The Twenty-Fifth Manchester Phonology Meeting

ABSTRACTS BOOKLET

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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 **twenty-fifth Manchester Phonology Meeting**, held at Hulme Hall, Manchester, in May 2017.

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

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

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

Oral papers

An Argument against the Richness of the Base from Koryak Labials

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One of the central departures of Optimality Theory and its descendants from earlier models of generative phonology is the principle of the Richness of the Base (ROTB), which holds that the set of inputs to the grammar lacks language-specific properties (Prince and Smolensky 2004). Since the set of ranked constraints is the only locus of crosslinguistic variation in these models, morpheme structure constraints (MSC) (Stanley 1967, Chomsky and Halle 1968 et. seq.) are inadmissible. In this paper, I present an argument against this view (strong ROTB), arguing that data from Koryak (Chukotko-Kamchatkan) requires morpheme-level filtering. In this language, *v* and *w* contrast prevocalically (1), but are neutralized to *w* elsewhere (2). While we can set up the root-final segment in the UR of (2) as *v*, morphemes with an underlying final *w*, like a putative **waŋaw-at-ə-k*, do not exist. While these facts are straightforwardly captured by an MSC banning *w* morpheme-finally, as well as by analyses employing morpheme-level filtering, analyses assuming strong ROTB are unable account for it.

(1) *wutku* 'here' vs. *vutq-ə-vut* 'darkness'

(2) *waŋav-at-ə-k* 'to speak', but *waŋaw* 'word', *a-waŋaw-ka* 'without words'

Two approaches to similar problems for frameworks assuming strong ROTB have been discussed in the literature. Adopting the analysis in McCarthy (2005) for a similar problem in Cairene Arabic requires a chain shift whereby, word-finally, underlying *v* is realized as *w*, and underlying *w* deletes, along with an OO constraint prohibiting *w* in a derived form if it is not in the base. However, the logic of this analysis does not extend to Koryak. Given that no morpheme alternates between being vowel-final in word-final position and *w*-final elsewhere, we need to rule out the possibility that a vowel-final morpheme that can appear both word-finally and word-internally that ends in a vowel when word-final, such as the plural morpheme *la* (3), is underlyingly /law/, which would result in an unattested alternation. This requires setting up the first form in (3) (the first person plural aorist) as the base of the whole verbal paradigm, but this is untenable on any restrictive theory of OO correspondence, as there is no principled reason to choose this form over any other. This problem is not present in Arabic as the base is simply the bare form of the root.

(3) *mət-aŋaŋja-la* '1NSG-sing-PL', *q-aŋaŋja-la-tək* '2.IMP-sing-PL-2NSG' (**q-aŋaŋja-law-tək*)

Another way to save the parallel OT analysis is to treat this as the result of a derived-environment fortition process that turns *w* to *v* prevocalically. The reason for restricting it to derived environments is to prevent it from affecting prevocalic *w* in other positions, where it contrasts with *v* (1). The problem with this approach is that this is not actually a derived environment phenomenon, as derived prevocalic *w* exists as a result of morpheme-internal epenthesis, as in (4a). This contrasts with forms like (4b), for which we can set up an underlying *v*. The differing behavior of different derived environments with respect to the putative fortition rule cannot be captured in a theory of derived environments with parallel evaluation like Comparative Markedness (McCarthy 2003) because it is unable to distinguish between different types of derived environments.

(4) a. /lewt/ 'head': *lewət* 'head' (**levət*), cf. *lawt-ə-paje-k* 'to cut hair'
b. /əlavt/ 'catamaran': *əlavət* 'catamaran' vs. *əlawt-o* 'catamarans'

In addition to the MSC approach considered above, a stratal account employing a morpheme-level constraint against final *w* ranked above the constraint requiring *v* to be prevocalic, along with the opposite ranking at the word level, will account for this data, as any morpheme with an underlying final *w* will have it turned into *v* before it is inputted to the next level. Given that monostratal approaches fail to account for the distribution of *w* and *v* in Koryak, but that approaches with morpheme-level phonology can account for it, this data provides an argument in favor of the latter.

Tonal accent in monolingual and bilingual lexical access: Insights from Swedish

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In Scandinavian languages like Swedish, tonal accent is a lexical phonological feature. However, despite minimal pairs, the functional load of this phonological feature is not as high as in, for example, Sino-Tibetan or Banto languages. Our goal was to investigate the importance of the tonal contrast for lexical access in monolingual and bilingual speakers of Swedish. For bilinguals, who hear both Swedish and one other, non-tonal language during acquisition, input is inconsistent with regard to the usefulness of tonal accent as a cue in lexical access. Would they treat tonal variance in the same way as native speakers?

In Swedish disyllabics, Accent 1 consists of a single contour peak on the first syllable, and Accent 2 shows an additional peak on the second syllable. Although there are few minimal pairs, tonal accent plays a role in morpho-phonology and speakers use tonal accent to discriminate words (Felder et al., 2009). Accent 2 (*färja*$_2$ - "ferry") is the most common pattern for disyllabics and functions as a default. Accent 1 (*sesam*$_1$ - *"sesame"*) is less predictable, marking specific semantic classes and loanwords (Wetterlin et al., 2007). Many Accent 1 disyllabics are underlying monosyllabics (which always carry Accent 1) with an epenthetic vowel (e.g., /fingr/ becomes *finger*$_1$), where the plural carries Accent 2 (*fingrar*$_2$).

We present two cross-modal semantic fragment priming experiments which we conducted with monolingual and bilingual native Swedish speakers in Stockholm. In both experiments, subjects made a lexical decision on the basis of a word presented visually. This was preceded by auditory exposure to a related or unrelated prime fragment (the first syllable of an Accent 1 or an Accent 2 word), pronounced accurately or with the opposing accent pattern. In Experiment 1 we used prime words without accent competitors. For instance, a word like *färja,* "ferry" (paired with semantically related target *båt,* "boat") resulted in fragment *fär*$_2$ (correct) or **fär*$_1$ (mispronounced). There is no noun in the lexicon for which **fär*$_1$ is an accurate first syllable fragment. Our results showed that monolinguals were very sensitive to accent mispronunciation, i.e. mispronounced fragments did not lead to priming. Bilinguals showed an asymmetry in their responses. They treated Accent 2 fragments like monolinguals, i.e. mispronunciations as Accent 1 did not lead to priming. Mispronunciations of Accent 1 fragments (i.e. auditory Accent 2), however, successfully activated the target words. In Experiment 2 all prime words had an accent competitor (e.g. *kändis*$_1$ - *känsla*$_2$), i.e. prime fragments were ambiguous in terms of segmental information. Accent therefore was the sole discriminating factor. Now *all* mispronunciations failed to result in priming, even for bilinguals.

Our findings have several implications. First, monolinguals use tonal accent in lexical access, despite its low functional load in Swedish. Second, bilinguals represent accent in a different way compared to monolinguals (although they are native speakers), reflecting exposure asymmetries between Accent 1 and 2. Bilinguals behave like monolinguals with regard to the default Accent 2 pattern, but struggle with the less predictable, alternating Accent 1 words. Finally, the overall sensitivity to mispronunciations in Experiment 2 shows that pressure from the lexicon drives the use of tonal accent in bilinguals: rather than automatically treating suprasegmental information as a cue for lexical access (like monolinguals), bilinguals appear to only draw upon tonal accent as an additional cue where segmental information (which is useful across both their languages) is ambiguous. Clearly, exposure to two languages with different phonological properties shapes the mechanisms employed in lexical access.

Stress Variation in English Complex Adjectives: Markedness, Faithfulness, and Frequency

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In descriptions of English morphophonology, traditionally a distinction is made between stress-shifting and stress-preserving affixes. This distinction has figured prominently in the theoretical literature, providing the basis for far-reaching claims about the nature of phonology-morphology interaction (most notably in Lexical Phonology: cf. Kiparsky 1982 et seq., Giegerich 1999; cf. also e.g. Pater 2000, Zamma 2012, Bermúdez-Otero 2012, Stanton & Steriade 2014).

