle for output, receives the elevated levels of archaic pronunciation and causes the individual to follow suit. An individual is thought to have a baseline rate of blinking based on that person's interactions with manifold social contexts. From this baseline, the blinking of the vestige constraint will increase or decrease.

As an example, take McCarthy's (1993) crucial ranking for a non-rhotic dialect, NOCODA >> FAITH (*ranking 1*), and the reverse ranking, FAITH >> NOCODA (*ranking 2*), for a rhotic dialect. If a non-rhotic dialect becomes rhotic, we should assume a historical change from *ranking 1* > *ranking 2*. VT formalizes this change as the demotion of NOCODA, which results in a transitional ranking between the earlier /r/-less state and the later /r/-full one, namely, $\text{VESTIGE}_{(\text{NOCODA})} >> \text{FAITH} >> \text{NOCODA}$. Older speakers might use the older pronunciation more often. Thus, $\text{VESTIGE}_{(\text{NOCODA})}$ is frequently active within this demographic. When an outsider with lower rates of r-less pronunciation enters a demographic with many older speakers, that individual will hear more instances of r-less pronunciation. This in turn will increase the individual's use of r-less forms. Non-rhotic forms may similarly decrease when the same person is situated in a demographic that almost never uses the older pronunciation.

In the VT approach, phonologists must rely on the work of sociolinguists to describe the blinking rate of the vestige constraint from one social context to the next. The specific advantage of VT to other models of variation in OT is that it uses fairly conservative OT architecture to reference the outside world whereby social conditioning factors are licensed.

Generating phonological words: Evidence from English phrase production

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What is the unit of planning in language production? Models of language production suggest that speakers plan the conceptual representation before planning the complete sentence. Since continuous speech is not simply a matter of concatenating lexical words and since postlexical processes apply across words, we need to understand the role of phonology in the planning process. In this paper we focus on the phonological units required in planning the production of prepared and online speech. Are the basic units syntactic words or phonological words consisting of lexical and function words? The rules for parsing a sentence into prosodic units in English are controversial. In the classic British sentence *Drink a pint of milk a day*, the units are assumed to be *{drink-a}{pint-a}{milk-a} {day}.* This phrasing suggests that function phonologically weak elements attach leftwards. However, it is also customary to think that a major syntactic break may align with a phonological break. Consequently, a sentence like *Talks are held upstairs* could be grouped as *{talks} {are held} {upstairs}* grouping the function word rightwards. Postlexical resyllabification and other phonological rules could provide additional evidence for the grouping. Of course both leftwards and rightwards attachment to phonological words raise the issue of recursivity, which we will also discuss.

In this paper, however, we would like to present a series of language production experiments examining the issue of units of planning and the timing involved in planning the phonological grouping. We will provide evidence that (a) the phonological word and not the syntactic word is the unit of planning and (b) phonological parsing and cliticisation leading to phonological words follows leftwards attachment and trochaic grouping, at least in Germanic languages. That is, unstressed determiners or auxiliaries attach to preceding phonological words without reference to syntactic structure.

We report two speech production experiments designed to investigate this issue. The experiments replicate and extend the Dutch findings of Wheeldon and Lahiri (1997, 2002). They demonstrated that in a prepared speech production task where subjects were given around four seconds to fully prepare an answer to a question, speech onset latencies were a function of the **number of phonological words** in a sentence. In contrast, in an on-line production task (subjects were asked to answer a question as soon as they heard it), latencies for the same stimuli were a function of the **length of the initial phonological word** of the sentence. We tested prepared and on-line production of the sentence types given in (1) below. The phonological word structure given by the bracketing is predicted by the algorithm that takes into account only prosodic information (rather than lexical or syntactic information) and attaches unstressed function words to the *preceding* phonological word.

(1)	**Clitic sentences**	$[\text{plant the}]_{\omega}$ $[\text{seeds}]_{\omega}$
	Non-clitic sentences	$[\text{plant}]_{\omega}$ $[\text{three}]_{\omega}$ $[\text{seeds}]_{\omega}$
	Pronoun sentences	$[\text{plant}]_{\omega}$ $[\text{them}]_{\omega}$
	Control sentences	$[\text{plant}]_{\omega}$ $[\text{seeds}]_{\omega}$

Our findings replicate the Dutch findings of Wheeldon and Lahiri (1997, 2002). In the prepared production task, latencies to the non-clitic sentences were longest whereas in the on-line production task, latencies to the clitic sentences were longest. The data support a prosodic based algorithm for phonological word formation. Speech measurement data also indicate that during normal language production, phrasing produces phonological words which are not isomorphic to syntactic words. These findings suggest that the phonological word is the preferred unit of output during speech production (Levelt, 1989, 1992), as speakers construct such a unit even at the cost of initiation speed.

Tone patterns *versus* High plateau or the prosody-syntax interface in Símákonde Noun Phrases (Bantu, P 23)

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The goal of this paper is to present an overview of the complexity of tone and phrasing in Símákonde Noun Phrases.

Símákonde is a variety of Makonde (Bantu, P23), spoken by immigrant Mozambican communities in Tanzania. It is claimed to have been rather protected from external linguistic influences, contrary to other varieties of Makonde; it is for example much less permissive than other dialects in the phrasing options that it offers (Patin & Rialland 2006).

Like other Eastern and Southern Bantu languages (Hyman 2009), Símákonde has lost the historical Proto-Bantu vowel length contrast and now has a regular phrase-final stress rule, which causes a predictable lengthening of the penultimate syllable of every Prosodic Phrase. The main concern is thus to find out what constitutes a Prosodic Phrase and what does not. It will be shown that Kanerva's 1990 analysis on Chichewa, summarized & discussed in Downing & Mtenje 2007 and assuming that *"All NPs, no matter how long and complex, are parsed into a single Phonological Phrase"* only works as an exception in Símákonde, in phrases that end with a demonstrative.

This paper will describe and discuss the various phrasing phenomena in the Símákonde Noun Phrase and present a description and an analysis of the factors playing a key role in the complexity of the Noun Phrase tone, such as the five melodies targeting the noun bimoraic penults automatically lengthened by stress (L, LH, H, HL and LHL) and the "phrasing power" of the various modifiers with a focus on the demonstratives, since demonstratives activate both a phrasing process and a High plateau neutralizing the various tone patterns of disyllabic noun stems, as shown in the following examples.

Prosodic Phrases are indicated with parentheses.

(1) (viloôngo) (víkúmeêné) (vyá naáswe) (viviíli)
8.pot 8.big 8.Gen white 8.two
Two big white pots

(2) (vílóngó víkúméné vyá náswé vívílí **aviilá)**
8.pot 8.big 8.Gen white 8.two **Dem**8
Those two big white pots

In (1), there are four distinct Prosodic Phrases that each have their full tone patterns and their bimoraic penult. In (2), the presence of the demonstrative reduces the four P-Phrases to only one with one phrase-final bimoraic penult and a High plateau neutralizing the tone patterns.

It will be shown that the most probable explanation of the High plateau in (2) is the fact that the demonstrative triggers the presence of an initial High tone which is a trace of the ancient augment (pre-prefix) that does not exist in Símákonde anymore.

References:

Downing, L. J. & Mtenje, A. 2007. "The ordering and prosodic phrasing of nominal modifiers in Chichewa", The structure and interpretation of nouns and noun phrases: Bantu, Chinese, Romance, International Net-workshop 1, SOAS, 29 November - 1 December 2007.

Hyman, L. M. 2009. "Penultimate Lengthening in Bantu: Analysis and Spread". *Third Conference on Bantu Linguistics, Tervuren, March 25-27, 2009.*

Kanerva, J. M. 1990. *Focus and Phrasing in Chichewa Phonology*. New York: Garland.

Patin C. & Rialland, A. 2006. "On the nature of rules sensitive to syntax: the case of Makonde tonology, in *Prosody and Syntax*, Fonagy, Kawaguchi & Moriguchi (eds.), Usage-based linguistic informatics 3, John Benjamins: Amsterdam. p 285-301.

