The Twentieth Manchester Phonology Meeting

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Twentieth anniversary meeting

ABSTRACTS BOOKLET

Thursday 24th - Saturday 26th May 2012

Held at
Hulme Hall, Manchester

Organised by a collaboration of phonologists at the
University of Edinburgh, the **University of Manchester**, and elsewhere.

This booklet contains the abstracts for all the papers presented at the **twentieth Manchester Phonology Meeting**, held at Hulme Hall, Manchester, in May 2012.

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** or the **dining 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 dining area.

The Old Dining Hall is in the main Hulme Hall building, upstairs, and just through the bar area and the dining area. The JCR is downstairs in the same building. It takes about a minute to walk from one to the other. The **final programme**, included in your registration pack, and available on the 20mfm website, gives the details of which papers are in which room, and at which times.

Oral papers

Shared neutralizations without shared representations

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A longstanding question is whether learners seek unified featural representations to capture distributional parallels across different manners. For example, Lakhota (Siouan) has three-way laryngeal contrasts for both stops and fricatives, but the phonetic nature of the contrasts differ: unaspirated [ka] ∼ aspirated [kʰa] ∼ ejective [k'a] stops vs. voiceless [xa] ∼ voiced [ɣa] ∼ glottalized [x'a] fricatives. Aspirated stops, voiced fricatives, and ejectives are banned in many of the same contexts, such as within clusters ([kpa], [xpa] vs. *[kʰpa], *[ɣpa], *[k'pa], *[x'pa]). It is tempting to posit that these segments contain a common representational element that is banned in certain contexts, such as a specified/marked laryngeal node, or a complex segment (Carter 1974). I show that such an analysis is unworkable for Lakhota, due to differences in which value acts as 'unmarked' in different contexts. I propose an analysis that refers directly to phonetic properties of each series, with constraints penalizing perceptually weak contrasts and favoring different outcomes depending on phonetic demands on segments in different contexts.

The three-way contrasts in Lakhota are seen only in singleton onsets; in all other contexts, they are neutralized to a single series. Neutralization usually favors unaspirated stops (allophonically voiced in some contexts) and voiceless fricatives ((1a–c)). However, there is a large class of disyllabic roots with "defective" final syllables: the vowel (a/e/Ø) resists stress, the onset must be simple, and the consonant must be an unaspirated stop or a *voiced* fricative ((1d)).

(1) Contextual neutralizations to one laryngeal value

Context	Stops		Fricatives	
a. Clusters: C2	unasp	CkV (*CkʰV, *Ck'V)	vcls	CxV (*CɣV, *Ck'V)
b. C1/__[−son]	unasp	kTV (*kʰTV, *k'TV)	vcls	xTV (*ɣTV, *x'TV)
C1/__[+son]	voi	gRV (*kʰRV, *t'RV)	vcls	xRV (*ɣRV, *x'RV)
c. Codas:	passive voi	CVk̬ (*CVkʰ, *CVk')	vcls	CVx (*Cvɣ, *Cvx')
d. ˈσ__V	unasp	ˈCVka (*ˈCVkʰa, *ˈCVk'a)	voi	ˈCVza (*ˈCVsa, *ˈCVs'a)

Why does neutralization sometimes favor voiceless fricatives ((1a–c)) and sometimes voiced ((1d)); and why is the distribution of voicing in stops different? Stated informally: in contexts (1a–c), durational cues to laryngeal contrasts (duration, VOT) are weak or absent, forcing neutralization. In principle, neutralization could favor any of the three series, but unaspirated stops may be favored for articulatory reasons (fewer gestures; Flemming 2004). This is consistent with the fact that stops undergo passive contextual voicing, avoiding an additional glottal abduction gesture. Fricatives, however, inherently favor some glottal abduction (Ohala 1983, Kingston 1990), and resist voicing for aerodynamic reasons (Vaux 1998; Beckman et al. 2009). Context (1d) involves an additional pressure: durational reduction before stressless syllables (cf. English flapping). Acoustic results show that voiced fricatives are shorter than voiceless in Lakhota (90–115ms vs. 135–195ms), and may be selected to achieve durational reduction. The same pressure should also favor neutralization to voiced stops; however, voiced stops are so short that they often surface as fricatives or glides. Voiceless unaspirated stops are roughly comparable in duration (85–120ms) to voiced fricatives, so the neutralizations in (1d) achieve durational reduction while consistently maintaining manner contrasts. These conflicting pressures are formalized in a grammar of durational targets and contrast constraints (Katz 2010).

The conflicting patterns in (1a–c) vs. (1d) cannot be derived by declaring one member of each series to be 'unmarked', but follow neatly from constraints on contrast and duration. To the extent that the series do pattern together, it is because they are subject to similar phonetic pressures. We conclude, following Beckman et al. (2009), that nothing is gained here (or perhaps more generally) by assigning unified representations to segments with similar distributions.

The Stress-Epenthesis Opacity in Palestinian Arabic

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I present a monostratal account of the stress-epenthesis interaction in Palestinian Arabic (PA). PA stress is shown in (1): it is final if the final syllable is superheavy, penultimate if the penult is heavy, and antepenultimate otherwise.

FINAL STRESS		PENULTIMATE STRESS		ANTEPENULTIMATE STRESS	
ba.ka.rá:t	*"spools"*	da.ra.bát.kom	*"she hit you.*PL*"*	bá.la.dak	*"your country"*
ba.ra:.mí:l	*"barrels"*	mak.táb.kom	*"your.*PL *desk"*	lá:.ma.to	*"she blamed him"*

Epenthetic vowels (italicized), which repair certain CC combinations in codas, are invisible to stress assignment. For example, in [ní.m*i*r.kom] "*your tiger*", where the penult is heavy, penultimate stress is expected, but antepenultimate is attested; in [ka.tá.b*i*t] "*I wrote*", where antepenultimate stress is expected, stress falls on the penult. In both cases, stress is assigned as if the epenthetic vowel were invisible.

In multistratal OT approaches, this invisibility is captured by assigning stress at an earlier stage than epenthesis, e.g. (in Kiparsky 2000, 2003) lexically, and post-lexically. The alternative I propose derives the invisibility from two constraints: DEP-μ and *emptyNucleus.

(3) DEP-μ: every mora in the output must have a carrier in the input.

(4) *emptyNucleus: syllable heads are moraic.

Combining (3) and (4) eliminates the one-to-one correspondence between vowels and syllables, for it makes it impossible for epenthetic vowels to head syllables on their own; a syllable headed by an epenthetic vowel will contain either a weightless nucleus (a violation of *emptyNucleus) or a moraic epenthetic segment (a violation of DEP-μ). An output candidate that contains an illegal coda, e.g. *[nimr.kom], will therefore lose to a candidate in which epenthesis repairs the cluster, but where epenthesis fails to introduce a new syllable, producing [nim*i*r.kom]. Stress is then correctly assigned according to the general rule described above.

The ban against moraic epenthesis finds support in Gouskova and Hall's (2007) study of epenthesis in Lebanese Arabic, a closely related dialect. Their results indicate that epenthetic vowels are shorter and more central than their non-epenthetic counterparts, suggesting that epenthetic vowels are less likely to contribute to metrical structure. I also situate the prosodic weakness of epenthetic vowels in a more general condition of PA. PA syncope targets light high vowels more frequently than low vowels. I interpret this as setting a threshold on the sonority of open syllable nuclei: since high vowels are less sonorous than low vowels (Selkirk 1984, Parker 2002), they are kept from heading light syllables. The greater weakness of epenthetic vowels restricts them, correctly, to syllables that already contain a moraic element, i.e. closed syllables.

Finally, I argue that a monostratal account is necessary, based on data that are problematic for Kiparsky's LPM-OT. The data is centered on an interaction between epenthesis and prothesis (Abu-Salim 1980). Prothesis repairs illegal phrase-medial complex onsets, e.g. /ba:b#<u>kb</u>i:r/ → [ba:b*i*kbi:r] "*a large door*". In cases where the prothesis site follows an illegal complex coda, e.g. /nimr#kbi:r/ → [nímr*i*kbi:r], the prothetic vowel bleeds word-internal epenthesis. But PA also allows further epenthesis, as is indicated by the grammaticality of [ním*i*r*i*kbi:r]. If prothesis is taken to apply post-lexically (as it should, given its sensitivity to phrases), then there is no reason for further epenthesis to apply at that stage, because it would incur further DEP violations without repairing any obvious sources of markedness. I argue that a monostratal approach can be used to account for the data, by invoking constraints on identity to isolation forms, e.g. [nim*i*r]~[nim*i*r*i*kbi:r] (see Kenstowicz 1996, Benua 1998). In LPM-OT, this move would amount to post-lexical constraints that nevertheless make reference to words, a logical possibility that still seems undesirable given the natural morphological divisions underlying the framework.

Vowel harmony in Even: insights from a perception study

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This paper deals with the system of vowel harmony in Even, a Northern Tungusic language spoken in eastern Siberia in the Russian Federation. Most phonetic and phonological studies of Even rely on data from the standard variety, Ola Even. In this paper I present insights into the phonological system of a hitherto undescribed Even dialect spoken in the Bystraia district in central Kamchatka, based on fieldwork data.

Even exhibits a system of root-contolled vowel harmony. In Ola Even two groups of vowels clearly contrast in relative height accompanied by pharyngealization (Novikova 1960). Harmony rules ensures that vowels belonging to the different classes do not co-occur in a phonological word. The two groups are as follows: /ɪ a ɔ ʊ ia/ vs. /i e o u ie/. Later studies of Tungusic vowel harmony have identified the underlying parameter of this distinction in all Tungusic languages as tongue root position, i.e. RTR vs. non-RTR (Ard 1981). However, a definite conclusion about the nature of this contrast has not yet been reached, cf. Li (1996), Dresher & Zhang (2006), Vaux (2009).

Acoustic analysis of the vowels of Bystraia Even shows that members of the pairs /ɪ/ vs. /i/, /ɔ/ vs. /o/ and /ʊ/ vs. /u/ consistently differ in F1, which is a strong cue of the ATR distinction (Guion et al. 2006). However, other acoustic parameters related to ATR features (F2, spectral slope, F0) do not follow the clear pattern predicted for ATR vowels. To my auditory impression there is no pharyngealized vowels in Bystraia Even, and that is also confirmed by the behaviour of F3. An additional feature, namely duration, was discovered to be significant for the distinction between short /ɪ/ vs. /i/ and /ɔ/ vs. /o/. At the moment it seems somewhat premature to choose a single phonological label for this phonetic feature before investigating other factors participating in the realization of the contrast.

In this paper I present the results of a perception study designed to shed light on the nature of the contrast between the two sets of vowels. The study included several perception tests of different design (identification test, test with manipulated vowel duration etc.), focusing on the high vowels /ɪ/ vs. /i/ and /ʊ/ vs. /u/. The results show that consonants play an important role in the discrimination of minimal pairs. Thus, if a word does not contain the vowels /a/ or /e/, which unambiguously indicate the vowel harmony class, some words were more easily perceptible than others depending on their consonantal make-up. Specifically, words containing voiceless velars and liquids were much better and more consistently perceived than words containing other classes of consonants (e.g. approximants or fricatives). The perception of the latter failed more often.

The results presented in this paper show that the contrast between vowel-harmony classes is expressed not just by vowels, but also by consonants (cf. a similar tendency in Mongolian, Svantesson et al. 2005), i.e. that all segments of a word participate in harmony (cf. e.g. Padgett & Ní Chiosáin 2001). Vowel duration, on the other hand, did not influence the perception of the words in any way; consequently, I propose to treat it as an enhancement feature.

Phonological variability in English blends

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In spite of a number of studies in this domain (see, for example, Bat-El 2006 for an overview), blending remains a somewhat enigmatic prosodic-morphological process. Examples of English blends are given in (1).

(1)	blend	base word 1	base word 2
	brunch	breakfast	lunch
	stagflation	stagnation	inflation
	smog	smoke	fog

The pertinent literature is strongly divided over the issue of how predictable the structural properties of blends are. Whereas the traditional descriptive literature has tended to stress the variability and, hence, unpredictability of the process (cf. e.g. Marchand 1969), there is a growing number of studies that has postulated constraints on variability (e.g. Kubozono 1990, Kelly 1998, Plag 2003, Gries 2004), with important repercussions in theoretical work where the structure of blends has been argued to be predictable from optimality-theoretic constraint interaction (e.g. Bat-El & Cohen to appear). These constraints pertain to the questions of how many and which segments of the base words survive, when and how segmental overlaps occur, where cut-off points can be located with non-overlapping forms, and how stress and length determine the shape of the output. It is, however, largely unclear, how the phonological variability is principally restricted. In particular, there is to our knowledge no empirical work on English that systematically investigates productive variability for a single set of base words.

The present study sets out to remedy this situation, presenting the results of a production experiment with more than 1,700 observations, in which 30 native speakers of English formed blends on the basis of 60 word pairs which systematically elicited specific constellations of structures.

It turns out that in general, blend structure is surprisingly uniform in terms of which portions of the base survive, the location of cutoff points, and stress assignment, lending support to earlier approaches working on the predictability assumption. However, we also identified areas of systematic variability which call into question some of the existing proposals. Examples are given in (2). Stress is marked by an acute accent.

(2)		blend 1	blend 2	base word 1	base word 2
	a.	cóffilk	coffílk	cóffee	milk
	b.	milóffee	móffee	milk	cóffee
	c.	bleen	breen	blue	green

Systematic variability affects, in particular, stress assignment in certain configurations (2a), length constraints as determinants of blend structure (2b), and constraints on the syllabic integrity of cutoff points (2c).

We will quantify the respective types of variation in our data, and discuss implications for a theoretical model. In particular, we will argue that our data are in principle compatible with an optimality-theoretic approach to blend structure, where systematic variability is modelled as ranking variability that is part of the co-phonology of the morphological process. However, a major challenge for an optimality-theoretic model of blend formation lies in the formalisation of pertinent faithfulness effects, which must crucially involve modelling overlap effects and comparison of (length of) the contributions by base word 1 and base word 2.

Complex Nasals and Nasal Neutralization Avoidance

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A minority number of languages of the world present complex nasal segments, typically prenasals (^{N}D), as in /ŋãnã^{m}p/ 'hunt' (Kualan, Onya Daraat); even less languages have pre-occluded nasals (^{D}N) as in /tàlú^{g}ŋ/ 'rooster' (Nothern Pame, Otomanguean) and post-occluded nasals (N^{D}) as in /am^{b}o/ 'to climb' (Karitiana, Tupi). Much research is available on prenasals, which have been proved to be legitimate underlying units in contrast with fully nasal and oral segments in various languages (see Hyman (2003) on Bantu, Iverson & Salmons (1996) on Mixtecan, among others); however, cases of pre- and post-occluded nasals are scarcely documented to the extent that their phonological status is still a matter of ongoing research (e.g. Otomanguean, Amazonian, Tupian, Austronesian). My goal in this paper is twofold: First, to provide aerodynamic and acoustic documentation of pre- and post-occluded nasals in a targeted number of language families: Nadahup, Dayak, Otomanguean and Dogon. Second, to propose a phonological rationale for these unusual patterns. The findings show that pre- and post- occluded nasal are independent units; the oral phase of the gesture is not an independent segment, and cannot be separated from the nasal portion by any process. Moreover, the phonetic data shows a great deal of variability of these segments so that in some cases there is no oral lag, but there is a sharp onset of the nasal before the vowel, which suggest a conspicuous difference with legitimate nasal-oral stop sequences, which do not dispense with the oral/nasal phasing. The patterns to be discussed are summarized below. Pre-occluded nasals. Consider the data from Yuhup in (1 and 2). If the form /wéní/ undergoes coarticulatory nasal assimilation, yielding *[wẽ́nĩ́], it would be indistinguishable from the phonetic output of the underlyingly nasal form in (2) [wẽ́nĩ́]. All things being equal, the oral phase on the complex nasal segment prevents the neutralization of the oral/nasal contrast in the precedent vowel.

1. /wéní/ [wé^{d}nĩ́], *[wẽ́nĩ́] 'to eat'
2. /wẽ́nĩ́/ [wẽ́nĩ́] 'to swim'

Post-occluded nasals. Consider the data from Kualan (Tadmor, n.d.) below. In Kualan there are no sequences nasal-voiced stops; the oral portion intervening between the nasal and the vowel in (3) [m^{b}o] shows the oral gesture blocking nasal assimilatory effects that potentially may produce confusability with the phonetic representation of /mõ/.

3. /mo/ [m^{b}o], *[mõ] 'elder sibling'
4. /mõ/ [mõ] '2nd person singular pronoun'

Throughout the detailed discussion of the phonetics of complex nasals in unrelated languages, I suggest that the synchronization of the gestures of the velum with oral articulators reveals a phonological pattern that avoids the neutralization of the independent oral/nasal contrast in vowels. i.e. neutralization avoidance prevents a potential 'innocent misapprehension' of listeners that otherwise could have profound impacts in the lexicon such as multiplication of homophones, for instance. Along the lines of Steriade (1997) and Boersma (2000) I suggest that the licensing of complex nasals reflect grammatical conditions which refer directly to phonetic implementation, namely the intergestural timing of nasal and oral articulators and the perceptibility of underlying contrasts. Reference to historical processes and comparative evidence complete the broader picture of the complex nasals phenomenon.

On the border of phonetics and phonology: Sonorant voicing in Hungarian and Slovak

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The traditional view concerning the laryngeal state of sonorants is that they are phonetically voiced but since they fail to participate in the voiceless–voiced opposition, they are phonologically represented as unspecifed for voicing. This underspecified representation of sonorants provides an elegant explanation of why sonorants do not induce voicing assimilation: they do not possess a voicing feature that could spread to the preceding voiceless obstruent. However, this approach simplifies matters and fails in languages like Slovak in which sonorants – including vowels – do cause voicing assimilation in a specific morphological environment, which can be broadly described as 'over a strong morpheme boundary' (Pauliny 1979), see (1). Word-internally, however, sonorants do not trigger voicing assimilation (2).

(1) /pm/ → [bm] *kúp múkú* [kuːbmuːku] 'buy flour'; /pl/ → [bl] *chalp lozí* [xlablоziː] 'man climbs'; /sta/ → [zda] *list a známka* [lizdaznaːmka] 'letter and stamp'

(2) *tma* [tma] 'darkness', *kladivo* [klaɟivo] 'hammer'

Strycharczuk & Simon (to appear) report a similar process in West Flemish and give a detailed perception-driven account. Slovak, however, is a step "further" than West Flemish in that our preliminary results suggest that there is no asymmetry between the voicing of fricatives and stops in presonorant position. The patterning of sonorants in Slovak is in contrast with 'obstruent voicing' languages, such as Hungarian, in which sonorants do not induce voicing assimilation in any context:

(3) /tb/ → [db] *hát-ba* [haːdbɒ] 'back-ill.' but: /tn/ → *[dn] *hát-nak* [haːtnɒk] 'back-dat.'

In this paper, we will provide a phonetic approach to the laryngeal phonology of the two types of languages (sonorant voicing vs. obstruent voicing), which can provide a better understanding of sonorant voicing. A crucial observation in connection to these two types of voicing languages is that sonorant voicing seems to occur if obstruents voicing is neutralized word-finally. In Hungarian voicing contrast is not lost word-finally, while it is in Slovak. Our hypothesis is based on this correlation between word-final obstruent devoicing and sonorant voicing: if a language displays presonorant voicing (over word boundaries), then that language also exhibits word-final devoicing (the reverse is not true, however). We suggest, following Jansen (2004), that neutralized (devoiced) obstruents can fall prey more easily to the effect of voicing, since they have no inherent/local voicing control so as to counterbalance the voicing spill-over. This increased amount of voicing can be argued to be interpreted (and perceived by listeners) as 'voicing assimilation', although it is phonetically different from that induced by actively voiced/voiceless obstruents to actively voiced/voiceless obstruents. Only laryngeally neutralized stops are capable of displaying passive voicing assimilation effects (from sonorants, including vowels). In addition, we hypothesize that Slovak sonorants display more voicing than sonorants in Hungarian, which can serve as a phonetic support for the difference between their phonological behaviour, i.e. their ability to voice passively devoiced obstruents.

This paper will give experimental evidence to check the validity of the hypothesis above. We will present the results of an acoustic experiment with 6 native speakers of Hungarian and Slovak, respectively, employing spontaneous and semi-spontaneous speech (TV news and reports) from Slovak aiming to (i) enumerate the potential phonetic parameters that cue voicing in obstruents vs. sonorants (active/passive voicing correlates such as phonation, harmonics-to-noise ratio, VOT, low spectral features in neigbouring vowels), (ii) measure and compare the voicing of word-final obstruents in Hungarian vs. Slovak, (iii) measure and compare the voicing of post-obstruent sonorants (over a word boundary) in Hungarian vs. Slovak.

Privative Laryngeal Features and Passive Voicing: Evidence from Hindi

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Linguists have long recognized a fundamental distinction between two very common types of languages with a two-way Voice Onset Time (VOT) contrast in stops. In *aspirating languages* such as German and Cantonese, the two series of stops are typically realized in utterance-initial position as either plain voiceless unaspirated (lenis) or voiceless aspirated (fortis). In *true voice languages* such as Russian, Spanish, and Tamil, however, the two series of stops in utterance-initial position are either voiceless unaspirated (fortis) or prevoiced (lenis). Recently, many phonologists (e.g., Harris 1994, Iverson & Salmons 1995, Honeybone 2005, Jessen & Ringen 2002) have argued that the phonological feature of contrast on stops in aspirating languages such as German is privative [spread glottis] ([sg]), while the phonological feature of contrast in a true voice language such as Russian is privative [voice] (1).

(1)	Phonetic	Orthographic	Phonological
Aspirating Languages	[p, t, k]	*b, d, g*	[∅]
	[p^h, t^h, k^h]	*p, t, k*	[spread glottis]
True Voice Languages	[p, t, k]	*p, t, k*	[∅]
	[b, d, g]	*b, d, g*	[voice]

Although utterance-initial lenis stops in an aspirating language such as German are typically voiceless, lenis stops that appear in intersonorant contexts exhibit *variable passive voicing*: some tokens exhibit voicing throughout the stop closure, some are totally voiceless, and others are voiced through only a portion of the closure phase (Jessen & Ringen 2002). In the context of the analysis sketched in (1), this phonetic process affects only those stops which lack a laryngeal specification, and only if they occur in a voiced context (between voiced segments). In true voice languages such as Russian in which the phonologically active feature is [voice], rather than [sg], however, the phonologically unspecified stops do not exhibit variable, or passive, voicing in intersonorant position.

This difference in the behavior of phonologically unspecified stops can be accounted for if we assume that at some level prior to the phonetics, privative features are transformed into numerically specified features (see Chomsky & Halle 1968), and that every segment must have a positive numerical specification for the feature that is active in that language—but not for any feature that is not active. Thus, a lenis stop in an aspirating language like German will have a small positive specification for [sg] as a consequence of this conversion—but no specification for the phonologically inactive [voice] feature. By contrast, the fortis stops in a true voice language such as Russian will have a small positive specification for [voice], but no specification for [sg]. If we further assume that phonetic processes such as passive voicing cannot change a numerically specified phonological feature, then the failure of passive voicing on fortis stops in languages like Russian is explained—they enter the phonetics with a [voice] specification already in place. The lenis stops of an aspirating language, on the other hand, enter the phonetics with no [voice] specification, and thus may be subject to passive voicing.

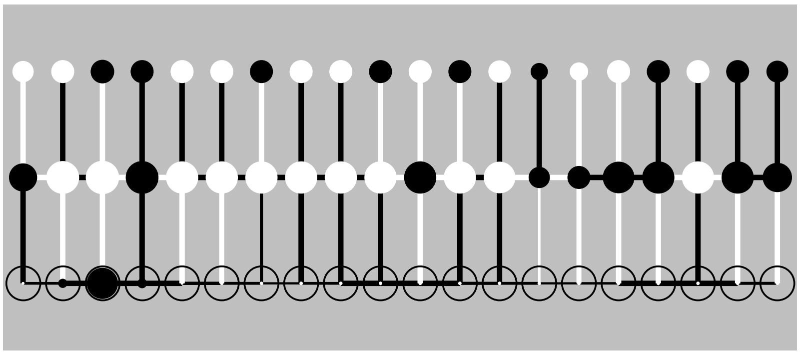
How do plain voiceless stops behave when both aspiration **and** voicing are contrastive in a language, and thus, both [sg] and [voice] are phonologically active? Our proposal makes a clear prediction, previously untested, about the behavior of intersonorant stops in languages such as Hindi and Thai, in which there are three or more contrastive series of stops (crucially including voiceless aspirated, prevoiced, and voiceless unaspirated): because [voice] is phonologically active, plain voiceless stops should receive a numerical specification for [voice] prior to the phonetics, thus failing to undergo passive voicing. In this paper, we report on new intersonorant stop data collected from native speakers of Hindi; preliminary results indicate that plain voiceless stops in Hindi are, indeed, robustly resistant to passive voicing in this environment.

Phonological categories as attractors of behaviour

Paul Boersma

The BiPhon (Bidirectional Phonology and Phonetics) model (Boersma 2007) exhibits several realistic effects at the phonetics-phonology interface, such as auditory dispersion (Boersma & Hamann 2008), merger (Boersma & Hamann 2011), and licensing by cue (Boersma 2008). However, it fails to handle other effects at the phonetics-phonology interface well, such as the perceptual magnet effect and category creation (Boersma, Escudero & Hayes 2003 is an unprincipled attempt using a representation of auditory distance). Moreover, the evaluation mechanism becomes cumbersome if there are more than two levels of representation, basically having to evaluate a number of candidate paths that is exponential in the number of levels.

The problems can be solved by replacing Optimality Theory with symmetric neural networks. Symmetric neural networks are neural networks in which the connection from node A to node B is exactly as strong as the connection from node B to node A (e.g. Hopfield 1984). This symmetry is needed to implement the bidirectionality of the BiPhon model, the idea always being that learners start by optimizing their comprehension of the ambient language, and then just reuse the same optimized connections in their subsequent production of the language. This symmetry indeed replicates the dispersion and merger behaviour of the OT version of the BiPhon model, but also exhibits the perceptual magnet effect and category creation with even the smallest possible network layout:



In this picture the bottom row of nodes represents an auditory continuum (e.g. F1) with 20 possible values. The second row is the phonological surface form. If a three- (or four-) peaked distribution of auditory values is fed to the bottom row, Hebbian learning (Hebb 1949) causes the second row to favour exactly three (or four) types of patterns of activity. Since activity patterns are the brain's way of representing behaviour, there come to be three (or four) types of behaviour. This replicates the perceptual magnet effect, and when the learner continues until she has just three (or four) *possible* patterns (not just *types*) of activity, she can be said to have achieved the creation of three categories. Thus, **categoryhood is gradient** in this model: nearly categorical behaviour emerges before strictly categorical behaviour does.

The picture contains a third row, namely the underlying form. If this row is connected to a fourth row representing meaning, lexicon-driven learning starts to help the development of both comprehension and production, leading e.g. to the interesting observation that learners can learn to produce L2 contrasts that they cannot hear!

The talk will show simulations of category creation, L2 perception, cue integration, auditory dispersion, merger, and licensing by cue.

The return of the *Silbenschnittkorrelation*: re-examining the Dutch vowel system

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1. Issue. This talk addresses a long-standing problem in the phonology of Dutch, viz. how the difference between the two sets of monophthongs—one typically transcribed as /aː, eː, øː, oː, i, y, u/, the other as /ɑ, ɛ, ɪ, ɔ, ʏ/—should be characterized. Phonetically, there appear to be two differences between these sets. First, all members of the second set are short, while all but the high vowels in the first set are long. Second, the two sets differ in quality, with the former usually described as 'tense' and the latter as 'lax'. Phonologically, the two sets of vowels show different behaviour. Most prominently, long/tense vowels can be followed by *at most* one consonant, while short/lax vowels must be followed by *at least* one consonant—or alternatively, short/lax vowels occur in closed syllables. This is shown in (1), where /ɑ/ in (1a) represents the short/lax vowels and /aː/ in (1b) the long/tense ones:

(1)	a.	*/rɑ/	/rɑm/	/rɑp/	/rɑmp/	b.	/raː/	/raːm/	/raːp/	*/raːmp/
			ram	*rap*	*ramp*		*ra*	*raam*	*raap*	
			'ram'	'quick'	'disaster'		'yard'	'window'	'turnip'	

2. Previous analyses. Broadly speaking, three approaches have been offered to account for these data:

(2) a. The property of length is basic; the other properties are derived from this.
b. The property of tenseness (or laxness) is basic; the other properties are derived from this.
c. The distinction between open and closed syllables is basic; the other properties are derived from this.

Recent work seems to have converged on (2b) (e.g. van Oostendorp 2000; Gussenhoven 2009), although (2a) still enjoys support (e.g. Booij 1995). Approach (2c) was favoured by Sievers (1901), who distinguished between *stark geschnitten* and *swach geschnitten* syllables, and by Trubetzkoy (1938) (cf. his *Silbenschnittkorrelation*, or 'syllable cut'), but has not figured in any modern analyses of the Dutch vowel system. In this talk, we review the arguments put forward for each of the approaches in (2). We show that the Dutch stress facts argue against (2a) and in favour of (2b,c). We further point out two problems with (2b). First, the distributional restrictions on short/lax vowels must be stated twice in this approach, once in the form of a feature and once in the form of a constraint on the syllable in which these vowels appear. Second, the phonetic correlates of the labels 'tense' and 'lax' on which this approach is based remain unclear.

3. Proposal. This leads us to return to approach (2c), a perspective which fits in well with what we believe is a promising trend in recent work, viz. the idea that certain phonological contrasts are more appropriately encoded in structural terms rather than with phonetically based features (e.g. Golston & van der Hulst 1999; Pöchtrager & Kaye 2010). More specifically, our claim is that tense and lax vowels are identical at the segmental level but differ in terms of the structure of the syllable rhyme that contains them: tense vowels occupy a non-branching rhyme, tense vowels a branching one. (A consonant following a tense vowel, e.g. the /p/ in *raap* in (1b), occupies the onset of an empty-headed syllable.) The syllabic approach obviates the two problems faced by (2b). First, the contrast between the two sets of vowels is stated just once, at the level of the rhyme. Second, no recourse is required to features whose phonetic exponence is unclear. And finally, as in (2b), the long/tense vowels are phonologically short, so that their syllables function as light for the purposes of stress assignment. We show that (2c) can be successfully combined with an Articulatory Phonology approach. If we assume that (stressed) syllable rhymes are timed more or less equally, such an approach allows for a better understanding of the difference between 'strongly cut' and 'weakly cut' syllables, and also offers a straightforward way to define tenseneness: vowels in weakly cut syllables have more 'space' to reach a full articulation.

Derivationalism in OT – Boon or Bane?

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It may seem that generative phonology has come full circle with the rise and development of Optimality Theory. Giving up derivation and rule-based analysis was the original premise of its creators (Prince&Smolensky 1993). Strict parallelism and direct input-output mappings seemed to grasp the gist of universal principles governing language-specific grammars. How come that we seem to be in need of derivation after all? A thorough study of phonological processes in various language families has led phonologists to the conclusion that parallel OT is unable to address more complicated problems. As a result, a number of improvements, or subtheories, within OT have been proposed to better adjust the theory to linguistic reality. Surprisingly, they have returned to the insight of the proponents of pre-OT derivationalism. Implicitly or explicitly, they have been adding some parts of what OT so ardently rejected: access to some intermediate stage(s) of candidate evaluation. By now, it has become clear that some derivationalism is indeed necessary to address opacity and other issues. The question is what kind of derivationalism should be filtered in and in what proportion.

The goal of this paper is to examine several OT strategies centered around opacity based on one example taken from Chilean Spanish. It will be demonstrated how an interaction between syllabification and coda condition repairs at word edges gives rise to a double opacity effect. Not only does the dialect show overapplication of *s* aspiration across a word boundary due to resyllabification, but also two competing coda *s* repair strategies. The dialect actually admits two repairs, depending on the structure of a given utterance: aspiration and deletion. The phrase *Estados Unidos* 'United States' [ɛh.ta.ðɔ.hu.ni.ðɔ] will be analysed using sympathy (McCarthy 1999), candidate chains (McCarthy 2006), Harmonic Serialism – HS (McCarthy 2000, 2010) and Stratal OT (Bermúdez-Otero 2003; Kiparsky 1999, 2003; Rubach 1997). The chosen example shows transparent [ɛh.ta] and opaque [ðɔ.hu] aspiration, as well as deletion of underlying *s* [ni.ðɔ]. To bring sympathy and candidate chains to any use with the above example, baroque methods offered especially by the former theory have to be taken to the extreme, while the most promising HS proves unable to render the correct output form by any means. The crucial conclusion is that making reference to a failed, sympathetic candidate, introducing a derivational chain and using iterative evaluations that mirror a rule-based derivation are all insufficient in solving the double opacity problem under analysis. The only framework that fares well against the Chilean data is Stratal OT which assumes cyclicity, following the important insight of Lexical Phonology (Kiparsky 1982, Booij & Rubach 1987) concerning the natural, indisputable and well-grounded distinction between the word and the phrase level in phonology. Even though HS is derivational in nature, it does not include the very mechanism within derivationalism that we need here. The key assumption necessary to account for such opacity effects is the distinction between stem, word and phrase phonology serving as the basis for cyclicity in the form of three different phonologies. Chilean opacity is observed precisely at word boundaries and cannot be avoided or rendered transparent by means of a step-by-step evaluation. HS does not permit constraint reranking which is indispensable to allow for both aspiration and deletion of the underlying *s* on the surface. Thus, the answer to the question posed in the title of this paper is that derivationalism is a mixed blessing: critical to phonology but acutely misleading.