One aspect that is still not well understood is the question of variability in stress assignment in complex words. Empirically, evidence is so far often anecdotal, but there are indications from recent work that variability has been underestimated (cf. esp. Zamma 2012, Bauer et al. 2013: chpt. 9). Theoretically, many traditional approaches rest on the assumption that application of morphophonological stress rules is categorical, and that variability can only be a result of lexical marking (cf. e.g. Pater 2000), or, in dual-mechanism models, of a mechanism that is fundamentally non-grammatical (but 'associative', cf. e.g. Bermúdez-Otero 2012).

The paper focusses on two adjectival derivational categories that are productive in modern English, *-able* and *-ory*. *-able* is generally considered to be stress-preserving, *-ory* is usually claimed to be stress-shifting. Exceptional stresses have been reported for both suffixes. Examples are provided in (1).

(1) a. stress preservation with *-able*: abrígeable, ánalysable
b. stress shift with *-able*: analýsable, documéntable

(2) a. stress shift with *-ory*: oscíllatory, compénsatory
c. stress preservation with *-ory*: artículatory, antícipatory

We will report on the results of a reading study, which obtained some 1,100 realisations of *-able* and *-ory* derivatives from 31 speakers of British English. All test words are derivatives with long bases (> 2 syllables). The study finds a substantial amount of stress variation both across and within lexical types. Moreover, statistical analysis (Conditional Inference Trees and regression) reveals that the variation is systematic, reflecting the presence and interaction of stress preservation effects and effects of phonological wellformedness (esp. of syllable quantity) in both *-able* and *-ory* derivatives. Both effects are probabilistic, and the two morphological categories differ mainly in terms of their relative strength.

In addition, we find effects of both the speaker and different types of frequency. No speaker in our study has consistent preserving or shifting stresses. Furthermore, speakers differ in terms of how sensitive they are to the lexical frequencies of derivatives and their bases. In general, unmarked stress is, in some speakers, more likely with high-frequency derivatives. Conversely, high-frequency of the base is found to correlate with stress preservation in other speakers. This is particularly interesting for *-ory* derivatives, for which our findings suggest that frequencies of both nominal and verbal base candidates may play a role, shedding some new light on the debate about whether *-ory* derivatives are denominal or deverbal. Finally, there is intra-speaker variation.

On a theoretical level, our data are not compatible with a traditional stratification account that categorically affiliates every affix to a stratum, nor is it compatible with a single-level account which assumes simple lexical marking of exceptions or constraints. Instead, the type of gradience found in both derivational categories seems to us to suggest an account that establishes a more direct and constrained connection between formal markedness, transparency, and frequency, taking them as correlates of psycholinguistic parseability (cf. e.g. Carlson & Gerfen 2011). If this is to be implemented via a stratal approach that is grounded on such psycholinguistic principles (cf. Bermúdez-Otero 2012 for a proposal), both *-ory* and *-able* must be considered dual level affixes, and differences between the two suffixes must be assumed to reside in the probability with which they affiliate to either level.

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Laryngeal co-occurrence restrictions reflect sub-segmental articulatory structure

Introduction: We propose that the natural classes which participate in long-distance laryngeal dissimilation are best defined over phonological representations which include information about sub-segmental, articulatory timing relations between oral and laryngeal gestures. We defend this proposal with a case study of Kaqchikel, a Mayan language which restricts the co-occurrence of ejectives in roots. Our findings lend support to the claim that predictable aspects of sub-segmental articulatory dynamics may be abstractly encoded in phonological forms (e.g. Browman & Goldstein 1986; Steriade 1993, 1994; Gafos 2002).

Kaqchikel: Kaqchikel is an Eastern Mayan language with over 500,000 speakers in central Guatemala. There is a phonemic contrast between plain voiceless plosives (/p t k q͡ʦ ͡ʧ ʃ/) and corresponding 'glottalized' plosives (/ɓ tˀ kˀ qˀ͡ʦˀ ͡ʧˀ/) as well as /ʔ/. Two ejectives are not allowed in a /CVC/ root, unless they are identical (Edmonson 1988:60-72). Hence /qˀaqˀ/ 'fire' is an attested root, but */qˀatˀ/ is not: */Tˀ$_{\alpha}$VTˀ$_{\beta}$/$_{\text{ROOT}}$, $\alpha \neq \beta$. The labial implosive /ɓ/ and glottal stop /ʔ/ are exempt from this restriction, and freely combine with ejectives at any place of articulation in /CVC/ roots (e.g. /-ɓiqˀ/ 'to swallow', /kˀaʔ/ 'incense', etc.).

Proposal: We assume that the phonological representation of ejectives includes a specification of laryngeal timing: the feature [CONSTRICTED GLOTTIS] is linked to an abstract, sub-segmental articulatory node corresponding to the release phase of the stop (Fig. 1; e.g. Kingston 1984, Keating 1990, Steriade 1994). Root co-occurrence restrictions are stated over these representations: Kaqchikel prohibits two instances of RELEASE-linked [CG] (i.e. ejectives) within a root. The natural classes predicted by these articulatory representations closely match the typology of long-distance laryngeal dissimilations (e.g. RELEASE-linked [SG] = aspirated stops but not RELEASE-less /h ɦ/, as in Ofo; MacEachern 1999).

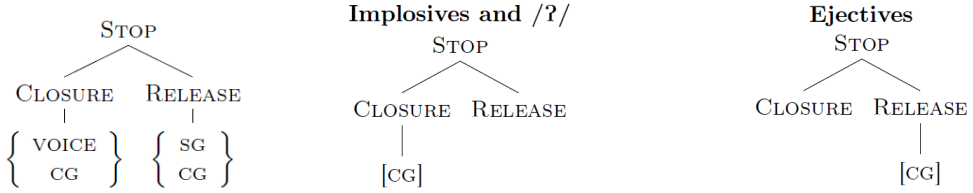

Fig 1: Laryngeal-oral timing relations in phonological representations

Alternative proposals: Drawing on a large corpus of spontaneous spoken Kaqchikel (16 speakers, 80 min.), we show that articulatory features like [VOICE] and [EJECTIVE], and auditory features like [LONG VOT], fail to define phonetically-appropriate phonotactic classes in the language (Lloret 1988, Mackenzie 2009, Gallagher 2010). The feature [VOICE] fails because restricted consonants (ejectives) and unrestricted consonants (/ɓ ʔ/) are typically all voiceless in Kaqchikel, /ɓ/ being realized as [ɓ̥] (Pinkerton 1986). The feature [EJECTIVE] fails because uvular /qˀ/, a restricted consonant, is normally realized as voiceless implosive [ɠ̊]. In our theory, /qˀ/ is restricted because it bears [CG] linked to *both* the CLOSURE and RELEASE nodes; this representation explains why /ɓ/ *may* be voiced in some cases in Kaqchikel, but /qˀ/ (like the ejectives) never is: *[VOICE, REL-CG]. Lastly, we show that the auditory features [LONG VOT], [LOUD BURST], and [CREAK] derive phonetic classes in Kaqchikel which do not match the desired phonotactic classes ([CREAK] wrongly groups ejectives and implosives; [LONG VOT] wrongly groups plain affricates and ejectives; and [LOUD BURST] fails to distinguish plain and ejective stops, which are phonetically lax in Kaqchikel; Kingston 1984).

Conclusions: Laryngeal phonotactics must make reference to the relative timing of laryngeal and oral features. Timing relations are therefore specified in the phonological representations of laryngeally-complex segments. We thus propose a theory of phonology which includes language-specific phonetic detail in phonological representations, but only in a relatively abstract form. These theoretical conclusions are empirically supported by the first large-scale acoustic study of stops in any Mayan language, and the first to draw on spontaneous speech.