[uj] or [wi]: that's the question

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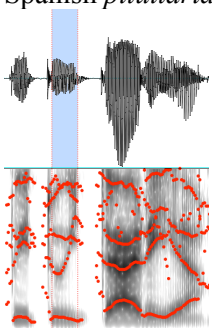
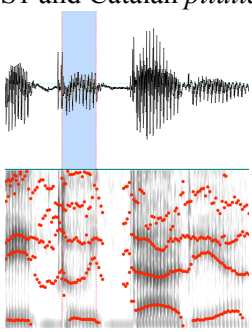
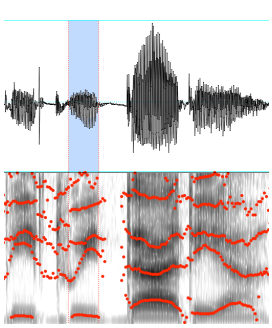
1. Introduction. Traditional grammars have remarked that high vowel sequences are generally pronounced in Spanish either as rising diphthongs (e.g. *v*[ju]da 'widow', *r*[wi]*do* 'noise') or as hiatuses (e.g. jes[u.i]ta 'Jesuit') [Alarcos 1950, Navarro Tomás 1918, Núñez Cedeño&Morales Front 1999, Quilis 1993], whereas in Catalan they surface as falling diphthongs (e.g. *c*[uj]*na* 'kitchen', *c*[iw]*tat* 'city') or hiatuses (e.g. jes[u.i]ta 'Jesuit') [Badia 1973, Cabré & Prieto 2004, 2008, Recasens 1993, Wheeler 1979, 2005]. In addition, dialectal and idiolectal variation between falling and rising resolutions has been attested in Catalan (Bonet&Lloret 1998, Fabra 1912), although it has never been systematized or explained. **2. Goals**. The main purposes of this study are the following: (a) to check the validity of traditional descriptions of Catalan and Spanish; (b) to assess if variation towards rising resolutions of high vowel sequences in Catalan is driven by language contact, that is to say, if it is more robust in bilingual speakers than in speakers with less contact with Spanish; and (c) to give a phonetic description and a phonological analysis of these sequences in both languages. **3. Pilot experiment**. 4 informants were interviewed, each of them representing the following groups of speakers: (S1) Spanish monolinguals, (S2) Catalan near-monolinguals, (S3) bilinguals with L1 Spanish, and (S4) bilinguals with L1 Catalan. A reading task was designed with 60 cognate words containing the target high vowel sequences. Different factors such as stress, the presence of a morpheme boundary between the two vowels and the relative position of the sequence within the word were controlled for. All the results were analyzed with Praat. The starting point of the F2 transition was taken as the phonetic correlate of rising/falling diphthongs: the more to the left the transition started, the more a diphthong was interpreted as being rising. **4. First results**. While Catalan and Spanish speakers both tend to present hiatus in the presence of a morpheme boundary and when the second high vowel is stressed, in the rest of contexts S1 realized these sequences as raising diphthongs (figure 1), while S2 uttered them as falling diphthongs (figure 2). In bilingual speakers, a tendency towards the rising diphthong has been attested especially in S3 (figure 3). S4, with greater contact and use of Catalan, realized more hiatuses than S3 in the presence of a morpheme boundary in unstressed position, but realized the other contexts as rising diphthongs as well. **5. Interpretation** This paper will try to derive a moraic representation (Prince 1983, Hyman 1985, Hayes 1989, Morén 2001) of high vowel sequences in Catalan and Spanish basing on the patterns of stress assignment in both languages. Taking into account these new data, it will be argued that the mapping between a given moraic phonological representation and the phonetics of /i, u/ is not one-to-one in these languages. This idea seems to be supported by the fact that there is no specific phonological behavior of high vowel sequences in Catalan and Spanish that accounts for the difference between falling and rising diphthongs. Therefore, along the lines of a Substance-free approach to phonology (Morén 2007), this variation is viewed as a phonetic difference, not relevant for the phonology. This position would also account for the fact that language contact is decisive in the realization of these sequences: greater contact with Spanish can modify the particular phonetics of /i, u/ in Catalan. **6. Figures.** Realization of Spanish *pituitaria* 'pituitary' by S1 and Catalan *pituïtària* 'pituitary' by S2 and S3:


(1) w i


(2) u j


(3) w i

Convergence and Divergence of Perception and Production in Phonological Acquisition

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I will present novel data to support an updated analysis of the relationship between perception and production in phonological development. Pater (2004) has argued that because parallel simplifications can be observed in perception and production, a single set of markedness principles constrains both mappings. To accommodate the fact that perception and production skills unfold on different timelines, he proposed that distinct sets of faithfulness constraints govern the mapping from surface forms to lexical representations and from LRs to surface forms. The single-subject data I present support the general notion of parallel restrictions on perception and production, but they also show that perception and production can differ in positional bias. Since the FAITH(LS)/FAITH(SL) split cannot capture this divergence, I propose a modified division.

A four-year-old boy with phonological disorder, B, was engaged in a nonword discrimination task featuring three phonemic contrasts in initial and final position. Consistent with the hypothesis that markedness constraints operate over both perception and production, B detected a contrast he produced in error with significantly lower accuracy than two contrasts he produced correctly ($p < .05$). However, B's perception and production diverged in positional bias. In production, B neutralized contrast preferentially in strong position, e.g. neutralizing the coronal-velar contrast (fronting) in initial/pretonic contexts only. In perception, however, B discriminated initial contrasts with significantly greater accuracy than final contrasts ($p < .01$).

I propose to capture B's pattern with a modification of Pater's (2004) model, implemented in a Harmonic Grammar framework. Instead of FAITH(LS) and FAITH(SL) constraints, faithfulness is divided into P-FAITH and G-FAITH constraints. P-FAITH penalizes any perceptually encoded form, the child's or another speaker's, that does not match the LR. When P-FAITH has a low weight, markedness can induce perceptual simplification. P-FAITH also has a positional component: the magnitude of violation is larger wherever neutralization is more perceptually salient. Meanwhile, G-FAITH penalizes any articulatory gesture not specified by the LR. G-FAITH constraints do not apply to perceptual mapping, nor are they positional, since articulatory asymmetry can be encoded directly in the magnitude of the markedness violation. The utility of a P-FAITH/G-FAITH division can be seen in the phenomenon of covert contrast, where perceptual neutralization (P-FAITH violation) occurs even though contrast was specified at the gestural level (no G-FAITH violation).

Tables 1-2 show that this model can also capture B's divergent patterns in perception and production, here for the velar-coronal contrast. For articulatory reasons that have been detailed elsewhere, fronting is driven by a high-weighted constraint *k whose magnitude of violation is larger in initial position. In 1(a), initial violation of *k outweighs G-FAITH and P-FAITH. In 1(b), the smaller markedness violation in final position is less than the combined violation of P- and G-FAITH, and the velar target emerges faithfully. Since G-FAITH does not apply over perception, in (2) the markedness violation trumps faithfulness in both positions, eliminating the asymmetry. The general perceptual advantage for initial over final contrasts becomes apparent when contrasts not associated with a high-weighted markedness violation are also taken into consideration. Finally, the use of nonwords presumably influenced the extent of perceptual neutralization in this study. For real words, stochastic variation in constraint weight will enable the child to perceive the correct target some percentage of the time, allowing him ultimately to arrive at a correct LR.

Edge Prominence

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Phenomenon There are several languages that systematically create clashes (two successive strong beats) at word edges (bold = primary stress; underlined = rhythmic beat):

(1)	Gibwa	1**2**3<u>4</u>5<u>*67*</u>	(2)	Gosiute Shoshone	**<u>1</u>**2<u>3</u>4<u>5*6*</u>
	Biangai	<u>*12*</u>3<u>4</u>5**<u>6</u>**7		Tauya	<u>*12*</u>3<u>4</u>5**<u>6</u>**

Standard metrical theory (MT) assumes that stresses are assigned after initially creating a rhythmic structure. Rhythm is assumed to have three characteristics: (i) it is hierarchical, (ii) it has the *tendency* to even spacing, and (iii) it is downward implicative (Hayes 1995: 27). Hierarchy and downward implication are universals, but even spacing is only a *tendency*, as seen in the clash systems above.

Problem Due to the fact that the languages in (1) display clashes in words with an odd number of syllables, MT can account for them by including the notion of degenerate (unary) feet that bear stress. However, the languages in (2) cannot be captured in MT, since any even number of syllables would be grouped into binary feet, which cannot contain two heads.

Solution In contrast to MT, the current proposal, following van der Hulst (1996), is based on the assumption that there is no initial rhythmic carpet, but that primary stress is assigned onto lexical items directly. After primary stress assignment, rhythm -as a post-lexical operation- applies to the structure, but it crucially respects limitations enforced by phonological structures. In order to account for the clash patterns above, I claim that in the languages in (1) and (2), the edge opposite of the primary stress is enforced by virtue of Edge Prominence (EP). Edge effects are independently motivated by for instance prepausal lengthening (Klatt 1976) and phonetic final lengthening (Hayes 1995). EP is considered to be a property that is expressed by (phonetic) reinforcement, and languages have the option of utilizing it (cf. extrametricality).