Globality in Stratal OT: Stratal Chains in Kashaya Metrical Structure

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Two recent variants of Optimality Theory employ intermediate representations in very different ways. OT with Candidate Chains (McCarthy 2007) evaluates a sequence of derivational steps simultaneously (i.e., Eval considers the entire chain), but allows a large (if finite) number of steps. Stratal OT (Kiparsky 2000, Bermúdez-Otero 2007) permits exactly one intermediate step inside the lexical grammar (output of the Stem stratum, input to the Word), but treats each Eval operation in sequence (i.e., without global effect across Stem and Word). I show that Kashaya metrical structure requires the Stem/Word distinction, but cannot be handled in sequence; instead, it motivates a global effect across these strata that can be formalized as a short chain.

Buckley (1994) proposes five lexical levels for Kashaya, but these can be reduced to two strata matching Stem and Word. Changes in vowel length such as Iambic Lengthening apply in the [Stem] but not the ⟦Word⟧ stratum (1a-b). The more complex "Foot Flipping" of Cvv.Cv → Cv.Cvv (occurring with rightward stress shift) presents a major problem: It too is limited to the Stem (2a-b), but is blocked by a closed syllable that arises due to a Word-level suffix (2c).

(1)	a. **⟦[ne-cid]-u⟧** (necí:)du *'bringing'*	b. **⟦[ne]-mela⟧** (nemé)la *'I brought'*	c. **⟦[ne-cid]-ba⟧** (necíṅ)ba *'after bringing'*
(2)	a. **⟦[q̇a:-cid]-u⟧** (q̇aci:)(dú) *'leaving'*	b. **⟦[q̇a:]-mela⟧** (q̇a:)(melá) *'I left'*	c. **⟦[q̇a:-cid]-ba⟧** (q̇a:)(cíṅ)ba *'after leaving'*

Buckley creates the conditions for Foot Flipping at the Stem level, potentially to be undone at the Word level, where Flipping goes forward only if the syllable structure permits. The global nature of classic OT eliminates this problem, but lacks an account of morpheme classes. Stratal OT accounts easily for the different suffix behavior, but not the role of surface syllable structure.

Buckley (1996) enriches classic OT with constraint-domains that express the differences between affix classes in a single global ranking, but the domains do not incorporate a larger theory of phonology–morphology interactions. By contrast, the more substantial framework of Stratal OT can account for Kashaya only by enriching the ordered strata with a global effect.

I propose simultaneous evaluation of short "stratal chains" analogous to OT-CC, but limited lexically to <*Input*, *Stem*, *Word*> steps. In essence, forms pass through the strata as usual, but a global constraint ranking chooses among alternate derivations. Some constraints are indexed to apply only to one stratal mapping, and are ranked differently from the equivalent constraints applying in the other stratum. In Kashaya, Foot Flipping is enforced by *(CVV)CV or the equivalent; the final consonant is extrasyllabic at the Stem level to permit Flipping in forms like (2a). Crucially, Word-level (but not Stem-level, or general) IDENT-LENGTH dominates *(CVV)CV.

(3)

⟦[q̇a:-cid]-ba⟧	*V:C	IDENT-L$_{\text{WORD}}$	*(CVV)CV	IDENT-L$_{\text{STEM}}$
a. ☞ <q̇a:cid, q̇a:ci(d), q̇a:ciṅba>			*	
b. <q̇a:cid, q̇aci:(d), q̇aciṅba>		*!		**
c. <q̇a:cid, q̇aci:(d), q̇aci:ṅba>	*!			**

Chain (3b), with Foot Flipping in a word that does not ultimately permit it, is rejected because it has corrective vowel shortening at the Word level step, where changes to vowel length are highly penalized by IDENT-L$_{\text{WORD}}$ as already shown by the lack of Iambic Lengthening in (1b).

Additional formal tools of standard OT-CC, such as Precedence constraints, are not adopted here because Stratal OT has independent accounts for opacity and other phenomena.

Voicing assimilation as gestural blending: acoustic evidence from Spanish

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This paper brings new data to argue for the re-analysis of a well-established topic in Spanish phonology, namely, the voicing assimilation of /s/ before a voiced consonant ([rá**z**go] vs. [rá**s**ko]), as the result of gestural blending rather than of a categorical voicing feature change. The traditional literature describes this assimilatory process as stylistically determined, gradient and variable (Hualde 2005), already suggesting the variable nature of the phenomenon. However, there is hardly any non-impressionistic data describing the process in detail and supporting these claims regarding its gradience. This study presents acoustic data from Peninsular Spanish to show that this assimilation, albeit gradient, is conditioned by certain prosodic factors. Moreover, we analyze Spanish voicing assimilation as an instance of gestural blending, an approach that, as we show, is able to account for the behavior of coda /s/ voicing.

Two previous studies provide some instrumental data on Spanish /s/ voicing assimilation (Schmidt & Willis 2010, Romero 1999) and conclude that assimilation is incomplete. Romero (1999) further finds that the laryngeal gesture associated with a sequence of /s/ and a voiced stop occurs between the oral gestures for /s/ and the stop, suggesting that Spanish voicing assimilation is the result of gestural blending in the laryngeal configuration. Based on these findings, this study tests the gestural blending model for assimilation by analyzing the effect of prosodic factors shown to affect gestural magnitude and organization. The rationale behind this is that the blending model makes testable predictions regarding the effect of these factors on the amount of assimilation.

Gestures tend to be larger in prosodically strong positions, including stressed syllables, leading to more overlap, more assimilation, among adjacent gestures (Beckman & Edwards 1994). Thus, we expect more assimilation when stress falls on the syllable following /s/ than on the syllable containing it (/rás.ge/ vs. /ras.gé/). Articulatory studies have found temporal overlap is less among gestures separated by or adjacent to a boundary and prosodic boundaries of different strengths (phrase vs. word boundary) display differences in the magnitude of their effects (Byrd & Salzman 1998). Thus, we expect the degree of assimilation to decrease as we move to higher prosodic boundaries, from word internal position to word boundary to intonational phrase boundary.

The current experiment tests the degree of voicing assimilation of /s/ preceding a voiced obstruent in Northern Peninsular Spanish under different stress conditions (/rás.ge/ vs. /ras.gé/) and prosodic boundaries: word internal (/ra**s**gámos/) vs. word boundary (/la**s** gómas/) vs. intonational phrase boundary (/buskala**s**, gómas no kjeɾo/). Three acoustic cues to voicing were measured: fricative duration, voicing during frication and preceding vowel duration. The percentage of voicing during frication was used to categorize each token as unvoiced, partially voiced or fully voiced.

As expected, the results show variation in the degree of voicing – speakers do not fully voice all instances of /s/ preceding a voiced stop. As for the factors, stress conditions assimilation only to a limited extent. Stress significantly affects preceding vowel and fricative duration but it does not correlate with the voicing category (unvoiced, partially voiced or fully voiced). Although the results for stress were unexpected, careful observation of the data led us to identify another possible conditioning, i.e., manner of articulation of the following stop. All the voiced stops following /s/ were realized as lenited, approximant consonants. Following Martínez-Celdrán (1991), we coded the manner of the following consonant as an open approximant (which displays formant structure with decreased amplitude) or a close approximant (which is formed without a tight closure and does not display a burst). We find a relation between the voicing category and the following consonant manner: when the following consonant is a close approximant, there is a higher percentage of no voicing, compared with a following open approximant, which favors voiced realizations. Results for the prosodic boundary effect suggest that the degree of assimilation changes in the predicted direction as the boundary is modified from word internal position to across an intonational phrase.

To conclude, the experimental results allowed us to redefine our gestural blending model of voicing assimilation for Spanish so that it is able to account for the observed patterns.

Contrast dispersion and the positional typology of geminates

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Research in the typology of geminate consonants shows that they are not equally distributed over various segmental contexts and prosodic positions. Thurgood (1993) reports that most languages restrict geminate-singleton contrast to intervocalic position. Geminates that are consonant-adjacent or word-edge-adjacent (word-initial or word-final) are significantly more rare. In addition, we observe phonological neutralization with respect to length contrast in these positions more often than intervocalically, both in synchronic and diachronic dimensions. In some dialects of Arabic consonant-adjacent and word-final geminates are subject to neutralization and surface as singletons. In Russian, variable degemination occurs with higher probability in word-initial and consonant-adjacent environments and is virtually exceptionless word-finally (Kasatkin and Choj 1999). Historic neutralization of the word-final gemination is also attested.

A process that is phonetically motivated is likely to manifest itself in unrelated languages through sound change, differences in phonological inventories, and morphophonological alternations (Ohala, 1983). One such explanation for geminate typology was advance by Pajac (2009) who studied production and perception of consonantal length contrast by speakers of Moroccan Arabic and established that (a) ratio between singleton and geminate duration increased in the order Initial+C < medial+C < initial+V < medial+V and (b) perceptibility of the contrast was more reliable as the ratio increased. While such differences in singleton-geminate ratio undoubtedly benefit the perceptibility of the contrast is remains unclear whether it is a universal factor. Contrary to Pajac's results, the data Ridouan (2007) reports for Tashelhit Berber demonstrate that geminate to singleton durational ratios are slightly higher in word-initial than in the intervocalic position, and are the highest in the word-final position. This shows that ratio differences can be language-specific and as such are unlikely to cause a near-universal cross-linguistic trend.

The present study reports the results of the perceptual experiment where perceptibility of the length contrast between short and long alveolar fricative [s] was examined in word-initial, intervocalic, consonant-adjacent, and word-final positions. Speakers of three languages (Russian, American English, Italian) took part in the experiment. Results demonstrated that even in the absence of the ratio bias a strong tendency exists for intervocalic singletons and geminates to be identified in a more categorical fashion then in other positions. The b-coefficients of the logistic function were used to evaluate the steepness of the identification curve as an indication of the perceptual distinctiveness of the contrast. Based on these findings the following hierarchy of the contrast perceptibility was established: intervocalic > word-initial > preconsonantal > word-final. Additional typological evidence based on a sample of 20 languages confirms that this hierarchy is reflected in the frequency distribution of geminates over these positions in various languages.

These results were used to construct an optimality theoretic model of the durational contrast typology building on the Contrast Dispersion theory. The proposal advanced here is that the asymmetries observed in the typology of durational contrast are a direct consequence of the differences in their relative perceptibility across various environments. The model developed in this study provides a unified account for the behavior of geminate consonants in diverse and unrelated languages. The model's predictions and its fit to the observed typological pattern is discussed as well as its interaction with other relevant factors, such as the effect of the morphological boundary (fake vs. true geminates), the possibility of the phonetic enhancement of the perceptually disadvantaged contrasts, and the effect of stress.

The vowel /a/ of Modern Hebrew beyond its surface realization(s)

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The pieces of the puzzle: The vowel [a] in Modern Hebrew (MH) alternates with both [e] and ø. Within the nominal system, reduction of [a] to ø (=syncope) is found in one well-defined environment: when [a] does not immediately precede the stressed syllable (*pakíd* but *pkid-á* 'clerk (ms.-fm.)', **pakid-á*). Two other alternations are apparent in "Segholate" nouns, i.e. nouns of the form CéCeC (default stress is final in MH). Here, the second vowel is [e] in the unsuffixed noun (*géver* 'man') but [a] before the plural suffix *-im* (*gvar-ím* 'men'). In the latter, the first vowel is again syncopated. When a suffix other than the plural is added, the first [e] vowel may also surface as [a] (*gavr-í* 'manly'). Finally, the feminine suffix has two forms: [a] and [et]. [a] is always stressed, [et] never is (*pin-á* 'corner', *rakév-et* 'train'). In the Construct State (a genitive-like compound construction juxtaposing two nouns) [a] becomes [at] (*pin-at rexov* 'street corner'); [et] doesn not change (*rakév-et šedim* 'ghost train').

Initial proposal(s): There is clear interplay between vowel quality and stress. This talk begins with the following claim: /a/ is realized as such only when it is phonologically long. Short underlying [a] is treated as zero. Having motivated this abstraction, it is shown that phonologically short [a] is ignored by stress. As a result, a weight-sensitive stress algorithm is proposed for the language. The effect of stress on non-stressed vowels is formalized, leading to a principle account of the phenomena. Considering that MH vowels do not exhibit length differences on the surface - no such account has ever been proposed - the analysis and its success make a general point in favor of abstractness in phonological analyses.

The analysis begins with the insight that the feminine suffixes [a] and [et] (3) are one and the same, a fact strongly supported by their near-complementary distribution. Within CVCV phonology (Lowenstamm 1996), two CV units are needed to accommodate [et] (CetV). The non-appearance of /t/ in [a] is immediately explained by assuming that this vowel is linked to two V positions, and the /t/ remains afloat ($Ca:^{t}$). There are two relevant implications to this analysis: 1) vowel quality mirrors underlying length - an /a/ linked to a single position will surface as [e]; and 2) stress ignores singly-linked final vowels - this is why [et] is never stressed, while [a] always is. Prior studies (Bat El 2008) treated [et] as both lexically unstressed and unrelated to [a(t)], and the [t] of [a(t)] as blunt allomorphy; our proposal not only explains **why** [et] is never stressed, but also argues for a single feminine suffix, thereby explaining the floating /t/ of [a(t)]. But most importantly, this proposal paves the way for a stress algorithm.

Next, the talk turns to the implications for the analysis of syncope. If /a/ can only be realized when long, then the retained, pretonic /a/ must be long. Pretonic Lengthening, already proposed for Biblical Hebrew, is assumed: /paki:d/=>[p**a:**ki:d], but /paki:da:/=> [pkida]. A stress algorithm is proposed: **stress the last phonologically long vowel; lengthen the preceding vowel.**

The third part of the talk deals with "Segholates". It shows that the tools proposed so far enable us to account for the [a]~[e]~ø alternations without the traditional assumption of allomorphy. In a item like *géver*, both vowels may be singly-linked /a/'s. This abstraction is especially striking for the second [e]: its lack of stress follows naturally. Moreover, when this [e] is pretonic, in the plural *gvar-ím*, it is realized as /a/. The disappearance of the first vowel in *gvar-ím* is also explained by assuming it is /a/. Finally, QáTaL is not a possible word in Modern Hebrew, which makes the following claim even stronger: **QéTeL is underlyingly /QaTaL/,** with two underlying short /a/'s. No rule of allomorphy is needed for the singular-plural alternation.

Thus, the analysis explains away several facts that were taken to be "lexical" in nature, by assuming abstract representations to which a stress algorithm is applied. The success of the analysis is presented as pointing to the necessity of such abstractions in phonological analysis. Time permitting, further arguments for the analysis of Segholates are presented, and cases like *gavr-í*, still problematic, are analyzed as phasal morpho-syntactic phenomena.

The unsolved problem of redundant features

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A considerable body of work in phonology has lent support to the idea that contrastive features have some special status that redundant features lack (see Dresher 2009 for an overview). Dresher (2009: 74), citing Hall (2007), calls this the Contrastivist Hypothesis, and gives its strongest formulation as "The phonological component of a language L operates only on those features which are necessary to distinguish the phonemes of L from one another." In its most literal interpretation, though, this statement cannot be true; phonology is capable of introducing allophonic (i.e., non-contrastive) differences through processes that cannot be described as the spreading of features from segments on which they are contrastive to segments on which they are not. For example, Canadian Raising (Bermúdez-Otero 2004) and Canadian French Closed Syllable Laxing (Poliquin 2006) both introduce allophonic height/ATR differences in vowels on the basis of the prosodic context and features of a following consonant that are not height or tongue root features.

An alternative way of implementing the special status of contrastive features would be the approach taken by Radical Underspecification (Archangeli 1988), in which predictable values are systematically absent from underlying representations, but may be filled in by redundancy rules during the derivation. This approach, however, drastically weakens the Contrastivist Hypothesis: rather than saying that the only contrastive features are present in the phonology, it says that only redundant features can be absent. A rule that applies before a redundant feature has been filled in will ignore that feature, while a rule that applies later will be able to see it. The approach taken by Nevins (2010) is similarly permissive: the search procedures in harmony rules are allowed to vary parametrically as to whether they see all features, or only contrastive ones.

Is there a way of allowing the phonology to introduce allophony, while still maintaining the strong contrastivist view that the phonology itself has access only to contrastive features? Suppose that non-contrastive features may be introduced by phonological rules, but are not themselves visible to subsequent phonological computation (only to phonetic interpretation). In other words, the phonology cannot see features that are 'colourless' in the sense of van Oostendorp (2007).

This reformulation of the Contrastivist Hypothesis also solves a problem identified by Hall (2007): if only contrastive features are present during the phonological computation, then there are some cases in which redundant features are incorrectly predicted to become unrecoverable. For example, Yowlumne (Newman 1944) has four contrasting vowel qualities underlyingly: /i a o u/. These vowels can be completely distinguished from one another on the basis of two features, [high] and [round], which features (or their equivalents) must be visible in the phonology in order to account for height-dependent progressive rounding harmony and long vowel lowering. However, if these are the *only* features specified on these vowels, then we incorrectly predict that a lowered /ii/ will become identical to /aa/, when in fact it surfaces as a distinct vowel [ee] that is not present in the underlying inventory. Hall (2007) concludes from this that some redundant feature (specifically, [low] on /a/) must be specified 'prophylactically'—it need not be visible to the phonological computation, but it must be present in the representation before lowering makes it impossible to know where it should be filled in. If the Contrastivist Hypothesis is re-implemented as suggested here, then phonologically invisible 'prophylactic' features are no longer a strange partial exception to the hypothesis, but rather a natural consequence of it. Predictable feature values are systematically invisible, not systematically absent: as in Radical Underspecification, they may be filled in before the derivation is complete, but unlike in Radical Underspecification, they do not thereby enrich the representations that are available to subsequent rules.

Marginal / Fuzzy / Quasi Contrasts: A Look at Intermediate Phonological Relationships

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The concept of the contrastive phoneme is in many ways central to phonological theory: it is a way of grouping together phonetically distinct sounds that seem to function in a similar way in the sound structure of a language. Fitting in with the theme of the conference, however, the notions of contrast and the phoneme are perhaps some of the largest "unsolved problems" in phonological theory—they were widely accepted as fundamental organizing principles during the era of structural analysis, soundly thrashed under *SPE* phonology, and yet, as Ladd (2006: 10) points out, "[f]or a theoretical construct that was discredited forty years ago, the classical phoneme is actually still doing pretty well." One of the reasons it seems to be doing well is that it does encapsulate useful phonological and psychological knowledge (cf. Hall 2007, Dresher 2008, 2011; Jaeger 1980, Kazanina et al. 2006, Boomershine et al. 2008). At the same time, there are a number of problems that arise when trying to define whether a particular sound is in fact contrastive or not in a given language: as Steriade (2007: 140) points out, "[T]he very existence of a clear cut between contrastive and non-contrastive categories" is contentious. Although there are a number of criteria that have been used to determine the relationship between any pair of sounds as either contrastive or allophonic, there is not an agreed-upon method for applying the criteria, there are no guidelines for resolving cases in which the criteria conflict, and there are in fact a large number of cases in which the criteria simply fail to classify relationships satisfactorily. This failure has led a number of phonologists to refer, in both descriptive and theoretical work, to relationships that stand somewhere between contrast and allophony, using terms such as "marginal contrast," "fuzzy contrast," "quasi-phoneme," and the like.

In this paper, I will present a typology of such intermediate phonological relationships as a guide for where future research may best be directed. Although there are many different sources of intermediacy, they can broadly be classified under the following headings. Each type will be addressed in turn, accompanied by a selection of examples from the phonological literature, illustrating that the problems are widespread across the world's languages.

- Problems with the concept of "predictability of distribution"
- Foreign, specialized, or otherwise distinct strata of languages
- Issues of variability and gradience
- Issues of frequency
- Issues of phonetic similarity

Although this is the first paper to lay out an extensive typology of intermediate phonological relationships, some problems with the distinction between contrast and allophony have been noted previously, and I will thus also provide an overview of the kinds of approaches that have been taken in the literature to resolve each of the above problems. I will not propose a particular unique solution to this problem, however, in part because a single solution may not in fact be possible (or desirable; see Scobbie [1993: 52]). The approaches I will discuss include:

- Different strata or subsystems of the grammar
- Functional approaches (e.g., functional load)
- Enhanced theoretical machinery and representations
- The incorporation of gradience into phonological models

In sum, this paper is intended to shed light on the unsolved problem of how phonological relationships are defined and lay out some of the potential pathways to its resolution.

The distribution of *h* in Welsh and English
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The segment [h] in English exhibits a remarkable and well-known distribution: it can only occur word-initially or before a stressed syllable (Hammond, 1999). There is a very similar distribution in Welsh. Both are shown in the chart below. The first column below gives the number of syllables in each word. The second column indicates which syllable the [h] appears in. The third and fourth columns give examples of [h] before a stressless syllable and the fourth and fifth columns give examples before a stressed syllable. Notice how [h] cannot occur medially unless it is followed by a stressed vowel. In English, this has been handled variously in terms of foot structure (Kiparsky, 1979) or syllable structure (Kahn, 1980; Davis, 1999).

#	pos.	stressless		stressed	
		English	Welsh	English	Welsh
1	1	—	—	health [hɛ́lθ]	haf [ha] ‘summer’
2	1	harass [hərǽs]	hyhi [həhí] ‘she’	hopeless [hópləs]	hanes [hánɛs] ‘history’
	2	—	—	cohere [kòhír]	gwahan [gwahán] ‘separate’
3	1	horrific [hərífɪk]	hanesu [hanɛ́si] ‘narrate’	hyacinth [háyəsɪnθ]	—
	2	—	—	behemoth [bəhíməθ]	mehefin [mɛhɛ́vin] ‘June’
	3	—	—	comprehend [kàmprìhɛ́nd]	didraha [didrahá] ‘not haughty’

Welsh and English have coexisted side by side for hundreds of years. Thus one might suppose that this similarity in the distribution of [h] reflects a similarity in the phonological organization of the two languages. The reality is actually somewhat more complex. In this paper, we show that though the two systems exhibit superficial similarities, the underlying phonologies are quite different in critical aspects. Specifically, in English, [h] is an expression of spread glottis. Its distribution is essentially parallel to that of aspiration: it is assigned to the beginning of syllables. In Welsh, however, [h] reflects voicelessness, *not* spread glottis. It also gets assigned to the beginning of syllables, but its different featural content results in subtle differences in distribution.

Evidence for this different treatment comes from distributional regularities in the Welsh consonant system and patterns of alliteration in Welsh poetry.

For example, one distributional difference is that [h] in Welsh can occur with a preceding nasal, e.g. *cymhleth* [kəmhlɛ́θ] ‘complex’, *cynhesu* [kənhɛ́si] ‘to warm’, *cynghanedd* [kəŋhánɛð] ‘harmony’, subject to the same stress conditions as above. In addition, the distribution of *rh* [r̥] in Welsh is parallel to [h], e.g. *aros* [árɔs] ‘to wait’ vs. *arhosodd* [ar̥ɔ́sɔð] ‘he waited’. Welsh also exhibits stress-conditioned allomorphy of its definite article *y(r)* parallel, but not identical, to the stress-conditioned allomorphy of English *a(n)*, e.g. *y dyn* [ədíːn] ‘the man’ vs. *yr haf* [ər há] ‘the summer’. We show how these facts and others follow from the featural difference proposed.

Finally, traditional Welsh poetry exhibits a pattern of consonant matching (*cynghanedd*), which sheds considerable light on the phonology of [h]. The relevant facts are that under specific circumstances, consonants must match or alliterate. For purposes of alliteration, a voiced stop followed by an [h] can be matched with a voiceless stop. A line from Dafydd ap Gwilym exemplifies:

Dydd heb haul, | deddyw polart, A sunless day, a base coin came, (58.59)

(Here the sequence *b h* alliterates with *p*.)

We show how all these facts follow from the OT analysis we develop based on the featural difference proposed. Thus, while English and Welsh exhibit very parallel phonological restrictions on [h], the featural basis is quite different, with clear empirical consequences. This suggests a general model of phonological contact where superficial patterns can be approximated, leaving the deeper phonological organization relatively untouched.

Laryngeal realism revisited: voicelessness in Breton

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In this paper I offer an in-depth analysis of laryngeal phonology in the Breton dialect of Bothoa (Humphreys 1995) and argue that in this language voiceless obstruents are more marked than voiced ones, and bear the privative feature [voiceless], despite the fact that phonetically the contrast is one of prevoicing vs. short-lag VOT. Unlike similar proposals for Slovak and Polish by Blaho (2008) and Cyran (2011), the analysis does not rely (chiefly) on pre-sonorant voicing, the phonological status of which is not assured (e. g. Strycharczuk 2010; Strycharczuk & Simon forthcoming). I show that there is robust phonological evidence for the activity of [voiceless] rather than a [voice] feature. In addition, I argue that Bothoa Breton, *pace* Lombardi (1995) and Element Theory approaches, is best analysed as contrasting three laryngeal classes in the surface phonology: voiceless obstruents, specified as ⟨Lar,[voiceless]⟩, voiced obstruents, specified with a bare Lar node, and laryngeally unspecified segments (sonorants and delaryngealized obstruents); this is essentially a feature-geometrical expression of the insight that Breton obstruents are voiced by default (Carlyle 1988; Krämer 2000; Hall 2009), cf. Rice (2003).

At the word level, there is evidence from assimilation and floating [voiceless] (1–2).

(1) a. [ɛsˈki*b*iən] ‘bishops’ (2) a. [ˈkaːzəz̥] ‘cat’
b. [ɛsˈkɔ*pt*i] ‘bishopric’ b. [ˈka*s*ad̥] ‘be on heat (of cats)’

In fact, all obstruent sequences at the word level are voiceless, which I interpret as a requirement to license any instance of a doubly linked Laryngeal node by a [voiceless] feature.

(3) a. [ãnˈwɛːzo] ‘offend’ b. [ˈtom*d*ər] ‘warmth’
c. [ãnˈwɛ*st*ər] ‘humiliation’ d. *[ãnwɛzdər]

Postlexically, laryngeal features do not spread leftwards. Word-final obstruents agree with following segments in *phonetic* voicing: there is “final devoicing” before a pause, “pre-sonorant voicing” where appropriate, and, crucially, “voicing assimilation” rather than devoicing before obstruents.

(4) a. [ˈkɔg̊] ‘rooster’ b. [ˌkɔ*g iz*ˈmaj] ‘Yves-Marie’s rooster’
c. [ˌlɒz*d*(˺) ˈ*b*ɛːr] ‘a short tail’

I interpret this as reflecting surface underspecification for laryngeal features (e. g. Colina 2009). Evidence for postlexical activity of [voiceless] comes from floating features and from a consonant mutation involving obstruent devoicing, which I analyse as coalescence with [h].

Finally, I propose an analysis of [voiceless] spreading across word boundaries. I argue that [voiceless], but not the Laryngeal node, may straddle such a boundary. This suggestion allows for a unified account of irregular devoicing in sandhi (5) (cf. Krämer 2000; Hall 2009) and the failure of morphosyntactically driven voicing following obstruents but not sonorants (6).

(5) a. [*d*en] ‘to me’ b. [o ˈvwɛr*p t*en] ‘an aunt of mine’ *[b#d]
(6) a. [*k*oːz̥] ‘old’ b. [o ˌgaːdə*r* ˈ*g*oːz] ‘an old chair’
c. [on ˌiːli*s* ˈ*k*oːz] ‘an old church’ *[z#g]

I suggest that this is explained if the voicing in (6) is caused by a floating Laryngeal node, which docks to the right in (6b) but to the left in (6c), creating a domain for the leftward spreading of [voiceless] from the initial segment of (6a). The facts in (5) are parallel if we assume (5a) contains the floating node lexically. This type of spreading is unavailable to other initial voiced obstruents because a Laryngeal node alone cannot straddle the word boundary.

Thus, a comprehensive analysis of Breton uncovers robust phonological evidence for the existence of languages which use prevoicing phonetically but reverse the markedness pattern expected for such systems phonologically (cf. Honeybone 2005; Iverson & Salmons 2011). This mismatch highlights the primacy of phonological patterning over phonetic implementation, and further supports the importance of a nuanced approach to phonological representation.

Towards a Germanic accent typology:
Similar diachronic developments in Scandinavian and Franconian

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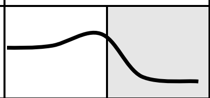
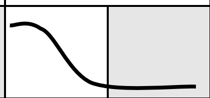
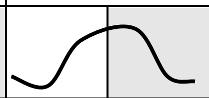
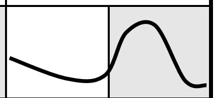
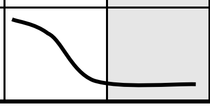
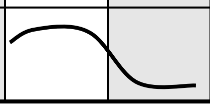
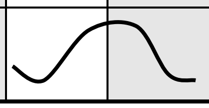
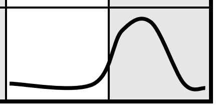
The issue. The reconstruction of developmental similarities between Scandinavian and Franconian tone accent systems (spoken in parts of Germany, the Netherlands, and Belgium) is a long-standing issue in historical phonology (see e.g. Schmidt 2002: 206), as are the diachronic relations between different dialect groups within the areas. While the substantially different lexical distributions in Scandinavian and Franconian indicate that the accent genesis occurred independently, we argue that the systems still have many aspects in common: a) they had similar original pitch contours for the two accents, and b) dialects of both systems have later undergone the same horizontal and/or vertical modifications of the contours, leading to the sometimes substantially diverse modern dialect groups in the areas.

Developments in Franconian. We exemplify our model by proposing a solution to a key issue in the diachrony of the Franconian accent opposition (as pointed out in Schmidt 2002, 2006, Kortlandt 2007): the reversal of declaration contours in so-called Rule B dialects (Bach 1921 for Arzbach). In non-final focus position, Accent 1 in Rule B is realized with a late fall (early in Rule A), and Accent 2 with an early fall (late in Rule A). In interrogation, however, the contours are similar in both areas (early rise for Accent 1, late rise for Accent 2, as shown in Köhnlein 2011). The contours for phrase-medial position are given in (1), from the focused accent syllable onwards; post-focus is marked grey:

	Declaration		**Interrogation**	
	Class 1	Class 2	Class 1	Class 2
Rule B (Arzbach, Köhnlein 2011)				
Rule A (Cologne, Peters 2006)				

The reversal is attributed to independent developments from a common original accent system with rising-falling contours (L*HL) from the focus syllable onwards, for both declaration and interrogation; relic dialects can still be found at the western fringes of the tone accent area (e.g. Hasselt, Peters 2008). When the majority of dialects developed focus syllables with a high peak in declaration, (L)H*L, (later) Rule A and Rule B followed diverse adaptation strategies (essentially a leftwards shift of the original contour in A, accent-initial pitch raising in B), leaving traces in intermediate dialects. This resulted in a reversal in declaration while the interrogative contours remained unchanged in the two areas, and are thus not reversed.

Similarities in Scandinavian. Typological evidence in favor of the suggested adjustment processes may be found in Scandinavian accent systems: Riad (1998, 2000) demonstrates that the tonal differences between some dialect areas can be understood as a diachronic leftwards shift of the pitch contours, which ultimately led to the Danish stød. This development is virtually identical to the one resulting in the modern Rule A declaratives. Yet while Riad assumes two-peaked Accent-2 realizations to be archaic, we argue that the modern dialects can be derived from a one-peaked original system: here, the two accents were realized with rising-falling contours, equivalent to what we propose for Franconian. Systems with two-peaked Accent 2 can be understood as an innovation characterized by initial pitch raising in the accent syllables, which closely resembles the first step in the development towards Rule B. Some systems may have become even closer to Rule B: e.g., acoustic data from Närpes seem to suggest that the overall pitch contours of the dialect show a reversal similar to that in Rule B declaratives, the “grave peak occurring earlier in the word than the acute peak” (Svärd 2001: 163).

Quantity, weight and stød contrasts in Danish

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The constraints governing the presence and absence of Danish stød are extremely intricate and have received considerable attention from phonologists in recent years (Basbøll 2005, Grønnum & Basbøll 2001 amongst others). On the one hand, without exception, stød requires minimally two moras to manifest itself. On the other, even if words appear to have the requisite number of moras, stød opaquely evades some forms. Note that Danish no longer have quantity contrast in consonants and double letters are remnants of old geminates.

	Singular	Indef. Plural	Definite Singular	Definite Plural	UR
a)	penˀ [pʰɛnˀ]	penne ["pʰɛnə]	pennˀen ["pʰɛnˀn̩]	pennene ["pʰɛnn̩nə]	μμ
b)	ven [vɛn]	venner ["vɛnɐ]	vennˀen ["vɛnˀn̩]	vennerne ["vɛnɐnə]	μ
c)	kul [kʰɔl]	kul ["kʰɔl]	kullˀet ["kʰɔlˀə]	kullˀene ["kʰɔlˀn̩nə]	μ ʔ
d)	balˀ [b̥alˀ]	ballˀer ["b̥alˀɐ]	ballˀet ["b̥alˀə]	ballˀerne ["b̥alˀɐnə]	μμ ʔ

The above set illustrates the pivotal data. Note the following points. First, the presence of stød in the indefinite singular does not predict its presence in the other forms. Second, similar plural endings do not correlate with stød. Third, definite singular forms always have stød.

To account for the phonological discrepancies, Basbøll's analysis (2005) assumes a three-way contrast in underlying stød on lexemes ([+stød], [-stød], no-stød) and the following:

i. endings are categorised as either 'productive' or 'unproductive'
ii. a general 'no-stød principle' blocking stød from appearing on the penultimate syllable of a 'minimal word'; MinWord = monomorphemic stem + 'unproductive ending' (UPE).