Initial CVs and the phonology of non-mutation in Welsh

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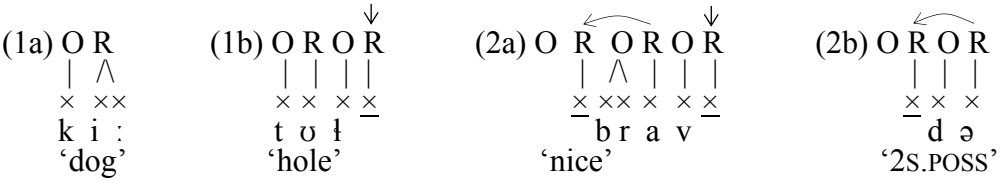
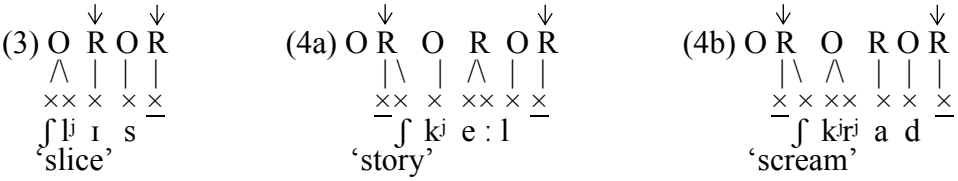
In mutation systems we typically find items that consistently resist mutation despite apparently satisfying all the requirements to undergo it (cf. King 2015). This is conventionally accounted for by treating them as lexically specified exceptions. I propose that exceptional items in Welsh (and elsewhere) are not marked as exceptional in the lexicon. Instead their behaviour derives directly from structural properties, namely an initial empty CV unit (Lowenstamm 1992) which is present in mutation resistant items but absent in susceptible items. The initial CV disqualifies such items from mutation because the initial empty onset cannot satisfy the structural requirements for mutation to take place. The proposed schism is illustrated in (1) vs. (2) below.



Items with the structures in (1) are those which regularly undergo mutation (e.g. in possessives, /ki:/ may surface as any of [ki:, gi:, xi:, ŋ̊i:], depending on the φ-features involved). Conversely, items with the structures in (2) are categorically immutable, because floating feature accounts require that the initial onset of a target is filled and able to support the inserted floating feature (cf. Lieber 1983, 1987; Breit 2015). These items are then essentially treated by the mutation system in the same way as vowel-initial items, i.e. by non-insertion of the floating phonological feature causing the mutation. The proposal eliminates the need to rely on mutation-specific lexical diacritics and it allows us to unify (and simplify) several hitherto unconnected phenomena.

First, the common view is that Welsh words must minimally be either bisyllabic or bimoraic, but function words such as /də/ ‘2S.POSS’ may be monomoraic (Hannahs 2013). With the initial CV we can simplify the word minimality condition: (all) words must minimally have two positions dominated by a rhymal category. We see that this is true of both bimoraic CVV words in (1a) and CVC words in (1b), and we further predict that apparently subminimal words such as (2b) must have an initial CV in order to satisfy word minimality. This in turn makes the very strong prediction that all such “subminimal” Welsh words must be immutable, which appears to be empirically accurate and is not predicted by other theories of immutability.

Second, assuming that initial sT clusters involve rhymal adjunction (Kaye 1992), we predict that words with initial sT clusters should be inherently immutable. In Irish (Welsh mutation does not affect /s, ʃ/), s- and sR-initial items (3) are mutable (e.g. /ʃlʲɪs/ ‘slice’ → [a hʲlʲɪs] ‘his slice’), but sT- and sTR-initial items (4) are immutable (Ní Chiosáin 1999:558), as predicted by the initial CV analysis.



Finally, purely diacritic accounts erroneously predict that individual items could be barred from specific types of mutation (e.g. spirantisation) yet take part in others (e.g. lenition). In contrast, the CV analysis makes the clear and restrictive prediction that items with the initial CV are excluded from all mutation processes, in line with the empirical facts.

Why phonology is not different (and neither is syntax)

Roberta D'Alessandro (Utrecht University) & Marc van Oostendorp (Meertens)

The question whether syntax and phonology work with the same formal apparatus is a long standing one. In a famous article, Bromberger & Halle (1989) maintain that the two are different. The incommensurability of the two has since been taken for granted, with some notable exceptions (Kaye, Lowenstamm and Vergnaud 1987, 1990 and following work; Nevins 2010). We propose that the formal structure of syntax and phonology is the same, except for differences dictated by the interfaces served by these modules (semantics and phonetics respectively).

A model based on features. We propose a model based on syntactic and phonological identical primitives (FEATURES). The only difference between two languages is in the features they have where features are a little more complicated than usually assumed: they do not just have an attribute, but also a specification whether they ATTRACT or REPEL other features. They are defined as follows:

(1)

F	G
⊃ H	⊃ F
* G	* H

where F, G and H are features, ⊃ indicates ATTRACTION (in 1, feature F attracts feature H, feature G attracts feature F); * indicates REPULSION (in 1, feature F repels feature G; feature G repels feature H). Features are intended as fully specified (attribute+value=1 feature, Harbour, Adger & Béjar 2008). Our key proposal is: **ALL PHONOLOGICAL AND SYNTACTIC OPERATIONS ARE DRIVEN BY FEATURE ATTRACTION OR REPULSION**

An example of attraction is ASSIMILATION, i.e. copying one feature in the feature matrix of the attractor. In phonology, an attraction process is vowel harmony. In syntax, one such assimilation is AGREEMENT, consisting in features acquiring the same specification (Nevins 2010). Another attraction process in syntax is VERB MOVEMENT: the verb is attracted to T or. This system is some sort of extended version - for syntax- of the feature strength system of the early Minimalist Program (Chomsky 1995). Furthermore, we show that a large number of segment inventories can also be described in terms of attraction.

REPULSION is at work, in phonology in all OCP-related phenomena. OCP (Leben 1973) regards the impossibility of identical tones to occur next to each other. In the course of time, OCP has come to indicate any process impeding the co-existence of two identical elements, adjacent to each other. OCP phenomena can be straightforwardly described as one feature repelling itself. Repulsion in phonology is also reflected in phonological inventories of languages. For example, Dutch does not have voiced velars. This is the result of the fact that [Velar $*_{\text{Voice}}$]. Something very similar to OCP is at work in syntax; all cases of dissimilation between identical pronouns (like Spanish **le lo > se lo*) are cases of repaired repulsion; The Person-Case Constraint (Bonet 1993) banning the co-occurrence of 3rd person datives and 1/2 person accusatives is also a slightly more complicated example of repulsion.

This system can correctly account for phonological and syntactic phenomena that are not yet understood, like the ban on symmetrical structures (XP YP configuration), or the transparency of sonorants in voicing assimilation in languages of the world. The model furthermore has the clear advantage of being learnable in a way that is very similar for syntax and phonology: one only has to acquire features and their properties.

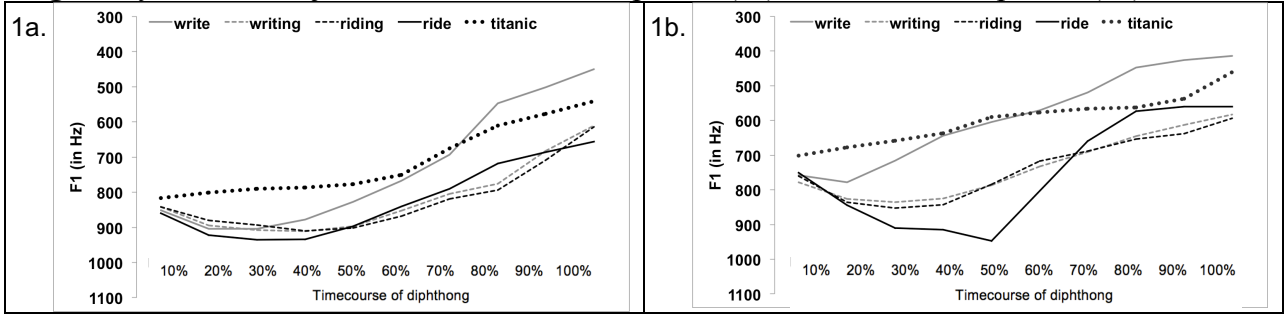
The eye-raising nature of incipient ay-raising: Phonetic /ay/-raising in Fort Wayne, Indiana

Stuart Davis, Kelly Berkson and Alyssa Strickler (Indiana University)

In canonical Canadian raising the diphthongs /ay/ and /aw/ raise to [ʌy] and [ʌw] not only before a voiceless consonant (*write* → [ɹʌyt]) but also before a flapped /t/ (*writing* → [ɹʌyɾɪŋ]). It is not the phonetic realization of the trigger that is relevant to the process, then, but the underlying phonological specification, a fact which has served as fodder for lively debate about phonological opacity (among others: Halle 1962, Chambers 1973, Idsardi 2006). Raising of /ay/ (but not of /aw/) has been documented in geographically distinct dialects of US English such as Ann Arbor (Dailey O'Cain 1997), New Orleans (Carmichael 2015), and Philadelphia (Fruehwald 2013, 2016). Fruehwald notes that raising in Philadelphia appears to have been phonological from its inception, positing that "the period of purely phonetic conditioning either was too brief to be identified or was nonexistent" (p. 404). Moreover, as noted by Chambers (1973) and Kaye (1990) there is no evidence that Canadian raising ever had a stage that was purely phonetic since in all acoustically documented dialects of /ay/-raising, the raising always occurs before a phonetically voiced /t/-flap (*writing* → [ɹʌyɾɪŋ]). In this paper, we present data identifying phonetic raising in the dialect of American English spoken in northeastern Indiana around the city of Fort Wayne (FW). We have been recording data across different generations of speakers indicating that /ay/-raising is of recent origin, allowing us to document the incipient nature of the sound change. In the present research we share acoustic analysis of this incipient raising variety of English, and suggest a possible developmental trajectory for Canadian Raising.