Analysis A system such as e.g. Biangai has primary stress on the penultimate syllable, which triggers a straightforward rhythmic echo from that the right edge. Crucially, though, the left edge syllable is phonetically strengthened by virtue of EP, hence a clash between rhythm and an EP strengthened syllable is observed. Independent evidence for EP in Biangai is provided by morphological interactions: stems that do not bear stress by themselves receive stress on the first syllable when followed by another morpheme.

Bidirectionality Bidirectional systems are systems that display a rhythmic melody that anchors to the edge that is opposite to the primary accent. They are naturally accounted for by including EP as a second phonological mechanism next to primary stress. Furthermore, in bidirectional systems that display rhythm, it moves away from the EP syllable (towards the primary stress); EP offers a solution, which retains the basic properties of rhythm as a fully automated process: there is nothing in rhythm assignment itself that would cause a rhythm *contra* primary stress, but an EP syllable can potentially enforce a rhythmic carpet of its own.

Stress shifts Essentially, the Hammock Principle (Van Zonneveld 1985) captures the observation that the initial syllable in English has some extra prominence to it (e.g. **à**bacad**á**bra). This effect is similar to the clash systems above and can be derived in the same fashion, except that in English, rhythm is not insensitive to EP syllables, but respects them (at the expense of a lapse). Furthermore, when primary stress is not expressed at its original location, it shifts onto the initial syllable rather than any (closer) intermediate beat: compare **<u>À</u>**p<u>a</u>l<u>a</u>chic**<u>ó</u>**l<u>a</u> with **<u>Á</u>**p<u>a</u>l<u>a</u>chic<u>o</u>la móuntains. Marking the initial syllable for EP makes it a natural attractor of stress in case the original syllable is not available.

Conclusion EP is an independently motivated property that offers a unified explanation for a wide array of phenomena, specifically clashes, bidirectional systems and stress shifts.

Stop contrasts in an obsolescent language: an acoustic study of Scottish Gaelic

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Traditional descriptions of the Scottish Gaelic stop system such as Ternes (1973) report two series of stops, orthographically <b d g> and <p t c>. The former series reflects voiceless unaspirated /p t k/, but the phonological interpretation of the latter series is less clear. They surface as post-aspirated voiceless [p^h t^h k^h] word-initially and elsewhere as pre-aspirated [^{h}p ^{h}t ^{h}k] (Ladefoged et al. 1998:4). Stops can also be palatalised or velarised but this study considers only the velarised set. By the principles of conventional phonological analysis the pre-aspirates should be taken as underlying in Scottish Gaelic, and the post-aspirates derived by rule, but previous analyses such as Ladefoged et al. (1998) take the post-aspirates as underlying perhaps due to the cross-linguistic rarity of pre-aspiration (Silverman 2003). Impressionistic reports state that Gaelic is undergoing rapid structural changes as might be expected in an obsolescent language (Anderson 1982:95). This poster uses original acoustic data to investigate how contrasts are made in contemporary Scottish Gaelic.

Word list data containing examples of word initial, word medial and word final <b d g> and <p t c> were digitally recorded in a noise attenuated sound studio. Each word was elicited three times within a carrier phrase. Also included on the list were English borrowings and non-traditional Gaelic words such as *apag* 'little ape' and *opara* 'opera'. These words tested psychological intuitions about pre-aspiration as Thráinsson (1978) did for Icelandic. Six native speakers of Lewis Gaelic participated; three aged forty and older, and three aged under twenty four. The age graded sample allowed investigation of a possible change in progress. A range of durational measures were taken off the waveform in PRAAT including vowel duration, consonant closure, VOT, modal voicing, breathy voicing (if any), total pre-aspiration (if any). The data were also submitted to a measure to assess noise in the signal independent of periodicity, adapted Zero Crossing Rate (cf. Gordeeva and Scobbie 2007, to appear).

This study presents an in depth acoustic analysis of the Gaelic stop system using data from modern-day Gaelic. Preliminary results suggest that traditional contrasts between <b d g> and <p t c> are still made by both generations studied, but are made in different ways such as more breathy voiced pre-aspiration in younger speakers and more voiceless frication /h/ as pre-aspiration in the older speakers.

Anderson, R., 1982. Determining the linguistic attributes of language attrition. In Lambert and Freed eds., *The loss of language skills.* Rowley: Newbury House.
Gordeeva, O., and Scobbie, J., forthcoming. Preaspiration as a correlate of word-final voice in Scottish English fricatives.
Ladefoged, P., and Ladefoged, J., 1998. Phonetic structures of Scottish Gaelic. *Journal of the International Phonetics Association* 28.
Silverman, D., 2003. On the rarity of pre-aspirated stops. *Journal of linguistics* 39:3.
Ternes, E., 1973, 2006. *The phonemic analysis of Scottish Gaelic.* Dublin: Dublin Institute for Advanced Studies.
Thráinsson, H., 1978. On the phonology of Icelandic pre-aspiration. *Nordic Journal of Linguistics,* 1.

Contrast Preservation Theory and the Germanic Sound Laws

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Chain shifts, both synchronic and diachronic, have been a long-standing problem in phonological theory. In classical generative phonology, a push chain A > B, B > C can only be expressed by a counterfeeding rule order: B → C, A → B, in order to prevent A from becoming C. However, the assumption of a counterfeeding rule order is problematic, because it obscures the conditioning of the chain. Classic OT does not fare any better, because chain shifts involve opaque and non-harmonic changes.

Recently, Łubowicz (2003, 2010) proposed a version of OT, called Contrast Preservation Theory (or PC Theory), in which constraints of a new type are introduced, i.e. constraints of contrast preservation (or PC Constraints). These exist alongside markedness constraints, while role of faithfulness constraints is greatly reduced. In contrast to other types of constraint, the role of PC constraints is to compare an evaluate *scenarios* of shifts, rather than individual candidate forms. PC Theory is a systemic approach because it refers to the system of contrasts. It is restrictive in that it implies that only push chains can exist, and that chain shifts cannot be circular. It differs from other theories on contrast like Dispersion Theory (Flemming 1995, Padgett 1997 and later publications) in that it does not focus on (the maximization of) contrast itself, but on phonological processes like neutralization of contrasts in some contexts and preservation in others, as well as on the transparent vs. opaque nature of processes.

Łubowicz shows that PC Theory can account for a number of interrelated synchronic shifts in languages like Finnish and Polish, but does not apply the theory to historical processes. However, Montreuil (2006) emphasizes the role PC Theory can play in the understanding and formal description of historical processes. He shows that PC Theory can account for the fact that an originally prosodic contrast in Gallo was transformed into a segmental contrast, a fact which other theories cannot account for.

In this contribution, I will show that PC Theory makes it possible to analyze the Germanic sound shifts, i.e. Grimm's and Verner's laws, as a single integrated push chain and a concomitant bifurcation.

In accordance with the Glottalic Theory (Hopper 1973, Gamkrelidze & Ivanov 1973, 1985, Vennemann 1984), I assume the existence of ejectives (glottalized plosives) in PIE, which replace the voiced plosives in the traditional model (Brugmann & Delbrück 1911, Lehmann 1952). Also in Glottalic Theory, the voiced aspirates of the classical model have been replaced by voiced plosives. In this way, the typologically problematic (as pointed out by Jakobson 1958) assumption of voiced aspirates without voiceless aspirates is eliminated.

The push chain is set into motion by deglottalization of the ejectives. This is formally represented by the advent of a markedness constraint *[CG] (*[constr. glottis]). This constraint, together with a PC constraint, PC_{IN}(CG) ('inputs that are distinct in the feature [CG] should remain distinct'), and two PC_{REL} constraints prohibiting the transformation of contrasts in [voice] and [cont] respectively, make the original voice stops turn into either voiceless spirants (Grimm's spirantization) or voiced stops (Verner's intervocalic voicing). The bifurcation between voiceless spirants and voiced stops is handled by a constraint IdentStressLaR, based on phonetic research by De Jong, Beckman and Edwards 1993,, which says that consonants in a position immediately after a stressed vowel should be faithful to the underlying laryngeal specification, as well as by a markedness constraint, saying that intervocalic consonants should be voiced.

In this way, a formal account is given for the fact that, like in the Gallo case, an originally prosodic contrast (i.e. the PIE free stress contrast, which was replaced in Germanic by initial stress) has been transformed into a segmental contrast. Also, the application of PC Theory provides us with an analysis of the Germanic sound shifts as a change in one go, thus eliminating all unattested intermediate historical stages which had to be assumed hitherto.

When the Autosegmental Theory Fails, Call for a Domain!

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In this talk, I will claim that an analysis of prosodic phenomena that is based on the notion of domain can sometimes provide an explanation when an autosegmental analysis fails. This claim will be supported by the analysis of two prosodic phenomena occuring in Shingazidja, a Bantu language spoken on the Grande Comore island (Comoros)

In the 90's, Charles Kisseberth developped with Jennifer Cole (Cole & Kisseberth 1994, 1995) and Farida Cassimjee (Cassimjee & Kisseberth 1998) an OT-related model that he called *Optimal Domains Theory* (=ODT), which adopts OT in all its essential aspects but also assumes that features are organized into domains.