Under these conditions, the difference in the indefinite singular is due to lexical extrametricality: *ven, kul* have final extrametrical consonants, while *pen, bal* do not. This does not however, explain the stød behaviour in the other forms. The definite singular is <u>not</u> an UPE since it always allows stød. However, the indefinite plural *-er* is an UPE for *venner* but allows stød in *ball/er* and is treated as an 'exception'. The definite plurals of (c) and (d) are also 'exceptionally' different from (a) and (b).

It is the 'exceptions' that interest us here. Our claim is that all alternations can be accounted for if we assume that (i) stems and endings may contrast in their lexical representation of stød and underlying phonological weight; (ii) surface constraints of bimoraicity and final consonant extrametricality govern the presence or absence of stød. The last column depicts our analysis revealing a 4-way underlying contrast for monosyllabic stems.

All monosyllables have stød in isolation if they can, i.e. if they are bimoraic. Thus (a) & (d) differ from (b) & (c) in their weight. The remaining forms either have stød because the stem or ending is lexically specified for stød, i.e. /*kulˀ*/ /*balˀ*/, definite singular endings /*ˀet*/, /*ˀen*/. Lexically specified and bimoraic /*balˀμ*/ has stød in all forms, while *kul* is underlyingly monomoraic because of final consonant extrametricality and thus only gets stød when not in word-final position. Note that all forms exceptionlessly have stød in the definite singular because of lexical specification of the endings and word final consonant extrametricallity no longer effects the weight of the stems.

Our analysis differs from Basbøll in that it only requires a privative lexical contrast instead of a 3-way. Morphemes either are lexically specified for stød or not. Furthermore, we choose to represent the difference in underlying weight with a catelectic mora (Kiparsky, 1991) instead of lexically specified extrametrical consonants because of CV stems like *ja* vs *træ* that only differ when the stem stands alone: *ja*, *jaˀen*, *jaˀer*, *jaˀerne* vs *træˀ*, *træˀet*, *træˀer*, *træˀerne*. Here we assume both stems are lexically specified for stød and the difference is attributed to their weight – monomoraic *ja* vs bimoraic *træ*. In hiatus situations the vowel of *ja* lengthens.

Transient Phonology, CON and Child Phonological Processes

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A problem in phonology that remains unexplained in spite of considerable attention is the phenomenon of child-specific phonological patterns. These include segmental neutralization specific to prosodically strong positions (see 1) and consonant harmony for major place of articulation.

(1) Positional velar fronting (PVF; data from Inkelas & Rose 2008: 710-711)

a. Fronting of velars in prosodically strong positions

cup	[ˈtʰʌp]	1;09.23
again	[əˈdɪn]	1;10.25

b. Absence of velar fronting in prosodically weak positions

bagel	[ˈbejgu]	1;09.23
back	[ˈbæk]	1;10.02

One school of thought (e.g. Hale & Reiss, 1998, 2008) holds that child-specific patterns reflect only performance limitations of young children and are unrelated to their grammatical competence. However, this misses the fact that patterns like velar fronting have the character of phonological processes—they are systematic and sensitive to phonological structures, including syllables and feet. An alternative account holds that child-specific phenomena are driven by constraints that are part of a universal inventory and remain present in adult grammars (e.g. Dinnsen et al., 2011). However, if we freely posit constraints to capture child-specific patterns, we cannot account for the absence of these patterns in adult typology. For example, if the positional velar fronting shown in (1) is driven by a universal constraint *#K ('Avoid initial velars'), we should find adult languages that selectively ban initial velars. In fact, such grammars are unattested.

We contend that child-specific patterns are most successfully explained through a TRANSIENT PHONOLOGY approach. This approach assumes that child and adult phonologies employ the same types of constraints, but that the precise inventory may differ across child and adult grammars. Previous literature has argued that children construct constraints in response to phonetic pressures or distributional properties of the input (e.g. Becker & Tessier, 2010; Hayes, 1999; Levelt & van Oostendorp, 2007; Pater, 1997). We argue that in a model of phonology that permits functional pressures such as ease of articulation to shape the constraint inventory, differences between child and adult constraint inventories are logically necessary. We defend this claim with examples illustrating that due to anatomical and speech-motor limitations of the child speaker, 'ease of articulation' has a different definition for a child versus an adult. In the course of physiological maturation, the pressures that gave rise to child-specific constraints will cease to apply. The transient phonology approach holds that constraint demotion is insufficient for the suppression of child-specific patterns: if child-specific constraints remain in CON, factorial typology predicts that their influence should be detectable somewhere in adult systems. We claim that the grammar must include an update mechanism that permits adjustments to the constraint inventory in response to representational changes or relaxing phonetic pressures. By positing child-specific constraints but limiting them to be both functionally driven and temporary, the transient phonology approach can explain both the existence of systematic child-specific patterns in early stages of development, and their absence from adult phonological typology.

Relating application frequency to morphological structure: the case of Tommo So vowel harmony

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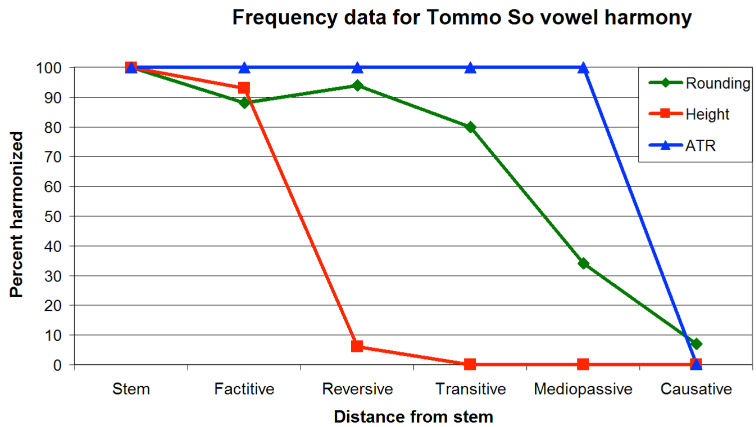
Phonological processes have been observed (Kiparsky 1994) to apply gradiently according to morphological structure: frequent application within stems, less frequent in domains formed by tightly-bound ("Level 1") affixes, and still less frequent with loosely-bound ("Level 2") affixes. Kiparsky proposed a theory in which the decline in application frequency is predicted to be *exponential*, following a descending geometric series as one proceeds outward from the stem. We describe a novel and more intricate example of this type, involving six degrees of morphological cohesion, and argue that it supports a rather different account of morphological distance effects.

Tommo So, a Dogon language spoken in Mali, has three independent vowel harmony processes, summarized in rule notation below (vowel inventory = [i e ɛ a ɔ o u]).

Height Harmony	**Rounding Harmony**	**ATR Harmony**
$\begin{bmatrix} \text{V} \\ -\text{high} \end{bmatrix} \rightarrow [\alpha\text{low}] \,/\, \#\, C_0 \begin{bmatrix} \text{V} \\ \alpha\text{low} \end{bmatrix} X \_\_$	$\text{V} \rightarrow [\alpha\text{round}] \,/\, \#\, C_0 \begin{bmatrix} \text{V} \\ \alpha\text{round} \end{bmatrix} X \_\_$	$\begin{bmatrix} \text{V} \\ -\text{high} \\ -\text{low} \end{bmatrix} \rightarrow [\alpha\text{ATR}] \,/\, \begin{bmatrix} \text{V} \\ -\text{high} \\ -\text{low} \\ \alpha\text{ATR} \end{bmatrix} X \_\_$
"Nonhigh vowels take on the same value of [low] as the word-initial syllable."	"Vowels take on the same value of [round] as the word-initial syllable."	"Mid vowels take on the same value of [ATR] as a mid vowel earlier in the word."
e.g. /dàgá-ndɛ́/ → [dàgá-ndá] 'fix' (-ndɛ́: factitive suffix)	e.g. /dɔ̀ɔ́-ndɛ́/ → [dɔ̀ɔ̀-ndɔ́] 'bring something close'	e.g. /kíbé-ndɛ́/ → [kíbé-ndé] 'make complete'

Harmony is feature-changing and optional; when it fails to apply, the underlying value of a suffix surfaces. The optionality follows a gradient pattern, with declining frequency of application going outward from the stem (frequency counts from the first author's field data):



Our computations indicate that these data would be fit very poorly with declining exponential functions. A much better fit can be obtained with **sigmoid** functions (the curve for ATR is assumed to be right-truncated; more data may show a less severe cut-off). Under the constraint-based framework of maxent grammars (Goldwater and Johnson 2003), such sigmoids are easily derived. We posit three AGREE constraints (one for each harmony process) and three IDENT constraints (one for each harmonizing feature). The AGREE constraints are level-sensitive; the constraint weight employed is the product of a constant (reflecting the overall strength of harmony) and a value ranging from 6 to 1 that expresses the inverse of the morphological distance of trigger and target. As we will demonstrate, such a grammar outputs sigmoid probability distributions; with suitable constraint weights, these closely mimic the observed harmony frequencies. Lastly, we return to the original data that supported Kiparsky's model and show that they can be fit just as closely with a sigmoid model as with an exponential one.

Is phonological learning different?

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The gist: Does structural complexity affect phonological learning the same way it affects the learning of analogous non-linguistic patterns? We report a phonological-learning experiment in which pattern difficulty differed from the order classically found with non-linguistic patterns, and discuss possible reasons and implications for natural-language phonology.

(1) Featural complexity: When a phonological pattern partitions a class of segments ($\boxed{\text{boxed}}$ vs. *starred in Figures 1 and 2), the formal structure of the pattern affects its typological frequency and its learnability in artificial-phonology experiments.

Figure 1. Natural-language inventories (after Clements 2003).

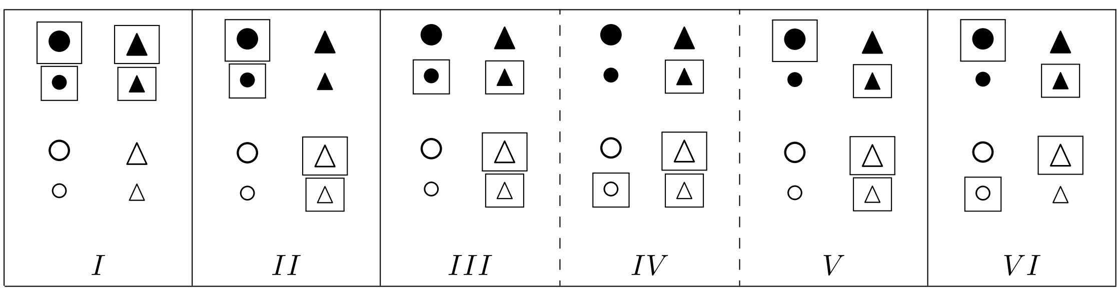
Favored (I)				Disfavored (II)	
$\boxed{\text{p}}$	$\boxed{\text{t}}$	$\boxed{\text{p}}$	$\boxed{\text{t}}$	$\boxed{\text{p}}$	*t
*b	*d	$\boxed{\text{b}}$	$\boxed{\text{d}}$	$\boxed{\text{b}}$	*d
$\boxed{\text{f}}$	$\boxed{\text{s}}$	*f	*s	*f	$\boxed{\text{s}}$
*v	*z	*v	*z	*v	$\boxed{\text{z}}$

Figure 2. Learning experiment, 7-month-old infants (Cristiá and Seidl, 2008).

Easier (I)		Harder (II)	
$\boxed{\text{m}}$	$\boxed{\text{b}}$	$\boxed{\text{m}}$	*b
$\boxed{\text{n}}$	$\boxed{\text{k}}$	$\boxed{\text{n}}$	*k
	*f		$\boxed{\text{f}}$
	*z		$\boxed{\text{z}}$

A hierarchy of complexity and learning difficulty has been established for *non*-linguistic patterns defined on one to three features (Figure 3, after Shepard et al. 1961): Learnability decreases in the order $I > II > \{III \approx IV \approx V\} > VI$. Phonological learning studies like those in Figure 2 have replicated the $I > II > VI$ order but have not addressed the other 3 patterns.

Figure 3.



(2) Experiment: We tested all 6 types using an "artificial-language" paradigm. Each participant ($N = 116$ to date) was assigned a type (I–VI). A phonotactic pattern of that type was chosen, with the 3 relevant features randomly selected from among the height, backness, voicing, and place (Cor vs. Dor) features of a set of 256 $CVCV$ tokens. Results matched the classic order of $I > II > VI$. But instead of the $II > \{III \approx IV \approx V\}$ order of non-linguistic patterns, we see $III > V$ ($p = 0.004$), $IV > II$ ($p = 0.058$, marginal), $IV > V$ ($p < 0.0001$, all by mixed-effects logistic regression). These results suggest **qualitative differences between pattern learning in phonology and elsewhere**.

(3) What makes phonology different? Detailed analysis indicates that learning is facilitated by the internal structure of phonological stimuli — prosodic and feature-tier organization, which lack analogues in most other domains. Phonological learning may therefore *appear* different because of the nature of phonological stimuli, rather than because of differences in the learning mechanism. Experiments in progress test this hypothesis by comparing isomorphic speech vs. nonspeech stimuli (designed to have analogues of prosodic and feature-tier organization), as well as supervised vs. unsupervised training.

What's in a cluster?

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Standard Government Phonology (Kaye, Lowenstamm & Vergnaud 1985, 1990) derived the phonotactics of coda-onset clusters (COs) from two principles: (**P1**) C2, the governor, is charmed (charm: inherent property of elements passed on to entire consonant) and C1, the governee, charmless, or (**P2**) C2 is at least as complex as C1 (complexity: number of elements). In English *winter* (negatively) charmed *t* governs charmless *n*, while in *helmet l* and *m* are uncharmed, but *m* is more complex than *l*.
Empirical problems. *Chapter* or *actor* require charmless *p*/*k* as governees. They differ from charmed *p*/*k* (*temper*, *tanker*) governing the nasal. No independent evidence for charmless *p*/*k* has been given and it is unclear why English lacks charmless *t* (why **tp*/**tk* are out). Also, the lack of **chabder*/**agdor* is unexplained.
Theoretical problems. Charm proved problematic and died a silent death in the 1990s, making (**P1**) useless. Moreover, the set of elements has been shrinking, making complexity and (**P2**) problematic. COs became a mystery.
Proposal. A successful theory of COs can be built around the element **A**, which acts as the glue keeping the members of COs together: Ignoring nasal-obstruent clusters and *sC* for now, every CO contains **A**: either in C1 (*rC*, *lC*), traditionally "sonorant-obstruent", or in C2 (*pt*, *kt*), traditionally "obstruent-obstruent" – a fact about melody usually unmentioned in the GP literature. I formalise this as follows:

(**1**) C1 of a CO needs to be A-licensed.
(**2**) C1 is A-licensed iff (**2.1**) it contains **A** in non-head position
or (**2.2**) is A-governed.
(**3**) A-governing: C2 A-governs C1 iff C2 contains **A** in head position.

In English *helmet* C1 is *l*, which contains **A** (as a non-head), thus C1 is A-licensed, (**1/2.1**) are met. Note the prediction made: there should be no restrictions on C2, which is (nearly) 100% correct: *l* is followed by any consonant possible in that position of the foot (except *r*). In *actor*, C1 does not contain **A**, hence, by (**2.2**), C1 needs to be A-governed by C2, i.e. C2 needs to contain **A** (as head). Again, this fits the facts: *kt* is possible, but **kp* is not, as *p* does not contain **A** and hence cannot A-license C1. (The asymmetry head/non-head in **2.1/3** exludes *t*, *th* as C1 and *r*, *l* as C2 in COs.) One further assumption derives *pt*/**bd* etc. (unaccounted before):

(**4**) C2 can either be fortis or A-license (but not both).

In *chapter* C2 (*t*) needs to A-license C1, thus cannot be fortis, i.e. the *t* is really lenis here, independently argued for in the analysis of English length (Pöchtrager 2006). That C1 cannot vary between fortis/lenis seems to be universally true of COs.
Further issues. (**F1**) **A** creating "bigger structures" (like COs) can be seen independently of clusters. English has superheavy rhymes (*feast*, *paint*...) where the long vowel depends on both members of the cluster containing **A**: one **A** allows building a cluster, two **A**'s allow for even bigger structures (long V + CC). (**F2**) **L** (nasality) is the other kind of glue in clusters, making **A** dispensible, e.g. *mp*. An affinity of **A** and **L** has been shown before (Ploch 1996), but **L**'s cluster building properties differ slightly from **A**. (**F3**) Typological variation is formally expressible: Italian disallows A-government by C2, hence no obstruent-obstruent clusters (*dottore*, **doctore*). Prince languages only allow **L** as glue, hence only nasal-obstruent clusters. (**F4**) GP assumes the mirror image of a branching onset (BO) to be a good CO (not the reverse). Indeed, **A** also plays a role in BOs: C2 usually contains (non-head) **A** (*br*, *dr*, *gl*, *pl*...). (**F5**) Glides have additional peculiar properties in COs, which follow from their internal structure. (**F6**) Kaye & Pöchtrager (2009) propose that **A** be replaced by structure. My proposal here can be translated in those terms and becomes even stronger: if **A** is structural, it can provide the room for other material to be plugged in.

Consonant cluster puzzles: evidence from Polish-English bilingual acquisition

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One of the most persistent problems in phonological theory has been the structure of word initial s+obstruent (sT) clusters and their relationship with other obstruent-obstruent (TT) clusters. In sonority-based models, the two cluster types would be classified together as clusters of non-rising sonority and have consequently both been analysed as involving word initial extrasyllabicity (e.g. Booij & Rubach 1990, Halle & Vergnaud 1980, Steriade 1982). The difference in their distribution in the world's languages, on the other hand, has motivated approaches that treat them as essentially different, such as CVCV theory, which accounts for the presence versus absence of TT clusters using the mechanism of word initial CV (Scheer 2004). In the latter approach, as in most phonological models, sT clusters are not given a (satisfactory) analysis, as witnessed by the fact that they have been labelled as 'magic' (Kaye 1992), a reminder that our knowledge of the structure of word initial sT remains limited.

An invaluable source of evidence in phonological analysis is the field of first language acquisition, which can provide a testing ground for competing phonological models, as well as new data that need to be considered by any theory of phonology. Based on developmental data showing later acquisition of word initial TT, it has recently been argued that the complexity of these clusters constitutes a superset of the complexity of initial sT (Sanoudaki 2010).

In this study, we seek to shed more light on whether initial sT and TT clusters share a common structure or not, using evidence from bilingual acquisition. An examination of the development of children acquiring two languages, one allowing word initial sT and TT clusters, while the other allowing sT only, could provide us with invaluable data in the form of potential cross-language interactions in the production of various cluster types. Following Paradis and Genesee's (1998) seminal paper on bilingual acquisition, three possible types of interaction between the two languages in a bilingual child are possible: transfer of a property of one language into the other, acceleration in the emergence of a property, or delay. As these have been extensively studied in syntactic acquisition only, there exists no sophisticated theory of phonological bilingual interaction that would allow us to make informed predictions in this case, making our study innovative and exploratory.

We tested the production of sT clusters and obstruent-sonorant clusters word initially and medially in sixteen Polish-English bilingual children and sixteen English monolingual children. Experimental results indicate interaction between Polish and English in the form of acceleration: bilingual children performed better at word initial sT than their monolingual counterparts, while their performance was comparable in all other conditions.

Following Paradis and Genesee (1998), the appearance of acceleration is linked to the existence of a more advanced level of complexity in one of the two languages. We argue that in this case, this means that the complexity of word initial TT clusters, present in Polish only, is either equal to or a superset of the complexity of word initial sT clusters. These results are therefore incompatible with any analysis according to which the two cluster types have different, independent structures. In contrast, they are compatible with any (extrasyllabic) analysis that assigns identical structures to sT and TT, as well as with any analysis that assigns a subset/superset relationship to the complexity of the two cluster types. When viewed in conjunction with familiar developmental data, however, the present results are only compatible with the latter approach, while the absence of acceleration in other cluster types implies that such relationship does not hold between word initial TT and word medial sT.

This study makes a step towards the solution of the s-cluster mystery, while opening up a new source of evidence for theories of phonological structure, that of bilingual acquisition.

Frequency Effects in the Production of Long Vowels in Turkish

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This study aims to understand whether the linguistic experience of Turkish speakers has an effect on the native speakers' knowledge of the phonology of his/her language. A production experiment with nonce words is conducted. In this experiment we have considered two types of frequency effects to explore linguistic experience; prototype effect and exemplar (phonological neighborhood) effect.

The representation of lexically specified vowel length (without a signal in orthography) is chosen due to its special status in Turkish. This type of length in Turkish is neither optional nor predictable and it gives rise to variation and confusion among speakers as illustrated in (1)[1].

(1) alfabe [alfabe]~[alfa:be] 'alphabet'
telif [telif]~[te:lif] 'copyright'

An analysis of frequent patterns will capture the dynamic nature of the variation and a production experiment will show us whether these patterns have psychological reality.

To find out the frequent patterns 1722 words with lexically specified vowel length have been sorted out from the official Turkish Language Dictionary (TDK, 1974) and analyzed in terms of i) the syllable number and structure of words, ii) the vowel of the syllable following the long vowel iii) the consonant preceding or following the long vowel. Results reveal that a prototypical word with long vowels in Turkish a) is bisyllabic or trisyllabic, b) has the long vowel /a/, /u/ or /i/, c) has the long vowel in a open syllable, d) has the long vowel in the penult, e) has the vowel sequences /a:/-/i/, /i:/-/a/ or /u:/-/i:/, f) has the long vowel situated between sonorants. We used this information in the production test.

Another frequency effect that we want to test is the phonological neighborhood effect. In the experiment we address following questions; i) Are the speakers more likely to produce long vowels when the nonce words share frequent patterns with the words with long vowels in the lexicon? ii) Are the speakers more likely to produce long vowels when the nonce words are very similar to the existing items (phonological neighbors)?

In order to answer these questions we have constructed 4 sets of nonce words; i) prototypical but not phonological neighbor (PRO), ii) phonological neighbor but not prototypical (EXE), iii) both prototypical and similar to existing words (BOTH) and iv) prototypically not-long and not similar to existing words with long vowels (NONE). We have made the participants to produce these 48 (12 words in each set) nonce words using a reading task.

The results obtained from 40 participants (mean age: 20.9) have shown that linguistic experience has an effect on the production of long vowels in Turkish (Table 1). The findings suggest that lexical neighborhood effect is more influential than the frequency of patterns effect in production of long vowels in Turkish.

Table. 1 Production rate of long vowels

Both	Pro	Exe	None
53 %	21 %	31 %	0 .80%

These results suggest that there is a significant correlation between production of long vowels in Turkish and the linguistic experience of the speakers. When both types of frequency effects i.e. frequency of patterns and phonological neighborhoodness are used creating nonce words, the versions with long vowels are favored. When they are used independently lexical neighborhood effect appears to be more powerful than the effect of frequency of patterns

[1] We have asked 40 people (G1-mean age: 20.5, G2-mean age: 79) to read out 35 words. and observed both diachronic and synchronic variation in some of these words.

Phonetically gradient allomorphy: the case of the Dutch past tense

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A number of recent studies have shown that aspects of what was previously thought to be categorical phonology can be gradient, probabilistic and non-deterministic, as well as influenced by extra-grammatical factors (e.g. Pierrehumbert 2001, Davidson 2006, Kuzla et al. 2007). This argues for a more complex view of the relationship between speakers' lexical knowledge and phonological representations, as well as of the phonology-phonetics interface, than is assumed in the modular feed-forward models of many standard phonological accounts. Our study of past tense formation in Dutch provides further evidence for this complexity, showing how both allomorph selection and the fine phonetic detail involved are partly influenced by extra-grammatical factors such as phonological neighbourhood density and lexical frequency.

In the standard account, the choice between the two allomorphs of the Dutch regular past tense morpheme, *-te* and *-de*, is based on the underlying fortis/lenis specification of the stem-final consonant of the verb it attaches to, as in (1).

(1)	verb stem		sg past tense			verb stem		sg past tense		
	dans	/dɑns/	*danste*	[dɑnstə]	"dance"	*bons*	/bɔnz/	*bonsde*	[bɔnzdə]	"bang"
	surf	/sʏrf/	*surfte*	[sʏrftə]	"surf"	*durf*	/dʏrv/	*durfde*	[dʏrvdə]	"dare"

However, Ernestus and Baayen (2001,2003,2004) report that Dutch speakers often select the "wrong" allomorph, leading to misspellings such as *bonste*,*surfde*. They further show that frequency and analogy are significant predictors of the occurrence of such misspellings, and argue that these forces partly drive allomorph selection, instead of it being solely and deterministically based on underlying specifications.

Our study examines the extent to which the incongruous allomorph selection is observed in speech (as opposed to spelling), and whether or not it bears on the phonetic detail of past tense formation. We elicited 864 past tense verb forms with fricative-final stems from 8 native speakers of Standard Dutch. We analysed the obstruent clusters in these past tense forms with respect to the potential parameters of the fortis/lenis contrast (vocal fold vibration, fricative duration, stop closure duration, burst duration and intensity, f_0 and f_1 of the following vowel). The measurements were then used to classify all past-tense forms produced by the participants as containing a *–te* or *–de* suffix, based on a by-speaker linear discriminant analysis. 27.2% cases of mismatch were found between the classification results and the prescriptive target suffix.

A linear mixed-effects regression model predicting the occurrence of mismatches showed significant main effects of token frequency and an index of analogical strength based on neighbourhood density. In addition, a series of models showed significant interactions between the prescriptive target and whether or not it agreed with the classification result. Fricative duration, closure duration, burst duration and f_0 all showed significantly greater differences between pronunciations classified as *–te* and *–de* within the prescriptively accurate cases, compared to when the realisations deviated from the prescriptive norm. In other words, the fricative+*te* and fricative+*de* clusters in verbs with a mismatched allomorph are more similar to each other with respect to these voicing cues, i.e. they show more category overlap, than those with a matching allomorph.

Based on these results we argue that the morphophonological rule as well as neighbourhood density and token frequency have an impact on allomorph selection as well as on the phonetic detail of past tense verb forms, as any conflicting information provided by these sources is reflected in more phonetically ambiguous realisations.

Diachronic Motivations: Duration and Syllable Structure in Latin Vowel Reduction

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Empirical studies have made significant progress in understanding the mechanics of vowel reduction through experimental work testing the influence in several languages of variables such as stress, duration, speech rate, position in the word, lexical frequency, and others (e.g. Fourakis 1991, van Bergem 1995, Flemming 2002; Padgett & Tabain 2005; Barnes 2006). This paper extrapolates from these findings to reconstruct the motivation behind the diachronic vowel reduction pattern seen in early archaic Latin (sixth to fifth centuries BC), ascertaining which influences were most relevant through a close examination of the evidence afforded by secure etymologies, contemporary inscriptions, and the familiar classical Latin end-forms. The paper argues that the most likely phonetic reconstruction of archaic Latin, consistent with evidence from vowel reduction and syncope, requires us to reconstruct the typologically unusual pattern of phonetically longer vowels in closed syllables than in open ones, as in Turkish (Jannedy 1995; Kopkallı-Yavuz 2003) and Finnish (Lehtonen 1970), contrary to the pattern normally found (Maddieson 1985). The additional duration of vowels in closed syllables permitted speakers to attain the targets for non-high vowels in these settings.

Under the fixed initial stress of archaic Latin (to the fourth century BC; Meiser 1998), internal open-syllable vowels were totally neutralised, usually raising to /i/ (**per.fa.ki.oː* > *perficioː* ‘I complete’), whereas in closed syllables, /a/ was raised to /e/, but the others vowels remained distinct (**per.fak.tos* > *perfectus* ‘completed’). Miller (1973) explains closed-syllable resistance by positing internal secondary stress on closed syllables. However, evidence from vowel reduction and contemporaneous syncope suggest internal syllables never bore stress in early archaic times, even if heavy. For example, the unstressed, weak-position, heavy-syllable vowel in initial light-heavy sequences reduced in an identical fashion to those in all other heavy syllables (e.g. **(fé.nes).tra* ‘window’), suggesting that all internal heavy syllables were identically unstressed. Other explanations are also considered and rejected, such as that proposed for English by Burzio (2007), since Latin, unlike English, reduction in closed syllables was not sensitive to segmental context.

If the typologically unusual explanation proposed is correct, Barnes’ (2006) duration-based analysis of Uyghur reduction, again reconstructing longer vowels in closed syllables, could equally well be applied to Latin, an attractive proposition given the close similarity between the two patterns. Finally, this durational pattern is manifested in Latin not only in vowel reduction, but also in the quantitative changes seen in ‘superheavy’ degemination (V:CCV > V:CV; contrast Maddieson’s (1985) ‘closed-syllable vowel shortening’ where open-syllable vowels are longer), and ‘classical’, ‘inverse’ (Hayes 1989) and CV:CV > CVC compensatory lengthening/shortening, allowing us to construct phonologisation accounts for such processes along the lines of Kavitskaya (2002).

The special status of Blackfoot /s/

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It has long been recognized that /s/ poses a challenge for syllable theory (see Goad 2011 for a review). /s/ fails to respect phonotactic constraints and displays phonological behaviour that is unusual for obstruents. Different proposals have been forwarded to formally express the exceptionality of /s/: it has been analysed as an appendix (Goldsmith 1990, van der Hulst 1984), as a coda (Kaye 1992) or as part of a complex segment (van de Weijer 1996). None of these proposals contest the position that /s/ is an obstruent. What makes /s/ different from other obstruents, however, is that it has robust internal cues for place and manner which ensures its perceptibility in non-optimal contexts; this, in part, accounts for its unusual distribution (Wright 2004).

This paper examines /s/ in Blackfoot, as Algonquin language, where /s/ shows a range of behaviour that goes well beyond the appendix-like behaviour it shows in other languages. We propose that this is because Blackfoot /s/ patterns as a *vocoid*: it can be underlyingly non-moraic (parallel to /j/), monomoraic (parallel to /i/) or bimoraic (parallel to /iː/).

We begin by pointing out that when /s/ is set aside, Blackfoot has a relatively simple syllable structure: (i) branching onsets are banned; (ii) rhymes are maximally bipositional: VV or VC; (iii) word-medial codas cannot license their own place: they are limited to the first half of geminates (1a) and placeless consonants: [ʔ] (1b) and [x] (1c); (iv) placeless consonants are confined to coda position; and (v) regarding syllable contact, [x] must be followed by less sonorous stops (1c) while [ʔ], which lacks supralaryngeal constriction, can be followed by any contoid (1b).

(1) a. kakkóówa ‘pigeon’
b. asókaʔsimi ‘jacket’
c. nitáóojixpinnana ‘We are eating’

(2) a. istópiit ‘Sit there!’
pájoist͡si ‘scars’
b. kissísi ‘your little sister’ (Franz 2009)

When [s] is an ordinary coda consonant, its behaviour is consistent with the observation that codas cannot license place and with constraints on syllable contact: coronal [s] can only be followed by [t, t͡s]; see (2a) above. Coda [s] can also form the first half of a geminate (2b).

Consider though the data on ‘unusual /s/’ in (3) and (4) (from Frantz & Russell 1995, Denzer-King 2009, Frantz 2009). None of these forms *appear* to be consistent with the syllable structure constraints mentioned above. Contrary to appearance, however, we show that the moraic representations for /s/ proposed (monomoraic, bimoraic), combined with the syllable structure constraints introduced above, lead to a straightforward analysis of these surprisingly complex patterns (cf. Elfner 2006 who chooses to expand on the syllabification options permitted to accommodate /s/, a proposal which is difficult to constrain to attested patterns).

Similar to other consonants, intervocalic geminate /s/ is underlyingly monomoraic. Unusual /s/ can also be monomoraic but it differs from intervocalic [ss] in that it projects its own syllable. This, however, does not have to be stipulated. Rather, the segmental context in which /s/ occurs determines its realization and syllabic status: it can be single [s] as a nucleus (3a.i-ii), long [ss] as onset-nucleus (3b.i-ii) or nucleus-onset (3c.i-ii), or triplet [sss] as onset-nucleus-onset when preceded by a coda (3d.ii). Further, there are data that require underlyingly bimoraic /s/, which occurs inter-consonantally as long nuclear [ss]; see (4i-ii). (Pre- and post-/s/ C in the headings in (3) and (4) can also be /s/, as evident from some examples. Glosses omitted for space reasons.)

	i.	ii.
(3) Monomoraic /s/:	V.Cs.CV	VC.Cs.CV
a. Nuc:	áa.ko.ks.ta.ki.wa	míʔ.ks.ka.pa.ji.nis.t͡si
b. Ons-Nuc:	í.ss.ka	o.t͡sí.ts.so.naoʔ.ss.ki.po.ka
c. Nuc-Ons:	a.nis.tá.ps.sí.wa	ki.ts.so.káʔ.ps.si
d. Ons-Nuc-Ons:		áàx.ss.sa.pi.wa
(4) Bimoraic /s/:	V.Css.CV	VC.Css.CV
a. Long Nuc:	i.tá.pss.ko.na.ki.wai.k͡si	ik.kss.píí.sa
b. Long Nuc-Ons:	s.tá.mss.sáa.ko.noo.sa	
c. Ons-Long Nuc:	ó.sss.ka	

In sum, our analysis straightforwardly predicts the range of options that Blackfoot displays. Time permitting, we will show how it extends to word-initial sC and ssC clusters as well.

The obstruent sonority paradox as a markedness interaction effect

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The sonority scale is a continuum from 'prototypical consonant/onset' (low sonority) to 'prototypical vowel/nucleus' (high sonority). The core sonority scale (Clements 1990) recognizes four levels, *obstruents<nasals<liquids<vocoids*. For some of these levels, there is cross-linguistic support for further subdivisions: vocoids are *high<mid<low* (Kenstowicz 1996), while liquids are *laterals<rhotics* (Zec 1995). These further divisions are often seen as universally available, even if not active in all languages.