Inspired by casual observation that raising had begun to occur in FW within the last decade, we began recording FW speakers producing a wordlist. Data from 27 participants have been analyzed thus far (11 male, 16 female, 19-78 yrs old), revealing that FW speakers fall into four broad patterns. Briefly: four talkers have **Pattern 0**, in which no raising occurs; eight have **Pattern 1**, in which only the very shortest diphthongs—those immediately before a primary stress, in words like titánic and citátion—are raised; nine talkers have **Pattern 2**, the phonetic pattern, wherein /ay/ raises before surface-voiceless triggers as in *write* and *titanic* but—crucially—does not raise before t-flaps; and, six have **Pattern 3**, the phonological pattern described for other varieties of English. Sample plots of time-normalized F1 trajectories are in (1), with data from a Pattern 1 talker in (1a) and from a Pattern 2 talker in (1b) (focusing on the 30% point of the /ay/ nucleus). While Pattern 2 provides clear documentation of phonetic raising and thus is of importance, what is of particular interest is the more incipient raising in Pattern 1, where raising only occurs in words like titánic and citátion and where the diphthong is of the shortest duration immediately before the syllable with primary stress. These are the very first words that undergo raising in an incipient dialect. That raising only occurs in such words in Pattern 1 is supportive of a view like that of Bermúdez-Otero (2014) that connects ay-raising to the clipped nature of the vowel. We suspect that other researchers, such as Fruehwald, have not focused on such words in their study of incipient Canadian raising. Further, as Chambers (1989) notes, in **Canadian** Canadian raising, there is no raising of /ay/ in words like titánic and citátion. Here we suggest that the imposition of this stress- (or foot-) based condition on Canadian raising is part of the phonologization process as is the raising before voiced /t/-flap (*writing* → [ɹʌyɾɪŋ]).

Fig. 1: /ay/ formant trajectories for a Pattern 1 speaker (1a) and a Pattern 2 speaker (1b).



Phonological consequences of high front vowel nasalization in French

Michael Dow (Université de Montréal)

Due to its phonotactic restrictions against adjacent nasal vowels + nasal consonants, French is often described as completely lacking regressive nasalization. While experimental evidence confirms this to a degree, in that mid and low vowels show negligent rates of nasality before nasal consonants, high vowels show significantly higher rates in the same context (e.g., Delvaux et al. 2008, Rochet & Rochet 1991), often exceeding 50% nasal. However, such phonetic findings are difficult to translate into a phonological framework because of vowel-specific factors favouring certain nasalized vowels over others (e.g., Hajek & Maeda 2000). As a first point, this paper presents new evidence that high front vowel nasalization must be considered phonological in French. This paper then pursues the resulting paradox this process introduces into the grammar of French, using Preservation of Contrast (PC) Theory (Łubowicz 2012) to provide a formal account.

High front vowel nasalization is established by applying a vowel-specific nasality threshold in a Solé-esque (1992, 2007) comparison of nasal phase vs. overall vowel duration. The data come from a nasometric corpus of European French containing the vowels /a, e, ø, o, i, y, u/ in real words preceding both oral and nasal contexts, e.g., /fis/ 'son' vs. /fin/ 'fine (f.)' (n = 2,759). The results show that nasal phase duration increases proportionately with overall duration only for pre-nasal /i, y/, suggesting alignment of nasality in reference to the vowel itself. Meanwhile, all other vowels show constant nasal phase duration, indicative of gestural alignment with the nasal consonant. These results strongly suggest that nasalization of only high front vowels is active in French.

In light of morphophonological evidence for lowering of underlying high nasal vowels (e.g., /fi^{n}/ → [fɛ̃] 'fine (m.)'), these findings lead to a curious disparity in French where high nasal vowels are favoured as the output of assimilation but actively avoided in inventory production. This paradox is especially salient in output-oriented frameworks, where the latter cannot be reduced to restrictions on input structure. In this paper, I argue that contrast plays an active role in blocking regressive nasalization on other vowels and must be encoded as part of the grammar of French. In order to account for this formally, I present an analysis in PC Theory, an optimality theoretic framework where contrast is built into the evaluation of scenario-candidates.

In this analysis, markedness pressures drive lowering of input high nasal vowels, which creates a partial height neutralization. By eliminating [ĩ] in contrastive positions, this process creates a gap in the inventory where regressive nasalization may apply; however, where oral-nasal contrast does exist, nasalization is blocked. High back vowel nasalization is blocked by markedness, whether motivated by a general front-back disparity in nasal vowels (e.g., Beddor 1982) or their phonetic particularities (Hajek 1997).

These effects are captured principally by a ranking in which *VN ("No oral vowel + nasal consonant sequences") is dominated by PC_{OUT}(nasal), which is violated when identical outputs correspond to segments which are distinct in nasality in the input (e.g., [ɛ̃] ← /ɛ, ɛ^{n}/). The full constraint ranking provided in (1), where *ĩ is a simplified markedness constraint against high front nasal vowels and *ũ against high back nasal vowels. (Lower-ranked markedness constraints are excluded for space.)

(1) French ranking, PC analysis

PC_{OUT}(nasal), *ũ ≫ *VN ≫ *ĩ, PC_{IN}(nasal), PC_{OUT}(high), PC_{IN}(high)

In short, nasalization seeks to occur on all vowels, but is impeded where contrast exists. Ultimately, this analysis provides further evidence for the utility of contrast as visible, if not central, to phonological grammar.

Strength is length

Guillaume Enguehard (Lille 3, LLF) & Xiaoliang Luo (Orléans, LLL)

0. This presentation focuses on the role of Licensing as a strengthening force. Our aim is to point out some of its limits, and to argue that it can be replaced by phonological length.

1. In order to account for the contrast between *lenis* and *fortis* realizations, it is often misunderstood that strict CV assumes two different mechanisms: Licencing and length. Licensing as a strengthening mechanism was proposed within Mirror Theory in order to account for the strength contrast between syllabic positions (Ségéral & Scheer, 2001). As for the role of length in strength contrasts, it was pointed out by Lowenstamm (1991) and Scheer (2000) in order to explain the specific inalterability of long vowels and geminates.

2. Our claim is that Licensing does not account for the specific inalterability of geminates. Theoretically, post-coda onsets and geminates undergo the same lateral relations: **i.** Government targets the embedded empty nucleus; and **ii.** Licensing targets the onset. However, in some languages post-coda plosives are unexpectedly weaker than geminates (e.g. Tamazight *ef**θ**el* vs *fe**tt**el*, zero and intensive forms of the verb meaning *to roll coucous*).

3. We aim to argue that length is more likely to account for strength contrasts than Licensing. Our proposition is that onsets branch to the position of codas. By assumption, branching has a strengthening effect, and position-sharing have a weakening effect. Geminates, which branch to *unoccupied* positions, are the strongest segments. Post-coda onsets, which branch to a position *occupied* by a coda, are weaker than geminates. Codas, which only share their position with the following onset, are the weakest segments. Finally, intervocalic onsets do not branch nor share their position with any adjacent consonant. They have the most neutral strength (note that they are typologically unmarked).