Cassimjee & Kisseberth (1998) proposed an ODT analysis of the tone systems of several Bantu languages, among which was Shingazidja. In this talk, I will demonstrate that an ODT analysis can account for two prosodic phenomena of Shingazidja that were not discussed in the Cassimjee & Kisseberth's paper, while an autosegmental account cannot.

A first evidence comes from a tone-intonation interface phenomenon that occurs in polar questions. Polar questions are prosodically marked: a super-high tone is inserted on the penultimate syllable of the utterance (e.g. *hawonó lé páha* 'did he see the cat?'), and all the syllables which separate the super-high from a preceding tone are raised. However, the polar questions that correspond to declaratives presenting a high tone on their last syllable do not present a super-high tone on the penult. Rather, the super-high tone appears on the *ante*penultimate syllable of the utterance, i.e. one syllable before its canonical target (e.g. *hawonó yé ḿ̩leví* 'did he see the drunkard?'). I will show that an autosegmental analysis of the retraction of the super-high using the *obligatory contour principle* has to be rejected since a super-high tone regularly appears on the penultimate syllable of a polar question corresponding to a declarative sentence involving a tone on its antepenult. To account for the variation in the placement of the super-high tone, I will claim that the landing of the super-high on the antepenult is necessary to avoid the alignment of the right boundary of the super-high tone domain with the left boundary of the high-tone domain of the last syllable.

The second evidence results from the analysis of a post-lexical phenomenon that occurs in the Northen dialect of Shingazidja: the spreading of the tone over the phonological phrase boundaries. When a surface tone occurs at the end of a phonological phrase, it spreads on the first syllable of the following phonological phrase (e.g. *[haniká]$_\phi$ [zé=ɲuŋgu mɓíːli]$_\phi$* 'he gave two cooking pots'), except if the target *underlyingly* bears a tone. A critical aspect of this rule is that it leads to the deletion of a surface tone on the following syllable (OCP), but not an *underlying* tone associated to the same syllable, which is free to shift. I'll show that an autosegmental analysis cannot account for this distinction, while an ODT analysis deals elegantly with all the aspects of the spreading rule.

Location and gender influences on tonal dialects of Kera (Chadic)

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This paper discusses the results of perception experiments and production measurements concerning the voicing and tonal contrasts in rural and urban Kera dialects in Chad. The most conservative dialect is probably that spoken by village-women, with no voicing contrast, and a 3-way tonal contrast. Village-men also have three tonal contrasts, but the low tone contrast is enhanced by a low, positive VOT cue. Among town-men, there are only two tonal contrasts, but the 'low' contrast from the village dialects is now cued mainly by low VOT, with a pitch equal to that found in the lower tonal contrast. Among town-women, they appear to be losing all tonal contrasts, moving towards a system that attempts to have a 3-way positive VOT contrast. As such a system is unattested in the world's languages, it will be interesting to see what grammar develops for this group of the population.

The Kera situation raises many fundamental questions in the fields of phonology and sociolinguistics. In terms of phonology, we will look at the following questions:

- Given the location of the various speech varieties in this continuum, is the main influence on VOT and voicing coming from contact with French, or another language? - or another influence altogether?
- Does the influence through contact work in one direction only or are both L1 and L2 affected?
- Are bilingual speakers using the same phonetic space for storage of both languages?
- At what point along the phonetic continuum from village to town does the phonological grammar become different?
- Does the data suggest a critical age for adopting the town dialect for those moving from village to town?
- What is the relationship between VOT, voicing and tone that is demonstrated here?

In terms of sociolinguistics, the most interesting part of these data is probably the variation according to gender. In languages where dialects differ according to gender, claims have been made that women will be more conservative than men in rural settings and more innovative in urban settings. A few classic examples are often cited. It is unusual however to find a case where both effects have been documented in the same language. Kera tonal dialects provide us with such a case. We will ask the following:

- Why are village women the most reluctant to change, while town-women are abandoning tone more than town-men?
- What are the differences in roles, behaviour and communities of practice, between town and village women that might give rise to this variation? Are the claims of sociolinguists such as Wolfram and Schilling-Estes (1998), Cheshire (2002) and Chambers (2003) on the reasons for gender variation supported with these data?
- Is there variation in the speech of individuals depending on who they are talking to and their location?
- The perception results do not show very much variation between town and village-women, in contrast to the production results. Is this because the voice used in the perception experiments was male? How much do listeners categorise speakers and adjust perception according to meta-linguistic and sociolinguistic cues?

This paper does not provide all the answers. But it provides an interesting case study for a discussion of these issues. The answers will only come through a closer collaboration between phonologists and sociolinguists.

A functional approach to sociolinguistic salience
Definite article reduction in the North of England

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Definite article reduction (DAR) is a dialectal feature confined to the North of England. In DAR dialects, the standard article alternates with a reduced one, which is mostly realised as a glottal stop and sometimes as a voiceless fricative before vowels (Lodge, 2009). DAR is a salient sociolinguistic marker in the sense of Labov (1972) and Trudgill (1986). This paper argues that its salience is derived from its status as a good boundary marker that listeners can utilise in order to segment the speech stream. What follows is that the salience of this feature stems from language use, and requires a functional approach to handle it.

Salience is the property of a dialectal feature which makes it cognitively or perceptually prominent both for speakers of the dialect and speakers of other dialects as well (Kerswill & Williams, 2002). DAR is a salient marker inasmuch as it shows variation, style shifting (Jones, 2007), can be an identity marker (Tagliamonte & Roeder, 2009), and has long been recognised by layperson and linguist alike as a typical feature of Northern speech (Jones 1999 and references therein). If we assume that salience is not the sum of traits that characterise a salient dialectal feature, but an additional property, we have to look for its external grounding.

It will be argued that DAR is salient by virtue of its status as a good boundary marker. The reduced article constitutes domains of low transitional probability, which listeners exploit to segment the speech signal. It has been recognised that word segmentation plays a major role in speech processing and that listeners use statistical inferences (besides other information) to locate word boundaries (Jusczyk et al., 1994, 1999; Saffran et al., 1996a,b; Cairns et al., 1997; Pierrehumbert, 2003; Hay, 2000). The idea is that, given a string XY, a segment X is a relatively good predictor of what other segment Y can follow it word-medially, but a poor predictor of what can follow if there is an intervening word boundary. This is because segment pairs within words are constrained by phonotactic patterns, whereas word-external ones are not. Therefore, in a corpus of English, low transitional probabilities will strongly hint at word boundaries.

Using the Celex Corpus (Baayen et al., 1993) and the Freiburg Corpus of English Dialects (Kortmann et al., 2005) it can be shown that reduced articles (when realised as glottal stops) constitute domains of extreme low probability in the speech signal. This is true vis-à-vis the standard article and generally; the probability of occurrence of word-initial glottal stops (the situation we normally find as a result of DAR) is virtually zero, much smaller than that of the competing standard article forms. Furthermore, the frequent connected speech sequences involving a reduced article (such as C?C or C?V) have a low frequency in non-DAR dialects, which also makes DAR forms very conspicuous.

The conclusion is that the salience of DAR can be derived from its distributions. Since said distributions lie in language use, and since salience plays an important role in the structural behaviour of dialectal features, this case illustrates an example of language use directly influencing language structure.

Acquisition and diachronic developments in the scope of phonological generalizations

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Many current theories of phonological acquisition stipulate that learning proceeds solely from positive evidence (Smith 1999, Hayes 1999/2001/2004, Prince and Tesar 2004, Tessier 2006, 2007, Hale and Reiss 2008), with the child then selecting the grammar with smallest extension compatible with this evidence. Models of this type predict that overgeneralization should not occur. Such theories stand in contrast to the SPE model (Chomsky and Halle 1968: 337), which assumes that children postulate the simplest (in featural terms) rule compatible with the primary linguistic data: "the value of a rule … increases as the number of features required to identify the contexts in which it applies decreases." Rules of this type are maximal in extension, and predict that learners may make overextension errors.

On the assumption that phonological change results from imperfect learning (Kiparsky 1965), the two classes of acquisition theories outlined above make distinct predictions about the kinds of diachronic change one can expect. This paper argues that the available historical evidence is incompatible with the predictions of either model, and instead calls for a theory of acquisition that allows for both over- and underextension.