The situation with obstruents, however, is much more problematic. It is generally held that voicing and continuancy affect obstruent sonority: *voiceless<voiced* and *plosives<fricatives* (Parker 2002). However, unlike vocoids and liquids, these obstruent subdivisions are not cross-linguistically consistent. **When both distinctions are made, it seems to be a language-particular choice as to whether voicing or continuancy is the primary distinction.**

(1) (a) Subdivide by voicing first, then by continuancy: (t < s) < (d < z)
    (b) Subdivide by continuancy first, then by voicing: (t < d) < (s < z)

Examples: *Voicing first* (1a)—Pirahã (Everett & Everett 1984), where stress is attracted to a syllable with a lower-sonority onset. Crucially, voiceless obstruents are chosen over voiced obstruents (plosives and fricatives). *Continuancy first* (1b)—Imdlawn Tashlhiyt Berber (Dell and Elmedlaoui 1985, 1988), where higher-sonority segments are preferentially chosen as syllable nuclei. Here, fricatives are chosen over plosives (voiced and voiceless).

If voicing and continuancy are seen as relevant to obstruent sonority, we are faced with a paradox: in some languages, voiceless fricatives are less sonorant than voiced plosives, while in other languages, the reverse is true. **This paper takes a different approach: Voicing and continuancy are not part of the sonority scale at all, but separate dimensions of obstruent markedness. In the weighted-constraint framework of Harmonic Grammar (Smolensky and Legendre 2006), gang effects resolve the obstruent-sonority paradox.**

Consider the constraints in (2), where only (2c) is based on the sonority scale.

(2) (a) *VoiObst — Assign a violation to each voiced obstruent in output forms.
    (b) *Fric — Assign a violation to each continunant obstruent in output forms.
    (c) *Onset/vocoid >> *Onset/liquid >> *Onset/nasal >> *Onset/obstruent

Obstruent peaks will violate these constraints as shown in (3).

(3)

[t]	[d]	[s]	[z]	
	*		*	*VoiObst
		*	*	*Fric
*	*	*	*	*Onset/Obstruent

No matter how these constraints are weighted, the voiceless plosive [t] is the most desirable, and the voiced fricative [z] is the least desirable. However, the relative weighting of the obstruent markedness constraints—unrelated to the sonority scale—will determine the relative preference between the voiced plosive [d] and the voiceless fricative [s].

This proposal is of theoretical interest for several reasons. First, it makes **typological predictions**: different classes of sonority patterns (low-preferring, as for syllable onsets, vs. high-preferring, as for syllable peaks) should show differences in how obstruents are subdivided. Second, as the gang effect that makes use of independently motivated obstruent markedness constraints to subdivide the obstruent sonority class is not available in standard Optimality Theory; **weighted constraints are crucial**. Third, if voicing and continuancy are no longer intrinsic to obstruent sonority, this has **implications for theories of lenition**.

LEARNING FROM MISTAKES: COMPUTATIONAL MODELLING OF SLIPS OF THE EAR

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Laboratory studies, historical linguistics and theoretical modelling have elucidated a number of phonetic trends of misperception. However, little work to date has investigated misperception in its most naturalistic form, namely slips of the ear (Bond, 1999), e.g. "End Rule Left" → "Andrew left", "Geez, really?" → "Disraeli". Our goal in this research develops a computational analysis followed by quantitative statistics based on a 3500+ pair corpus of slips of the ear. Investigation the targets and directionality of misperception in the "messy" realm of real conversation can provide a testbed for numerous theoretical and experimental constructs, as applied to speech perception (Miller and Nicely, 1955), word segmentation from phrases (Mattys et al., 2005) and cross-dialectal comprehension (Labov, 2010).

As the old adage goes, "Data is not the plural of anecdote", and thus to draw reasonable and reliable conclusions about whether naturalistic occurrences of this sort end up mirroring, paralleling, or diverging from independent evidence collected with laboratory methods, we have collected and compiled a corpus of 3,638 naturalistically occurring instances (the largest existing corpus to our knowledge), consisting of slips from English spontaneous conversation, mostly North American varieties phonetically transcribed using collectors' transcriptions and interlocutors' demographics.

Analysis of the errors in terms of consonant substitutions, deletions, or insertions was computationally extracted using alignment algorithms from computational biology (Kondrak, 2003), with subsequent application of parameter optimization techniques, the ultimate outcome of which was a two-dimensional confusion matrix of all substitutions (treating insertion or deletion as alignment with zero).

A frequency analysis of insertions and deletions (INDELS) of consonants yield the following trends (normalised rate using corpus token frequencies), in terms of a scale of confusability (and hence substitution), according to manner, voicing and place:

["≻" indicates "is confused with a higher rate than"]

(1) Manner Stop ≻ Liquid ≻ Fricative ≻ Nasal ≻ Glide
(2) Voicing Voiced Stop ≻ Voiceless Stop ≻ Voiceless Fricative ≻ Voiced Fricative
(3) Place Glottal ≻ Coronal ≻ Dorsal ≻ Labial

The normalised trends in Manner (1) and Voicing (2) largely provide a good fit with the commonly invoked sonority hierarchy (Clements 1990, Ohala 1994): least sonorous consonants have the fewest spectral cues and the least amount of energy in a sound (Wright, 2004). Viewing insertion or deletion as substitution by zero, the empty segment -- which has no energy -- is perceptually most similar to less sonorous sounds, which indeed have the highest INDELS rate. One divergence between the data in (1) and the literature consensus: liquids are more confusable than expected based on their sonority alone. The normalised place trend (3) matches largely with Jun's (2004) scale of least perceptibility, Coronal ≻ Labial ≻ Velar; and with Lombardi's (2002) place markedness constraint hierarchy, *{Labial, Dorsal} ≻ *Coronal ≻ *Pharyngeal, which implies that changes between less-marked segments and zero have a lower cost than between more-marked ones and zero. Finally, certain substitution-pairs suggest that phonotactic processes specific to the phonology of English phonological/phonetic processes play a role, namely l-vocalisation, θ-fronting, and t-d-neutralisation due to tapping ([d] ↔ [ɾ]).

Given that conversational misunderstandings seems massively influenced by top-down context effects, expectations about the interlocutor's common ground, etc., it is highly encouraging that the perceptual biases that have been identified in laboratory studies based on meaningless syllables find great resonance even when communicational effectiveness *is* at stake. Given the divergences from these scales identified above (e.g. the higher confusability of liquids and of voiced plosives), we outline how context-sensitive confusion matrices could refine these conclusions based on effects of phonetic implementation and positional and stress information.

Opaque Vowel Lengthening in Friulian: a Harmonic Serialist Solution

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Friulian presents a synchronic vowel length alternation. Vowel Lengthening (VL) applies in stressed vowels when followed by a word-final, underlying voiced obstruent that surfaces as voiceless due to final devoicing (/lov/ → [ló:f] 'wolf.masc'). Devoicing thus renders VL opaque. Elsewhere, vowels remain short ([ló.ve] 'wolf.fem'; /fat/ → [fát] 'made.masc').

Hualde (1990)'s interpretation of the data is to assume that only voiced segments are mora-bearing units in Friulian. When devoicing applies, the mora associated with the voiced obstruent is set afloat and then linked to the vowel. Some problems arise if this analysis is implemented using parallel Optimality Theory. First, there is no way to motivate VL given that both devoiced and voiceless segments are evaluated equally by markedness constraints banning specific segments to be linked to moras. Second, assuming that only voiced segments are mora-bearing units is only supported by VL and should be independently motivated.

This paper accounts for VL in Friulian using Harmonic Serialism (HS). The main goal is to provide new evidence in favor of the hypothesis that metrical foot building, as opposed to syllabification, is subject to the gradualness requirement on GEN (Elfner 2010, Pruitt 2010).

I follow Prieto (2000) and Repetti (1989) in interpreting VL as a strategy to satisfy the requirement that head foots are minimally bimoraic. However, as opposed to Baroni & Vanelli (2000), Hualde (1990) and Iosad (2011), I assume that both devoiced and voiceless segments in coda position are mora-bearing units. As a matter of illustration, consider the input /lov/. At step 1 of the derivation, top-ranked *VOICEDOBSTRUENT/CODA and PROSODICWORDHEAD (Elfner 2010), which demands prosodic words to be stressed, favors the candidate in which a subminimal metrical foot is built and the voiced obstruent is left unparsed. This outcome requires that *VOICEDOBSTRUENT/CODA and PROSODICWORDHEAD dominate FOOTBINARITYμ and PARSESEGMENT. It is crucial that the candidate with devoicing and metrical foot building, the transparent candidate, cannot be generated because it shows the application of two operations. At step 2, VL applies in order to satisfy FOOTBINARITYμ. A crucial competing candidate is the one that adjoins the voiced obstruent to the already existing syllable as a voiceless moraic coda. Notice that this candidate respects gradualness because syllabification can co-occur with devoicing. Although both the candidate with devoicing and the candidate with VL that keeps the voiced obstruent unparsed satisfy FOOTBINARITYμ, the latter is more harmonic than the former because *μ/C, which disfavors those coda consonants associated with their own mora, dominates PARSESEGMENT. At step 3, adjunction of the voiced obstruent as a voiceless consonant is the most harmonic operation given that PARSESEGMENT dominates IDENT(voice). VL is thus obtained. Now consider the input /fat/. At step 1, parsing the whole string of input segments and building a binary metrical foot is consistent with gradualness and satisfies *VOICEDOBSTRUENT/CODA, PROSODICWORDHEAD, FOOTBINARITYμ and top-ranked WEIGHTBYPOSITION, which requires coda consonants to project their own mora. The derivation converges at step 2 because the competing candidate with VL fatally violates DEPLINK, which dominates *μ/C. The ranking DEPLINK » *μ/C, however, does not block VL in /lov/. I propose to define DEPLINK in a way that it is only violated when a new autosegmental relation between two pre-existing elements in the input, here a root node and a mora, is present in the output but not in the input. In the case of VL before voiced obstruents, DEPLINK is not violated simply because there is no extra mora in the input, being the voiced obstruent temporarily unparsed.

All in all, the most salient advantage of this analysis is to derive VL not by stipulating the underlying moraicity of consonants, but by resorting to the independent need of satisfying the markedness constraints *VOICEDOBSTRUENT/CODA, PROSODICWORDHEAD and FOOTBINARITYμ, which are active everywhere in the language.

Chain-shifting Mutation as Compound Opacity: Vowel Raising in Mayak

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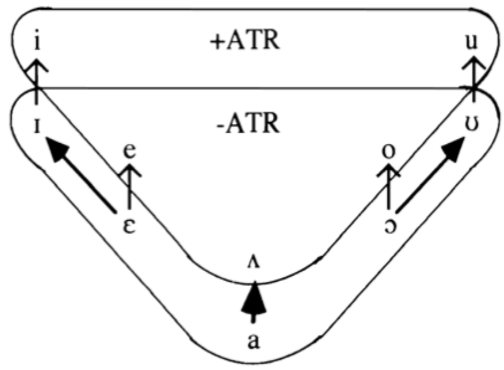
The Phenomenon: Andersen (1999) argues that Mayak (Western-Nilotic) has besides different patterns of [ATR]-harmony (cf. past *-u* in (1-a)/the thin arrows in (1-b)) a morphological vowel raising process (VR) triggered by specific affixes which shifts high/low [–ATR] vowels to [+ATR], but mid [–ATR] vowels to high (cf. Antipassive *-ɪr* (1-a)/the thick arrows in (1-b)).

(1) **Mayak: [ATR]-Harmony and Chain-Shifting Mutation** (Andersen, 1999:16)

a.			**Past**	**Antipassive**	
	[ɪ]	ʔɪt̪	ʔið-u	ʔit̪-ir	'shape'
	[ɛ]	ɗɛc	ɗɛj-u	ɗɪj-ɪr	'grind'
[–ATR]	[a]	ʔam	ʔam-u	ʔʌm-ɪr	'eat'
	[ɔ]	kɔc	koj-u	kʊj-ɪr	'take'
	[ʊ]	gʊt̪	guð-u	gut̪-ɪr	'untie'
	[i]	tiŋ	tiŋ-u	tiŋ-ir	'hear'
[+ATR]	[ʌ]	nʌk	nʌɣ-u	nʌk-ɪr	'beat'
	[u]	t̪uc	t̪uj-u	t̪uc-ir	'send'

b.



Theoretical Impact: If Andersen's claim is correct, Mayak vowel raising instantiates a striking case of chain-shifting and "quirky" (phonologically non-uniform) mutation, a phenomenon which – if existent – is a major piece of evidence for the stipulation of mutation-specific rules/constraints (Lieber 1992, Zoll 1996, Wolf 2005a,2005b) or the assumption of a basically unrestricted morphology component (Green 2005, Iosad 2006,2007,2008). Crucially, Mayak VR can also *not* be captured as affixation of floating sonority grid marks (Trommer 2010,2011) since it makes vowels *less*, not more sonorous. **Claim:** In this talk, I show that the Mayak data follow from the interaction of two different types of opacity: *First*, Mayak shows slightly different [+ATR]-spreading processes at different strata in the sense of Stratal OT (Bermúdez-Otero 2010). *Second,* [+ATR]-spreading is restricted by a containment-based markedness constraint which evaluates surfacing and non-pronounced vocalic features on a par (van Oostendorp 2011). **Analysis:** I argue that all affixes triggering VR are stem-level affixes, where stem-level phonology exhibits a standard type of [±high] harmony which raises mid vowels to high before high vowels. Independent evidence for this claim comes from the fact that VR-affixes also involve characteristic irregularities and trigger other alternations specific to them. Moreover, all VR-affixes are high. The shift of [–ATR] low and high vowels to [+ATR] is stem-level spreading of a [+ATR] feature which is associated to the affix vowel (in VR-affixes which are consistently [+ATR]) or a floating part of the suffix (in VR-affixes with [–ATR] alternants). This leaves the puzzle why stem mid-vowels do not get [+ATR] ([ɛ,ɔ] $*\Rightarrow$ [i,u]). I derive this fact from the constraint in (2), which blocks shifting to [+ATR] for [–ATR] mid vowels (e.g. [$\text{ɛ}_{[-\text{h}-\text{l}-\text{A}]}$]) even if these are raised to [+high] (e.g. [$\text{ɪ}_{[+\text{h}-\text{l}-\text{A}]}$]). Since (2) applies to containment-based representations where features may be marked for non-pronunciation, but not completely delinked from their segmental hosts, it blocks composite shifts such as [ɛ] $\Rightarrow$ [i].

(2) *E̘: Assign $*$ to every vowel associated to [–high], [–low] and [+ATR]

Also for (2), there is independent evidence in Mayak: The [+ATR] mid vowels [e,o] have a highly restricted distribution, basically resulting from word-level [+ATR] spreading, irrelevant for VR. Finally, I show that, as expected under this analysis, not all VQA-affixes trigger all shifts attributed to VQA, and discuss parallels and differences of the Mayak data to similar patterns of chain-shifting vowel harmony in Romance (Mascaró 2011).

/Ompa/ is further away from /onta/ than vice versa for Dutch infants: Prelexical bases of the labial-coronal perceptual asymmetry

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Coronals have a special status in many phonological systems, and it is often considered they have an unmarked or underspecified place of articulation (Paradis & Prunet, 1991). This special phonological status has typically been associated with lexical underspecification. This is reflected in perceptual asymmetries, such as the detection of a labial that is mispronounced as a coronal, but not a coronal that is mispronounced as a labial, by both children (Fikkert, 2010) and adults (Lahiri & Reetz, 2010). Interestingly, a comparable perceptual asymmetry has recently been reported in six-month-old infants for the contrast /paan/-/taan/ (Dijkstra & Fikkert, 2011). As infants at this age are generally considered 'universal listeners' (e.g., Eimas, Siqueland, Jusczyk, & Vigorito, 1971), this suggests a *prelexical* basis, at least for the labial-coronal perceptual asymmetry. In this study, we extend those recent findings, by showing that the labial-coronal perceptual asymmetry occurs even when infants are provided with a clearer contrast through the word-medial consonant clusters /mp/-/nt/; and we further assess the role that acoustic-phonetic cues could play in such perceptual asymmetries.

Sixteen six-month-olds infants were tested with a slightly modified version of the Central Fixation paradigm (Werker et al., 1998). Eight tokens of the naturally recorded non-words /ompa/ and /onta/, respectively, were chosen based on the highest accuracy scores in an adult perceptual discrimination task, in order to ensure high perceptual distinctness. Half of the infants were habituated to tokens of /ompa/, whereas the other half were habituated with /onta/, while they fixated on a central screen. Both groups were then presented with new /ompa/ and /onta/ tokens, while the visual stimuli remained unchanged. The test /onta/ constituted a 'switch' for the /ompa/-habituated infants, whereas it mapped onto the 'same' category for the /onta/ infants, and vice versa. A repeated measures ANOVA revealed that the two habituation groups differed ($F=4.67$, $p<.05$), with infants increasing their looks during switch trials when habituated to /ompa/ ($p<.01$), but not when habituated to /onta/ ($p=.513$). Thus, even when ample evidence is given for place of articulation changes, young infants find it harder to hear a switch from coronal to labial than vice versa. We further assessed the acoustic-phonetic bases of this perceptual asymmetry using Praat (Boersma & Weenik, 2005), by measuring the acoustic characteristics of each of the eight /ompa/ and eight /onta/ using 12 mel-frequency cepstrum coefficients. The distance between every pair of tokens was then calculated after applying a dynamic time-warping. A principal components analysis on the distance matrix clearly separated the two categories, and revealed that the /onta/ set had a larger variability than the /ompa/ set. Thus, the acoustic-phonetic asymmetric distances were larger from the /ompa/ set to the/onta/ tokens than vice versa, suggesting that acoustic-phonetic factors could underlie infants' labial-coronal perceptual asymmetry.

The etiology for the special status of coronals in the phonologies of the world remains a key unanswered question. In current work, we are extending our acoustic investigations to a wider sample of labial and coronal tokens in infant-directed speech. Further, we are investigating perceptual labial-coronal asymmetries in prelexical infants and children in other languages. With these two lines of research, we contribute to our understanding of the role of prelexical acoustic-phonetic and language-specific phonological factors in early input on shaping possibly lifelong patterns of perception with regard to this special category.

/ə, ɪ/-lowering in Manchest[ʌ]:contextual patterns of gradient and categorical variabilit[ɛ̈]

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As noted by Wells (1982), the unstressed vowels in English display high levels of inter-dialectal variation. For example, the phenomenon of *happY*-tensing i.e. [hapiː] vs. conservative RP [hæpɪ] is well documented for most Southern British dialects (Fabricius 2002; Harrington 2006). However, others studies note that /ɪ/ shifts in the opposite direction in many northern dialects of English: Beal (2008: 136), Foulkes & Docherty (2007: 66) and Lodge (1978) all observe that *happY* has an even more open quality than a canonical RP [ɪ] in northern varieties. Moreover, the use of lowered variants of /ɪ/ in these dialects mirrors recent changes affecting the *lettER* vowel in Multicultural London English (MLE) very closely. Specifically, word-final /ə/ often undergoes lowering to [ɐ] or [ʌ] in MLE; and as Tollfree (1999:170) observes, this phenomenon is particularly noticeable utterance-finally.

In this paper, we present the results of a new study that tested the contextual use of /ɪ, ə/-lowering in Urban Mancunian English (UME) experimentally. 20 Manchester-born speakers were recorded producing stimuli designed to test /ɪ, ə/–realisations in the phonological environments listed in (1) below.

(1)

	Context	Example
(a)	Absolute phrase-final position	*party* || *letter* ||
(b)	Word-final prevocalic position	*party on, letter opener*
(c)	In nominal plurals before word-final [z]	*parties, letters*
(d)	Word-finally before word-initial [z]	*party zone, letter zone*
(e)	Other word-final preconsonantal contexts	*party matters, letter mailers*

Our results reveal hitherto undocumented patterns of variation that provide crucial insights into the phonological conditioning of /ɪ, ə/-lowering in UME. Analysis of formant data confirm, firstly, that /ɪ/-lowering applies categorically for almost all speakers in phrase-final environments; but prepausal /ə/-lowering occurs less frequently. Thus, whilst some speakers favour forms like [paːtɛ̈] and [lɛtʌ] prepausally, others show a tendency not to use /ə/-lowering in this context (i.e. [paːtɛ̈] , [lɛtə]). Furthermore, /ɪ, ə/-lowering never occur in examples like (1c), and we do not observe frequent use of /ə/-lowering in word-final preconsonantal contexts. By contrast, /ɪ/-lowering in environments (1d–e) is comparatively common, but there are strong inter-speaker differences: whereas some speakers use variable categorical lowering in word-final preconsonantal environments, we observe clear evidence of phonetic gradience for other speakers. We also see that /ɪ, ə/-lowering interacts with /ɹ/-sandhi and /j/-sandhi in word-final prevocalic contexts (1b). Interestingly, /ɪ, ə/ display a tendency not to lower in examples like *letter opener* [ɫɛt**əɹ**ɔpnʌ] and *party on* [paːt**ɪj**ɒn] even for those speakers who use categorical lowering in non-derived preconsonantal contexts (i.e. 1d–e).

The fact that categorical use of /ɪ/-lowering is restricted to phrase-final contexts – whereas word-final phrase-medial /ɪ/ lowers only gradiently or variably – provides evidence for a crucial generalisation about the synchronic use of /ɪ/-lowering: namely, that speakers simultaneously use a categorical, invariant version of /ɪ/-lowering in prepausal contexts, but a gradient or variable version of the same process phrase-medially (cf. Bermúdez-Otero 2010). Accordingly, drawing on observations from the life cycle of phonological processes (Bermúdez-Otero 2007, 2011), we present an analysis showing that /ɪ/-lowering is currently in transition from a phrase-level process to a word-level process for many of our speakers. Thus, the increased use of /ɪ/-lowering has an important knock-on-effect: lexical /ə/ chain-shifts to [ʌ] (thus creating an emergent pattern of /ə/-lowering in UME) as the domain of application of the older, more established pattern of /ɪ/-lowering shrinks.

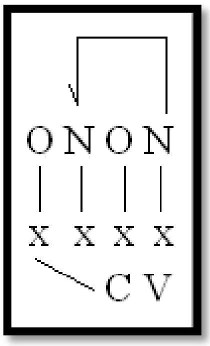
Word and syllable boundaries are not always coextensive: There are no moraic onsets

Shanti Ulfsbjorninn
SOAS

Since the work of Topintzi (2006, 2010) and Davis (2011), which build on the work of Davis (1999), Hayek and Goedemans (1998), and Hart (1991), moraic onsets have been provided with new and rich sources of evidence and argumentation. This has been argued to be a success because positing moraic onsets plugs gaps in typologies: what syllabic constituents can associate to moras: Nμ, Coμ, **Oμ**; and what hierarchies of weight are there in quantity systems: VC = V, VC > V, CV = V, CV > V.

We will argue that moraic onsets are only different from singleton onsets in being preceded by an empty ON pair (1).

(1)



Our central argument, drawn from seven languages, is that syllable structure can be empty, and that word and syllable boundaries are not necessarily coextensive. We claim that moraic onset data is better served by an empty nucleus analysis under standard assumptions of visibility (cf. French (Charette 1991; Scheer 2004)).

Moraic onset geminates in Pattani Malay, Marshallese and Chuukese have their empty nuclei structure revealed by vowel-zero alternations in synchronic and diachronic derivations (related paradigms, dialect differences, and historical development in these and related languages)) (cf. Blust 1984; Blevins 2008).

For the moraic-r onset deletion (except in r + jV contexts) and compensatory lengthening (except intervocalically) in Samothraki Greek, we propose a two step process. Firstly, all /r/s undergo echo vowel prosthesis (except in the already post-vocalic environments); secondly intervocalic /r/ is deleted. Together this produces the semblance of compensatory lengthening and explains its absence intervocalically. The same process as occurred in the development of Saramaccan (Aceto 1996; Good 2011).

Italian (Tuscan/Roman) inherent geminates are shown to be not limited to palatals (i.e. /d/ in /lod:ijɔde:ɣrɛʃi/ 'the God of the Greeks') (*pace* Davis 1999), and we show how our hypothesis extends to explaining the inherent suitability of the respective allomorph shapes.

In Baale (Yigezu and Dimmendaal 1998), we set up the moraic account from scratch because some might analyse the strange behaviour of its geminates (vowel length is permitted before them, but not before coda-onset sequences) as moraic onsets. We argue, however, that the empty nucleus account is sufficient to explain Baale and allows us to plug a gap in the typology of word-medial vowel/consonant length trade-offs (Yoshida 1993; Scheer 2004).

Finally, we turn to Aranda and show from loanword adaptation and the vowel-zero alternations of connected speech that its syllable structure is in fact: ONON. Its vowel-initial words begin with empty onsets, and consonant-initial words begin with wholly empty ON pairs (cf. Mccovell 1996). This will include discussion of Aranda's language game Rabbit Talk (Breen and Pensalfini 1999; Nevins 2010) for which we will provide a non-serial account which does not rely on moraic onsets, or extrametricality.

CONDITIONS ON VOWEL QUANTITY CONTRASTS: THE CASE OF LANCASHIRE ENGLISH

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The data collected in PAC corpus (Durand and Pukli 2004) indicate that vowel quantity system of Lancashire English (LE) largely retains the distinctions associated with Standard Southern British English. The only deviation from the standard pattern is observed in four LE speakers (LE I) in which the contrast between *Pete*/*meat* and *sit*/*pit* vowels has been reduced.

In this talk I will present the results of measurements of vowel length in 8 speakers of LE. All of them show vowel quantity contrast in *not* and *naught* as well as *pat* and *start*. All of them also possess a quantity contrast between /iː/ and /ɪ/ in *bead* and *bid*. However, the increase in the duration of the front close vowel in *Pete*/*meat-sit*/*pit* does not exceed 26% in LE I, while in the other four speakers (LE II) the Pete/*meat* vowel is 98% longer. Moreover, the quantity distinction found in open syllables before voiceless plosives is prominent in all eight speakers. In LE I group *Peter*/*people* vowel is 78% longer than the *vicar*/*little* vowel, while in LE II speakers /iː/ is 93% longer.

The questions that ought to be asked are: i) why open and mid vowels should be less vulnerable to quantity distinction loss than close vowels, ii) why lenis plosives support the length distinction more readily than fortis plosives, and iii) why open syllables make a better environment for vowel length contrast than close syllables? I will claim that the LE pattern illustrates the working of three principles responsible for the licensing of vowel length in world's languages.

The fact that open and mid vowels are less prone to vowel length reduction is the consequence of the relative prominence of A element within their internal make-up. I will argue that the probability of a vowel being long may be represented on the following scale: A > A.X > X. Where: 'X' represents an element other than A and '>' stands for 'requires weaker licensing than'. Consequently, if a language has long vowels, it has long open vowels and the presence of close doubly linked objects implies the presence of non-close ones. The scale may also express the relative proneness to vowel-length reduction: vowels with no A, i.e. vowels that require the strongest licensing to be long, are the most vulnerable to shortening and are the first to be targeted by vowel-length inhibiting processes. It is the scale that allows for the presence of vowel length contrast in *not-naught* and *pat-start* and its simultaneous absence in *Pete*/*meat-sit*/*pit*. It predicts that the reverse situation is impossible.

The second relevant principle is Licensing Absorption. It says that the licensing from a V position to a preceding V position is partially absorbed by the intervening C position. The greater the substantive complexity of the consonant associated to this C, the less licensing reaches the preceding V making it hostile to doubly associated melodies. As /d/{A.ʔ.h} is less complex than /t/{A.ʔ.h.H} in all versions of Element Theory (e.g. Harris 1994, Cyran 2010, Backley 2011), it is only natural that *bead* is more likely to have a relatively long vowel than *Pete* or *meat*.

The fact that LE I speakers retain the quantity distinction between /iː/ and /ɪ/ in open syllables is the consequence of the property of different nuclei to have different licensing potential. As argued in Cyran (2003, 2010) the licensing potential of nuclei is expressed on a universal scale according to which pronounced nuclei are more potent than empty nuclei. Since the vowels in items like *Pete* or *meat* are licensed by Final Empty Nuclei they are more prone to shortening than the vowels found in *Peter* or *people*.

Floating prosody: evidence from Tagalog two-syllable reduplication

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Background. Shryock 1993, analyzing stress shifts in Cebuano, proposes that stems with penultimate stress/length have as part of their lexical entry an abstract prosodic requirement, not tied to any particular segments. Shryock's idea can be illustrated schematically using similar data from Tagalog (Schachter & Otanes 1972). Diacriticless /gupit/ 'cut (N)' and /gupit-in/ 'to be cut' receive default final stress: [gupít], [gupit-ín]. But /$\text{buhat}_{\text{penult-stress}}$/ 'carrying' and /$\text{buhat}_{\text{penult-stress}}$-in/ 'to be carried' both have penultimate stress: [búhat], [buhát-in]. The diacritic could invoke a rule/constraint, or could be a floating piece of metrical structure. Sabbagh 2004 proposes correspondence to prosodic shape to explain stress shifts in Tagalog verbs, but also correspondence to stress association to explain different shifts in nouns. (See also Chung 1983 on Chamorro suffixation; Ito, Kitagawa, & Mester 1996 on a language game.) Treating a word's prosody as dissociable from its segments is consistent with some psycholinguistic models of speech production (e.g., Levelt 1999).

Proposal. Tagalog two-syllable reduplication provides further evidence for correspondence to both prosodic shape and stress association. An Optimality Theoretic analysis is implemented (Prince & Smolensky 1993).

Evidence. In the simple case—when a two-syllable root is reduplicated, with no suffixation—the reduplicant's stress generally matches the base's. In data from a dictionary (Ferrer 2006; additional examples from English 1986), if the base has final stress, so does the reduplicant 95% of the time (214/224 cases): [patíd-patíd] 'disjointed'. (Because of the behavior of longer stems—see below—I assume that the first copy is the reduplicant) And if the base has penultimate stress, so does the reduplicant 95% of the time (170/179): [jákap-jákap] 'lovingly embraced'. These data are expected, whether the reduplicant gets its stress from corresponding syllables in the base or from the base's prosodic shape.

In longer stems with final stress, the reduplicant gets final stress also, though the data are sparser. We see reduplicant-final stress in all 16 trisyllabic stems ([dalá-dalawá] 'two by two') and both quadrisyllabic stems ([salí-salimuót] 'tangled'). This could reflect faithfulness to the base's prosodic shape, or default final stress because the syllables that the reduplicant corresponds to in the base are both unstressed. The situation is the same with suffixed, final-stressed bases: all 35 cases with disyllabic roots have reduplicant-final stress: [tamís-tamis-án] 'to sweeten', and so do the 4 cases with trisyllabic roots: [balá-balansaŋ-ín] 'to upset'.

In longer bases with penultimate stress, 47% (15/32) of reduplicants show penultimate stress, matching the base's prosodic shape but creating a stress mismatch with the corresponding syllables: [dóse-doséna] 'by the dozen'; and 50% (16/32) match the corresponding part of the base but not the base's prosodic shape: [bihí-bihíraʔ] 'very rarely' (1 item varies). Thus there is variation between the two types of stress faithfulness. The situation is the same with suffixed, penultimate-stressed bases: for disyllabic stems 63% (65/103) have penultimate stress in the reduplicant ([ʔísip-ʔisíp-in] 'to consider'), and 35% (36/103) have final stress in the reduplicant ([dilí-dilí-hin] 'to reflect'); 2 have a different pattern. The 8 cases of trisyllabic, penultimate-stress stems taking suffixes are evenly split between the two patterns ([bútu-butunís-an] 'plant sp.' vs. [tabá-tabakú-han] 'plant sp.').

Conclusion. Two types of stress faithfulness are active in Tagalog: the familiar type, in which corresponding stress-bearing units have the same stress, and faithfulness to a prosodic shape. In ordinary suffixation, part of speech determines which type of faithfulness prevails (Sabbagh 2004). In most of two-syllable reduplication, both types of faithfulness produce the same result. But in one subset of the data where the two types produce different results, we observe variation, perhaps because learners don't receive sufficient input to decide the matter.

Poster papers

Multicategorial Prefixed Words Stress Behaviour: the Case of Disyllabic Verb/Noun Pairs

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The present study aims at establishing a reliable account of the stress behaviour of the well-known and much discussed case of disyllabic verb/noun pairs. The study takes into account stress patterns in British English as well as American English and Australian English, allowing for dialectal comparison.

In his PhD in 1979, L. Guierre showed that prefixed verbs are generally stressed on their roots (late stressed: *ad'mit, co'llect, in'volve...*) whereas nouns, whether prefixed or not, usually follow the "Normal Stress Rule" (NSR), that is stress on the first syllable in the case of disyllabic words. (*ˈcollege, ˈinsect, ˈsorrow*)
Under the pressure of these conflicting principles and that of isomorphism, *i.e.* the tendency to preserve form, his work showed that verb/noun prefixed pairs actually display three distinct possibilities:

- each member of the pair follows the "regular" stress pattern of its own category (e.g. *ˈexport* (n), *exˈport* (v); *ˈrecord* (n), *reˈcord* (v)). The verb is late stressed while the noun is early stressed. (Stress alternation, type 1)
- both members of the pair follow the pattern of nouns (e.g. *ˈaccess*, *ˈcombat*, *ˈsuffix*), i.e. early stressed (Isomorphism, type 2)
- both members of the pair follow the pattern of verbs (e.g. *conˈtrol, comˈmand*, *reˈmain*), i.e. late stressed. (Isomorphism, type 3, the most frequent (about 60%))

against the traditional view of a stress alternation default.