4. From this level of analysis, the question is: what does motivate such a *interconsonant spreading*? We assume, following Harris' (1990) analysis of assimilation, that spreading is motivated by segmental complexity. We will show how this hypothesis of an internal branching structure in consonant clusters sheds light on their syllabic behaviour. We will base our analysis on Sanskrit reduplication (among others). Sanskrit reduplication targets the first component of onsets with *rising* sonority (e.g. **k**an-i-**kr**and *cry out*), but the second component of onsets with *falling* sonority (e.g. **k**an-i-**sk**and *leap*). Steriade (1988) proposed two conditionning factors: length (conditions the amount of reduplicated segments) and extrasyllabicity (conditions the identity of the reduplicated segment). We will show that *interconsonant spreading* accounts for the contrast between /kr/ and /sk/ without referring to extrasyllabicity. Assuming that spreading is driven by segmental complexity, /k/ spreads to /r/ in kan-i-**kr**and, and to /s/ in kan-i-**sk**and. Hence the following generalization: the reduplicated component (/k/ in both cases) is the *longest* segment of the branching onset.

5. To conclude, based on Tamazight, Sanskrit, Gothic, and other languages, we aim to propose how phonological length can account for various syllabic phenomena such as strength contrast and behaviour of branching onsets. The long-term objective is to unify the effects of Licensing with more common autosegmental representations.

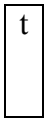
Harris, J. (1990) 'Segmental Complexity and Phonological Government', *Phonology*, 7(2), 255–300. **Lowenstamm**, J. (1991) 'Vocalic length and centralization in two branches of Semitic (Ethiopic and Arabic)', in Kaye, A. S. (ed.) *Semitic Studies in Honor of Wolf Leslau*. Wiesbaden: Harrassowitz, 949–965. **Saib**, J. (1974) 'Gemination and spirantization in Berber: diachrony and synchrony', *Studies in African Linguistics*, 5(1), 1–25. **Scheer**, T. (2000) *De la Localité, de la Morphologie et de la Phonologie en Phonologie*. HDR dissertation [ms]. University of Nice. **Ségéral**, P. & Scheer, T. (2001) 'La coda-miroir', *Bulletin de la Société de Linguistique de Paris*, 96(1), 107–152. **Steriade**, D. (1988) 'Reduplication and Syllable Transfer in Sanskrit and Elsewhere', *Phonology*, 5(1), 75–155.

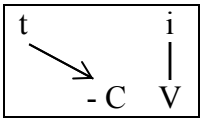
Activity as an Alternative to Autosegmental Association

Noam Faust (Université Paris 8 CNRS SFL) & Paul Smolensky (Johns Hopkins University)

Alternations between a lexical segment and its absence recurrently receive accounts endorsing autosegmental representations of linguistic material. Such frameworks allow one to separate the cognitive existence of the segment from its realization, by positing that in order to be realized, segments must be supported by skeletal positions (1a). But such support can be lexically absent; in that case, the segment will remain afloat (1b), unless it receives support from some additional morpheme that is concatenated to it (1c).

(1) a. 

b. 

c. 

Since the advent of Optimality Theory, emphasis has largely moved away from representations to computation. But no systematic alternative to such accounts has been put forth, to the best of our knowledge. This talk proposes that the notion of "activity" (Smolensky, Goldrick & Mathis 2014) is such an alternative. This notion can provide, we believe, a formal device for expressing intuitions about varying strength of linguistic material in many parts of grammatical theory. Thus, we propose that material which in autosegmental treatments is deficient in structure (1b,c) is in fact deficient in activity, possessing a reduced degree of presence in a linguistic representation.

To illustrate the general notion of activity, we first present a preliminary account of a segment-zero alternation from Modern Hebrew (MH): [ʃit-a] 'method', [ʃit-a**t**-i] 'methodic'. An analysis is conducted within Gradient Harmonic Grammar, in which the different candidates are given harmony scores in accordance with their violations of weighted constraints. The alternating consonant /t/ of the suffix is assumed to have activity level lower than optimal. Weighted constraint interaction effectively establishes a threshold of realization for every type of segment in every position. At the right edge of the word, because of a constraint *C]$_{PRW}$, this threshold is set high. And while both deficient and non-deficient /t/s violate *C]$_{PRW}$ there, the surfacing of deficient /t/ is more of a violation of DEP than would be the surfacing of a non-deficient /t/; accordingly only the latter is realized. The deficient /t/ will only be realized in environments where the realization threshold is relatively low for consonants, e.g. before a vowel. We show that our account is as effective as an autosegmental one, while making fewer assumptions and having better empirical coverage. Moreover, while activity seems to be generally necessary for the understanding of human cognition (Rumelhart & McClelland 1986), multiple autosegmental tiers do not have support outside language.

We then move on to show another advantage of activity over autosegmentalism, namely that the notion of activity easily extends to constituents above the segment level. Indeed, this might be the correct analysis of the Modern Hebrew facts. The realization [-á] (full V́, unrealized /t/) is in complementary distribution with [-et] (unstressed epenthetic vowel, realized t). By factoring in stress as an activity-enhancer, we show that activity can be shared in a zero-sum fashion by the segments of a morpheme. Under this view, both [á] and [et] are /-at/, with deficient activity associated to the morpheme. If the morpheme is stressed, its deficient activity is added to the activity provided by stress. The stressable part of the morpheme - the vowel - can be realized, with the result of /t/ remaining unpronounced; but if the morpheme isn't stressed, the /t/ alone will be realized, and epenthesis will replace the lexical vowel, which will not have enough residual activity to be realized.

Thus, encoding realization-potential into lexical knowledge can explain not only segment-zero alternations, but also cases of apparent allomorphy. Combining the two results, we move on to morpheme-zero alternations, i.e. cases where entire morphemes remain unrealized for phonological reasons: Yiddish [**gə**-ʃik-**t**] 'sent' vs. [ʃifʁ-íʁ-**t**] 'encoded', *[**gə**-ʃifʁ-íʁ-**t**]. By attributing low activity to /gə/, we derive its non-realization from alignment and *LAPSE, which are crucially violated elsewhere in the language.

Time permitting, we conclude by speculating on activity-based accounts of other phonological alternations such as epenthesis and syncope.

Pitch accent in Crow and Osage

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Accentuation in Missouri Valley Siouan is traditionally taken to be 'phonemic' or 'contrastive', listed as part of a stem's lexical entry and not derived by any process; this is because there are minimal pairs that differ tonally (íi 'mouth' vs. ií 'hair'). This is claimed for both branches of Missouri Valley Siouan, Crow (Gordon 1972; Wallace 1993; Graczyk 1991, 2007) and Hidatsa (Boyle 2007, Park 2014). But Boyle et al (2016) have recently argued that Hidatsa has a *predictable* accentual system based on quantity sensitive iambs. We adopt iambs for stress in Crow, but claim that morphemes fall into tonal classes, ℒℋ*, ℒ*ℋ, and a default class with final ℋ on the last mora (1).

(1)	weight/tune	ℒℋ*	ℒ*ℋ	final mora ℋ
	LH	(tàˈláa) 'grease'	(xaˈlàá) 'rain'	
	H	(ˈíi) 'mouth'	(ˈií) 'hair'	
	LL	(àˈpé) 'nose'	n.a.	same as ℒℋ*
	HL	(ˈhúu)pa 'handle'	(ˈhuu)pá 'shoe'	same as ℒ*ℋ
	LLL	(ìˈlí)či 'odor'	(iˈlì)čí 'hind quarter'	same as ℒ*ℋ
	LHL	(dàˈkáa)ka 'bird'	(aˈwàà)sá 'bean'	same as ℒ*ℋ
	HH	(ˈíax)(xii) 'able to pull/lift'	(ˈiax)(xíi) 'forehead'	
	LLH	(bàˈlá)(xii) 'weapon'	(aˈwà)(číi) 'badger'	(ˈawa)(šií) 'fog'
	HLL	(ˈáp)(čiši) 'rub'	(ˈìax)(páši) 'be full'	(ˈan)(nawí) 'attitude'

There is overlap among classes in certain environments (LH and H; LL; HL, LLL, and LHL), but the classes are reliably separated elsewhere (HH, LLH, and HLL).

Our analysis generalizes to other Siouan languages like Osage (Quintero 2005). Tonally, words are either ℋℋℒ... or ℋℒℳ... as shown by F0 measurements in Altshuler (2009). Generalizing our approach from Crow, we argue that Osage has iambic stress on all words (σˈσ)(σ$_{\text{l}}$σ), but two tonal classes ℋ*ℒ and ℋℒ* with leftward spread of ℋ, and toneless syllables realized as ℳ. The result is compatible with the pitch data Altshuler provides.