The typology of rule change established by early generative historical linguists such as Kiparsky (1968) and King (1969) was premised on the SPE acquisition model, where the learner selects the simplest and most general rule compatible with the data. Rule types predicted by this model include rule addition, rule loss, rule reordering and rule simplification. Rule simplification is of particular interest, as this results when a process is hypothesised to be more general than it actually is, leading to an extension in scope. Rule overgeneralization of this type is amply attested in both language acquisition (Macken 1987) and historical change. For example, r-insertion in English has expanded its scope in the following stages:

(1) Stages of development in the set of prevocalic vowels triggering r-insertion (Vaux 2008)
- i. {ə} following the merger LETTER and COMMA sets (Heselwood 2006)
- ii. {ə a} (the system of many current speakers of British English)
- iii. {ə a ɔ:} with *sore, soar* and *saw* homophonous, having developed by analogy in the last century (Wells 1994)
- iv. {ə a ɔ: ɜ: centring diphthongs aw} in certain dialects (Vaux 2008)

Learning triggered exclusively by positive evidence and constrained by the Subset Principle (Prince and Tesar 2004, Hale and Reiss 2008) suggests that scope expansions of the sort in (1) should not occur; if learners were to overgeneralize in the ways documented here, they would not then be able to subsequently restrict the scope of their hypotheses on the basis of positive evidence alone (Hale and Reiss 2008). Instead, Subset Principle-driven learning predicts that phonological processes should either maintain or contract their scope over time.

The predictions of this model for historical phonology have yet to be fully realised. While rule complication is occasionally attested (Lipski 1973, Chumbow 1975, 1977), it is not the only or primary direction that change in scope can take. A relevant example is vowel nasalization, which occurs before any nasal segment in Old French (2), while in Late Middle French nasalization is only triggered by *coda* nasals (3), giving [plẽn (plẽ)] but [plenə, plɛn] (Chumbow 1977).

(2) V → [+ nas] / ___ [+ cons, +nas]
(3) V → [+ nas] / ___ [+ cons, +nas] {#, [+cons]}

The existence of rule simplification and rule complication are problematic for Subset-driven and Simplicity-driven theories of acquisition respectively.

From syntax to phonology: phi and phases

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In this talk I investigate the correlation between phonological phrasing and syntactic parameters. Specifically, I focus on the phrasing of SVO clauses, showing that phonological properties such as whether the subject and verb are phrased together in a particular language can be predicted on the basis of independently-diagnosed syntactic properties including the presence/absence of object raising and *pro*-drop. I begin by re-evaluating phonological phrase (ϕ) domains in basic SVO clauses. Dobashi (2003:38) claims there are four types of SVO languages:

(1) a. $(S)_\phi$ $(V)_\phi$ $(O)_\phi$ (Aŋlɔ Ewe/French)
b. $(S)_\phi$ $(V)_\phi$ $(O)_\phi$ or $(S)_\phi$ $(V\ O)_\phi$ if O is non-branching (Italian)
c. $(S)_\phi$ $(V\ O)_\phi$ (Kimatuumbi)
d. $(S)_\phi$ $(V\ O)_\phi$ or $(S\ V)_\phi$ if S is non-branching (Kinyambo)

However, this typology is incomplete and incorrect in several respects. For example, it ignores the fact that clitics and other non-branching arguments may be phrased with the verb in French:

(2) $[$Marie le voit$]_\phi$
Marie him sees
'Marie sees him'

Non-branching can also be phrased with the verb in Aŋlɔ Ewe, a fact which is also omitted from the typology. On the basis of this and other data to be presented, I argue for a refinement of Dobashi's typology, namely that he following types of phrasing patterns are available:

(3) Typology of ϕ-domains
a. $(S)_\phi$ $(V)_\phi$ $(O)_\phi$
$(S)_\phi$ $(O\ V)_\phi$ if O is non branching (Aŋlɔ Ewe)
b. $(S)_\phi$ $(V)_\phi$ $(O)_\phi$
$(S)_\phi$ $(V\ O)_\phi$/$(O\ V)_\phi$ if O is non-branching (Italian)
c. $(S)_\phi$ $(V)_\phi$ $(O)_\phi$
$(S\ V)_\phi$ $(O)_\phi$ if S is non-branching
$(S)_\phi$ $(V\ O)_\phi$/$(O\ V)_\phi$ if O is non branching
$(S\ O\ V)_\phi$ if S and O are non-branching (French)

I show that the different patterns in (3) are predicted under an account which takes a spell-out domain to define ϕ, as argued by many authors recently. Thus, ϕ-domains depend on the interaction of three syntactic properties (holding constant the position of the verb in T/*v*): whether the subject is in an A' position, whether the object has raised out of VP, and whether the arguments branch. The specific syntactic proposal I adopt, a hybrid of Uriagereka's (1999) Multiple Spell-Out and Chomsky's (2000 et seq.) phase system, makes predictions which go beyond the standard phase-based approach and better accord with the phonological facts: previous phase-based works such as Newell (2008) and [Author (2009)] note the need to make additional assumptions regarding the separate phrasing of complex specifiers and adjuncts, precisely as indicated by Uriagereka and handled straightforwardly by the account to be presented. I also eliminate Dobashi's ϕ-restructuring, making the relationship between spell-out domains and ϕ completely transparent.

Rhythm and Reduction in Icelandic

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This presentation deals with phonetic reduction of adverbs in Icelandic arguing that there is a rhythmic influence on reduction patterns.

Icelandic adverbs containing the suffix *-lega* '-ly' such as *náttúrlega* 'naturally, of course' are often quadrisyllabic in their citation forms (cf. [nauh.tur.lɛ.ɣa]). In spontaneous speech, though, these adverbs display a wide array of possible realisations, from quadrisyllabic to tri-, di- or even monosyllabic forms (cf. [nauh.tur.la] or [nauh.tla]). For high-frequency adverbs, some contracted forms seem to have been partially lexicalised.

Icelandic adverbs thus behave comparably to their Dutch cognates containing the suffix *-lijk* (e.g. *natuurlijk*) that are equally prone to undergo phonetic reduction (Ernestus 2000). A number of seemingly language independent factors that have an impact on the production and/or perception of phonetic reduction have been discovered such as sentence finality (Keune et.al 2005) and recency effects (Tron 2009). For Icelandic, one language specific factor that influences reduction has to be added.

As Dehé (2008) shows, Icelandic displays a tendency towards an even trochaic or dachtylic rhythm (eurhythmy) which influences the realisation of a reductive phonological process, Final Vowel Deletion. It is thus to be expected that eurhythmy also plays a role in adverb contraction, the hypothesis being that reduction patterns of adverbs are sensitive to the overall rhythmic pattern of the IP: the realisation of an adverb as e.g. tri- or disyllabic is influenced by which form fits best into the (trochaic or dachtylic) rhythm.

According to this claim, *náttúrlega* would be expected to be realised as trisyllabic (e.g. [nauhturla]) in (1) and as disyllabic (e.g. [nauhtla]) in (2):

(1) ˈ*Jóhanna* ˈ*gaf henni* ˈ*náttúrlega* ˈ*bækurnar.*
Jóhanna gave her of.course books.the
'Jóhanna gave her the books, of course.'

(2) ˈ*Anton* ˈ*átti* ˈ*náttúrlega* ˈ*bækur.*
Anton owned of.course books
'Anton owned books, of course.'

The hypothesis of a rhythmic influence on reduction is tested by studying the realisations of ten adverbs containing the suffix *-lega* and their embedding into the rhythmic pattern of the IP which they form part of in a corpus of spoken Icelandic. The corpus contains mainly family conversations but also transcriptions of call-in radio shows and parliamentary speeches.

Preliminary results from the corpus analysis suggest that eurhythmy indeed has an effect on adverb reduction: the general reduction patterns of the adverbs in question show a tendency to adjust to the rhythmic pattern of the IP. This generalisation is only valid, though, for mid- and low-frequency adverbs as the partly-lexicalised disyllabic forms of high-frequency adverbs seem to be more independent of rhythmic constraints. As the availability of corpora of spoken Icelandic is quite limited, these preliminary results will have to be backed up by an experimental study.

Is This Microvariation? Towards a Typology of Alemannic Quantity Systems

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The Alemannic (South-West German) dialect group displays a remarkable (and confusing) amount cross-dialectal variation of quantity systems. Several lengthening and shortening processes led to patterns such as the following:

Bodensee Alemannic	[rat] [re.tər] [miʃt] [løf.fəl] 'wheel, wheels, dung, spoon'
High Alemannic	[raːt] [re.tər] [miʃt] [løf.fəl]
Highest Alemannic I (Uri, Switzerland)	[rat] [reː.tər] [miʃt] [løf.fəl]
Highest Alemannic II (Valais, Switzerland)	[rɑtt] [retər] [miʃt] [løf.fəl]
Southern Low Alemannic	[rɑːt] [reːtər] [miʃt] [løf.fəl]
Northern Low Alemannic	[rɑːt] [reːtər] [miʃt] [lø.fəl]
North-East Swabian	[rɑːt] [reːtər] [miːʃt] [lø.fəl]

In this paper I will show that the variation can be reduced to specific interactions of a limited set of word-prosodic parameters from moraic theory (Hayes 1995), such as requirements on the minimal weight of words or syllables, positional or total neutralisation of geminates, and positional weight of coda consonants.