Several hypotheses have been explored as to why a pair would follow one pattern rather than the other (-type of verbs: static or processive (Huart); -diachrony (Fournier/Rossi-Gensane: 2002); -semantics (Trevian: 2003); frequency of use (*LLL*: 2012) but the preliminary question as to what should be considered an actual verb/noun pair seems to have been just taken for granted.

The first part of this study is devoted to the problem of establishing a reliable corpus of verb/noun pairs. While it is clear enough that relying on a given author's intuition about his own language is not scientifically satisfying, an un-mitigated recourse to dictionary data raises quite a number of questions, or even doubts. In this perspective, what does the use of frequency corpora allow for? To what point are they reliable? How should/could the information they provide be used? Though a number of points are clearly open to debate, it seems that the actual number of real verb/noun pairs is much lower than what is usually assumed.

The second part of the study gives a precise account of the stress behaviour of "reliable" verb/noun pairs: what type of the three is the dominant type, if there is one? Are there structural differences between the three dialects under study, or only accidental divergence?

Finally, an aspect that is much discussed in other areas of stress behaviour in contemporary English, the third part is devoted to the question of a possible relationship between vowel reduction (or non-reduction) and stress alternation: do the data used here confirm the hypothesis?

However interesting in itself, the case of disyllabic prefixed verb/noun pairs is not so much a study of a particular aspect of English phonology as an investigation of what could found a reliable account of actual language facts and processes.

COMPENSATORY LENGTHENING: EVIDENCE FROM CHILD ARABIC

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ABSTRACT

This paper examines the phonological phenomenon of compensatory lengthening (henceforth CL), wherein the loss of an element of a representation (i.e. a consonant or vowel) triggers a CL of another neighboring phonetic element. It examines this phenomenon in child Arabic phonology, and in particular in child Hijazi Arabic, a dialect spoken in Jeddah, Makkah, and Madina in Saudi Arabia. It investigates this phonological process in early word acquisition within the framework of the Prosodic Theory (McCarthy & Prince 1986, 1990) and Moraic Theory (Hayes, 1985, 1989). Cross-sectional spontaneous data were collected from twenty two monolingual children (aged from 1;0 to1;9), living in Jeddah, Saudi Arabia, by recording their speech using the object-naming technique in near natural settings and analyzed using a qualitative approach.

The study aims to test if children, who acquire Arabic, a moraic language sensitive to syllable weight and characterized by vowel-length contrast, may use the CL strategy in case of coda consonant or vowel deletion and whether they follow a universal path in this respect (Bernhardt & Stemberger,1998; Kehoe, 2002; Fikkert, 1994, and Ota, 1998, 2003; Song, J. & K. Demuth, 2008) or influenced by their language-specific phonology. Adopting the moraic conservation approach (Hayes, 1989), the study investigates and provides a mora-based analysis of two types of CL: V- lengthening and C- lengthening. Factors such as adjacency, directionality, and perceived similarity that play a role in motivating CL are also considered.

The analysis results have shown that the subjects' early word productions differ from the target/ adult forms, exhibiting both V- lengthening (e.g. /liʕba/ → [li:ba] 'toy') and C-lengthening (e.g. /dabdu:b/ → [daddu:b] 'teddy bear'), that were used to compensate for a deleted phonetic segment both in mono- and disyllabic forms. Monophthongization of diphthongs accompanied by V-lengthening is evident in the data too (e.g. /laimu:n/ →[li:mu:n] 'lemon'). The moraic analysis has provided a satisfying explanation of CL in Arabic (i.e. lengthening fills a mora that has been vacated as the result of a deletion rule) and it accounts for both V-lengthening and C- lengthening by arguing that the trigger is always a moraic segment. As to C-lengthening, the results also show a preference for left-to-right directionality (i.e. the trigger precedes the target) (e.g. /ʔaɾnab/ → [ʔannab] 'rabbit'), but there are few cases of right-to-left directionality [ʃukɾan] → [sukkan] 'thank you'). Trigger and target adjacency is satisfied in both cases. The study concludes that Arabic-speaking children go through a similar universal path in using CL, but despite this, it emphasizes the importance of investigating the impact of the ambient language and the role of language specific phonologies.

Effects of phonological and phonetic truncation in the realization of boundary contours

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Introduction: The aim of this paper is twofold: to contribute to the study of the intonation of phrase final contours (boundary tones and nuclear pitch accents) while presenting data from a Spanish variety that to this date has never been studied, the Spanish spoken in Montevideo, Uruguay. Intonation studies produced under the framework of the Autosegmental-metrical model proposed by Pierrehumbert (1980) and Ladd (1996) have given more attention to pitch accents and to the realization of focus, with little work done on boundary tones. Within this framework there is a large consensus that Spanish has two distinct accents located phrase-finally, a pitch accent associated to the last stressed syllable of the phrase, called nuclear accent, as well as a boundary tone associated to the edge of the phrase (Hualde 2005). A recent body of research illustrates that when the space to realize a pitch accent is limited, different realization of the pitch accent can emerge. Grabe (1980) argues that German and English have the same final accent in declaratives but with distinct realizations due to truncation or compression of the accent in cases of reduced voiced material for accent realization. Lee (2010) and Gabriel et al (2010) also suggest that truncation might be driving the unexpected contour found exclusively in final oxytonic words of yes-no questions in the Spanish variety of Buenos Aires. This paper will explore the following research questions regarding boundary tones.

Research questions: What are the strategies applied to the realization of boundary contours when the last stressed syllable occurs at the edge of the phrase? Do speakers apply similar strategies to sentence medial and sentence final boundaries? How can these patterns contribute to the understanding of boundary tones?

Experiment: The data presented in this paper was retrieved from several yes-no questions produced by 3 male and 3 female monolingual speakers of the Spanish variety spoken in Montevideo. All 6 subjects were recorded in Montevideo in the summer of 2012 during a reading task which prompted utterances with different complexities (simple one-phrase sentences and complex two-phrase sentences as result of coordination or subordination), as well as with different stress patterns on the final word in relation to the edge of the phrase (proparoxytonic, paroxytonic and oxytonic words).

Results: The acoustic analysis of the data shows that oxytonic stress at the phrase edge triggers different realizations of the boundary contour. This paper will argue that two distinct strategies are at play: phonological truncation, which produces a different contour due to an allophonic boundary tone, and phonetic truncation, which produces another contour but preserves the same boundary tone of proparoxytonic and paroxytonic words. These patterns are then contrasted with other possible cases of truncation mentioned in the literature.

Re-interpreting the minimal foot as a domain for lenition

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The paper aims to bring together earlier and more recent observations about lenition sub-systems in varieties of English. Phenomena like the "Withgott effect" (after Withgott 1982), the "*competitive* chain of reduction", the problems with "unfooted" syllables (Balogné Bérces 2011a), as well as a recent proposal to split the "intervocalic" consonantal position into post-short and post-long (Balogné Bérces and Honeybone to appear), all suggest a phonologically relevant scale of strength relations primarily manifesting itself in consonant lenition.

From a purely descriptive point of view, this means that classical lenition taxonomies may need to be amended to include subtypes of the "weak(er)" phonological position in stress-sensitive lenition systems, along at least two dimensions: (i) distance from the foothead; (ii) length of the preceding vowel. This is justified by dialectal/register differences in varieties of English: in certain systems *ci<u>t</u>y* but not *vani<u>t</u>y*, *la<u>tt</u>er* but not *la<u>t</u>er* will lenite (cf. Balogné Bérces 2008, 2011a-b).

Upon closer inspection, however, these two seem to be related and therefore collapsible: lenition may be confined to the "minimal foot": the bimoraic minimal string reminiscent from minimal word phenomena, with an implicational relation among lenition systems such that lenition outside this minimal domain implies lenition within. In general, smaller/no variability is expected within this domain; the parametric variation outside this domain is due to more/less strict positional faithfulness / lenition inhibition. (Balogné Bérces 2011b)

The paper subscribes to representational, rather than procedural, solutions. After it has shown that foot-based (adjunction/coda-capture) analyses of the above observations are problematic, it comes up with an alternative solution, in which prominence relations are reduced to lateral interactions, with less hierarchical structure, or at least with more linear contextual relations/constraints. More specifically, it is claimed that the data fall out naturally if we assume a CVCV skeleton (Lowenstamm 1996) with two lateral relations, government (a destructive force) and licensing (supporting segmental expression of the target) (Ségéral and Scheer 1999). Assuming further that (i) stressed vowels distract the licensing charge of the following vowel, and that (ii) long nuclei are VCV sequences exhibiting right-to-left V-to-V licensing, properly derives a ternary distinction between licensed position (phonologically strong), governed position (within the "bimoraic minimum"), and licensed-governed position (a weak position outside the minimal foot domain).

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Privative [spread glottis] and [voice] in the Phonetics and Phonology

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In languages that exhibit a two-way laryngeal contrast among stops, there are two very common patterns. In *true voice languages* such as Russian, Hungarian, and Spanish, the contrast in utterance-initial position is often between a series of prevoiced ("lenis") stops and a series of plain voiceless unaspirated ("fortis") stops. In *aspirating languages* such as German and English, the contrast in utterance-initial position is typically between a series of plain voiceless unaspirated (lenis) stops and a series of voiceless aspirated (fortis) stops. Many have recently suggested that the feature of contrast in aspirating languages is privative [sg] and in true voice languages, the feature of contrast is privative [voice]. Thus, the two-way contrast in aspirating languages would be between stops specified as [sg] and stops with no laryngeal specification, and in true voice languages, the contrast is between stops that are specified as [voice] and stops with no laryngeal specification.

While utterance-initial lenis stops in aspirating languages are usually voiceless, intervocalic or intersonorant lenis stops are variably voiced; that is, they are sometimes fully voiced throughout the closure, sometimes totally voiceless, and sometimes voiced through only part of the closure. Such voicing is often referred to as *passive voicing*, understood to be the result of a voiced context. According to those who maintain that the feature of contrast in aspirating languages is [sg], this voicing occurs when stops unspecified for a laryngeal feature are between voiced segments. Two objections to this analysis have been raised: First, Jansen (2004, 48) notes that there is a difference between the fortis stops in true voice languages and lenis stops in aspirating languages: the former do not undergo passive voicing, whereas the latter do. If privative features are assumed, both are represented as laryngeally unspecified, and hence should behave similarly. Second, in languages such as Mandarin, Cantonese, Icelandic and Danish, where there is clearly an aspiration contrast, the unspecified stops do not undergo passive voicing. In this paper we first present evidence that, indeed, fortis intervocalic stops in true voice languages do not undergo passive voicing. Second, we outline an account of how these objections can be addressed.

Proposal: We assume that at some level prior to the phonetics, privative features are transformed into numerically specified features (see Chomsky & Halle 1968), and that every segment must have a positive numerical specification for the feature that is active in that language—but not for any feature that is not active. This would mean that in a true voice language, a specified laryngeal feature of [voice] on stops would become something like [9voice] *and the stops that lack a specification for [voice] (in the phonology) become something like [1voice]*. Similarly, in an aspirating language, a specified [sg] feature would become specified for a relatively high degree of [sg], say [9sg], and the unspecified feature on stops would become something like [1sg] or [2sg]. Then, if passive voicing is a phonetic process, all that is needed is the assumption that *such phonetic processes cannot change a numerically specified phonological feature*. Thus, passive voicing will affect (lenis) stops in aspirating languages because *they are not specified* for [voice] (just [sg]), but it will not affect (fortis) stops in a true voice language because they will be specified as [1voice]. According to the second objection, there are languages with an aspiration contrast in which unspecified stops do not undergo passive voicing. The question is how to prevent the stops that are not phonologically specified for [sg] from undergoing passive voicing in the phonetics *because they have no specification for [voice] to block passive voicing as do stops in true voice languages*. We suggest that in some aspirating languages (Icelandic, Danish), in the conversion from privative features to numerically specified features, the stops phonologically specified as [sg] would, like German, be specified with a relatively large numerical specification, but stops *unspecified* for [sg] would receive a value larger than in German, say 5, sufficient to block passive voicing. This reflects the larger glottal spreading in Icelandic and Danish lenis stops reported by Deterding & Nolan (2007).

Falsifiability vs. falsifiability in phonology

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Background: A prevalent trend in current phonological practice is what Hale & Reiss (2000) term *data-fitting*: fine-tuning phonological models, often with the help of *ad hoc* restrictions, in order to exclude unattested languages from the set of possible grammars generated by the model. Examples of this practice are proposals of universally fixed rankings (cf. McCarthy 2002) or restrictions on constraint conjuction (cf. Baković 2000) in Optimality Theory. This practice is usually justified by invoking a simplistic version of Popper's (1934/1959, ff.) notion of *falsifiability*: "The more a theory forbids, the better it is." (Popper 1963).

We argue that this practice should be abandoned, for three main reasons. First, it is based on a dubious interpretation of Popperian falsifiability. Second, *ad hoc* restrictions do not further our understanding of language, but they decrease the coherence of a model. Third, the practice is based on data from a very small subset of existing languages. We examine each of these arguments in detail.

Falsifiability: Closer examination of Popper's work reveals that his notion of falsifiability refers to more fundamental properties of a model than is generally understood in phonology. Accordingly, we distinguish two notions of falsifiability: *surface falsifiability* and *fundamental falsifiability*. A frequently cited example for the two kinds of falsifiability relates to the theory of evolution by natural selection: "fossil rabbits in the Precambrian" (Haldane) would falsify the theory on the surface level, whereas proving that mutations do not occur or that they occur but cannot be inherited would falsify the theory on a fundamental level. Analogously, Optimality Theory is fundamentally falsified by proving that candidate selection cannot be computed by humans, but not if a particular constraint ranking is shown to be at odds with empirical data.

Coherence: Accordingly, imposing arbitrary restrictions on constraint ranking or constraint conjunction does not make a model more fundamentally falsifiable. It does, however, lead to a less coherent and a less parsimonious model by introducing an extra mechanism (the list of arbitrary restrictions). Moreover, since these restrictions are typically simple restatements of the observed range of data, they contradict the Popperian scientific method: "The introduction of an auxiliary hypothesis should always be regarded as an attempt to construct a new system; and this new system should then always be judged on the issue of whether it would, if adopted, constitute a real advance in our knowledge of the world." (Popper 1959/2002).

Empirical breadth: Both overgeneration and undergeneration are challenging to any theory of phonology, but they are of a very different nature. Since the overwhelming majority of existing languages are still undescribed, and most other languages only received impressionistic descriptions, our understanding of what is impossible is tentative at best. Proposing a theoretical tool *solely* for the purpose of excluding a non-existent pattern decreases the coherence of the theory in order to accommodate a mere *assumption*. In fact, many language types thought to be impossible have recently been shown to exist (see, for example, Rice 2009 on ternary stress systems).

Summary: We argue that, all else being equal, a theory with *ad hoc* restrictions of the type "CONSTRAINT1 must universally dominate CONSTRAINT2" is not preferable to a theory without such restrictions: it is not more falsifiable under a careful interpretation of Popperian falsifiability, it is less coherent than a theory without arbitrary restrictions, and it is constructed based on an *assumption* that unattested patterns are in fact impossible. Thus, theoretical innovations should always be based on existing patterns, not motivated by trying to exclude unattested phenomena.

Stress-testing GP – the phonology of Taa

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Government Phonology and its descendants are stretched between parsimony – seeking to minimize the number of elements – and the great range of contrasts found in natural languages. A common solution is structured element sets, from the simple headedness of early GP, to the complex relations of Dependency Phonology, or the non-segmentalist GP of recent years. Solutions have been tested against, for example, the large vowel inventory of Danish, or the moderately large consonant inventory of Mandarin (Kaye 2000). However, we know of no GP-based analyses of the languages traditionally viewed as having the largest inventories, such as the Khoisan and Caucasian languages.

In this presentation we discuss GP analyses of the Taa language (also known as !Xóõ or !Xoon). Existing phonological analyses are mostly descriptive and feature-based in SPE style; points of disagreement include the features appropriate for clicks, the analysis of the wide range of click 'accompaniments', and various phonotactic constraints and assimilation phenomena. We claim that a GP approach can illuminate some (though not all) of these issues.

Data is from Traill (1985, 1994) and UCLA (2009) (mainly eastern dialect), and Naumann (2009, in progress) (western dialect), in transcribed and audio form. In summary: Taa has non-click stops at five places and with six manners; clicks at five places and with nine manners; and about a dozen click clusters (at each of the five click places). It has five basic vowels, with several possible modifiers. It also has four surface tones.

The sole mention known to us of clicks in GP uses an "ad hoc" element **K**, without further discussion. We argue that this can in fact be a principled choice, and show that in a Harris (1994)-style GP with **R**, the five basic clicks can be reasonably accounted for by combining **K** with existing elements.

We next consider non-segmentalist GP (Jensen 1994, Kaye 2000), which aims to minimize the number of elements further by abolishing the distinction between consonantal and vocalic elements, leading to CV and strict-CV systems. We argue that clicks cannot be shoe-horned into standard presentations, and we still need a click element **K**. This poses the question of what **K** means in vocalic position.

In answering this, we are led to a re-analysis of the complex click consonants of Khoisan, which are currently analysed (e.g. Güldemann 2001) as clusters of click consonants with other consonants. The constraints of all GP theories, let alone CV versions, are incompatible with such clusters; but rather than introduce many empty V slots, as was done for Polish clusters (Cyran and Gussmann 1999), we suggest that the distinctive characteristics of clicks in Khoisan phonology arise partly from the ability to occupy both C and V slots.

If time permits, we will outline one of the main phonological processes in Taa, raising of the low vowel /a/ in certain contexts. In the published descriptions, this phenomenon is puzzling, as it involves raising of /a/ before /i/, which is blocked by certain preceding clicks, and by pharyngealization, but not blocked by uvular consonants following non-blocking clicks. We suggest how the published account can be described in GP; but we then go on to show that the audio data reveals a more complex picture than the published description, a picture which appears to require enrichment of the theory.

What's in an [h] ? On a 'strange' lenition pattern in Ancient Greek

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The goal of this paper is to build on the 'lenition-inhibition' constraint proposed very recently by Patrick Honeybone (OCP 2012), in light of the Ancient Greek (AG) data. Lenition patterns usually follow a scale which can be roughly summarized as "initial, onset" >> "medial, intervocalic" >> "final, coda" (Honeybone 2012). Languages like Proto-Germanic, Mid-Scots and AG however, which display a fricative-to-[h] lenition, seem to follow a different pattern, excluding lenition in coda position. In this paper we discuss two main issues: how far AG fits this 'strange' lenition pattern, and what AG data can bring to the problem of defining the constraint against [h] in coda, formulated by Honeybone as a prohibition against the feature [spread glottis] in coda.

First, we discuss the fact that the [s]-to-[h] lenition in AG is best explained as an 'across-the-board' lenition punctually blocked in final codas, rather than as a clear-cut type opposed to a "Spanish type" (Ferguson 1990 – "Spanish" standing for New World varieties of Spanish). The peculiar pattern of the [s]-to-[h] lenition in AG has long been noticed. Consider the data below[1]:

Proto-Greek [s] > [h]		*Proto-Greek [s] is maintained*	
#__V	*sems > he:s	__#	he:s
#__R	*sreo: > r^{h}eo:	#__T	sperma
V__V	*genesos > Hom. geneos	V__T	esti
R__V	*ekrinsa > ekri:na	R__T	*enspetes[2]
V__R	*esmi > e:mi	T__V	ksenos
R__R	*arsma > harma	T__R	Myc. aiksma[2]

Depending on the syllabification chosen for -sR- sequences, this lenition has been analysed in different ways (Steriade 1982, Wetzels 1986). We will discuss this problem, adding some epigraphical evidence (Devine & Stephens 1994). For now, suffice it to say that the AG lenition actually violates the expected lenition pattern, at least for word-final codas. Another crucial point to underline is that [h] is not found where aspirated stops are not found.

On this basis, we tackle the problems posed by a constraint hinging on the feature [spread glottis] in coda position, as Honeybone (2012) proposes it, within a framework in which lenition is defined as "segmental decomposition" (Harris 1990). If [spread glottis] is in [h], it should be also in the original voiceless fricatives, and a constraint on [spread glottis] should apply to the fricatives as well. On the other hand, it is remarkable that [h]-prohibition in coda is observed only in languages which have aspirated stops (Proto-Germanic, Mid-Scots, AG vs. Spanish), and that these aspirated stops are themselves also excluded from the coda position. The constraint against [h] can thus be analysed as a disfavouring of laryngeal features word-finally (*cf.* also the word-final devoicing). An assumption which could shed light on these facts is that the fricative-to-[h] lenition in Spanish and AG is the same process as far as phonetic "substance" is concerned, but that the [h] residue is phonologically interpreted in a different way depending on whether the language has aspirated consonants or not. In languages without aspirated consonants, [h] is analysed as a ("pure") fricative (Lass 1976, Kaye, Lowenstamm & Vergnaud 1990) and may appear in every position. In languages with aspirated consonants, [h] may be reinterpreted as a laryngeal feature and thus obey the same restrictions as the other laryngeally marked segments, namely aspirated stops. This supposes that we accept the Sapirian view that one signal may correspond to two different phonological objects (Sapir 1925, Carvalho 2008).

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[1] See for example Lejeune (1972). The phonetic transcription for the initial rhotic "r^{h}" is very rough. It won't be discussed in this paper. Words with a '*' are phonetic reconstructions; the other ones are attested in Classical Attic unless otherwise specified ("Myc." = Mycenaean Greek, "Hom." = Homer). We use "R" as a symbol for sonorants, and "T" for stops. We do not take into account here the other sources of [h]; they appear (and do not appear) in the same contexts.

[2] In R__T, T__R contexts, the [s] was maintained in Common Greek, but has changed to [h] or Ø afterwards.

Word-level affixes trigger stem-level cycles: Evidence from German dorsal fricatives

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The complex relationship between phonology and morphosyntax can only be explained in an account that is both representational and derivational in nature. In this paper we use Stratal Optimality Theory (Bermúdez-Otero 1999) with the addition of affix cycles (Mohannan 1986, Baker 2005). We argue that Word-level (Class-II or postcyclic) affixes trigger their own stem-level cycle before being concatenated with the stem at the word level. Segmentally word-level affixes behave like miniature stems, retaining the insight of Borowsky (1993) that word-level affixes constitute a domain.

(1) Stem-level suffixation
(Bermúdez-Otero in prep.)

X^{SL}

base affix

(2) Word-level suffixation
(after Baker 2005)

X^{WL}

base affix^{SL}

Within this structural framework we can explain the distribution of the German dorsal fricatives, the so-called *ich-Laut* and *ach-Laut*. The palatal and velar fricatives are in almost complementary distribution in German; the velar fricative occurs after central and back vowels and the palatal fricative elsewhere:

Following a back vowel:	[buːx]	*Buch*	'book'
Following a front vowel:	[kyːçə]	*Küche*	'kitchen'
Word initial:	[çiːna]	*China*	'China'
Following a consonant:	[mɪlç]	*Milch*	'milk'

Affixation of the diminutive suffix *–chen* can lead to exceptions whereby the palatal fricative is permitted after a back vowel, e.g. *Kuhchen* [kuçən] 'cow (dim.)'. This violation can be understood if we assume that (i) the canonical pattern of the *ich-Laut* and *ach-Laut* distribution holds at the stem level, with markedness outranking faithfulness in the constraint hierarchy for that level; (ii) that the word-level diminutive suffix *–chen* forms a stem level domain by itself, and (iii) that faithfulness outranks markedness at the word level.

A prosodic analysis is also able to provide a suitable account of dorsal fricative assimilation (Iverson & Salmons, 1992, Merchant, 1996 or Wiese 1996). However, such an analysis is not able to provide a comprehensive account of the opaque interaction of dorsal fricative alternation with *g*-spirantization and final obstruent devoicing. In our analysis, word-level affixes like *–ig* provide domains for a stem-level phonotactic favouring [ɣ] over [g] following [ɪ]. Stem-level [ɣ] then gives [g] in onsets, e.g. *Königin* [køːnɪgɪn] 'queen', and [ç] in codas, e.g. *König* [køːnɪç] 'king', at the word-level. Crucially, the fronting of [ɣ] to [ç] under word-level coda devoicing follows without stipulation from the observation that, whilst forms like *Kuhchen* violate the prohibition of [ç] after back vowels, the ban on [x] after front vowels sustains no exceptions within word-level domains.

Finding Regularities in Irregularities: An experimental investigation of Polish vowel-zero

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Vowel-zero alternations in Slavic languages have received considerable attention over the years due to the numerous exceptions surrounding their application (e.g., Scheer 2011). In Polish, these alternations are commonly found in nominal inflectional paradigms. When the inflectional suffix is null, the vowel /ɛ/ appears between the final two consonants in the stem (1a); when the inflectional suffix contains a vowel, the two consonants remain a cluster (1b).

(1) a. $CVC_1\varepsilon C_2$+Ø# b. CVC_1C_2+V#

However, this is not true of all stem-final consonant clusters. Notably, even lexemes with the same consonant cluster can behave differently (2a-b).

(2) a. kɔtf+a (nom.sg.) ~ kɔtɛf+Ø (gen.pl.) 'anchor'
b. pwɛtf+a (nom.g.) ~ pwɛtf+Ø (gen.pl.) 'fin'

The irregular application of this phenomenon has led many researchers (e.g., Rubach 1984, Gussmann 2008) to posit that lexemes which undergo vowel-zero have an underlying vowel that is the target of this alternation; such vowels are absent in lexemes which fail to show the alternation. However, there are arguments against this type of lexical specification. For one, it ignores the strong tendency for the alternation to occur in clusters of rising sonority. In addition, it cannot explain similar patterns in the emergence of vowel-zero alternations in borrowings (cf. Bethin 1992). Furthermore, it also fails to account for lexemes which optionally exhibit the alternation (cf. Cyran 2005).

The present investigation sets out to establish that the vowel-zero alternation in Polish nouns is a productive process with a number of environmental factors that constrain it. Nonce forms were used to test this hypothesis in order to tease apart speakers' phonological intuitions without interference from lexical exceptions. The experiment consisted of 320 nonce forms targeting various types of consonant clusters as well as other factors related to the linguistic environment. These factors were: the grammatical gender of the stem, the quality of the vowel immediately preceding the consonant cluster, the length of the stem, and the number of possible morphemes in the stem.

The experiment took the form of a *wug* test (Berko 1958). Each nonce form was given a vocalic suffix, and was then embedded in a meaningful phrase in order to clearly identify the nonce form as a noun and unambiguously indicate its gender. Five native speakers of Polish (2 male and 3 female) were presented with each meaningful phrase on a computer screen, and were then prompted to complete a second phrase that required them to produce the nonce form with a null suffix. If speakers inserted a vowel between the final two consonants, it was interpreted as an instance of vowel-zero.

Results show that, for most speakers, the sonority contour of the coda cluster is a very significant factor, with clusters of rising sonority exhibiting far more vowel-zero alternations than clusters of falling sonority. The other factors tested also showed some strong tendencies. Notably, grammatical gender was found to be significant for most speakers, with neuter nouns exhibiting more vowel-zero alternations than masculine or feminine nouns. These results then suggest that Polish speakers are learning phonological rules regarding the environment of vowel-zero rather than memorizing each instance of vowel-zero in their lexicon.

Polish phonotactics and morphonotactics: a quantitative and qualitative study

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The description of Polish consonants and consonant clusters has been taken up in the literature, e.g., by Jassem 2003, Dunaj 1985, Dukiewicz and Sawicka 1995, Dobrogowska 1984, 1990, 1992 Wierzchowska 1971, 1980, and most extensively Bargiełówna 1950. The objective of this project is the formulation of a new and exhaustive description of the consonantal reality of the Polish language and its quantitative consonantal model. The novelty aspect of this project is the introduction of several original parameters of analysis and a study of samples of natural language of unprecedented size. The object of research is the consonant cluster viewed in terms of its morphology (derivation and inflection), size, position in a word and the linear order of the component phonemes.

The consonant sequences were extracted from three types of corpora: 1. a list of lemmas based on a 8K dictionary of "core" Polish, 2. a list of inflectional forms generated on the basis of standard paradigms for Polish nouns, adjectives and verbs, and 3. a list of over 500,000 inflectional forms derived from a collection of newspaper texts. The result is a list of approx. 1,500 Polish consonant clusters accompanied by statistical data.

Another area studied is the statistics of morphological boundaries cutting across consonantal clusters, with a view to showing possible differences between these morphonotactic clusters and the lexical ones, i.e. those that do not feature a morphological boundary (cf. Dressler and Dziubalska-Kolaczyk 2006). For example, the clusters /mpstf/, /jstf/, /fstf/, /tɕstf/ etc. all include the initial part of the suffix *-stwo*, which means that the clusters have a morphological boundary preceding the consonant /s/: /mp|stf/, /j|stf/, /f|stf/, /tɕ|stf/. Thus, those clusters are morphonotactic by default. By this analysis all clusters of Polish will be divided into those which are exclusively lexical, those which are exclusively morphonotactic and those which have either origin. It is predicted that the lexical clusters will be subject to phonological constraints to a much higher degree than the morphonotactic ones (cf. Dziubalska-Kolaczyk 2009, Zydorowicz 2010). The verification of this hypothesis will be conducted within the *Beats-and-Binding* model of phonotactics, which operates with the *Net Auditory Distance* principle (the NAD). The NAD formulates universal well-formedness conditions for consonant clusters in all word positions. The model has an advantage over the traditional measure of markedness by means of sonority, namely, it takes into consideration such parameters of consonant description as place of articulation and manner of articulation. This fine phonetic specification allows for more thorough evaluation of clusters.

It is hoped that the new methodology and approach will broaden the perspectives of research on phonotactics of Polish as well as other languages.

Explaining glide syllabification in English: Artifacts of language games and orthography

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Language game studies have led to contradictory claims about the syllabification of glides in English. Some claim that [w] is in the onset and [j] is in the nucleus (Hammond, 1990; Davis & Hammond, 1995), while others claim that [w] is in the onset and [j] varies by individual (Barlow, 2001). In this paper I present a study using a modified Pig Latin in order to determine whether past results can be explained methodologically, and also to explore the source of the variability (individual differences or an artifact of language games (Churma, 1985)). The results provide evidence that both [j] and [w] are in the onset when we take into account phonotactics and orthographic interference as sources of variability.

Background. In English, [j] can be preceded by most consonants, but only followed by [u], and [w] can be followed by most vowels, but cannot come after labials. This restricted distribution creates a problem for English language games since they create ill-formed /CGV/ sequences (e.g., *[twu] or *[mjɛɪ]), causing glides to move or delete. The glides then pattern according to phonotactics, giving the appearance that [w] patterns in the onset, but not [j] (Hammond & Davis, 1995; Barlow, 2001; Hammond, 1990). To explore this confound I taught subjects both regular [ɛɪ] PL and a modified [u] PL that reverses the phonotactics issue, allowing for the comparison of [w] and [j]. I hypothesized that, with the confounds for [j] removed, (i) [w] and [j] both pattern in the onset and (ii) the variability in past studies is due to phonotactics and phonology-external factors (e.g., orthography).

Study. Participants (N=20) were taught PL ([ɛɪ] PL rule: "Move all the consonants from the beginning of a word to the end and add [ɛɪ], as in [u.blɛɪ] for blue.") and instructed to listen to words (all disyllabic, initial stress) over headphones and say them back in PL. The study had two halves, each with training (40 words, no /CGV/) and an experimental block (92 words, 15 /CjV/ and 15 /CwV/). Participants learned either [ɛɪ] PL or [u] PL first and then switched at the half. Responses and RTs were recorded. Responses were coded by glide location.

Results & Discussion. The participants fell into four groups: (i) [j] always deletes, (ii) [j] is always in nucleus, (iii) [j] deletes in [ɛɪ] PL, but is in onset in [u] PL, and (iv) [j] is in nucleus in [ɛɪ] PL, but is in onset in [u] PL. [w] patterned in the onset fairly consistently across PLs, with expected higher error rates in [u] PL for groups (iii) and (iv). The RTs loosely mirrored the verbal responses: all groups had higher RTs for /Cjɛɪ/ than /Cju/ (expected by phonotactics), while only groups (iii) and (iv) showed this effect of phonotactics for [w].

While previous PL studies (Davis & Hammond, 1995; Barlow, 2001) predict groups (ii) and (iii), they do not predict (i) or (iv), or that [w] would circumvent phonotactics. The results suggest that the glides are not only affected by phonotactics, but also orthography for some speakers. Orthography, while not present in the study, can explain groups (i) and (ii): [w] has an orthographic correlate in 'w' and persists despite phonotactics, while [j], with no correlate, is invisible to PL when applied at orthography, leading to either deletion or no movement. In line with response patterns, the RT data for groups (i) and (ii) show no phonotactics-driven delay for /Cwu/ over /Cwɛɪ/, suggesting that PL is applying at orthography for these speakers. This greatly weakens past claims based on (i) and (ii) that support [j] being in the nucleus.

Orthographic interference, however, cannot explain the data for groups (iii) and (iv). Since [j] has no orthographic correlate, it can only be manipulated when PL applies to a phonological representation. Groups (iii) and (iv) move [j] with the onset, repairing when necessary, meaning that they are directly manipulating [j]. The RT data also support the claim that these speakers are manipulating a phonological representation, showing a cross-over interaction of phonotactics by type of PL. These findings suggest that both glides are in the onset, and question the validity of the data that was previously used to support [j] being in the nucleus.