(2)	stress/tune	ℋ*ℒ	ℋℒ*
	(σˈσ)	(ℋˈℋ)	(ℋˈℒ)
	(σˈσ)(σˈσ)	(ℋˈℋ)(ℒˈℳ)	(ℋˈℒ)(ℳℳ)

Altshuler assumes a one-to-one assignment of tone to stress, claiming that footing is distinctive; some words begin with a degenerate foot (ˈσ)(σ$_{\text{l}}$σ), others with a binary foot (σˈσ)(σ$_{\text{l}}$σ). We show that our analysis is less stipulative (no distinctive footing or degenerate feet) and draws useful comparisons to other related (Crow, Hidatsa) and unrelated (Swedish) languages.

Preliminaries to phonological typology

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Phonological typology inventorizes structural properties and studies their distribution across languages, including their correlations with each other and, for some, with extra-linguistic factors (Hyman 2009). An *a priori* characterization of the common element in phonological grammars may enable us to define those properties confidently and insightfully (Bickel 2011). The three common elements, while akin to Hockett's design features or perhaps Poeppel's (2012) cognitive procedures, more directly represent grammatical properties. None of them are new and all of them minimally enjoy a reasonable level of support.

Segments. Vowels, consonants and tones are the three featurally specified, linearly sequenced units providing phonological content. Segments and specific features may form parallel autosegmental tiers (Goldsmith 1977, McCarthy 1985). The 'universal' is that all languages have segments, but a language's specific segments and features result from ergonomic conditions in speech production and perception (cf Ridouane & Clements 2011). If [a] occurs in all languages, it is because phonetic conditions on its inclusion are highly favorable.

Prosodic hierarchy. A hierarchically arranged set of featurally empty constituents, with higher ones encompassing lower ones. They are the containers of the phonological content. This arrangement, not the specific levels, is universal (cf Schiering et al. 2010). One or more of a language's prosodic constituents may be headed.

Attachment. Segments and prosodic constituents are related by alignment and association. Like all linguistic constituents, segments are aligned somewhere (McCarthy 1993), but only segments may additionally have or acquire an association (Goldsmith 1977).

An agreement on these preliminaries may promote less cluttered descriptive statements.

1. Distinguishing alignment from association clarifies a number of phenomena. Italian initial [sC]-clusters treat [s] as gesturally poorly integrated compared to English and German (Hermes 2013), illustrating alignment without association of a word-edge consonant. Giryama rightward H-displacement to the second mora in the penult (Volk 2011) illustrates right-edge alignment plus association in a pattern known from intonation studies as 'phrase accent' (Grice et al. 2000).
2. Some of the disagreements over word prosodic typology may be due to an incomplete recognition of the different roles of the elements listed above. Tones are segments, with minimally all the properties that vowels and consonants have (Hyman 2011). Stresses are feet, ie syntagmatic, empty, but headed prosodic constituents (Hayes 1995), where languages vary in the extent to which they express headedness phonetically, meaning there can be feet in languages without evident stress. Since languages cannot skip prosodic levels on an idiosyncratic basis, stress, unlike tone, is obligatory if the language has stress. Accents, like word melodies, are specifications of 'attachment'. To illustrate, Barasana manipulates accents for tone distributions (Kenstowicz & Gomez-Imbert 2006) and Ambonese Malay is a language with syllables and Pwords, but no feet (Maskikit-Essed & Gussenhoven 2016).

The Synchrony and Diachrony of External Sandhi Processes

Mark Hale & Madelyn Kissock, Concordia University, Montréal

This paper explores some of the factors that are likely to lead to the diachronic development of external sandhi processes, with a particular focus on whether and how phonological processes interact with subphonemic coarticulation effects and suprasegmentals to induce such sandhi. We take as our case study a set of Telugu external sandhi processes, beginning with one which results in final vowel deletion before a following vowel-initial word (i.e., a regressive process, affecting all short vowels).

(1)	*meːka*	*undi*	→ *meːk undi*	*ɖabbu*	*anteː*	→ *ɖabb anteː*	
	goat	be-IIISgMasc		money	say-CONDIT		
	"There's a goat there."			"If you're talking about money…"			

The vowel deletion is an across-the-board effect, triggered solely by adjacency (lack of intervening pause).

This process is notable for two reasons in the larger context of Telugu phonology. First, according to Dutta, Irfan and Harsha (2016), Telugu appears to have significantly stronger carryover, rather than anticipatory, vowel co-articulation in adjacent syllables. This might lead one to expect that co-articulation would have favored the survival of the features of the first V (which perseverate), rather than of the second. Second, there is an external sandhi process of voicing assimilation that voices a voiceless initial consonant after a final vowel under in part syntactically triggered conditions. Lisker (1962) describes this process; recent fieldwork confirms that it remains productive.

(2)	*adi*	*kaːdu*	→ *adi gaːdu*	*miː*	*kurci*	*kuːɖaː*	→ *miː gurci guːɖaː*	
	that	be-NEG		your-PL	chair	also, too		
	"That's not right."			"Your chair too?"				

Unlike the vowel deletion sandhi process, the consonant voicing is progressive. While we might not expect *all* phonological processes to follow from carryover co-articulation, since other factors may be at play, we might expect, a priori, that external sandhi effects – a fairly coherent subgroup – would group together with respect to the directionality of co-articulation effects (Manuel, 1999).

We propose that a series of diachronic events has produced the aberrant directionality behavior of V#V sandhi. Our explanation rests on the interaction of the vowel-vowel sequences with the ubiquitous epenthetic vowel [u]. In spoken Telugu, [u] is epenthesized to any consonant-final word when that word occurs *in pausa*, whether sentence internally, sentence finally, or in citation forms. For historical reasons, words which lexically contain final vowels are relatively few in number compared to those that end in consonants (and thus frequently surface with epenthetic *u*). There would, of course, be no motivation for epenthesis of final *u* if, in connected speech, the next word began with a vowel. For a learner, such data is of course ambiguous as to whether it involves epenthesis + vowel deletion, or a simple failure of epenthesis. The across-the-board nature of vowel deletion in external sandhi indicates that the vowel deletion analysis was opted for, and thus naturally extended to the (relatively rare) non-epenthetic word-final vowels in connected speech.

The paper concludes with a general consideration, within the framework of phonetically-driven sound change, of how external sandhi effects, particularly those which display syntactic sensitivity, arise in phonetics and get phonologized. The case of the progressive word-initial voicing of voiced stops is instructive here: how, phonetically, do we get V#kV to become V#gV under appropriate syntactic conditions, without also predicting intervocalic voicing of identical, but, e.g., word-internal, sequences (VkV → VgV)?

Microvariation in laryngeal realism: Preaspiration in North Germanic

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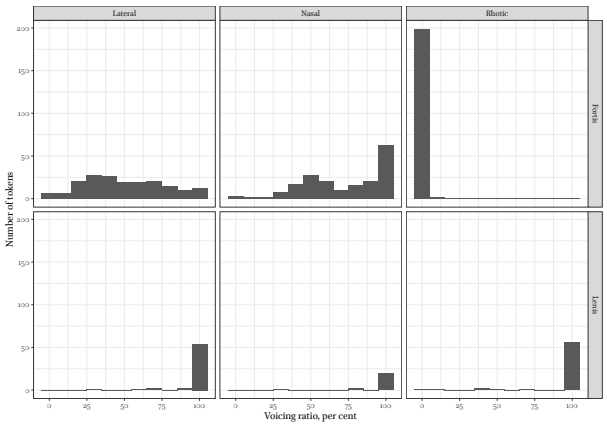
In this paper I consider the range of microvariation in the expression of laryngeal contrast, focusing on (voiceless) preaspiration in North Germanic. On the basis of an acoustic study, I suggest that both the presence of preaspiration and the diversity of its realization have been under-reported in existing descriptions. This, in turn, has important consequences for our understanding of the phonology of laryngeal contrast. Specifically, I argue that the observed variation in laryngeal phenomena is incompatible with a version of 'laryngeal realism' (Honeybone 2005) that produces inferences about phonological specifications on the basis of phonetic implementation (e. g. Beckman, Jessen & Ringen 2013); instead, I advocate a more abstract approach that gives primacy to phonological behaviour.