In this account monosyllabic lengthening plays a crucial role. Monosyllabic lengthening has not yet been a standard assumption of German historical linguistics. Traditionally, lengthened vowels in monosyllabic words are explained as the result of analogical levelling (e.g., Paul 1884). It is assumed that etymologically short vowels have been lengthened on phonological grounds only in stressed open syllables of disyllabic forms; these lengthened vowels have been analogically extended to closed syllables in monosyllabic forms. However, in the traditional account alternations such as [raːt] – [re.tər] are not predicted. I therefore argue that open syllable lengthening and monosyllabic lengthening are two independent processes.

The paper starts with an overview of the dialect-geographical distribution of the several Alemannic quantity systems (section 1). I will then discuss the evidence in favour of monosyllabic lengthening, and the exact conditions under which monosyllabic lengthening applies in the different dialects (section 2). Section 3 introduces the other word-prosodic parameters which generate the variation space for our dialects. In section 4 I will discuss the more general question as to whether this kind of variation is an example of 'microvariation', involving a specific set of 'microparameters'. The idea of microparameters is borrowed from generative syntactic theory (Kayne 1996) where it is often assumed that cross-dialectal variation involves a different set of parameters (i.e., microparameters) than cross-linguistic variation (which involves macroparameters). I will argue that no linguistically relevant distinction can (and should) be made between micro- and macroparameters. Cross-dialectal variation within Alemannic can be accounted for on the basis of well-established structural parameters which are often employed in cross-linguistic typological research. Furthermore, a specific set of parameters which is responsible for structural variation only within the limits a national language and its varieties would be totally unexpected from a sociolinguistic point of view.

Hayes, Bruce (1995): *Metrical Stress Theory*. Chicago: University of Chicago Press.
Kayne, Richard S. (1996): Microparametric syntax: some introductory remarks. In: Black, James R. / Motapanyane, Virginia (eds.): *Microparametric Syntax and Dialect Variation*. Amsterdam: Benjamins. pp. ix-xxviii.
Paul, Hermann (1884): Vocaldehnung und vocalverkürzung im neuhochdeutschen. In: *PBB* 9: 101-134.

Mikołaj Kruszewski in the Twenty-First Century

Daniel Silverman SJSU

Mikołaj Kruszewski's brief career in linguistics– spanning only eleven years, from 1876 to his premature death in 1887– sits prominently alongside the finest scholars' from any era, in terms of both the theoretic fruit it bore, and the sweep of its influence. Although geographic and linguistic isolation limited the extent to which K.'s ideas were disseminated among European and American thinkers (K. studied in Kazan and usually wrote in Russian), his scholarship has nonetheless slowly trickled into the linguistic mainstream by indirect means, among them, through the slightly-better-known scholarship of K.'s teacher, Jan Baudouin de Courtenay.

Some of K.'s most important theoretic proposals and insights include:

- The *arbitrary relationship between sound and meaning*
- The *non-teleological nature* of the linguistic system
- The *generative* or creative character of language, termed "production" (as opposed to "reproduction")
- The proposal that *phonological rules* ("sound laws") are universal
- The *connectionist* organization of the lexicon in "systems" or "nests" of morphemes and words, an organization that makes acquisition, lexical storage, and linguistic creativity so speedy and effortless: *laws of similarity* (phonetic and semantic) and *laws of contiguity* (which prompt the mental association of words that tend to be contiguous in the speech stream)
- The proposal that the linguistic system may be analyzed as the product of *pressures and constraints in inherent conflict with one another*
- The role of *paradigm uniformity* in allomorph selection
- The *positional prominence of morpheme-initial elements* in terms of (a) the number of contrastive values found here, (b) the resistance to both phonetic change and morpheme re-association of these elements, and (c) these elements' psycholinguistic "salience"
- The relevance of *transitional probabilities* to parsing
- The recycling of *entrenched motor routines* as a contributing factor to phonological regularity
- The relevance of *memory of recent versus remote speech tokens* as a factor in sound change
- The inevitable *mismatch between articulatory and acoustic configurations* that, just as inevitably, leads to both sound change and the "reintegration" or "re-association" of sounds into other (neighboring) morphemes
- *Frequency of usage* effects on patterns of sound change
- The proposal that linguistic memory consists of *stored exemplars* and is *stochastic* in nature
- The relevance of *variation* to patterns of sound change
- The role of *the listener as a source of sound change*

The actual scope of K.'s influence is exceedingly difficult to gauge, since many subsequent scholars (the presenter among them) have clearly been unaware that certain of their insights are prefigured– or, sometimes, fully explicated– in K.'s work. In this presentation I hope to (re-) introduce K.'s scholarship to contemporary theoretic discourse by relating K.'s proposals to current trends in phonological theory.

Immigrants Start on the Periphery - A Stratal Approach to Loanword Phonology

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Contemporary research into loanword phonology (for an overview, see Kang, forthcoming) focuses on the question how the phonological structures in the source language get transformed into the corresponding structures encountered in the recipient language. Following this heuristic, and using word before/after pairs as data, little attention was given to the cases where the original structures are preserved (importation) or where adaptation takes place on another, crucially related level – in morphology. Consequently, accounting for this type of facts remained out of the scope of the theories of loanword adaptation.

I will present a novel model of loanword integration which is based on the conceptual apparatus of research into synchronic lexica of the languages which treat loanwords in a special way (see Ito & Mester 2001, 2002) and the findings of research into bilingual production and code-switching (for an overview, see Poplack 2004). In the present model, the words which are in a language as a result of ongoing language contact and which maintain links to the original form in the source language in bilingual speakers are considered to be in the *portal*. The concept of the *portal* is used to model the *uniformity* with which all the words containing a particular to-be-adapted structure are treated. Furthermore, the lexicon is accepted to be inherently stratified, with onion-like layers inside-out (à la Ito & Mester). Ito & Mester's static model of lexical stratification is expanded into a model of loanword integration - the outermost stratum of the lexicon, the most liberal one in terms of marked phonological structures and the most conservative one in terms of morphological combinability, is recognised as the natural host for new borrowings. The properties of the outermost stratum of the lexicon are derived from two lexicon-internal forces: faithfulness indexed to loanwords **FAITH(LOAN)** (Ito & Mester 2001) and Lexical conservatism, which thwarts the proliferation of allomorphs in paradigm formation (Steriade 1997).

I will discuss two types of facts which this theory is especially suited to account for. First, I will report on the results of an experiment in which Serbian speakers' "etymological intuitions" about nonsense words were elicited. In this case only the structures actively repaired in native words were used as phonotactic foreignness cues. The results show that speakers are highly sensitive to those cues, a finding which leads to the conclusion that lexical strata are a constituent element of the speakers' knowledge of language (for comparable results see e.g. Gelbart & Kawahara 2007).

In the second part, I will discuss data on morphological adaptation and gender assignment. Serbian native words ending in short mid vowels generally belong to neuter declensions (e.g. *selo*$_{N}$ "village" *polje*$_{N}$ "field"). However, the neuter declensions are "closed" and most loanwords of this type enter a unique type of masculine nouns which undergo a gender switch, becoming neutral in plural forms (*kimono*$_{M}$ - *kimona*$_{N}$). My explanation makes crucial use of the fact that in singular neuter paradigms, there are restrictions on co-occurrence of stem-final consonants and final vowels, so that words like *pončo* or *sake* are not possible neuters (but *pače* and *klupko* are attested neuter nouns). Crucially, because *some* of new words cannot join the neuter declension, *none* of them does. I interpret this as an effect of the Portal, which drives the words originating from the same contact together. In addition to this pattern, my elicitation data show that in paradigm formation, the final vowels often remain as a part of the stem, unparsed by morphology (so the paradigm like *ego*$_{NOM}$, *egoa*$_{GEN}$, *egou*$_{DAT,}$ *egoom*$_{INS}$ etc. is formed). I will show how Lexical conservatism and **FAITH(LOAN)** can be used to account for these effects and their distribution.

In sum, I will present a model which, going beyond sound correspondences, has a broader coverage of data and makes more global predictions. Taking the lexicon as the starting point, this approach succeeds in relating research into loanword phonology and morphology in a natural and insightful way.