Haplology vs. echoing in terms of *intervals*: Marginal rules in Greek derivation

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There are two opposing forces in grammars: *haplology*, which requires phonologically identical morphemes underlyingly to surface as one phonological string (e.g., Stemberger 1981, Menn & MacWhinney 1984, Golston 1995, deLacy 1999a,b) and *echoing*, which results from the requirement to repeat a sequence of two identical (parts of) morphemes (e.g., Yip 1995). Although both forces are recruited in the crosslinguistic repertoire of the phonological rule machinery (e.g. Japanese *si* haplology vs. Turkish reduplication), they hardly coexist in a single morphological process. This paper addresses the case of two derivational suffixes in Greek, namely *-íkos* 's.o. related to X' and *-ístas* 's.o. who plays instrument X', which are known to exhibit instances of haplology (Dictionary of Modern Greek/Triantafyllidis 1998) when the relevant conditions are met, e.g. /pontifik-ikós/ *pondif**ikó**s* 'of pontiff'. In this paper, however, we argue that, besides haplology, a strategy of echoing may also be employed by the speakers. Interestingly, the process copies material from the suffix the size of a VC *interval* (Steriade 2010) and places it at the right side of the stem, e.g. /ɟog-ikós/ *joɟ**ik**ós* ~ *joɟ**ikik**ós* 'of yoga' (< oral corpus, cf. also /trox-iz-o/ 'whet' → *troxis+tís* ~ *troxizis+tís* 'whetter', Konta (in prep.)).

In order to investigate the dynamics of each force in the Greek grammar, we designed and conducted a production experiment which recreated artificially an environment that could trigger haplology or echoing. More specifically, we constructed one, two and three syllable-long pseudostems (i.e. CVC-, CVCVC-, CVCVCVC-) ending in {p, f, t, k, b, g, s, z, m, n} and preceded by the vowels {a, e, i}. The 144 items were orally presented to native speakers (25 (under)graduate students, age range: 18-32) escorted by a picture depicting the activity/instrument, etc. assigned to the pseudoword. The participants were instructed to form a derived word by adding the relevant suffix (e.g., lapiko → lapik+ikos, penisi → penis+istas). Their productions were recorded and codified by two native speakers of Greek.

As expected, our speakers primarily opted to faithfully preserve the segmental make-up of the pseudoword (86,7% for *-íkos* and 94% for *-ístas*). Curiously, however, they also employed strategies that led to either: (a) the resolution of identical strings of intervals via deletion of one of the neighboring strings (1a), alternation of the voicing value of the stem-final consonant (1b) or metathesis (1c); or (b) the production of identical VC segments via insertion (2a), change in the voicing value of the stem-final consonant (2b) or metathesis (2c):

(1)	a. /lapík-ikós/	[lapikós]	b. /natík-ikós/	[natiɟikós]	c./kapénis-ístas/	[kap**isen**ístas]
(2)	a. /tízem-ístas/	[tizemisístas]	b. /felápig-ikós/	[felapicikós]	c./bíset-ístas/	[betisístas]

These findings clearly suggest that two admittedly marginal forces (7.4%) apply to either create or block strings of identical intervals. We will argue that two competing grammars are responsible for this result: One grammar ranks OCP-flavored constraints over faithfulness which naturally fails to protect adjacent strings of intervals (MAX-INTERVAL). The competing grammar, on the other hand, ensures a correspondence between a portion of the derivational suffix (base) and a portion of the echoed string (reduplicant) (CORR_{BR}(CD)) [where CD=correspondence domain] at its left (ALIGN-L), which is the size of an interval (CD=I).

To conclude, the Greek data provide support for the parallel presence of both haplology and echoing as strategies that either obscure or highlight morphological boundaries. Morever, they substantiate the importance of intervals as a legitimate prosodic unit by presenting independent evidence for it from other reduplicative processes in Greek (e.g., *bíra míra* 'beer and the like', *θíes míes* 'aunts and other relatives').

Markedness and Epenthesis: Evidence from Telugu and Polynesia

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De Lacy and Kingston (forthcoming), building on claims of de Lacy (2006). propose a role for markedness in grammar, based on competence factors (de Lacy's c-markedness) rather than performance factors (such as cross-linguistic frequency, ease of articulation, etc.), a move which we applaud, in principle. However, even once phonologists agree that the domain for useful explorations of a possible role for markedness in grammars resides in the language faculty itself, the question of what precise claims for a role for markedness, if any, should be adopted remains open for discussion. In this paper we explore arguments regarding epenthesis offered up by de Lacy and Kingston (forthcoming), as well as in de Lacy's book-length treatment of markedness (de Lacy 2006), treating both vowel epenthesis and the epenthesis of consonants.

Regarding vowel epenthesis, we present detailed acoustic and phonological evidence regarding the epenthesis of [u] in Telugu, a Dravidian language, unexpected under de Lacy's assumptions. The phenomenon is discussed in de Lacy (2006:302), where de Lacy notes that "Further close analysis of Dravidian languages is clearly warranted." We show that attempts to avoid the theoretical implications of [u] epenthesis by claiming that the vowel in question is not phonetically [u] (as de Lacy suggests for a variety of Dravidian languages in the passage under discussion) cannot be maintained.

We then turn to the more extensive consideration of a case of consonant epenthesis, pursuing an argument offered up in de Lacy and Kingston (forthcoming) for a UG-based ban on the epenthesis of velars (such as [k]). The argument has a general appeal, in that it also appears to provide a specific mechanism for diachronic argumentation in the exploration of grammar-based markedness. The argument runs like this: (1) Maori has a rule of [t]-epenthesis to break up (certain, presumably illicit) vowel hiatuses; (2) closely related Eastern Polynesian sister Hawai'ian shows a change of Proto-Eastern Polynesian *t to /k/; (3) one might therefore expect Hawai'ian to show [k]-epenthesis (which would be the regular phonological reflex of Eastern Polynesian [t]-epenthesis); (4) Hawaiian doesn't, showing [ʔ]-epenthesis instead; (5) this is because velar epenthesis is absolutely blocked by UG for all human languages, so when Hawaiian *should have* ended up with it, it *had* to revert to epenthesis of the less-marked glottal stop instead.

We argue in this paper that (1), (3), (4), and (5) are all empirically challenged claims, presenting evidence which reveals that some of the claims are simply misguided (e.g., that because Maori shows [t]-epenthesis, we should assume that the ancestor of the other Eastern Polynesian langauges did), others manifestly false or highly implausible (e.g., that there is a default C-epenthesis in the relevant structures at all). We also contend that the diachronic story offered by de Lacy and Kingston fails under any notion of "language change" which locates at least significant aspects of historical developments in the acquisition process (as in, e.g., Hale 2007).

Finally, we briefly consider related empirical problems faced by the approach of de Lacy and Kingston (e.g., neutralization to ŋ), arguing that their attempts to sidestep these counter-examples are also ultimately unsatisfying.

Theoretical Implications of Bondu Vowel Harmony

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This paper highlights several theoretical implications of the system of [±ATR] vowel harmony (VH) in Bondu, a Dogon language of Mail. Data come from fieldwork and have not been published. While Bondu seems to have seven surface vowels, namely, 2 [+high +ATR] vowels ([i], [u]), a [–ATR +low] vowel [a], and a [±ATR] contrast in the mid vowels with front [e]/[ɛ] and back [o]/[ɔ], there is evidence for a more abstract vowel system phonologically consisting of ten vowels with certain high vowels being [–ATR] and certain low ones being [+ATR]. Evidence is from the perfective suffix /–ɛ̀/ which alternates between [è] ~ [ɛ̀], depending on the [ATR] value of the vowel in the verb root. (1) shows root-controlled [±ATR] harmony. (Forms are in 3rd sg.)

(1) a. [nòj–è] sleep   c. [dɔ̀g–ɛ̀] leave
b. [nèmbìl–è] beg   d. [kɛ̀ʤ–ɛ̀] cut

The data in (2) are more complex.

(2) a. [bìj–è] lie down   c. [gìj–ɛ̀] dance
b. [sùg–è] go down   d. [ʤùg–ɛ̀] recognize

While all root vowels in (2) are phonetically [+ATR,+high], we analyze those in (2c-d) as having an underlying [–ATR] feature. Here we follow Archangeli & Pulleyblank (1994) who view the feature combination [–ATR] [+high] as antagonistic: phonetically unrealized but phonologically present. Similarly, while there is only 1 surfacing [–ATR,+low] vowel in Bondu, roots with low vowels are divided between those that take a [+ATR] suffix (3a) and those taking [–ATR] (3b).

(3) a. [bàr–è] help   b. [pàg–ɛ̀] tie

We analyze the surface low vowel in (3a) as abstractly [+ATR, +low], (3b) as [–ATR, +low] with the underlying [ATR] feature of the root spreading to the suffix.

An argument for the abstract feature analysis comes from the complex alternations found with the imperative suffix in (4) (same roots from above).

(4) a. [nój–ó]   f. [dóg–á]
b. [némbíl–ó]   g. [kéʤ–á]
c. [bíj–ó]   h. [gíj–á]
d. [súg–ó]   i. [dʒúg–á]
e. [bár–á]   j. [pág–á]

We analyze the realization of the imperative suffix vowel by the spreading of the underlying [ATR] feature of the root vowel as in the perfective, but with an additional process raising the underlying [+ATR, +low] suffix vowel when preceded by a vowel that is underlying [+ATR, –low]. The unexpected realization of [+ATR] on the root vowels in (4f-g) (compare with 1c-d) is analyzed as a docking of a floating [+ATR] feature that comes with the imperative suffix. This is consistent with Wolf's (2007) view that floating autosegments avoid docking on morphemes that sponsor them since the suffix vowel in (4f-i) remains [–ATR]. (4) also is a case where both phonological VH and morphological VH apply to the same form in the sense of Finley (2008).

Further, an underspecification analysis of these data is problematic. First, there is no consistency whether [+ATR] or [–ATR] is underspecified given the behavior of high vowel roots in (2) and (4). Second, Bondu has certain dominant suffixes that change the underlying [±ATR] feature of the root vowel. One such suffix is the infinitive as in (5) which changes root vowels to [+ATR], while the medio-passive suffix changes root vowels to [–ATR] as in (6).

5. a. [nój–ílòŋ]   b. [kédʒ–ìlòŋ]   c. [dòg–ílòŋ]
6. a. [nɔj-ijɛ]   b. [kɛdʒ-ijɛ]   c. [dɔg-ijɛ]

This not only argues against a default feature analysis of Bondu [±ATR] VH, but also argues against theories like Bakovic (2000) in which only one value of the VH feature can be dominant.

Exploring stress deafness in English listeners: an experimental study.

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Word-accent, which is realised in English as stress, plays an important role in word recognition cross-linguistically (Cutler & Norris, 1988; Cutler, Dahan, & van Donselaar, 1997). However, English speakers have been shown to have difficulty acquiring word-accent in a second language (L2): English learners of Polish perform only slightly better than French learners of Polish in a stress identification task (Kijak, 2009) and English learners of Japanese have difficulty learning which words take which word-accent pattern in Japanese (Taylor, 2011). English listeners thus appear to be 'stress deaf', to adopt the term coined in influential research by Dupoux and Peperkamp (DP) on the perceptual behaviour of French listeners and learners (Dupoux, Peperkamp, & Sebastián-Gallés, 2001; Dupoux, Sebastián-Gallés, Navarette, & Peperkamp, 2008).

DP attribute 'stress deafness' to the degree of unpredictability in the word-accent system of a particular language (Peperkamp, Vendelin, & Dupoux, 2010), supporting a probabilistic model of linguistic knowledge: if word-accent is predictable, learners do not encode it in lexical representations in their first language (L1), nor, crucially, when learning an L2. If this account is correct, English learners should not be stress deaf, as the research above suggests them to be, since English stress is only partially predictable. Kijak (2009) attributes English listeners' apparent stress deafness to the low functional load of stress in English: fewer than two dozen minimal pairs can be found in English which contrast in stress alone (Cutler & Pasveer, 2006). However, Kijak also points out that the differing phonetic correlates of stress in a listener's L1 may affect their ability to perceive the position of L2 stress. In English, the primary phonetic cue to word-accent employed by listeners in lexical recall tasks has been shown to be vowel quality differences between stressed/unstressed vowels (Cooper, Cutler, & Wales, 2002; Cutler, Wales, Cooper, & Janssen, 2007). Since unstressed vowels are not reduced in Polish, the English listeners in Kijak's study may simply have failed to perceive stress since the targets displayed no vowel reduction.

In this paper we will present the results of a study (currently in progress) which i) replicates DP's methodology in order to confirm where English stands on their 'stress deafness' continuum, but also ii) introduces degree of vowel reduction as an additional independent variable. Use of DP's robust testing paradigm is needed, since most of the existing data available for the performance of English listeners comes from studies in which they served as a control group, and in which they have performed at ceiling level (Altmann & Kabak, 2010), just as DP's French listeners did, using a purely acoustic strategy, in AX discrimination tasks.

In a perception study, participants (30 naïve English listeners who are speakers of British English) 'learn' pairs of nonsense words from a purported 'new language' which differ minimally in one parameter: word-accent position in Condition 1, [naˈma]~[ˈnama], or word-medial consonant in Control Condition, [ˈmana]~[ˈmaka]. A word sequence recall task is then used to elicit responses from participants that tap into their abstract phonological processing, rather than a more surface acoustic memory strategy. For the core study, nonsense word stimuli from the DP studies are used, but to introduce our additional independent variable (vowel quality variation in stressed/unstressed syllables), a further set of stimuli are added in which the position of stress is additionally marked by vowel reduction in the unstressed syllable of the disyllabic target: Condition 2 e.g. [nəˈma]~[ˈnamə].

We hypothesise that native English listeners do encode word-accent in lexical representations (as DP predict) but that these representations are phonetically rich, and thus encode only the phonetic cues to word-accent which are used in L1 lexical recall (here, segmental, rather than suprasegmental). If correct these results support a hybrid model of lexical representations (Pierrehumbert, 2003; 2006), combining probabilistic knowledge with phonetic detail.

Morphological Locality

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This paper presents evidence that locality may be computed at the morphological level. In a nutshell, the idea is that sound patterns of one morpheme may depend on whether another morpheme follows, regardless of the phonological content of that second morpheme. I show that morphological locality can be captured with a simple modification of alignment constraints.

Phonological alternations are often local at the segmental level. For instance, Arosi assibilation applies whenever /t/ immediately precedes /i/ (/tirot-i/ → [siros-i]). Other patterns, however, impose additional morphological restrictions. Finnish resembles Arosi in all respects except that assibilation is limited to the morpheme boundaries (/tilat-i/ → [tilasi], *[silasi]).

One way to look at assibilation to say that some vocalic feature spreads to the preceding onset. In OT, these effects can be achieved with Generalized Alignment (McCarthy & Prince 1993). Here, I use a more recent version, Licensed Alignment (LA) proposed by Hyde (2008) and Jurgec (2011). To illustrate, consider a constraint with [**c**on**t**inuant] (1). This constraint is violated by triplets ⟨σ,×,[ct]⟩, when the relevant × precedes a [ct] segment within a σ. Associations represent synchrony and exclude precedence, so only non-continuants violate *σ[×,ct].

(1) *σ[×, continuant]
*⟨σ, ×, [ct]⟩ / σ
× [ct]

(2) *ω[*morpheme*, cont]
*⟨ω, *m*, [ct]⟩ / ω
m [ct]

(3)

/tilat-i/	*ω[*m*,ct]	DEPLINK(ct)	*σ[×,ct]
a. ti.la.t-i	*!		**
b. ☞ ti.la.s-i		*	*
c. si.la.s-i		**!	

The constraint in (1) can capture Arosi, but fails to account for Finnish. Now the comparison between classic alignment and LA becomes crucial; LA constraints have an additional category— × in (1). This category specifies a target, which is a segment in this case. However, one can easily imagine other kinds of targets. The challenge is that these targets are not random. In particular, features generally tend to be realized in prominent positions, and the current approach shares this idea with Positional Licensing (Steriade 1995; Zoll 1998; Walker 2001, 2011). One way to express prominence is through headedness. So, targets can be *prosodic heads* of syllables, words or empty prosodic domains (all root nodes). Furthermore, targets may also be *morphological heads* of words or heads of empty domains (all morphemes).

Let us look at these targets a bit closer. Prosodic targets can be used to capture many patterns, including vowel harmony or umlaut. Morphological targets, on the other hand, predict languages like Finnish. More specifically, one option is that the target of alignment is a morpheme (*m*). For instance, the constraint *ω[*m*,ct] (2) prefers spreading to particular morphemes. This constraint is violated when no segment of the morpheme in question is linked to [ct] that is itself also linked to the following morpheme. The effects of *ω[*m*,ct] can be seen in Finnish (3). Simply put, the dominant *ω[*m*,ct] limits spreading to heteromorphemic targets, DEPLINK[ct] prefers minimal spreading, while *σ[×,ct] chooses the actual onset target.

Such application of assibilation only across morpheme boundaries is a case of *Derived Environment Effects* (DEEs). In Finnish, DEEs are limited to the final root consonant. Several other cases of DEEs apply anywhere in the root. In Dutch, for example, [ɹ] is possible in unsuffixed loanwords (*Ba*[ɹ]*ack*). Yet when followed by any suffix, the rhotic must be replaced by the native one (*ba*[ʁ/*ɹ]*ack-en*). Assuming that [ɹ] is [**r**etrofle**x**], the constraint *ω[rx,*morpheme*] is violated by the ungrammatical **ba*[ɹ]*ack-en*, but crucially not by *ba*[ʁ]*ack-en* and *Ba*[ɹ]*ack*.

This paper shows that locality in phonology is sensitive to morphology. The proposal is actually quite simple: alignment constraints can have prosodic *or* morphological targets. This allows for a unified analysis of phonological and morphological locality.

Perceptual Similarity in Sonority Contours: Evidence from Early Irish Rhyming Patterns

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This paper aims to explain the basis of Early Irish rhyme and lend support to the concept of phonological similarity in sonority contours. Previous evidence for sonority contour-based similarity has come from patterns of epenthesis in consonant clusters (Flemming, 2008; Steriade, 2006) arguing that the perceptual distance between C_1C_2 and C_1VC_2 is smaller when there is a steep rise in sonority between C_1 and C_2 because that rise is more similar to the one between C_1 and an epenthetic vowel. Adapting this, I argue that in Early (Old & Middle) Irish rhyme, the relevant dimension of similarity was the sonority profile: the difference in sonority between the most and least sonorous points. This can be used to explain some puzzling facts about Early Irish rhyme, namely the division of rhymeable consonants into classes, the behavior of consonant clusters, and the behavior of rhymes of two syllables.

It has been noted (e.g. Tristram, 1995) that Irish rhyme is based on near-sameness rather than strict identity, as evidenced by the defined classes of consonants which can correspond in perfect Irish rhyme. These six classes are laid out by medieval Irish grammarians as follows:

(1) Class P: Voiceless stops: [p, t, k]
Class B: Voiced stops: [b, d, g]
Class F: Voiceless fricatives: [f, θ, x]
Class S: Sibilant: [s]
Class β: Voiced fricatives (β): [β, ð, ɣ] + singleton sonorants (N): [l, r, n, ṽ]
Class NN: Geminate sonorants: [lː, rː, nː, mː, ŋː]

The classes above show place of articulation was not important for similarity, but manner was. The division of these classes is straightforward if one thinks of them as divided by levels on the sonority hierarchy, as defined in Parker (2002), in (2b) with less sonorous segments to the left. Imperfect rhymes also point toward sonority as the key factor because rhymes could occur across the classes, but only into neighbors on the sonority hierarchy. Acceptable cross-rhymes are marked with an arrow in (2a). (Other factors are involved in [S] and the geminates.)

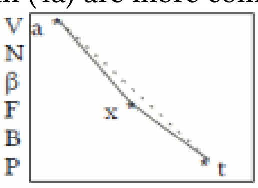
(2) a.	[Class P]	↔	[Class B]	↮	[Class F]	↔	[Class β]	↔	[Class N]
b.	[voiceless stops]		[voiced stops]		[voiceless fricatives]		[voiced fricatives]		[nasals | laterals | /r/]

Rhyme of consonant clusters shows the crucial similarity is in the sonority profile, which is a more precise comparison of the sonority contour of the rhyme, comparing the difference in sonority between the highest and lowest sonority point of each rise and fall, as well as the sonority levels of the lowest point(s). Clusters could be rhymed by forming a perfect rhyme (3a), skipping an intervening consonant (3b), or mismatching the intervening consonant (3c):

(3)	a. clecht ~ imthecht	/ɛxt ~ ɛxt/	("Saltair na Rann":93-94)
	b. cacht ~ námat	/axt ~ at/	(4035-4036)
	c. tlacht ~ comnart	/axt ~ art/	(15-16)

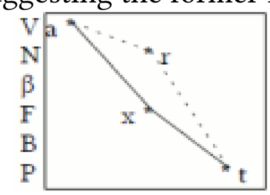
Rhyme domains which allow skipping segments occur only sparsely in poetry, and in rock lyrics Zwicky (1976:683) notes that only 3.1% of rhymes involving skipping a segment will skip an internal segment (e.g. "proud-ground") rather than one on the edge ("pass-fast"). The frequency of this option in Irish, and similar data in imperfect bisyllabic rhyme, makes sense if we compare the sonority profile rather than each segment. Initial frequency counts suggest that rhymes of the type in (4a) are more common than those in (4b), suggesting the former is a closer match:

(4) a.



- /axt/ (solid)
- /at/ (dotted)

b.



- /axt/ (solid)
- /art/ (dotted)

I argue that the "near-sameness" that has been noted in Irish rhyme is the result of a requirement that both RHYME! and MISMATCH! constraints be satisfied. RHYME! requires that strings of segments in the two lines stand in correspondence, and MISMATCH! requires that they not be completely identical. The ranking of faithfulness constraints relative to these shows the relative importance of these dimensions of similarity to Early Irish rhyme. For example, violations of MAX(C) and IDENT(PLACE) are tolerated, as is a limited degree of mismatch on sonority profile, but a large difference in sonority profile is not.

Asymmetric vowel epenthesis in Farsi as a Coda Condition effect

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Farsi avoids complex syllable onsets by vowel epenthesis, as many other languages do (see, e.g., Fleischhacker 2002, Shademan 2002). Whether the epenthetic vowel precedes the cluster or separates the consonants depends on the quality of the consonants. Coronal sibilant (i.e., /s/) plus obstruent clusters in loanwords are subject to prothesis ('ski' -> *eski*), while obstruent plus sonorant sequences are repaired by anaptyxis ('Florida' -> *felorida*). The same strategy is attested in Farsi speakers of English as L2 (Boudaoud & Cardoso 2009).

Gouskova's (2002) Optimality Theory analysis of similar patterns attributes the split to the Syllable Contact Law (informally, "sonority should decrease from one syllable to the next"; Vennemann 1988). This analysis is problematic since it cannot explain prothesis in cases where /s/ is followed by a more sonorous segment, as in the preferred Farsi renditions of test words such as the potential English borrowings *slang, snack, smoking* or *sweater*. In the Farsi rendition [ʔes.næk] of *snack* the contact between the first two syllables is of rising sonority, which violates the Syllable Contact Law. Fleischhacker (2002) proposes a series of perceptually grounded positional constraints against epenthesis of the type DEP-V/X__Y to account for asymmetric epenthesis patterns in complex onsets. With such constraints the pattern can be analysed by stipulating the appropriate DEP constraints.

In this paper, the asymmetries are attributed to an interaction of the constraint against string-internal insertion, CONTIGUITY, with the Coda Condition (Ito 1988), which allows only a restricted set of consonants in the syllable coda. Italian, for example, tolerates /s/, sonorants and the initial half of geminates in the coda, while other languages tolerate only sonorants or only nasals. The Farsi CODACOND is thus similar to the Italian one. The effect of this constraint in Farsi is surprising, since the language allows all sorts of consonants in coda position ([læb] 'lip'), even complex codas ([râst] 'right').

More evidence for the activity of CODACOND in Farsi comes from words with consonant clusters with an initial nasal. If prompted to realize *Ndebele, Mbeki* or *Mvuyelwa*, Farsi speakers apply prothesis, as in [ʔen.de.be.le]. The preferred realisation of the Russian name *mrɯl'ov*, however, shows anaptyxis, i.e., [me.ɾu.lov] > ?[ʔem.ɾu.lov]. The Coda Condition explains this split pattern easily. In the first set the nasal is followed by a homorganic consonant, which is allowed according to CODACOND, while in the last example the nasal is labial and the following consonant is coronal, i.e., the nasal's place of articulation is not licensed by the following onset, as it is in the first set of words with initial nasals. The analysis is illustrated in the tableaux below.

(1)	/snæk/	*CPLX$_{\text{ONS}}$	ONS	MAX	DEP-V	CODACOND	CONTIGUITY	DEP-C
a.	[snæk]	*!				*		
b.	[næk]			*!		*		
c.	[senæk]				*	*	*!	
d.	[es.næk]		*!		*	*		
☞ e.	[ʔes.næk]				*	*		*
(2)	/mɾɯlov/							
a'.	[mɾu.lov]	*!				*		
b'.	[ɾu.lov]			*!		*		
☞ c'.	[me.ɾu.lov]				*	*	*	
d'.	[em.ɾu.lov]		*!		*	**		
e'.	[ʔem.ɾu.lov]				*	**!		*

Phonology and Gender Assignment in Loanwords

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The present paper is an attempt to uncover how phonology can interfere with gender assignment in loanwords based on a corpus of French loans into Moroccan Arabic (MA).

While few researchers attribute gender assignment in loanwords to chance (Bakin 1980), many relate it to biological, phonological and semantic factors. Zamora (1975) claims that semantic translation of the loan determines gender more frequently than phonological shape. Poplack *et. al.* (1982) claim that the phonology and syntax of loanwords can be significant in determining gender. Smead (2000) finds that phonology has greater influence on determining gender. Walter (2006) attributes grammatical gender in loanwords to morphopnonoogical factors as well as the proportional distribution of gender in the lexicon.

Adopting an OT framework, I will investigate the role phonology plays in assigning gender to French borrowings in MA. Given that all nouns are either feminine or masculine in both languages, the prediction is that loanwords would preserve their original gender. Surprisingly, the data show a great deal of asymmetry in gender assignment. While some keep their original gender, others don't.

I shall examine these irregularities from the point of view the phonological criteria used in assigning gender to loanwords. These are, in turn, the result of prior phonological alternations applied to satisfy the requirements of the host language on such phenomena as phonemic patterns and word size.

1- Requirements on phonemic patterns include permissible vowels in MA. The latter needs to accommodate the French 14 vowels into its basic inventoy {a,i,u}. First, Fr. /e/ is generally adapted as [a]; final /e/ in /tablije/ 'apron' and /sãdrije/ 'ash tray' is adapted as [a] in MA, resulting in [Tabija] and [sandrija], respectively. Second, with the exception of /õ/, final nasal vowels are adapted as [a] in MA (/brãʃmã/ > [branʃma] 'connection', /restorã/> [restora] 'restaurant'. All these examples involve masculine Fr. words assigned feminine gender in MA. I will start by demonstrating that both cases of adaptation are phonetically driven. The auditory similarity between Fr. /e/ and MA /a/ result in the mapping of the former to the latter. Consequently, since MA feminine gender is marked by final-*a,* the last vowel in these examples is re-analyzed by the borrower as the feminine marker, hence, the words are assigned feminine gender.

2- Such loans as /trus/ > [latrus] and /tart/> [laTarT] 'tarte', where Fr. definite article –*la* is attached to are worth considering. The fact that this is manifested only in monosyllabic words drives to the conclusion that the high ranking of the constraints PwD (μμ) and Dep I-O in the native grammar explain such adaptation, which, in turn, clarifies why they are feminine in both languages.

After analysing these cases, I shall discuss the extent to which the phonological shape can predict gender assignment. I will conclude by arguing that although the (morpho) phonological shape is an important factor in determining gender, it interacts with other factors such as analogy and frequency of use of one gender or another in the lexicon of the host language, which suggests the impact role of probability matching in the borrowing language.

'Cycling within the Segment'

Labial harmony in Turkic, Tungusic and Mongolian languages

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In this paper, I argue in favour of a view in which harmony proceeds cyclically; in particular, labial harmony crucially precedes tongue root harmony.

Following the framework of Dependency/Government Phonology (Anderson and Ewen 1987/Kaye, Lowenstamm and Vergnaud 1985), I assume a small set of unary elements to be the building blocks of phonological representations. These elements have a dual interpretation, depending on their status as heads or dependents (van der Hulst 1988, 2005, 2012). Below, (1a) represents the aperture elements, and (1b) the color elements (cf. Odden 1991):

(1a)	*Head*	*Dependent*	**(1b)**	*Head*	*Dependent*
|∀|	ATR	high	|U|	back	round
|A|	low	retracted	|I|	front	---

Vowel harmony is assumed to operate under strictly local licensing between a head (the trigger) and a dependent (the target) (van der Hulst 2012). Representations of morphemes that vary according to their harmonic class are assumed to contain a variable harmonic element, which can be licensed by an adjacent instance of that element: a licensed (|U|) results in a labial vowel, whereas unlicensed (|U|) fails to impose labiality on its segment and surfaces as unrounded.

(2)	oɣo - lor 'child-PL'	**(3)**	kinige - ler 'book-PL'	(Yakut)
	AA A		∀∀ A A	
	U**U** » **(U)**		**(U)**	

I argue that labial harmony requires licensing by either (i) a bridge (Charette & Göksel 1994), which requires agreement for an element E (see (4)); or (ii) asymmetric licensing (Moskal 2012).

(4) **a.** ∀: Kachin Khakass, West-Siberian Tatar
b. A: Yakut, Altaic-B
c. I: Chulym Tatar, Kazakh, Karakalpak
d. I or ∀: Kyzyl Khakass, Nogai
e. I or A: Altai, Kirgiz-B, Ojrat, Teleut, Shor-A
f. I, ∀ or A: Shor-B

In addition, I propose that there is a crucial difference between lexical elements and derived elements. Lexical elements are always visible, whereas elements that are derived by harmony become visible in cycles *within the segment*. In Tungusic (Li 1996) and Mongolian (Svantesson *et al*. 2005) languages, we observe that they the primary harmony system involves the tongue root. Tongue root harmony involves the element |∀| acting as a variable, and |U|-licensing always requires an |A|-bridge. An |I|-bridge is not available in these languages, since front rounded vowels are absent from the inventories. However, an interesting asymmetry arises: in Turkic languages, |U|-licensing can be parasitic on an element that itself is the result of harmony (=licensed |I|'s deriving from palatal harmony), (4c-f); in contrast, in Mongolian and Tungusic languages, the element |∀|, which is the result of harmony, is not available as a potential bridge. I argue that there is an asymmetric relation between aperture elements (|A,∀|) and color elements (|U,I|), in that the process of licensing (i.e. harmony) proceeds cyclically, with the licensing of color elements preceding that of aperture elements; crucially, elements that are specified at the level of lexical representation are accessible at any point, but (syntagmatically) licensed elements only become accessible at the point of their licensing.

Moreover, this architecture allows for a natural account for the discrepant behaviour of /i/, which is opaque to labial harmony in Tungusic languages but transparent in Mongolian languages.

In sum, a dependency-based elemental approach captures the various requirements labial harmony is subject to by using a minimal set of elements. Furthermore, vowel harmony proceeds cyclically, with palatal and labial harmony preceding tongue root harmony, which accounts for the non-availability of |∀| as a potential bridge that would facilitate labial harmony.

The segment in monostratal phonology

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The segment, which is usually written as a single alphabetic symbol, has played a central role in phonological theories. It is typically considered that segments lie at the interface between prosody and melody: while they often function as the terminal units of prosodic structure, they can also be simultaneously viewed as bundles of melodic features.

Phonological studies have employed the notion of the segment in different ways as a means of capturing (i) lexical contrast and (ii) phonetic interpretation, both of these being indispensible notions for the purposes of phonological description: the first is one of the fundamental notions of phonological thinking while the second concerns the interface between phonology and the articulatory-perceptual systems. In classical phonemics (Jones 1950), for example, the segment is considered to be the minimal unit of phonological contrast as well as the minimal unit of phonetic interpretation. According to this view, features are no longer regarded simply as taxonomic properties of phonemes (cf. Trubetzkoy 1939). Early generative phonology provides another example, where in SPE the segment (i.e. a full set of distinctive features) is still the minimal unit of phonetic interpretation, but it loses out to features as the minimal unit of contrast. In the SPE framework, contrasts are expressed in terms of features, which are taken to be universal properties. Yet another view is to be found in frameworks which utilize monovalent primes (Anderson & Jones 1974, Anderson & Ewen 1987, Schane 1984, Harris 1999, Backley 2011), in which the segment does not play any contrastive or interpretable role in phonology. Both of these roles are taken over by features.

This paper compares the three traditions described above, by analyzing patterns of static distribution and dynamic alternation involving segments. It also discusses how the monovalent approach to segmental representation (where the feature, rather than the segment, functions as the minimal unit of both phonological contrast and phonetic interpretation) is appropriate in monostratal models of phonology (cf. Harris 2004), in which all intermediate levels of representation (to which redundancy rules and repair strategies apply) are excluded and in which lexical entries make specific reference to prosodic structure and melodic units (both of which are regarded as idiosyncratic, unpredictable properties). Ultimately, the paper concludes that, while the segment may continue to be employed as a convenient notion for describing phonological patterns, it can no longer be regarded as a formal representational unit in monostratal phonology.