As discussed by Pétur Helgason (2002), whilst preaspiration and sonorant devoicing before stops in Insular North Germanic have long been recognized by the scholarship, their distribution and behaviour in mainland varieties have been less well understood. In the case of Norwegian, for example, traditional descriptions designate preaspiration as characteristic of Jæren and Gudbrandsdalen, with only passing references for other dialects. However, Pétur Helgason (2002) has shown preaspiration to be pervasive in other North Germanic varieties. More recently preaspiration has also been described for the Norwegian of Trøndelag (e. g. Ringen & van Dommelen 2013). Moreover, it appears possible that this picture may be partially due to under-reporting in traditional auditory descriptions: thus, Tengesdal (2015), in an instrumental study, shows that Oftedal's (1947) claim that preaspiration of fortis stops is absent in Dalane Norwegian is likely incorrect.

I report a comparative acoustic study of preaspiration in two regions of Norway: the south-west, parts of which (Jæren, parts of Dalane; Oftedal 1947, Tengesdal 2015) are traditionally considered preaspirating areas, and the north, where preaspiration has not been consistently described before (but see Iversen 1913, Elstad 1982). I show that preaspiration is attested in (at least some) northern dialects, at rates not dissimilar to those in the west. More importantly, the data show a more granular diversity than is implied by broad dialectal labels, which can be demonstrated statistically; I use clustering algorithms on the estimated effects from regression models with uncorrelated random slopes by speaker to quantify this variation.

This microvariation in the expression of laryngeal contrast is important for our understanding of the relationship between phonological specification and phonetic substance. In particular, I suggest that the precise phonetic interpretation of a distinction between (say) fortis and lenis stops can be much more diverse than can be provided for by a theory deriving these differences from phonological specification, such as some versions of laryngeal realism (e. g. Beckman, Jessen & Ringen 2013).

A further argument in favour of the primacy of phonological behaviour is provided by [ʁ]-devoicing in south-western dialects. I argue that is both phonetically categorical (in contrast to lateral and nasal devoicing), as seen in the figure, and phonological, being triggered only by |fortis| stops. Crucially, lenis stops do not trigger any sonorant devoicing, even gradiently, despite being categorically voiceless (rather than 'passively voiced') themselves. This coarse-grained phonological behaviour is consistent with a substance-free privative analysis where obstruents are specified as |fortis| vs. ∅, but not with one that attempts to capture the phonetic behaviour of lenis stops in phonological representations.



Toward a Typology of Mid Vowels

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Mid vowels have two long-standing representations in phonological theory. Dependency Phonology sees them as complex segments that obtain from featural combinations (e.g. Anderson and Ewen 1987 and related frameworks). In this sense, they can be simultaneously [high] and [low]. More conventionally, mid vowels are argued to be non-[high], non-[low] segments (e.g. Lahiri and Reetz 2010, who follow the articulatory reasoning of Chomsky and Halle 1968). Is there a correct and incorrect (universal) representation for mid vowels? Or is there evidence for a typology that includes both representations?

There are numerous processes in Germanic languages which strongly support a representation of mid vowels that is simultaneously [high] and [low]. For example, the [high]-[low]-sequence [ja] in Old Norse words like *b[ja]rg* 'rock' and *st[ja]ki* 'stake' is a regular reflex of Proto-Germanic *[e] (retained in the corresponding Old Saxon cognates *b[e]rg* and *st[e]kko*). It is claimed that this change falls out from complex mid vowels. The process is analyzed as the unpacking of the two height features of an original complex mid vowel into separate [high] and [low] sounds. Thus, [e_{HL}] > [$j_H a_L$], where the features [high] and [low] are represented with subscripted $_H$ and $_L$, respectively. As a further example, consider the [e] in Old High German verbs like *bitt[e]n* 'ask' and *suoch[e]n* 'seek'. Those mid vowels are reflexes of Proto-Germanic *[ja] (retained in the corresponding Gothic cognates *bid[ja]n* and *sōk[ja]n*). Hence, the Old High German development involves distinct [high] and [low] segments that coalesce into a single complex mid vowel ([$j_H a_L$] > [e_{HL}]). Six additional synchronic and diachronic processes have been identified, which corroborate [high] and [low] mid vowel structure in Germanic languages.

Not all mid vowels should be represented as complex segments. Non-[high], non-[low] mid vowels are supported by processes of lowness dissimilation, as observed in numerous Oceanic languages (Lynch 2003). In Paamese, for example, /na/ 'I am' is realized as [ne] before a low vowel (/na/-*tahosi* > [ne]*tahosi* 'I am good'). Elsewhere it appears as [na] (/na/-*mesai* > [na]*mesai* 'I am sick'). Additional examples of lowness dissimilation outside the Oceanic sphere are reported by Blevins (2009). Such examples are important. If mid vowels were universally [high] and [low] segments, they should *never* be the output of lowness dissimilation. That is, [a_L]...[a_L] should never become [e_{HL}]...[a_L] because the dissimilated output form still involves an OCP violation owing to the two adjacent [low] features. The claim, then, is that these kinds of processes may only occur in languages with non-[high], non-[low] mid vowels. Given such mid vowel structure, the Paamese data are analyzed as the removal of the (privative) feature [low], which creates a segment that is not specified with any height features, to wit, a mid vowel. Hence /na_L/ is realized as [$ne_{\varnothing}$], where $_{\varnothing}$ indicates that the resulting segment is non-[low] and non-[high].

The resulting picture is that mid vowels have at least two typological configurations. A number of research questions are born out of this provisional conclusion. These include whether mid vowel typology implies some kind of parameter in universal grammar or whether typology is epiphenomenal and many more language-specific representations should be added to the list. As the study of features is increasingly emergentist (in the sense of Mielke 2008 and much following work), pursuing these questions can offer insight into the boundary between the innate linguistic faculty and language-specific structure.

North Low Saxon overlength as pre-lenis lengthening: synchronic and diachronic implications

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The issue. We argue that the typologically rare occurrence of overlong vowels in North Low Saxon (spoken in Northern Germany) can best be analyzed as an instance of *pre-lenis lengthening*, from a synchronic as well as from a diachronic perspective. Synchronically, overlength reflects the presence of an empty-headed syllable that breaks up some word-final /VD/ sequences. Furthermore, we claim that largely neglected data from Baden (Feyer 1941, Westermann & Westermann 1941, our fieldwork) support a diachronic pre-lenis lengthening account, typically (but not always) limited to cases of schwa apocope in /VDə/ contexts.
The data. (1) provides some examples of the ternary quantity opposition in Altenwerder. Following Prehn (2012), the [d̥] in (1c) indicates that final devoicing tends to be incomplete after overlong vowels; (1d) shows that final devoicing is complete after long vowels (phonological representations are preliminary).

(1) a. /zɪt/ [zɪt] 'I sit' b. /ziit/ [zi:t] 'page' c. /ziid/ [zii:d̥] 'silk' d. /huuz/ [hu:s] 'house'

It is generally assumed that overlength is restricted to monosyllabic forms that originally ended in a voiced consonant followed by an apocopated schwa (Middle Low German */ziidə/ > [zii:d̥]). The Baden dialect, however, demonstrates that at least this variety has the ternary contrast also in disyllables (our preliminary data, confirming previous descriptions; note that obstruent duration seems to differ for at least some speakers, from (2a) longest (2c) shortest):

(2) a. [wɛ.kŋ] 'to wake up' b. [wɛ:.kŋ] 'weeks' c. [wɛɛ:.gŋ] 'to weigh'

The analysis. Synchronically, items with overlong vowels are stored with a disyllabic trochaic foot template /$\sigma^{+}\sigma^{-}$/ (*Contrastive Metrical Structure*; Iosad 2016, Köhnlein 2016). Since the template enforces disyllabicity, word-final lenis obstruents are syllabified in the onset of the empty-headed second syllable (see Ruscher 1983 for a similar syllabification):

(3) /ziid, ($\sigma^{+}\sigma^{-}$)/ → [zii:.d̥]