Phonology knows about lexical categories

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Background. Phonological differences between nouns and verbs have been explored by a number of authors, including Postal (1968), Smith (1997, 2001), Myers (2000), and Becker (2003). For example, nouns may show more stress or tone contrasts than verbs, as in Spanish, Shona, or Hebrew; or they may be subject to different prosodic templates or different size requirements, as in Chuukese, Hebrew, or Arabic.

However, allowing phonological rules or constraints to refer to lexical category, which is after all a type of morphosyntactic information, would significantly increase the power of the phonological system. To avoid taking this step, several phonologists have sought alternative approaches to noun/verb phonological differences that do not require any appeal to category-specific phonology. One attractive approach (e.g., Kenstowicz 1996, McCarthy 2002, Shiraishi 2004, Cable 2005) takes advantage of the fact that in many languages, nouns are free forms whereas verbs are bound forms. In such a language, even inflected nouns have a related freestanding base whose existence may affect their phonology—by way of a formal mechanism such as cyclicity, output-output faithfulness, or paradigm-uniformity effects—while inflected verbs, which have no related freestanding base, are not affected by those components of the phonological system and may therefore show phonological patterns that are different from those of nouns. On this view, no direct reference by the phonological grammar to lexical categories such as "noun" or "verb" is needed; the free/bound distinction automatically generates the observed differences between noun and verb phonology.

The contribution of this paper. As attractive as it is to relate noun/verb differences to the distinction between free and bound morphological forms, however, not all cases can be handled this way. In some languages with noun/verb phonological differences, both nouns and verbs are bound forms, or both nouns and verbs are free forms.

One such case is Spanish. Nouns and verbs have different stress patterns: verb stress is completely predictable on the basis of the inflectional form, but nouns are lexically contrastive among final, penultimate, and antepenultimate stress (Harris 1983). While it is certainly the case that some nouns are free while no verbs are free, the free/bound distinction does not determine which nouns may support stress contrasts. Crucially, there are nouns that have bound roots (with an obligatory gender-marking suffix), but also have the marked, antepenultimate stress pattern.

(1) Spanish bound nouns with (marked) antepenultimate stress

masculine	*feminine*	
[náwfraɣ-o]	[náwfraɣ-a]	'shipwrecked person'
[bíɣam-o]	[bíɣam-a]	'bigamist'

A second case is Chuukese (Muller 1999). In this language, nouns are subject to a minimality requirement that does not apply to verbs. However, both nouns and verbs may appear unaffixed, so here as well, no account of the noun/verb difference based on the free/bound distinction is possible.

Additional cases to be presented, in which category-specific phonology cannot be reduced to the free/bound distinction—and which, moreover, include *three*-way phonological differences among nouns, verbs, and adjectives—include Mandarin Chinese (Feng 2003) and Hebrew (Becker 2003).

Thus, there are languages in which noun/verb phonological differences are not reducible to the difference between free and bound forms, and are therefore not accounted for with cyclicity, output-output faithfulness, or paradigm-uniformity effects. These cases show that the phonological grammar must be able to refer to lexical categories—as it is already known to refer to morphosyntactic categories such as inflection classes, and to other morpheme classes such as "native" and "non-native" forms. Finally, the fact that the phonological grammar has access to information like this from lexical entries has implications for morphological and syntactic frameworks such as Distributed Morphology or the interface conditions of the Minimalist Program.

Unnaturalness in phonology

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The last two decades have seen a marked proliferation of phonological models, some of which depart radically from the principles laid out in classical generative works such as Chomsky & Halle (1968), Goldsmith (1976) and Prince & Smolensky (1993). More specifically, it has been proposed that (i) there is no need for underlying and surface representations, as models based on a single level of representation can also capture linguistically significant generalisations (e.g. Scobbie et al. 1996, Bybee 2001), and (ii) diachronic phonological explanations take precedence over synchronic ones (Blevins 2004). At the same time, certain concepts originally conceived in synchronic derivational models of phonology are still used in their original meaning throughout the discipline, which inevitably leads to confusion. The main goal of this presentation is to clarify one such concept, namely that of the unnaturalness of phonological patterns.

I propose the following definitions of naturalness and unnaturalness:

Definition 1. A phonological pattern is *natural* if and only if it can be interpreted as the result of a sequence of phonetically motivated sound changes.

Definition 2. A phonological pattern is *unnatural* if and only if it is not natural.

While Definition 2 is trivial, there are several points to be discussed in connection with Definition 1. First, it singles out phonetic motivation as the basis of naturalness, although an equally coherent definition could also involve other criteria, such as productivity or order of acquisition (cf. Stampe 1979). However, it appears that only phonetic motivation is strongly correlated with the frequency of phonological patterns in the languages of the world (Blevins 2004), which suggests that it might be the best indicator of naturalness. Second, Definition 1 is based on sound changes, which means that it is diachronic in nature. The reason for this is that a synchronic definition would be hard to interpret in a diachronic model, and that synchronic models based on phonetic motivation (e.g. Steriade 2001) make very specific assumptions about grammar that are incompatible with surface-based approaches. Finally, Definition 1 refers to a (potentially one-membered) sequence of changes rather than a single change. This is because it is not clear what the criteria are for distinguishing a single change from a series of changes (is [k] > [tʃ] a single change, or a series of changes, e.g. [k] > [kʲ] > [kᵠ] > [tʃ]?).

An immediate corollary of this definition is that most patterns involving *telescoping* or *opacity* are no longer seen as unnatural (*pace* Hyman 1975, Blevins 2004): since such patterns normally emerge as the result of a sequence of phonetically motivated sound changes, they are natural in the sense of Definition 1. On the other hand, patterns involving *analogical extension*, *rule inversion* and *morphologisation* result from phonetically unmotivated changes (i.e. they cannot be explained as a function of perception or articulation), which means that they are unnatural. It should also be noted that both rule inversion and morphologisation seem to be special cases of analogical extension: rule inversion (as defined by Vennemann 1972) only has a direct empirical effect when the inverted pattern is extended to novel lexical items (e.g. intrusive-*r* in SBE) and morphologisation can be said to occur when an originally phonologically conditioned pattern becomes morphologically productive, that is, when it starts to spread to novel lexical items (e.g. umlaut in German). Therefore, one of the most interesting consequences of this definition is that it reduces the distinction between natural and unnatural patterns to one between phonetically motivated and analogical change. Since several authors have proposed that unnatural phenomena are direct reflections of the computational system underlying language (Andersen 1981, Buckley 2000), this result suggests that we have to reevaluate the role of analogy within grammar.

Belfast and Glasgow English 'rises': Are there phonological distinctions between them?

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Is there a phonological distinction between statement and question intonation in Glasgow and Belfast English, when both varieties use Nuclear 'rises' on statements *and* questions (Cruttenden 1997, Ladd 2008)? How about between the two varieties themselves, which until now, have not been systematically compared?

The expected contour shape is that of a Nuclear 'rise-plateau-slump', with a rise on the main-stressed syllable followed by a leveling off and sometimes a final fall. Autosegmental-Metrical (AM) analyses of these 'rises' have been problematic (see Ladd 2008: 128ff). A key assumption is that there is no final/boundary rise (H%) in either of these varieties. Thus, the Tones and Break Indices (ToBI) system (Beckman & Ayers Elam 1997) would transcribe the Glasgow/Belfast pattern in the same way as the very different U.S. 'stylised low rise' (Ladd 2008: 128ff, Mayo et al 1997). The Intonational Variation in English (IViE) system (Grabe et al 1997-2002) allows an alternative three-way boundary tone distinction (H%, 0% (level), L%) (Grabe 1998), but it is unclear whether these Belfast and Glasgow make such a phonological distinction (see Lowry 1997: 23).

Results from a new experiment directly comparing Belfast and Glasgow 'rises' suggest that within each variety, questions and statements are systematically distinguished only through gradient expansions of pitch range in questions. Thus the difference between them does not involve the choice of phonologically distinct tones.

However, there is a clear difference between Belfast and Glasgow in the choice of boundary tone at the end of the Intonational Phrase (IP). In Glasgow, there is the 'rise-plateau-slump' pattern with a clearly low boundary (L%). In Belfast, by contrast, the pitch tends to rise continuously to reach H%. Along with additional differences in the Alignment of the L and H components of the 'rises' with respect to the Nuclear syllable, I argue that Belfast and Glasgow 'rises' are phonologically distinct from each other. Interestingly though, the Belfast 'rises' may not in fact be distinct from the phenomenon of High Rising Terminals (HRTs)/ 'Uptalk' in other English varieties, contrary to some existing views (e.g. Ladd 2008: 127). This raises the further issue of whether Belfast and Glasgow 'rises' actually share a common origin.