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The representation of diphthongs in English in Strict CV Phonology

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In a strict CV approach (Lowenstamm 1996), "syllable structure" consists of a strict alternation of C and V positions, as a result of which the representation of long vowels, geminates and consonant clusters contains an empty nucleus. Ségéral and Scheer (1998), working on German in this framework, analyse diphthongs as closed syllables. Applying this to English (Received Pronunciation), and utilising trochaic (left-to-right) proper government (following Rowicka 1999), words like *meter*, *vector*, and *data* have the structures in (1a-c).

```
(1) (a)                      (b)                      (c)
    C  V  C  V  C  V         C  V  C  V  C  V         C  V  C  V  C  V
    |  |        |  |         |  |  |     |  |         |  |  |     |  |
    m  iː       t  ə         v  ɛ  k     t  ə         d  e  ɪ     t  ə
```

This, however, encounters problems, because diphthongs in English typically pattern with long monophthongs rather than with closed syllables, whereas their representations suggest otherwise. First, in stress assignment in verbs, closed syllables and syllables containing a long vowel or a diphthong all behave alike word-internally, counting as heavy. Word-finally, however, diphthongs form a natural class with long vowels in attracting stress (e.g. *dený*, *agrée*), as opposed to syllables closed by a single consonant which normally remain unstressed (e.g. *fínish*). Second, phonotactic restrictions exist between the melodies constituting a diphthong (i.e. only the combinations /eɪ, aɪ, ɔɪ, əʊ, aʊ/ occur, ignoring centring diphthongs resulting from pre-R breaking), whereas no such restrictions apply between short vowels and "codas" proper, in examples like *vector* in (1b), despite their identical structure.

The distribution of the glides /j, w/ becomes relevant in this context, and it is given in (2).

(2)	(a) V __ V	[əˈw̲eə]	'aware'	(d) V __ C	*[vʊj̲tə]	(cf. [vɛk̲tə])
	(b) # __ V	[j̲ɔːn]	'yawn'	(e) V __ #	*[hʊj̲]	(cf. [hʊk̲] 'hook')
	(c) C __ V	[ˈlɪkw̲ɪd]	'liquid'			

In English, /j/ and /w/ can precede a vowel (2a-c), but they cannot occur before a consonant (2d), or at the end of the word (2e) (cf. "real" consonants, like /k/, in these positions). The generalisation thus is that glides in English cannot be followed by an empty V position (3a).

```
(3) (a)                          (b)
      C  V  C  V  C  V             C  V  C  V  C  V
      |  |  |     |  |             |  |  |     |  |
    * v  ʊ  j     t  ə             d  e  ɪ     t  ə
```

Then, however, diphthongs in English cannot be represented as in (1c), because melodically the glides /j, w/ are equivalent to their short vowel counterparts /ɪ, ʊ/ in Government Phonology, containing the sole element **I** and **U**, respectively, and they differ only in the syllabic status of these melodies (e.g. Harris 1994). But the syllabic position of the melody **I** in (1c) and (3a) is also identical, and yet only one of them is well-formed.

I propose to represent diphthongs in English as in (3b). Since glides (i.e. C positions containing a single element **I** or **U**) must be followed by a filled V position, the melody of the underlying off-glide of the diphthong in (3b) spreads to the following V position. (Glides in (2), fulfilling a purely consonantal role, are of course still only connected to a C position, and forms like (3a) are ruled out.) The representation of long vowels and diphthongs is thus parallel in that both of their V positions are filled, whereas they differ from "closed syllables", whose second V position is empty. I will utilise this difference in accounting for their divergent behaviour with respect to stress word-finally. Phonotactic restrictions between the melodies constituting a diphthong can now follow from the proper governing relation contracted between the two V positions (whereas in a "closed syllable" (1b) the vowel is in no way related to the following consonant, and therefore no phonotactic constraints apply).

This analysis is further supported by the fact that some diphthongs are subject to additional phonotactic restrictions, imposed by a following consonant. Namely, /ɔɪ/ can only occur before alveolar consonants, and /aʊ/ before coronals. A representation connecting the off-glide only to the second V position cannot account for such restrictions, but if the melody is connected to both a C and a V position, then both types of interactions are expected.

Morphologically driven underapplication, lexical exceptions, loanword phonology and foreign language acquisition. Which is their lowest common denominator

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1. Introduction and goal. Languages exhibit a set of phonological processes which underapply due to morphological reasons, which have lexical exceptions and which show a different behavior in loanword phonology. The purpose of this paper is to draw attention to the correlation between these three phenomena, and to investigate its consequences on foreign language acquisition. This paper departs from the observation that those processes that underapply in a given language due to morphological reasons tend to coincide with those processes that have more lexical exceptions and with those processes which exhibit a peculiar behavior within loanword phonology. Overall, a gradation can be made between the processes which meet all these three factors, the processes which meet just some of them and the processes which do not meet any one. These facts should bring about a specific division between phonetically and phonologically driven processes, and the subsequent division of markedness constraints, and our expectation is that this must have significant consequences in the acquisition of a second language. The purpose of this paper is to provide empirical evidence in favor of this expectation. In order to illustrate our argument, we will focus on the phonology of Catalan, although it can be extended to the behavior of other languages. **2. Rebellions within the phonology of Catalan. 2.1** Deletion of posttonic *–n* and *–r* in (absolute) word-final position (*canço*[n]*eta* ~ *cançó*[∅]; *carrer*[ó] ~ *carre*[∅] ~ *carre*[∅]*s*) are processes which show morphologically driven underapplication (*i.e. Cat. enté*[n], *cantara*[n]; *Insular Cat. ma*[n], *reme*[n]; *mi*[ɾ], *conside*[ɾ]), many lexical exceptions (*be*[n], *qui*[n], *na*[n]; *ace*[ɾ], *ma*[ɾ], *co*[ɾ], *moto*[ɾ], *futu*[ɾ], *amo*[ɾ],) and a totally discrepant behaviour in loanwords (*canca*[n], *caima*[n], *taliba*[n], *toboga*[n], *oranguta*[n], *xama*[n], *dossi*[eɾ], *af*[eɾ], *amat*[eɾ], *someli*[eɾ]. **2.2** The process of cluster reduction of word-final homorganic lateral / nasal + stop clusters (*i.e. sant* [sán], *alt* [ál]) has no lexical exceptions but many instances of underapplication morphologically driven (*i.e. reso*[lt], *mò*[lt], [3]; *Eivissan Cat. (jo) ca*[nt], *(jo) sa*[lt]), and considerable variation in loanwords (*i.e. PowerPoi*[nt~∅], *Pai*[nt~∅], *Ka*[nt~∅], etc.). Epenthesis in word-final clusters to avoid a Sonority Sequencing Principle violation or a Sonority Gradiency violation (*i.e. centr*[ə]; cf. *centr-al*; *retaul*[ə]; cf. *retaul-et*) do not generally show lexical exceptions but underapplication morphologically driven (*i.e. Bal.Cat. compr* [kómpɾ], *entr* [ə́ntɾ]), and also a peculiar behavior in loanwords (*i.e. Cat. ra*[jl], *gaso*[jl], *ma*[jl]). **2.3** Vowel reduction of [é], [ɛ́] and [á] to [ə] in unstressed position underapplies due to paradigmatic pressure in the phonology of Majorcan Catalan (cf. *v*[é]*nt* ~ *v*[e]*ntet*; *esp*[é]*ra* ~ *esp*[e]*ram*), has many lexical exceptions in all Eastern varieties (*i.e. class*[e], *Balm*[e]*s*) and exhibits a totally irregular behavior in words of recent introduction (*i.e. cin*[e], *vàt*[e]*r*, *v*[e]*det*, *R*[e]*psol*; *Maj. p*[e]*l·lícula*; *b*[e]*nigne*). On the other side, there are processes which are never challenged in any of the depicted circumstances, like word-final obstruent devoicing (*i.e. llo*[β]*a* ~ *llo*[p]) or word-initial epenthesis (*i.e.* [ə]*steps*; [ə]*Sting*). (The data listed in this section can be found in Bibiloni 1983, 1998; Bonet & Lloret 1998; Lloret 2002; Mascaró 2002, 2005, and Pons 2002, 2007, 2011.) **3. Consequences on foreign and second language speech.** 50 native speakers of Catalan with an intermediate / a proficiency level in English and French were recorded reading 2 texts (written in English and French) which contained 96 occurrences of the phonic structures targeted by the processes depicted above during about 2.50–3 min. The same 50 native speakers were recorded uttering the same occurrences in isolation and within sentences. Up to now, a sample of 25 native speakers have been analyzed. The analysis of the production of these 25 native speakers confirm the prediction made above, with a gradation from *quasi* compulsory phonological processes towards absolutely avoidable ones: *a*) 84% of the cases with final obstruent devoicing *vs*. 16% of the cases with word-final voicing preservation; *b*) 51% of the cases with word-final cluster simplification *vs*. a 49% of the cases with cluster preservation; *c*) 36% of the cases with epenthesis in word-initial *sC*- clusters *vs*. 64% of the cases without epenthesis; *d*) 11% of the cases with word-final *–r* deletion vs. 89% of the cases with preservation; *e*) 0% of the cases with word-final epenthesis in sonority rising clusters *vs*. 100% of the cases with cluster preservation.

What aphasia brings to Government Phonology : /s+stop/ case.

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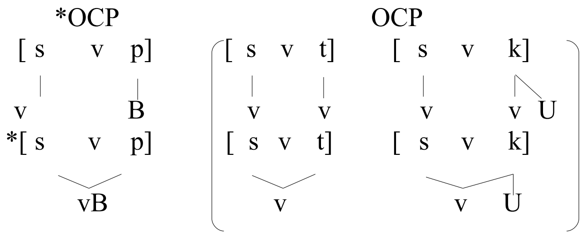
Introduction. The impoverishment, degradation and restructuration of the phonological system related to aphasia still raise many questions within the field of phonology. Paradoxically, although phonological processes found in aphasics have been, so far, associated to a simplification of structure and representation, some of their realisations can be much more complex than those found in healthy speakers.
The object of this presentation is to understand the phonological processes in aphasia in French through the observation and analysis of clusters and isolated segments in their two dimensions : segmental- through the notion of internal complexity [Harris : 1990] [Scheer : 1998] ; and syllabic- via government relations structuring their phonological representations [Scheer : 2004].
Theoretical tools. The status of [s+stop] cases as in *escargot* [ɛskaʁgo] is still unclear [Kaye : 1996] (heterosyllabicity, ambisyllabicity). However, building on the interrelation between the segmental and syllabic dimensions [KLV : 1985], [Cyran : 2010] and [Scheer : 2011] more particularly, we argue that the CVCV model can account for pathological data and sheds light on the processes underlying phonological disorders.
Experimental conditions. Our experiment is based on a sample of 15 aphasics (Broca, Wernicke, Conduction) of the stroke unit in Nantes Centre Hospitalier Universitaire : all patients suffer from aphasia caused by lesions resulting from brain damage.
Results and discussion. How do aphasic patients deal with clusters ? Here is a representative sample of "substitutions" produced by aphasics :

place	**[s+stop]**		**Aphasic's productions**
[dorsal]	*"snail"* *"cap"*	*escargot* : /ɛskaʁgo/ *casquette* **:** /kaskɛt/	[ekaʁgo], [tɛʁtaʁdo] [taspɛt], [kastɛt], [kopɛt]
[labial]	*"vaccum"*	*aspirateur* : /aspiʁatœʁ/	[asəpœtœʁ], [tastiʁatœʁ]
[coronal]	*"mosquito"*	*moustique* : /mustik/	[musik]

We show that phenomena, such as the elimination of branching constituents (but also the substitution of a segment in a clusters) observed in our results do not occur randomly. They result from conditions associated to the interaction between the syllabic position and the nature of the segment.
Our analysis of these results reveals different degrees of complexity of stop consonants and shows that the "substitutions" of segments systematically occur as a lenition pattern :

[dorsal] → [labial]
↓ ↓ /K/ turns mostly to /P/ and/or /T/ : /kaskɛt/ > [kopɛt]/ [taspɛt]
[coronal] /P/ turns mostly to /T/ : /aspiʁatœʁ/ > [tastiʁatœʁ]
↓ /T/ is the end result before the disappearance : /mustik/ > [musik]
Ø

It also accounts for the asymmetric behavior of clusters [st] and [sk] *versus* to [sp], as only the latter gives rise to schwa epenthesis ([asəpœtœʁ]). Building on the OCP and government constraints, such contrast in aphasic production comes as no surprise.



We argue that our study offers a more accurate description of the phonological architecture of French as well as of the linguistic tools necessary to describe it, at the same time contributing to a better understanding of the phonological operations associated with aphasia.

Tonal alignment as a phonological feature – evidence from Dinka

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While distinctive features play a prominent role in segmental phonology, their relevance to the phonology of tone is contested (Mazaudon 1988; Hyman 2010; Clements, Michaud & Patin, to appear). The tone features that have been postulated so far are equally problematic from a phonetic angle. Segmental features are supported by evidence that the states represented by the values of each feature identify phonetic qualities that make them stable and therefore attractive for speech communication (Stevens 1989). Stevens (1989:41) hypothesizes that 'quantal' relations of this kind, between speech production and speech perception, underlie all phonological distinctions. However, there is no evidence that the features that have been postulated to represent tone height reflect a quantal relation between fundamental frequency and perceived pitch (Stevens 1989:41, Stevens & Keyser 2010). Stevens & Keyser write (2010:13): "[W]hat if anything is quantal about [tonal distinctions]? Candidates for quantal characterizations of tone do not leap immediately to mind." In this paper, I present evidence of precisely such a quantal relation in tone. Different from earlier proposals regarding tone features, my argument relates not to tone height but rather to tone alignment.

The evidence comes from a contrast in tonal alignment in Dinka, involving two falling contours. The early-aligned falling contour is the most common allophone of the Low toneme; this fall sets in within the onset or early in the vowel. The late-aligned contour is the only realization of the Fall toneme; this fall sets in between 30 and 50 milliseconds into the vowel. A comprehensive production study, involving data from 13 speakers, reveals that the difference in alignment between these two patterns is maintained consistently across manipulations of time pressure (cf. Caspers & van Heuven 1993). It has been argued that this type of contrast does not to occur, because it would compromise contrast maintenance (Silverman 1997:479-480). To the contrary, the results show that a language can have two falling contours in its surface phonology, identical in excursion size and in range. Because tone is densely specified in Dinka, the contrast cannot be represented persuasively with reference to associations outside the syllable on which the falls are realized. Instead, a feature [+/- movement] is postulated to represent the alignment contrast under investigation. This feature is phonetically motivated, in terms of the model of pitch perception proposed in House (1990). The results also include evidence of enhancement/dispersion (Liljencrants & Lindblom 1972), hypocorrection (Ohala 1989), and three-level vowel length (cf. Remijsen & Gilley 2008, Odden 2011).

Templates in marginal data

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Goal – We show that Indo-European languages like French and German, which are a priori concatenative in essence, i.e. non-templatic, languages, may exhibit some templatic activity. The type of activity attested in French (F), German (G) and Serbian (S) is crucially distinct from that known from Semitic (non-concatenative) languages, and may be observed in non-conventional data, i.e. in what we call marginal data, data which are shared by only a subgroup of the linguistic community. Evidence in favour of the existence of templatic activity in non-templatic languages will be drawn from language games (F and S) and hypocoristic formation (F and G).

Templates – Traditionally, a template corresponds to an amount of (syllabic/phonological) space associated to a piece of morpho-syntactic information. For instance, in Classical Arabic, Form II, which is used to derive causatives, is built by geminating the second root consonant. Thus, all verbs of Classical Arabic shall have the same $C_1VC_2C_2VC_3$ shape in Form II (e. g. *kattab* "caused to write").

Marginal data – German, French and Serbian exhibit a kind of templatic activity slightly distinct from that attested in Classical Arabic: size/shape restrictions do express some (extra-)linguistic information (affection, games etc.) which, however, does not need to have any morpho-syntactic function; in some cases, this piece of information is already expressed elsewhere in the string.

German – In (Standard) German, diminutives are built by (optionally) truncating a form, and adding the high-vowel suffix *-i* to the obtained base to create a strictly disyllabic form (e.g. *Vat-i* on *Vater* "father", *Gis-i* on *Gisela* [surname]) (cf. Alber 2007, Downing 2005, 2006, Féry 1997, Itô & Mester 1997 a.o.). Truncation takes place in order to make a large base small enough to fit into a disyllabic form ending in *-i* (e.g. *Gis-i* on *Gisela* [surname]).

French – One way to build hypocoristics in French is to reduplicate one syllable of a name (e.g. *Mimi* for *Michel*), or part of it (e.g. *Dédé* for *André*, *Béber* for *Albert*) (cf. Plénat 1999). Crucially here, in an overwhelming majority of outputs, the result of the process is a disyllable. Another way to build a French hypocoristic is to construct an acronym (e.g. *JP* [ʒipe] for *Jean-Paul*, *JC* [ʒise] for *Jean-Christophe*). And again, the resulting output is most of the time a disyllabic item. We do observe exactly the same thing for hypocoristics built on the basis of common names (e.g. *traintrain* for *train* "train", *foufou* for *fou* "crazy"): the hypocoristics are most invariably disyllables.

The French language game known as Verlan, a syllable-inverting language (e.g. *teuté* on *tête*), is also subject to a number of size-relating constraints: i) Verlan is hardly able to manipulate bases which are more than di- or, more exceptionally, trisyllabic –such outputs are really scarce and felt awkward/"unnatural" by Verlan speakers as if such items were too big to play the game-; ii) when it does, then large bases have a tendancy to be reduced to/realized as disyllabic outputs (12 out of 53), iii) all monosyllabic CVC bases like *tête* [tɛt] "head" are turned into CVCV-disyllables (*teuté* [tøte]). Out of 788 outputs, 687 are disyllabic when we found only 452 disyllabic inputs (cf. Rizzolo 2010).

Serbian – Šatrovački (cf. Rizzolo 2007), the Serbian equivalent of French Verlan shows the same characteristics as its near cousin: i) monosyllabic inputs (23) all become disyllabic and, all as crucially, ii) out of 194 outputs 175 are disyllables. Trisyllables are scarce (19), which suggests, just as for French, that they are too big candidates for such a language game.

To account for such data, one needs to formulate a number of size/shape restrictions. In Modern Standard German, the restriction (i.e. disyllabicity + *-i*) indicates the presence of a *hypocoristic*. In French, the presence of a hypocoristic is betrayed by its shape (disyllabic). Verlan and Šatrovački impose size restrictions on the input as well as on the output, which makes it even easier to distinguish between Verlan/Šatrovački and French/Serbian. In these data, then, size restrictions are used for more or less marginal (extra-)linguistic purposes – and do not convey purely morphosyntactic information.

Another definition of "template" – Thus we must refine the standard definition of "template" given above and consider that a template is a size-restriction device which is available to all humans and which may – but crucially does not have to (since not every single language exhibits signs of templatic activity) – be summoned by individual grammars to convey some (extra-)linguistic information which may but does not have to be of morphosyntactic nature.

Discovering new vowel harmony patterns using a pairwise statistical model

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Vowel harmony is typically analyzed as a primarily categorical phenomenon: either a language has harmony, or it does not; either a given vowel in a given environment harmonizes, or it does not. However, a more gradient measure of harmony can reveal finer-grained information. For example, according to Harrison et al.'s (2002–2004) vowel harmony calculator (henceforth, VHC), an arbitrary word in Tuvan has a greater chance of being fully harmonic (94%) than one in Turkish (62%), even though both languages categorically have backness harmony. This fact cannot be predicted by traditional categorical analysis — it must be derived statistically. In this work, we propose a new method to statistically measure harmony based on feature agreement within pairs of tier-adjacent vowels, and we compare our results to those from VHC's whole-word measure. While the results of these methods correlate very well, they also differ in ways that open up new avenues for future research and provide interesting challenges for categorical phonological theories.

VHC uses the word as a categorical harmonic domain: if all of a word's vowels are the same for a given feature, then the word is classified as harmonic; otherwise, it is disharmonic. In particular, VHC considers Turkish words like *krematoryum* 'crematorium' and *ekskavatör* 'excavator' to be equally disharmonic for backness, even though *krematoryum* has three adjacent harmonic vowels. If a language's disharmonic words are unevenly distributed between these two types, the acquisition, productivity, and/or long-term stability of the harmony pattern could be affected.

We propose a statistical measure of harmony in a corpus that looks at adjacent vowel pairs instead of entire words. Unlike with VHC's exact measure of word-based harmony, analytically calculating a similar exact normalized measure for pairwise harmony is incredibly complex. It is much more tractable to use computer simulations to estimate it instead, so we bootstrap 2000 randomly generated corpora using the same vowel and word-length probability distributions of a given corpus. We then compare the proportion of harmonic vowel pairs in the original corpus to the distribution of the harmony proportions in the randomly generated corpora, calculating the original corpus's z-score: how many standard deviations it is from the mean harmony proportion of all of the randomly generated corpora. Crucially, because z-scores are inherently normalized quantities, they can be meaningfully compared between languages and/or features, allowing for synchronic and diachronic comparison of different harmony patterns within and across languages.

Our results for 15 languages correlate strongly with VHC ($r \approx 0.89$ for backness), which is expecetd: a language with many fully harmonic words should also have many harmonic vowel pairs. However, our model also reveals information that is missed by word-based statistics and traditional phonological analysis. For example, VHC finds that Estonian and Uzbek have little whole-word backness harmony, but we find that Estonian has a large z-score for pairwise harmony ($z \approx 24$), greater than Votic ($z \approx 13$), which is harmonic. This suggests statistically significant "hidden harmony" between vowels that need not extend to the entire word. We also find negative z-scores, such as for Uzbek's backness harmony ($z \approx -3$), which suggests "anti-harmony": a preference for disharmony. For Uzbek, anti-harmony reflects the result of the loss of historical harmony due to vowel merger, but such negative z-scores could also arise from other factors.

We have proposed a new statistical measure of vowel harmony, looking within pairs of tier-adjacent vowels, rather than across entire words. This model can be used on any corpus and can find at least two new pairwise harmony patterns that are invisible to more traditional analyses: hidden harmony (as in Estonian) and anti-harmony (as in Uzbek). These new patterns enrich traditional categorical descriptions of harmony, which opens new areas for understanding the fundamental nature of harmony and how to represent it formally in phonological theory.

Templatic Morphology and the Prosody of Moroccan Arabic

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In recent years, linguists have sought to explain Semitic root-and-pattern morphology from a universal perspective, doing away with such Semitic-specific constructions as the consonantal root and the pattern which are undesirable from a universal perspective (Bat-El 2003). Stem-based derivations alongside strict prosodic constraints are the tools linguists use to deny a highly-abstract and language-specific analysis of Semitic (Bat-El 1994, 2003, Ratcliffe 1997, Ussishkin 1999, 2000, 2003, 2005, Tucker 2010, but see also Kihm 2006).

Moroccan Arabic challenges this program because it shows Semitic morphology without the same sort of prosodic structures, such as the bisyllabic stem (e.g. *bab* ‘door’ and *bwib-a* ‘little door’ or *kəlb* ‘dog’ and *klijəb* ‘puppy’). Prior analyses consider consonant clusters licit in Moroccan Arabic (Bernouss 2007, 2009, Heath 1989, 1997, 2002; Keegan 1986a&b, Sayed 1981). A Moroccan specific analysis (Boudlal 2009) has used language-specific templatic constraints to account for the occurrence of initial consonant clusters (i.e. INITIAL-CC: Candidates must have an initial consonant cluster). This paper provides a prosodic analysis of the diminutive that uses the same prosodic machinery of other Semitic languages. This machinery uses types of constraints known to be independently required, fulfilling the goals of the theory of prosodic morphology (e.g. McCarthy 1993, McCarthy and Prince 1990) and generalized template theory (McCarthy and Prince 1995).

The syllable in Moroccan Arabic, however, is not as clear as it is in other languages. Recent work suggest that Moroccan Arabic has single consonant, syllable-like units (Boudlal 2009, Kiparsky 2003, Dell and Elmedlaoui 2002) which are supported by gestural evidence (Gafos et al 2010, Shaw et al. 2009). Here I follow Kiparsky (2003) and Dell and Elmedlaoui (2002), assuming that Moroccan Arabic disprefers consonant clusters: a structure like [.k.təb.] is preferred to the monosyllabic [.ktəb.]. This makes a prosodic analysis possible. The epiphenomenal [ə] largely makes arguments of consonantal roots vs. stems a moot point.

/bɣl+i$_d$/	*COMP	ALIGN-STEM,L;μ,L	ALIGN-DIM,L;STEM,L	ALIGN-DIM,R;σ,R
→a. [.b.ɣi$_d$.j$_d$əl.]			bɣ	
b. [.bi$_d$.ɣəl.]		b!	b	ɣəl
c. [.b.ɣil.]			bɣ	l!
/bɣl+i$_d$/	*COMP	ALIGN-STEM,L;μ,L	ALIGN-DIM,L;STEM,L	ALIGN-DIM,R;σ,R
→d. [.b.ɣi$_d$.la.]			bɣ	
e. [.bi$_d$ɣ.la.]		b!	b	ɣəl

This OT prosodic analysis of Moroccan Arabic relies on universal categories of morphology (roots, stems, and specific morpheme edges) and prosody (syllables and morae), aligning the left edge of the stem to the left edge of some mora. When alignment of the stem dominates infixation of a diminutive morpheme (i.e. ALIGN-DIMINUTIVE,LEFT;STEM,LEFT), we see that what appears to be surface clusters, (a) *bɣijəl* ‘little mule’ from *bɣəl* ‘mule’ in the tableau, is the optimal candidate, rather than candidate (b). Note that [ə] is epenthetic. Finally, the diminutive must be syllable-final (via alignment) which motivates germination in the masculine form (a is preferred over c) but not in the feminine (d).

This analysis also covers quadrilateral diminutives like *farut*, *fwirit* ‘key’ as well as forms with vowels (*bab*, *bwiba* ‘door’) with minor modifications.

Theoretically, this analysis not only makes Moroccan Arabic resemble other Semitic languages, but also extends generalized template theory and the universalist. Furthermore, this analysis is based on the experimental work of Gafos et al. (2010) and Shaw et al. (2009) and links the gestural results to the theories of Dell and Elmedlaoui (2002) and Kiparsky (2003), suggesting a physical correlate to the mora in Moroccan Arabic and laying the groundwork for additional investigations into prosody and articulation.

What is an “onsetless” syllable?

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Syllables without consonantal onsets have given phonologists fits for years. Though Onset is a widely accepted constraint, a number of languages allow systematic violations in initial position. Initial vowels may also be invisible for stress-assignment, reduplication, lengthening or tone, a fact that many authors attribute to some sort of prosodic deficiency. For example, Odden (1995) notes the lack of compensatory lengthening in Kikirewe when a glide forms from an initial vowel, and claims that the vowel is extraprosodic. However, he later (Odden 1996) presents reduplication data from Kikirewe in which onsetless syllables are copied into the reduplicant, undermining his earlier claim.

The prosodic implications of onsetless syllables also complicate analyses of syllabification. In Tashlhiyt Berber (TB), Onset violations occur only in phrase-initial position, yet onsetless syllables may be heavy for versification (Dell and Elmedlaoui 1988). In other words, prosody does not seem to require consonantal onsets in this language, yet they occur almost everywhere. Indeed, the need to allow initial Onset violations leads Clements (1997) to rank *Peak/t above Onset, resulting in a flawed syllabification of *r.fq* ‘be happy’, in which the fricative is incorrectly predicted to be the peak an onsetless second syllable. Another notorious challenge is Eastern Arrernte (EA). Breen and Pensalfini (1999) present evidence from stress assignment, reduplication, and language games indicating that all syllables in EA are vowel-initial. For example, the form *iterem* ‘thinking’ in the secret language Rabbit Talk, in which the initial constituent of the word is transposed to the end, yields *iremit*. A traditional CV-based analysis is problematic, since it is unclear how to derive the /it/ that gets moved.

In the Onset Prominence (OP) environment (Schwartz, 2010), which builds on recent insights into the structural nature of segmental representation (cf. Golston and Hulst 1999, Pöchtrager 2006), the behaviour of onsetless syllables is accounted for with a single representational parameter depicted in (1). Prosodically-active initial vowels are specified for the Vocalic Onset (VO) layer of structure, a specification lacking in prosodically inert onsetless syllables.

(1) Prosodically active (left) and inert initial vowels

From the OP perspective, not all processes involving onsetless syllables are created equal. Invisibility for reduplication and stress assignment suggests prosodic inertness. Conversely, the lack of both lengthening and tone-bearing ability is compatible with VO specification. The former, as well as syllabification facts in TB and EA mentioned above, fall out naturally from OP phonotactic mechanisms, rendering Onset (and perhaps Align) superfluous. Regarding the latter, the OP environment predicts that lexical tone and VO specification should be incompatible. Assuming VO-specified initial vowels bear phonetic marking, often realized as a drop in pitch (e.g. Hillenbrand and Houlde 1996), F0 effects at vowel onset may obscure the perceptibility of the tonal specification. In sum, VO parameters offer a simple and unified account of a range of problematic phenomena, and facilitate the formulation of new hypotheses for experimental phonetic study.

**The Acquisition of French liaison in L1 and L2:
different means to the same end?**

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Liaison, a phenomenon of external sandhi in spoken French, is without a doubt one of the phonological concepts which has most inspired contemporary phonology. However, while attempts to formalize the phonological phenomenon of liaison have been the focus of a vast body of work (see Tranel 1995, Côté 2005 for in-depth reviews), the developmental aspects of liaison in the phonological grammar of both children and adults have received considerably less attention.

In this paper, we examine the hypothesis put forth by Wauquier (2009) that there exist differing acquisitional strategies, and therefore differing processing strategies, in a first and second language (L1 and L2, respectively) with respect to liaison. Based on patterns of production errors in both L1 and L2 acquisition, Wauquier suggests that L2 learners process liaison at the lexical level based primarily on surface (and orthographic) forms, while L1 learners make use of a phonological strategy allowing them to create abstract generalizations based on the particular prosodic position of the liaison consonant (LC) and on the well-formedness constraints which regulate its surface realization. L1 production errors suggest that French-speaking children acquire liaison through grammatical generalizations based on obligatory liaison contexts (e.g. determiner (Word 1) + noun (Word 2), *un éléphant* 'an elephant'). For example, Wauquier cites errors such as the insertion of the wrong LC at the boundary between Words 1 and 2 as in *[le.ne.le.fɑ̃] instead of [le.ze.le.fɑ̃] for *les éléphants* 'the elephants'. This error suggests that the child has erroneously segmented the input *un éléphant* [ɛ̃.ne.le.fɑ̃] 'an elephant', analyzing /n/ as the onset of Word 2 instead of encoding it as a resyllabified LC belonging to Word 1.

Far less data on the L2 acquisition of liaison are available. What data are available suggest that the phonological opacity of surface forms in spoken French initially constitutes a major obstacle for L2 learners. Unlike L1 learners, L2 learners largely approach acquisition with representations of segmented lexical units already in place. Observed L2 errors include a lack of resyllabification of the LC and the use of the orthographic, as opposed to the underlying, consonant as the LC (e.g. *un grand ami* 'a great friend' produced [ɛ̃gʀɑ̃dami] instead of [ɛ̃gʀɑ̃tami]), suggesting lexically-constrained processing. However, Wauquier proposes that while L1 learners without exception eventually acquire stable, immutable representations of liaison consonants, L2 learners, even at advanced levels, may not encode, or may erroneously encode, the prosodic position of linking consonants in their phonological grammar of French.

We present more recent data from psycholinguistic experimentation suggesting that, while acquisition strategies may initially follow different paths in L1 and L2 development, L2 learners can indeed establish abstract generalizations of liaison that are in line with those of native speakers (see for example Shoemaker, 2010; Tremblay, 2011). We will present data exhibiting nativelike behaviour in both the production and perception of French liaison in late learners, attesting to the establishment of abstract constructions in advanced L2 learners and calling into question the existence of a critical period for the acquisition of this phonological phenomenon.

Licensing Licensing By Cue

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•Steriade's licensing-by-cue hypothesis (1997) proposes that contrastive cues are more likely to be expressed in contexts where they are better-recoverable by the listener. In its strictest form—that is, as an active synchronic pressure on phonology as expressed with optimality-theoretic constraints—licensing-by-cue has been challenged as being too strong (for example, Gerfen 2001, Hansson 2003, Yu 2004). In this presentation I defend a weakened form of Steriade's hypothesis, relegating it to a *diachronic* pressure whose presence is often observed in synchrony, though, to be sure, may be obscured by subsequent diachronic developments (this is, basically, both Hansson's and Yu's proposal). The focus of my talk is a consideration of several cases of long-distance-triggered deletion (in Latin, in Sanskrit, in American English), arguing that Steriade's approach provides a more satisfying account of these phenomena in comparison to Ohala's "hyper-correction" proposals (e.g. 1981).

•According to Ohala, listeners may misinterpret a context-independent property as context-dependent one. For example, in Latin **kʷiŋkʷeː** > **kiŋkʷeː**, assuming an intermediate stage during which a degree of labiality persists from the first labial element to the second velar release (**kʷi̹ŋk̹ʷeː**), a listener may mistakenly conclude that the labiality on the first vowel is simply an automatic "spillover" from the second velar release interval, so they "undo" it, "mis-" attributing it to solely the second **k**. The result of such a hyper-corrective sound change is labial dissimilation. As Ohala astutely notes, such patterns are typically observed among features that are not limited to short duration (stricture features), but instead are present across spans (labiality, tongue body features, tongue root features, laryngeal features, etc.).