Morphologization in Modern German and Old English

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Both Old English and Modern German exhibit similar phonologically conditioned processes displaying significant morphological conditioning. For example, in West Saxon adjectives, an unstressed vowel deletion process targets a different deletion site depending on the grammatical gender of the word.

In this paper I will focus in particular on Modern German schwa alternations, which result from a phonological process that is highly sensitive to sonority. A verb stem with a nasal such as *atmen* 'breathe' (examples from Giegerich 1999) shows no epenthesis in an affixed form such as the infinitive: *atmen* or past tense: *atmete*, while a verb stem ending with a non-nasal sonorant will have an epenthetic vowel in the infinitive: *besiedel+n* 'populate', *erweiter+n* 'extend'. This indicates a strong link between the sonority level and epenthesis, with the less sonorous stem final consonants, nasals, lacking epenthesis. However, morphological category plays a role. Noun stems in Standard German reject epenthesis throughout the inflexional morphology. Adjective stems, interestingly, show epenthesis in nasal environments and in /r/ stems, with non-epenthesis in /l/ forms.

There have been many accounts of this phenomenon (e.g. Wiese 1986, 1996 etc.). A stratal rule-based account by Giegerich (1999) claims that the alternations outlined above result from stratified rhyme conditions across three lexical levels, with nouns being syllabified at level 1, adjectives on level 2 and verbs also on level 2. The syllabification at level one, affecting nouns, causes forms to surface throughout the paradigm without epenthesis. In the verbs, on the other hand, consonant+liquid clusters undergo epenthesis at level 2. According to Giegerich (1999), any unaffixed forms unaffected by these rhyme conditions undergo a general process at level 3, causing epenthesis in any consonant+sonorant rhyme cluster that has not undergone syllabification earlier in the derivation e.g. *Atem* 'breath'.

In this paper I will present an alternative account using Stratal OT (Kiparsky 1998, Bermúdez-Otero forthcoming etc.) and will discuss the ways in which the phonological and morphological aspects of these alternations can be accounted for. The treatment that I will present assumes that we are dealing with morphologized anaptyctic epenthesis (see Bermúdez-Otero forthcoming for anaptyxis in West Saxon nouns), in which the epenthetic forms are the result of a repair process for syllable boundaries with a rising sonority contour. This account does not specifically require the use of a third lexical level, as the unaffixed forms such as *Atem* 'breath' undergo epenthesis as a result of different phonological constraints.

I will conclude by addressing the question of why such complex morphophonological relationships arise. According to Giegerich (1999), in contrast to Present Day English, in which this type of pattern only alternates in a limited way involving unproductive affixes at level 1, such as *cylind**e**r cylin**dr**ical*, Modern German owes its complex pattern to the richness of its inflexional paradigms. This is a property shared by Old English, which also exhibits significant levels of complex morphophonological interaction. This supports the assertion (Anderson 1989) that opacity levels in the grammar contribute to the morphologization of phonological processes, as rich morphological patterns present the perfect conditions for phonological opacity.

Special session

Sociolinguistics, variation and phonology

Predictability and other biases in phonological variation

Andries Coetzee (University of Michigan)

Over the past decade, the study of variation has become standard fare for theoretically oriented phonologists, and multiple different models of phonological variation have been developed in current theoretical models (Boersma & Hayes 2001; Anttila 1997; Coetzee 2006; etc.). These approaches have proved to be extremely successful at accounting for phonological variation. Not only can they account for where variation is observed and where not, but they also often predict the frequencies with which different variants are observed very accurately. This is usually presented as reason for celebration. "We have successfully solved the problem of variation!"

In this presentation, I will argue that this celebration is premature. These models of variation are all exclusively grammatical. Variation, on the other hand, has been demonstrated by decades of research in the variationist sociolinguistic paradigm to be influenced by grammar *and* many other factors. If an exclusively grammatical model accounts for all aspects of phonological variation, it therefore does more than its fair share of the work. It is then not an accurate model of the system in the mind of speakers that is responsible for producing variation.

I will illustrate this problem by discussing variable word-final t/d-deletion in English (*west* → *west/wes_*), showing that it is influenced by ordinary grammatical/phonological factors but also by non-grammatical factors. Specifically, I will show that it is influenced by *predictability* – more predictable words are more likely to undergo deletion. I will then develop a model of phonological variation within Harmonic Grammar that allows both grammar and non-grammatical factors to influence phonological variation.

Implications of sociolinguistic findings for phonological theory

William Labov (University of Pennsylvania)

From the earliest studies of variable realization of morphosyntactic elements, it has been found that phonological conditioning is coupled with other evidence for invariant representation at the morphological level, while the absence of phonological conditioning is associated with variable morphological insertion. This relationship is consistent with a feed forward model in which decisions at a higher level are not determined by outcomes at a lower level. Evidence from studies of reading errors confirms this relationship in the morphosyntax of African American Vernacular English.

Further evidence for the invariant character of underlying representations is found in the study of regular sound changes in the Atlas of North American English, where fine-grained phonetic conditioning determines the advancement of the changes independent of word frequency. Multiple regression analyses of the fronting of /ow/ in go, goat, road, etc., shows such a result, where the basic unit of change is the phoneme, and the few significant lexical differences can be shown to be the result of multiple coarticulatory effects. Some small and fluctuating lexical effects can be detected in this process, indicating that there may be a final stage of phonetic adjustment to lexical identity.

Detail and abstraction in sociophonology: some data from Scottish English

Jane Stuart-Smith (University of Glasgow)

Recent research from socially-stratified studies of speech production and perception has provided persuasive evidence to suggest the presence/storage of fine phonetic detail relating to both linguistic and social-indexical contrasts (Foulkes fc 2010). The proposition of episodic or exemplar models of mental representation to account for such findings is now commonplace

(e.g. Johnson 1997, Pierrehumbert 2003). But many aspects are still unclear, for example, how abstracted categories, linguistic and social-indexical, might emerge and/or exist alongside stored exemplars, and what these kinds of abstraction might be like (and indeed how these might relate to those posited in theories of phonology with more emphasis on invariant base forms).

In this paper I consider three kinds of data from a number of sociophonetic studies of Scottish English, which raise questions about the level of detail, and the kind of abstraction, social and linguistic, which may need to be represented as a part of our phonological knowledge (Docherty and Foulkes 2000).

The first consists of 'mixed' variants, that is, allophonic variation which is auditorily and acoustically complex, showing fine phonetic detail which cross category boundaries, and which index more than one layer of social meaning. Such variation has been found for a set of consonant changes in progress in Glaswegian (Stuart-Smith et al 2007), as well as in an emerging regional minority ethnic accent, spoken by Glaswegians of Asian heritage (Stuart-Smith et al forthcoming). The second concerns the complex relationships between articulatory configuration, acoustic output and perceptual object, as illustrated by an Ultrasound Tongue Imaging investigation into the articulatory basis for the auditorily and acoustically difficult – and 'mixed' – reflexes of one of the Glaswegian consonant changes, derhoticisation of Scottish coda /r/, in e.g. *car* (e.g. Lawson et al 2008). The third considers the phonetic and phonological consequences of experiencing speech without the possibility for interaction, as exemplified by recent sociolinguistic and laboratory phonology research investigating the possible influence of watching London-based television dramas on the changing vernacular of Glaswegian adolescents.

These data confirm the need for the inclusion of fine phonetic detail – and its social-indexical encoding – in descriptions of phonological knowledge, but at the same time, they also point to the necessity of developing clearer modeling of abstraction in conjunction with detail, if an exemplar approach is taken.

Theory and geography

Marc van Oostendorp (Meertens Instituut & Leiden University)

In a distant past, even serious dialectologists were willing to entertain purely geographical explanations for the geographical distribution of linguistic phenomena: people used more closed vowels in coastal areas because in this way they could prevent the wind from blowing into their mouth. Such types of explanations seem no longer acceptable to current linguistics, which raises the question to what extent geographical patterns are interesting at all.

In this talk, I discuss two possible ways of looking at dialectological data in order to draw theoretical conclusions from them. The first is taking those data as a diasystem, and trying to find correlations between phenomena. As an example, I present a database of (surface) segment inventories from approximately 700 Dutch dialects, and show how Clements' (2009) ideas on Feature Economy helps bring some structure into those inventories.

Using diasystems still ignores the geographic dimension however. I then move to three different ways in which geographic information can be made relevant to phonological theorizing, in each case basically taking the old dialectological adagium 'Aus dem raümlichen Nebeneinander ein zeitliches Nacheinander' (from geographical spread we can determine historical change) and turn it into a tool for synchronic analysis.

Finally, I discuss some of the problems in working with dialect data, such as the trustworthiness of the data, and the dependence on the whims of individual transcribers.