•The problems: a careful reading of Ohala's approach reveals that he proposes a *conjectural* mismatch between *speaker intent* and *listeners' conclusions about speaker intent*. The acoustic signal itself is rarely ambiguous. Ohala himself implicitly assumes as much, as his examples rely on the role of listeners formulating hypotheses about speakers' *mental states*, not about these speakers' *physical states*; recall, hyper-correction crucially relies on such hypotheses. Moreover, Ohala's approach ultimately makes crucial reference to (1) the traditional segment, in the sense that listeners are formulating hypotheses about the *intended segmental affiliation* of particular acoustic cues, and (2) underlying representations, in that he assumes listeners "undo", "factor out" or "correct" supposed "distortions" in the speech signal. Such distortions, note, may be characterized as such only if we assume the existence of an idealized "undistorted" (underlying, phonemic) state. Such an assumption is part and parcel of structuralist, and especially generativist phonology. Additionally, Ohala cannot account for the observation that such long-distance dissimilations typically involve deletion at the *beginning*-edge of the span, not the *final*-edge of the span (Grassman's Law, rhotic dissimilation in American English [Hall 2009], etc.).

•The licensing-by-cue alternative: listeners may indeed hear a span of labiality from the first velar-vocoid sequence through the second velar-vocoid sequence (**kʷi̹ŋk̹ʷeː**), but the cues to this labial posture are *less* saliently encoded on the first of these sequences, *more* saliently encoded on the second. This is due to the presence of pervasive labiality during the early portion of the span, acoustically encoded as a rather meager F2 transition during the glide-vowel span (**kʷi̹ŋk̹ʷeː**). By contrast, the second glide-vowel sequence is characterized by a robust F2 transition, due to the change in lip posture from rounded to unrounded (**kʷi̹ŋk̹ʷeː**). The result is a span of labiality with its cues most prominent during the second glide-vowel sequence. Due to the acoustic robustness of these particular transitions, listeners may attend to—and come to rely most heavily upon—this particular acoustic component of the span. In time, the cues that precede this latter velar-vocoid sequence may become less important, thus precipitating their diachronic demise.

•The Implications: Here, then, is a licensing-by-cue account of the dissimilatory change that (1) offers a compelling explanation for the *final*-edge robustness observed in these patterns, and (2) involves no guessing games, no segments, no derivations, no underlying representations…just licensing-by-cue.

Ineffability and UR Constraints in Optimality Theory

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Phonologically-conditioned ineffability (PCI) occurs when phonological constraints block affixation. For example, Hilpert (2007) and Mondorf (2009) find that English adjectives are less likely to form the comparative with the suffix *–er* if the adjective ends in a liquid (e.g., **austere+er*, **ill+er*). When ADJ+*er* is ineffable, English speakers must use the periphrastic, *more* ADJ, to express the comparative instead.

In the MPARSE theory of Prince & Smolensky (1993), PCI occurs when an input maps to the null parse, the ineffable candidate. Under this view, the input contains a fully-specified underlying representation (UR) which fails to surface. In other theoretical accounts of PCI, the input to EVAL is also a UR and the output is similarly deficient (e.g., Raffelsiefen 1998, Orgun & Sprouse 1999, Kager 2000, Walker & Feng 2004). One problem for the standard view is its incompatibility with phenomena showing that phonological markedness can influence the choice between URs. For example, affixes exert phonological selectional restrictions on stems, and markedness constraints can select between allomorphs (see Wolf 2008 for an overview).

This paper shows how PCI can be accounted for in a framework where the selection of URs occurs at EVAL (UR-in-EVAL: e.g., Bonet 2004, Boersma 2006, Wolf 2008). Under this account, phonological constraints can block the selection of a UR. When a candidate lacking a UR is optimal, the result is ineffable. UR constraints militate against ineffability, demanding that input morphological structure be realized by phonological structure. For example, the constraint COMPARATIVE=/əɹ/ requires that the comparative suffix be realized by the UR /əɹ/. When a UR constraint is ranked below a conflicting markedness constraint (e.g., *[ɹəɹ]>>COMP=/əɹ/), a candidate containing that UR may lose, resulting in ineffability. This approach to ineffability, in which the selection of URs occurs at EVAL, has two advantages over the MPARSE model.

1. In the MPARSE model, the null parse cannot violate faithfulness constraints. If it did, the null parse would nearly always lose (McCarthy & Wolf 2007). The requirement that the null parse violates no faithfulness constraints is stipulative (for similar criticisms: Kager 1999, Orgun & Sprouse 1999, Nevins and Vaux 2003, Rice 2005). Under the UR-in-EVAL analysis, the requirement that an ineffable candidate violates no faithfulness constraints is satisfied without stipulation, since ineffable candidates lack URs and vacuously satisfy faithfulness constraints.

2. A common property across cases of PCI is that ineffability is subject to lexical exceptions (Hetzron 1975, Orgun & Sprouse 1999, Fanselow & Féry 2002). This is true of PCI in English. Although [ɹəɹ] and [ləɹ] are avoided in English comparatives, the sequences occur elsewhere in the language, even at morpheme boundaries, as in *referrer* and *caller*. Furthermore, in Hilpert's (2007) counts of comparatives from the BNC, some l-final and r-final adjectives arbitrarily prefer *–er*, contrary to the general pattern (*able+er, $^{\surd}$humble+er). Lexically-specific MPARSE constraints are unable to account for many of these patterns (McCarthy & Wolf 2007:19). Under the UR-in-EVAL analysis, lexical exceptions follow straightforwardly from the high ranking of the corresponding UR constraints, which are by definition lexically-specific.

The UR-in-EVAL analysis provides a unified account of ineffability and other cases of phonologically-conditioned UR selection. Just as phonological constraints can choose between two URs, phonological constraints can block the selection of a UR, resulting in ineffability.

Ambiguity-driven dispersion in exemplar and prototype models

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This talk uses computational modelling to show that the dispersion of phonetic categories driven by selection against ambiguous tokens is not exclusive to models relying on exemplar-based storage. The results presented here can be seen as an extension of modelling work presented in Wedel (2004), and certain ideas in Labov (1994). The significance of these findings is that they suggest that dispersion effects should emerge automatically in any model of phonetic implementation, regardless of the exact nature of the mapping between abstract categories and their phonetic realisations. The availability of a simple emergentist explanation for dispersion that is compatible both with generative and non-generative models of phonetic implementation casts doubt on the validity of accounts based on innate constraints (Flemming, 2004).

Ambiguity-driven dispersion (proposed in Labov 1994 and further elaborated in Wedel 2004) is based on the following two assumptions: (i) each production of a given category has some influence on future productions of the same category, and (ii) the influence of phonetically ambiguous productions is weaker than that of non-ambiguous productions. These assumptions have important consequences for the evolution of phonetic categories over time: the influence of non-ambiguous tokens persists longer than that of ambiguous tokens, which creates a selection pressure for distinctiveness. As a result, categories drift apart and remain well-separated.

The two assumptions presented above receive support from a number of sources. As for (i), Goldinger (1998) presents evidence that previously perceived tokens can temporarily influence a listeners' productions, while Harrington (2007) demonstrates that prolonged exposure to a given speech pattern can lead to change within the lifetime of a single individual. There are several arguments that support the second assumption as well. In some cases ambiguous tokens may not be recognised at all and thereby fail to contribute to the update of phonetic categories. Moreover, an ambiguous token may be assigned to the wrong category, which also drives categories apart through a mechanism termed 'variant trading' in Blevins and Wedel (2009).

Wedel (2004) presents simulations of the evolution of sound systems which implement the above assumptions in a straightforward way: since categories are represented by phonetically detailed exemplars, category update consists in the addition of new exemplars; misperception and miscategorisation are then modelled as a failure to add ambiguous exemplars to the correct category representation. These simulations produce the expected results: phonetic categories are gradually pushed apart in phonetic space. However, exemplar-based production and perception are not necessary prerequisites for ambiguity-driven dispersion. This is due to the fact that the two assumptions underlying ambiguity-driven dispersion both relate to the update of categories, but not to the way categories are represented in memory. Since exemplar theory only concerns the representation of categories, but not their update, similar effects should emerge in other models of category representation as well. This is confirmed by the fact that the exemplar-based simulations discussed above can also be reproduced in prototype-based frameworks.

This finding has several important consequences. First, it helps to clarify the notion of ambiguity-driven dispersion through identifying the update of categories as its locus and separating it from particular theories of category representation. Second, it allows the argument about ambiguity-driven dispersion to be reformulated in a way that makes it clearly relevant to generative models of phonology and phonetics as well. Even researchers who object to the idea of exemplar-based storage have to assume that phonetic implementation consists of a mapping between an underlying category and some type of probability distribution over phonetic space (whether this mapping is achieved by rules, constraints or some other device does not change the core of the argument). Since there is good evidence that this mapping is subject to continuous update and is affected by an implicit selection pressure for distinctiveness, ambiguity-driven dispersion is just as likely to occur in generative models of phonetic realisation as it is in exemplar-based models. Moreover, the fact that dispersion happens automatically in any system of phonetic implementation that allows for category update makes nativist theories based on constraints for maximal perceptual distinctiveness such as Flemming (2004) redundant.

How Palatalisation in Italian Verbs is a Regular Process

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Introduction. In Italian, velar stops [k,g] palatalise to affricates [tʃ,dʒ] if followed by a front vowel [i,e]. When root-final [k,g] is followed by suffix-initial [i,e], palatalisation is expected, but the process is uniform in neither nouns (Giavazzi 2010) nor verbs. I demonstrate that the seemingly irregular palatalisation patterns of under- and overapplication at the root-suffix boundary in Italian verbs are entirely predictable by formalising a base-to-derivative correspondence (Benua 1998), in which the infinitive acts as base (as the phonologically informative member of the paradigm: Albright 2002) and inflected verbs are its derivatives.

Overpalatalisation & -ere verbs. I propose here that segments in inflected verbs are faithful for stridency *when that same segment is stressed in the infinitive*. Three constraints are used:

ID(STRID) / $C_{[+\text{STRESS}]}$ (BD) : Stressed Cs in a base (infinitive) retain stridency in derivatives
ID(STRID) (IO) : Cs in the input must match for stridency in the output
*KI : No velar stop to front vowel sequences

Verbs like *piacére* overpalatalise: their infinitive's stressed syllable contains an affricate. Verbs like *víncere*, with the affricate unstressed, palatalise normally. (*-o*, *-i* are PRES 1, 2SG).

(1) *piacére* (to please) → *piaccio*, *piaci* (overpalatalisation)

/pjak+o/	ID(STRI) /ć (BD)	*KI	ID(STRI) (IO)
pjá.ko	*!		
☞ pjá.tʃo			*
Base = Inf: pja.tʃɛ́.re			

/pjak+i/	ID(STRI) /ć (BD)	*KI	ID(STRI) (IO)
pjá.ki	*!	*	
☞ pjá.tʃi			*
Base = Inf: pja.tʃɛ́.re			

(2) *víncere* (to win) → *vinco*, *vinci* (normal palatalisation)

/viŋk+o/	ID(STRI) /ć (BD)	*KI	ID(STRI) (IO)
☞ víŋ.ko			
vín.tʃo			*!
Base = Inf: vín.tʃɛ.re			

/viŋk+i/	ID(STRI) /ć (BD)	*KI	ID(STRI) (IO)
víŋ.ki		*!	
☞ vín.tʃi			*
Base = Inf: vín.tʃɛ.re			

As verbs ending in *-cere* or *-gere* are rare, I present results of a wug-type experiment (Berko 1958) on stress assignment and conjugation of nonce-verbs with these endings. Preliminary results indicate that, as with the verbs above, speakers assign stress to the initial syllable when heavy, then palatalise normally (3a), or otherwise assign penult stress and overpalatalise (3b):

(3) a. 'fól.tʃɛ.re' → fól.ko, fól.tʃi   b. 'po.tʃére' → pó.tʃo, pó.tʃi

Thus, palatalisation as derived above is productive & stem URs ending [k,g] are recoverable.

Faithfulness to +/- stridency. The analysis extends to all verbs ending *-are* & *-ire*. These always have penult stress. Now, the [-strident] feature of the stressed onset in *pagáre* (to pay) blocks palatalisation, while the [+strident] feature in *cucíre* (to sew) causes overapplication:

(4) *pagáre* → *paghi* (underapplication) & *cucíre* → *cucio* (overapplication)

/pag+i/	ID(STRI) /ć (BD)	*ki	ID(STRI) (IO)
☞ pá.gi		*	
pá.dʒi	*!		*
Base = Inf: pa.gá.re			

/cuk+o/	ID(STRI) /ć (BD)	*ki	ID(STRI) (IO)
cú.ko	*!		
☞ cú.tʃo			*
Base = Inf: cu.tʃí.re			

Conclusion. My analysis derives all palatalisation patterns. This bears on Pirelli & Battista's (2000) listing theory where Italian verb stem variation is too unpredictable to be phonological.

Why a phonological contrast does not prime a perceptual contrast in L2 VOT

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L2 phonological studies on the acquisition of segmental contrasts generally show that there are virtually no learning difficulties in cases where the L2 (target language) segmental inventory forms a sub-set of the L1 phonological inventory. This follows from the expected positive transfer from the L1; contrasts already present in the L1 are employed in the production of L2 contrasts. This paper presents counter-evidence to this position showing that Saraiki (Indo-Aryan) learners of English have difficulty in the production of English initial aspirated voiceless stops despite the fact that Saraiki has a 4-way voicing contrast in stops. Thus while English is an aspiration language with a 2-way contrast Saraiki has both voiced and voiceless, plain and aspirated stops.

From a phonological point of view, treating English as an aspiration language implies the presence of an $|\underline{\mathrm{H}}|$ element denoting aspiration to capture the plain vs. aspirated voiceless contrast as $|\underline{\mathrm{U}}$ ʔ $\mathrm{H}|$ for [p] and as $|\underline{\mathrm{U}}$ ʔ $\underline{\mathrm{H}}|$ for $[p^h]$ (cf. Backley 2011, note that the difference lies in the headedness of |H| indicated by underlining). By comparison Saraiki with a 4-way contrast also has these two representations in addition to their voiced counterparts and would as such be expected to show no difficulty in the L2 acquisition of voiceless aspiration.

In an experiment with 30 UK-based Saraiki learners of English the results show that Saraiki learners replace English voiceless aspirated stops with their plain counterparts. If the results were due to allophonic versus phonemic distribution of the aspiration contrast in English v. Saraiki we would expect a performance at chance level with a 50-50 split between productions of English $[p^h]$ as either aspirated or plain. The significant treatment of English $[p^h]$ as plain [p] thus requires some explanation and we treat this as following directly from perception owing to differences in the VOT systems of English and Saraiki.

As has been pointed out in various studies (Lisker & Abramson 1964) English has a voicing lag for voiceless aspirated stops and neutral or zero VOT for voiceless unaspirated stops (perceived as "voiced" initially). This system is usually contrasted with 2-way voicing languages like French with zero VOT and voicing lead. The question then is how the 4-way contrast of Saraki fits into this system. Our findings suggest a long voicing lag for voiceless aspirated, zero to short voicing lag for plain unaspirated, short voicing lead for breathy voice and long voicing lead for plain voiced. Furthermore seen from the point of view of VOT ranges (VOT range calculated as 2 Standard Deviations of mean VOT) where English produces its plain and aspirated voiceless stops within the same range, Saraiki must be argued to have two distinct VOT ranges for the production of its plain and aspirated voiceless stops. The L2 results follow from the fact that Saraiki learners correlate their plain voiceless stop VOT range to the sole English VOT range on the basis of perception because the two VOT ranges overlap. Saraiki learners of English do not correlate aspirated English stops with aspirated stops in Saraiki because the English VOT range fails to act as sufficient cue to trigger perception of aspiration, which is triggered by a greater VOT range in Saraiki. This paper thus contributes to our understanding of finer details in the perception of voicing and provides an explanation of the mismatch between phonological representation and unexpected learning outcomes.

Furthermore the widely recognized VOT variation with place of articulation is also attested in the learning scenario with the acquisition path: dorsals ≫ labials ≫ coronals. This too, we argue, follows from perception in that it is the greatest increase in VOT (velars) that is closest to the Saraiki aspiration range that is first to emerge.

STRATAL OPTIMALITY THEORY:
THE RIGHT MODEL FOR HUNGARIAN INFLECTIONS

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In this presentation I will argue that Stratal Optimality Theory (Kiparsky 2000, 2003, 2011, Bermúdez-Otero 2011, to appear, and others) affords insightful analyses for a wide range of data in the inflectional system of Hungarian that hitherto have eluded investigators. I will offer novel solutions and argue against alternative treatments in the literature for two of these facts.

1. "Lowering" is responsible for the appearance of the low vowel A (= *a*/*e* by vowel harmony) in the initial position of a host of inflectional suffixes where otherwise the mid vowel O (= (*o*/*ö*/*e*) is countenanced. (I will use Hungarian orthographic symbols throughout.) There are two main sources for "lowering." The first is a closed but large set of nominal stems, numbering over 400 (and a few derivational suffixes). Thus, while the initial vowel of the plural and accusative suffixes are generally mid vocalic (cf. *drót-ok* 'wire-PL' and *drót-ot* 'wire-ACC'), it is low after a "lowering" stem: e.g. *ház-ak* 'house-PL,' *ház-at* 'house-ACC.' The other source for "lowering" is found in verbal and nominal inflectional suffixes in case they follow another inflectional suffix rather than the stem: e.g. *drót-ok-at* '*wire*-PL-ACC' (compare *drót-ot*). The conventional analysis (see Siptár & Törkenczy 2000, among others) is that all inflectional suffixes ending in a consonant are marked for "lowering": e.g. /$ház_A$ + V_ek_A + V_et_A/ → *ház-ak-at*. ($_A$ = floating LOW feature; V_e = "empty" V slot.)

My proposal is to treat the O and A realizations of V_e in terms of two separate default constraints. Stratal OT provides just the right framework for such an analysis. Accordingly: (1) the STEM level morphology (M) provides a template for stems (bare root + optional derivational suffixes). What makes Hungarian interesting is that V-initial inflectional suffixes are assigned to both the STEM level and WORD level M, subject to the STEM level constraint that an inflectional suffix can only attach to a derivational unit (i.e. an inflectional suffix can not follow an inflectional unit). (2) In the STEM level phonology (P) the default value of V_e is O. (3) In the WORD level M, additional inflectional suffixes may be added to satisfy the WORD level morphological template. (4) In the WORD level P, the default value of V_e is A. E.g.: STEM level M: /drót + V_ek/ 'wire-PL' → STEM level P: *drótok* → WORD level M: /drótok + V_et/ 'wires-ACC' → WORD level P: *drótokat*.

2. In verbs, A can break up the sequence CCC, where the last C is coronal ([+consonantal] in Vago 1980): e.g. *ad-nak* 'they give' vs. *áld-anak* 'they bless.' I will propose that V_e is inserted at the WORD level in satisfaction of the (WORD level) constraint *CCC (omitting some detail); proper constraint ranking will rule out other possible outputs, such as CVCC, CC; as expected, V_e is filled as A by WORD level default. (I will not account for the high level of intra- and inter-speaker variability of epenthesis.)

Verb stems ending in a long vowel followed by a consonant allow WORD level epenthesis (e.g. /ásít + ni/ 'yawn-INF' → *ásít-ani* [ɑːʃiːtɒni]). The stem final V:C sequence will be analyzed in terms of VCC, where VC hook up to the same vowel melody (= long vowel); see Vago (1980). The fact that such stems condition epenthesis is automatically explained.

If geminate consonants are analyzed in terms of length (CC), as in Selkirk (1990) and Ringen & Vago (2010), they are expected to be able to serve as context to epenthesis, as in the input /hall-ni/ (= CVCC-CV) 'hear-INF.' Not so under the conventional weight analysis (moraic C), as in Hayes (1989) and Topintzi (2011), among others: /hal-ni/. Facts like *hall-ani* argue against the conventional representation of geminates.

Where an Illusory Vowel Goes: An Experimental Investigation of Consonant Cluster Perception

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This study presents a comprehensive typology of epenthesis positioning in loan adaptation and provides a P-map (Steriade 2001/2009) analysis of this typology. The results of a perception experiment support the hypothesis that the epenthesis asymmetry results from the perceptual similarity between a consonant and an epenthesized (CV or VC) output.

Typology. In loan adaptation, vowel epenthesis frequently occurs as a repair, when a cluster of a source language is phonotactically illegal in the borrowing language. The most notable previous finding has been that the position of epenthetic vowels differs depending on the type of cluster; sonority-rising clusters, especially stop-sonorant (TR), are more likely to be split by an epenthetic vowel than sonority-falling clusters, especially sibilant-stop (ST), e.g., 'plastic' > [bilastik] (internal epenthesis) vs. 'study' > [istadi] (external epenthesis) (Egyptian Arabic; Broselow 1992). This study investigates epenthesis patterns in all possible types of clusters, both in word-initial and in word-final positions, from a cross-linguistic survey of loanwords. From the results, I propose new generalizations about the preferred site of epenthesis. First, if a cluster contains a stop, a vowel is epenthesized *after* the stop, e.g., 'button' > [pət^{h}ɨn], 'camp' > [k^{h}ɛmp^{h}ɨ] (Korean; my elicitation). Second, if a cluster contains a sonorant, a vowel is epenthesized *before* the sonorant, e.g., film > [filim] (Hebrew; Cohen 2009). By focusing only on initial clusters (Gouskova 2003, Steriade 2006) or on ST and TR clusters (Broselow 1992, Fleischhacker 2001, 2005), previous work has failed to identify the current broad generalizations and cannot uniformly explain the cases where the epenthesis patterns are different word-initially and word-finally, e.g., mnemonicheskij (Russ.) > [ymnemonicheskij] 'mnemonic' (Kirghiz; Gouskova 2003) with external epenthesis vs. gimn (Russ.) > [gimun] 'hymn' (Kirghiz; my elicitation) with internal epenthesis. Clusters with a word-initial fricative show complex patterns that are incorporated into the full analysis but not discussed here for simplicity.

Experiment. My hypothesis is that the typology results from perceptual similarity between a consonant and its epenthesized form. Specifically, a stop is perceptually more similar to a stop-vowel sequence than to a vowel-stop, and a sonorant is perceptually more similar to a vowel-sonorant sequence than to a sonorant-vowel. To confirm this hypothesis, an XAB discrimination task was conducted with English speaker subjects. Stimuli were a nonce word containing a consonant cluster in word-initial (C_1C_2í:bna) or word-final (napí:C_1C_2) position and two [ə]-epenthesized forms (C_1əC_2í:bna, əC_1C_2í:bna / napí:C_1əC_2, napí:C_1C_2ə), recorded by a Russian and an Arabic speaker. Results from the first 10 subjects show that the perceptual similarity judgments are consistent with the typology, providing initial support for the current hypothesis. Epenthesis was preferred *after* a stop (77%: initial 65%, final 89%), *before* a nasal (70%: initial 71%, final 69%), and *before* a liquid (84%: initial 76%, final 92%).

Analysis. Based on the P-map hypothesis, the typology of epenthesis positioning can be accounted for by the fixed rankings of correspondence constraints in (1), projected from the perceptual difference from the experimental results. A faithfulness constraint prohibiting a more perceptually salient change outranks a faithfulness constraint prohibiting a less perceptually salient change. Since a constraint prohibiting epenthesis, DEP-V, before a stop is always ranked over DEP-V after a stop (1a), an epenthetic vowel after a stop is favored. Similarly, for sonorants, an epenthetic vowel appears before the sonorant, where its insertion is penalized by lower ranked DEP-V constraint (1b). Consequently, it will be shown that the site of epenthesis, both word-initially and word-finally, can be uniformly explained by the proposed fixed rankings reflecting the perceptual similarity scale. (1) a. DEP-V/_T >> DEP-V/T_ b. DEP-V/R_ >> DEP-V/_R

"Phonology rules"
The relatively weak impact of morphology on /t/ deletions in German

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In Germanic languages, coronal stops are the most likely consonants to be lenited (e.g. Raymond et al., 2006; Mitterer & Ernestus, 2006). In this regard, German shows the same tendency and exhibits a high amount of final /t/ deletion in conversational speech. Many linguistic and extra-linguistic factors have been identified that predict these deletions to a certain degree. In this regard, a recurring factor accounting for /t/ deletions is phonological context. At the same time, morphological factors, such as morphological status of the consonant or its relative frequency, have also been shown to constrain /t/ deletions (e.g. Guy, 1980; Hay 2003).

Here, we investigate the relative importance of these factors on final /t/ deletion in German verb forms. To that end, we constructed a corpus of naturally produced 2nd and 3rd person singular forms in the present tense. Crucially, the suffixes for these verb forms are /-st/ and /-t/, respectively (for instance, *du hau-st* "hit 2nd.p.sg.pres." vs. *er hau-t* "hit 3rd.p.sg.pres). Note that the /s/ of the 2nd person suffix is sufficient for distinguishing this verb form from all other forms, whereas /t/ is the sole marker for the 3rd person. Therefore, we can compare differences in morphological marking by /t/ with respect to deletion rates, expecting less deletions if /t/ is the sole marker in the 3rd person.

Nine participants produced each verb form in three different phonological contexts (/t/ followed by /v/, /s/, or a vowel) across the two morphological conditions 2nd vs. 3rd person. Additionally, we used the same amount of regular and irregular verbs where regular verbs display a regular past tense suffix <-te> and irregular show a vowel change in the past tense and some also in the present tense. This design allowed for comparing the influence of phonological and morphological factors on final /t/ deletion.

Statistical analyses involving a model selection approach (Baayen, 2008) revealed that phonological context is the best predictor for /t/ deletion. However, we also found evidence for a seemingly morphological effect reflected by deletion differences between the 2nd and 3rd person singular in the expected direction. This effect interacted with the phonological context in such a way that /t/ deletion rates differed mostly between the 2nd and 3rd person, that is, they were higher if the context allowed for cluster simplification of suffix /s/ and preceding /s/. Relative frequency, on the other hand, improved model fits but did not reach significance as effect on /t/ deletions.

We conclude that phonological factors are the driving force for deletions of final /t/ in German. Morphological factors seem rather weak in comparison. Future research is necessary to show that these factors are similarly weak if there are no disambiguating pronouns.

Special session

Unsolved Problems in Phonology

Jacques Durand (Universite de Toulouse-Le Mirail) *Latent Consonants*

I address the latent consonant issue via the question of French liaison and latent/ghost consonants. I will consider it historically along different lines:

(1) the theoretical issue in generative phonology from Schane (1968) to the present, partially linking it to Stephen Anderson's history of phonology (rules vs. representations) and issues of abstractness/concreteness

(2) I show the relevance of corpora and how they force us towards more usage-based models (whatever the formalization)

(3) I argue that despite progress with corpora (including the *Phonologie du Français Contemporain* corpus which I have been involved in building), much remains to be done but that phonology cannot insulate itself from psycholinguistic experimentation and phonetic research (this is all the more true as all the corpora I know on the issue of French liaison are too sparse on some relevant data).

All in all, I will look at a half-century of theoretical phonology, with 1968 as a starting-point, 1992 (when the 1st Manchester workshop was held) as an interim point, and the present as I understand it. I will ask if any progress has been achieved. I would say 'yes' but not necessarily in the ways that were anticipated in the original generative phonology work and I will also argue that we have had to shed quite a lot of illusions on the way.

Sharon Inkelas (University of California, Berkeley) *Nonderived Environment Blocking*

This paper tackles the well-known problem of nonderived environment blocking (NDEB) from a new perspective: confidence-based strength scales. Building on results from research on memory and lexical storage, it is proposed that segments are stored with degrees of confidence along a scale from 0 to 1. Segments in invariant environments are stored with fullest confidence; those occurring in morphologically variable context will be stored with lower confidence. In OT, faithfulness constraints are sensitive to confidence strength. Segments stored with a high degree of confidence will be more faithfully preserved than those stored with a low degree of confidence, all else being equal. This provides an analysis for many derived environment effects. Typical examples are Finnish Assibilation and Polish Palatalization, in which suffix vowels trigger an alternation on stem-final consonants which tautomorphemic CV sequences do not undergo. Stem-final consonants occur in varying environments and are therefore stored with less confidence than stem-medial consonants which have an invariant following context and are stored with high confidence. Faith-strong >> Markedness >> Faith-weak accounts for this pattern. This analysis brings together many insights from the past literature on derived environments, from Kiparsky's Alternation Condition to McCarthy's Comparative Markedness.

Donca Steriade, joint work with Peter Graff and Paul Marty (MIT) *Segment Sequencing – the case of accidentally ambiguous processes*

Some segment sequences are stable, while others simplify or are avoided by other means. In writing a grammar, the phonologist must identify what factors determine these stability differences. Segment sequencing is an unsolved problem because no agreement exists on what these factors are. This study examines the stability factors that play a role in the analysis of C-clusters with distinct sonority profiles: rises (e.g. *bl, zl*), falls (e.g. *lb, rl*), plateaux (e.g. *bd*). These have different word distributions, different contrast licensing abilities (e.g. rises typically allow the same contrasts in their first member as prevocalic consonants, unlike falls/plateaux) and they function differently as triggers of syncope, reduction, glide-V alternations, and in stress. An integrated analysis of this familiar typology is yet to be proposed, but one can identify two hypotheses about stability in existing work:

(a) Syllabic analyses claim that the stability factors are syllabic conditions (e.g. work from Vennemann 1972 to Prince & Smolensky 1993, later OT work). Key assumptions are: (i) a cluster's sonority profile determines its syllable position: e.g. sharp rises are typically the only complex onsets; (ii) onsets preserve contrasts better than codas. With (i), this is said to explain the greater number of contrasts in the _[+son] vs. _[-son] context; (iii) the complexity of syllabic positions is limited: e.g. onsets cannot branch.

(b) Distinctiveness analyses are based on the idea that the distinctiveness of contrasts is what differentiates stable from unstable sequences (Flemming 2004). Jun (2004), Flemming (2008), Steriade (2001) apply this idea to C-clusters: e.g. the richer set of contrasts in pre-sonorant stops is due to release-related cues to place/manner that a following sonorant provides, independently of syllabic structure (Steriade 1999).

This talk compares the performance of these proposals in the analysis of *accidentally ambiguous processes* (AAP). In an AAP, learners are exposed to data consistent with both type (a) and type (b) analyses; novel, phonotactically legal forms can be constructed to disambiguate the analysis, but they happen not to occur. We report a new result: in the two AAPs studied thus far, novel forms reveal that type (a) analyses are not being entertained by learners. Both cases involve cluster reduction processes in which certain sharply rising clusters (*bl*) behave differently from falls/plateaux, but where the evidence is missing on the other rises (e.g. *dl*, *zl*). The latter are attested, and they are heterosyllabic; but they happen to be absent in the context of the relevant process. An illustration based on French (Tranel 1987, Goslin & al. 2000) is seen in (1):

1. The process: i-> j/ _V	obligatory after any *one* C: *rj, sj, pj, mj…*
a. Blocked after [bl]: **ablja*, ok *ablia*	and after *pl, gl, kl, fl, dr, tr, kr, gr*: <u>onsets</u>
b. Allowed after [rl]: *arlja*	and after *sk, sm, rp, lt, rl, pt, mn*: <u>coda-onset</u>
c. No data after [dl]:	or after *zl, ʒl, sl, tl, vl, zr, sr, ʃr*: <u>coda-onset</u>

Most sharp rises (1.a) block glide formation. Falls and plateaux (1.b) allow it. The system withholds any evidence on the possibility of glide formation after *heterosyllabic* rises (1.c). The French speakers consulted confirm that the latter are heterosyllabic and reject glide formation in this context: *[ad.lja], *[az.lja] are as bad as *[a.blja]. Available lexical data (1.a-b) is consistent with syllabic or distinctiveness analyses, but their predictions for the hidden contexts in (1.c) diverge.

A syllabic, type (a) analysis (Kaye & Lowenstamm 1984) attributes the difference between *[ablja] and √[arlja] to the fact that [bl] is an onset and [rl] is not. The key hypothesis here is that *[blj] is impossible because 3C onsets are prohibited: [bl] must be an onset and [j] must be an addition to it. This analysis wrongly predicts that [dl, zl] will allow glide formation: *[az.lja] should pattern like √[ar.lja], but doesn't. A type (b) analysis will be proposed on the basis of new evidence: in an AX discrimination task, subjects find pairs like [ablja]-[abja] less distinct than other attested XljY-XØjY pairs; discrimination is significantly improved in the pre-V variants [ablia-abia]. These results support an analysis in which glides are avoided if they interfere with the distinctiveness of a neighboring contrast, [l-Ø]. This analysis predicts that [adlja]-[adja] is as hard to discriminate as [ablja]-[abja]. The full AAP evidence suggests that analyses that rely on syllabic constituents – or at least on *onset* structure – are ignored by speakers. We show that this rejection is not due to additional complexities in the syllabic analyses, nor to evidence that directly contradicts their factual premises. We will discuss the implications of this finding and the source of differences between these results and apparently contradictory ones, e.g. Moreton, Feng & Smith (2008).

Nina Topintzi (Universitaet Leipzig) *Compensatory Lengthening*

Hayes' (1989) seminal paper on compensatory lengthening (CL) and its analysis as moraic preservation after segment loss or reduction, has proved foundational to our understanding of the phenomenon. With the advent of Optimality Theory however, it was soon realised that Hayes' analysis is untranslatable in a fully parallel framework. Likewise, empirical difficulties emerged; in particular, contra the theory's prediction, deletion of non-moraic segments has been found to also generate CL, as in Samothraki Greek onset r-loss or Ngajan non-moraic coda loss. The biggest chunk of the talk examines various responses to these two problems, ranging from Parallel OT to Harmonic Serialism, but also extending to other, phonetically-inspired analyses, such as Kavitskaya (2002). The second, smaller, part of the talk briefly looks at some other, often neglected aspects of CL, such as the directionality and locality issues, and suggests that this is the area where more future research needs to be conducted.