Forms as the one in (3) show incomplete final devoicing and, as we argue, pre-lenis lengthening. The resulting durational difference between long and overlong vowels is comparable to what Denes (1955: 761) already observes for vowel-obstruent interactions in English: "in certain circumstances, non-spectral characteristic such as duration can serve as the basis for phoneme recognition". Functionally speaking, the tendency to devoice makes producing the primary voicing cues more difficult in word-final lenis obstruents, and the durational cue in the pre-lenis vowel gets (phonetically) strengthened. In most dialects, the durational difference between long and overlong vowels (presumably) disappears in intervocalic position; yet Baden retains it even in 'overt' disyllables. This seems to suggest that overlength in obstruent-final forms originated as an exaggeration of intrinsic durational differences between longer vowels in /VDə/ contexts as compared to /VT/ or /VTə/ contexts. In most dialects (though not in Baden), the exaggeration was contingent on apocope.
Previous approaches typically encode ternarity directly (e.g. Ternes 1981), or assume a binary contrast between monomoraic lax vowels and two types of tense vowels (e.g. Prehn 2012: monomoraic plus moraic fortis obstruent [$zi_{\mu}t_{\mu}$], bimoraic plus non-moraic lenis obstruent [$zi_{\mu\mu}$d̥]). As we discuss, the direct ternarity account has a hard time explaining interactions with obstruent voicing and quantity alternations in morphological paradigms (see also Prehn 2012). The binary approach seems to predict ambisyllabicity of voiceless consonants following long / tense vowels in disyllables with initial stress, which seems unattested. Furthermore, it cannot account for oppositions between long and overlong lax vowels, which may be rare but exist (see e.g. the Baden examples in (2)). Concerning the historical dimension, we argue that the pre-lenis lengthening scenario seems preferable over a compensatory lengthening approach, where mora reassociation would be allowed in /VDə/ contexts, but would somehow have to be blocked in /VTə/ contexts.

/s/-weakening in Andalusian Spanish: from (partial) deletion to (in)complete gemination

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Spanish dialectal research has traditionally reported an enormous amount of variation in the realization of implosive /s/ (e.g., Navarro Tomás 1918, Alarcos 1958, Alonso 1972, Lipski 1984, Gerfen 2002, Vida 2004, 2015, Hualde 1987, 2005, Torreira 2012, Núñez Cedeño 2014). In this paper we investigate the phonological representations and constraints involved in several puzzling solutions which result from the weakening of word-internal /s/ in coda position in Andalusian Spanish (AS), a particularly interesting variety where aspiration (1a,e) may coexist with complete derived geminates (1b,f); partial derived geminates (1c); partially aspirated realizations, with concomitant gemination (1g) or without it (1h,i); an innovative affricate ([t͡s], 1j), and plain deletion (1d,k) –with further fricativization in some varieties (1l).

Table 1.Some solutions of word-internal coda -s weakening in AS

/s + sonorant/	/mismo/	/s + stop/	/pasta/
a. aspiration	[mih.mo]	e. aspiration	[pah.ta]
b. complete gemination	[mim.mo]	f. complete gemination	[pat.ta]
c. incomplete gemination	[mim̥.mo]	g. preaspirated geminate	[pa^{h}t.ta]
d. deletion	[mi.mo]	h. aspiration + postaspiration	[pah.t^{h}a]
		i. deletion + postaspiration	[pa.t^{h}a]
		j. affrication	[pa.t͡sa]
		k. deletion	[pa.ta]
		l. deletion + fricativization	[pa.θa]

There are at least three controversial issues related to the data in (1), which any phonological analysis should account for. First, some of the attested solutions like the merged affricate [t͡s] (1j) are particularly challenging for current phonological theory because they must allow some kind of feature internal structure that specifically captures the reordering of phonological features within contour segments. Second, cases like [mim̥.mo] and [pa^{h}t.ta] cannot simply be analyzed as derived geminates, given that some underlying phonological feature of the /s/ has been retained in the first part of these geminates. Furthermore, [mim̥.mo] is equally problematic for traditional feature geometry models that assumed that major class features like [sonorant] cannot spread or delink independently of other features. In this paper we show that the Parallel Structures Model (PSM) of feature geometry (Morén 2003, 2007), in which major class features are defined structurally but not featurally, offers an optimal framework to account for these data. Additionally, it will be demonstrated that the internal structure that specifically captures segmental-internal timing is crucial in phonological representations, especially when trying to account for contour and complex segments, whether they are single consonants or geminates (along the lines of Riehl & Cohn 2011, Núñez Cedeño 2014). Though with the advent of Optimality Theory (OT) the role of phonological representations in formal analyses has been extremely minimized placing the burden of explanation on not independently-motivated constraints, we argue that an OT analysis of the AS data couched in the PSM can account for these facts without renouncing to modularity. There are two main ingredients in our analysis: on the one hand, the detection of false geminates (1c) vs. true geminates (1b,f,g), and, on the other, the identification of contour laryngeal geminates (1g), which conform an unattested structure in PSM (Morén 2003: 242) and which compete with contour manner outcomes emerging from reordering of features to preserve sibilancy (1j).

Emergence of the falling tone in Dinka and Nuer

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In W. Nilotic languages such as Nuer and Dinka, various grammatical properties are signalled primarily by introducing complex and layered changes to the stem. These changes involve modification of vowel quality, quantity, tone, and consonantal mutation: W. Nuer *lép* 'tongue.SG.NOM', *lɛàp* 'tongue.SG.GEN', *lɛ̱e̱̱p* 'tongue.PL.NOM'. However, related languages from a more conservative W. Nilotic sub-branch Burun suggest that the ancestral language had a rich inventory of affixes which were lost in Nuer and Dinka. For example, Surkum *ʔʌ̀m-bi* 'eat-AP' (*ʔàm* 'eat.TR') vs Nuer *cạ̀m* 'eat.AP' (*càm* 'eat.TR'); Mayak *ʔin-ʌth* "intestine-SG" (*ʔin* "intestines") vs Nuer *cièn* "intestine.SG" (*cị́ín* 'intestines.PL). Historically, the stem-modifying morphological operations seen in Dinka-Nuer are relics of processes related to the presence and loss of the old suffixes, such as compensatory lengthening, intervocalic lenition, vowel harmony (Andersen 1990, 1999). The loss of suffixes also correlated with emergence of such properties as vowel phonation contrasts (breathy vs creaky/modal) and three degrees of length in Dinka and Nuer.

In this talk, I propose that loss of suffixation also introduced new complexity to the old W. Nilotic tonal system, bringing about emergence of contour tones. Burun languages typically have only two tonemes (H and L) but, as I will argue using Mabaan as example (Andersen 1999, 2006), partial attrition of suffixes has already became a contributing factor for the appearance of falling tones in these languages. Full attrition of suffixes in Nuer and Dinka has taken this process a step further. I suggest that the same tonal rules that apply in Mabaan over a span of a root and a partially atrophied suffix, apply within the stem in Nuer and Dinka, and are responsible for generation of some falling tones. Another source of falling tones is found in Nuer where high tones are realized as falling over all modal (but not breathy) vowels.

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Vowel nasalisation in Scottish Gaelic: The search for paradigm uniformity effects in fine-grained phonetic detail

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According to the modular feedforward architecture of grammar, the phonetic component is sensitive only to the output of the phonology and is thus blind to morphological or lexical conditioning (Pierrehumbert 2002). However, this prediction is challenged by claims that fine-grained phonetic detail may display e.g. paradigm uniformity effects (Steriade 2000) or lexical frequency effects (Bybee 2001). In the present study I search for potential paradigm uniformity effects on vowel nasalisation in Scottish Gaelic by investigating alternating items in which a nasalising environment is removed by a morpho(phono)logical process. A clear distinction is found between categorical phonological nasalisation, which is "carried over" into derived forms, and gradient phonetic nasalisation, which is eliminated completely when the triggering environment is removed. This is consistent with the predictions of the modular architecture.

Studies claiming to find evidence of morphologically conditioned phonetics often overlook the fact that a modular architecture may allow prosody to mediate between morphology and phonetics, thus granting the phonetics indirect access to morphological structure. For instance, the subtly differing degrees of /l/-darkening and GOOSE-(non-)fronting found by Strycharczuk & Scobbie (2016) between morphologically simplex *hula* and morphologically complex *fooling* are compatible with an analysis in which *-ing* is adjoined directly to the prosodic word, à la Bermúdez-Otero (2011: 2028), resulting in distinct prosodic structures in *fooling* vs. *hula*. Ideally, the search for morphologically conditioned phonetics must therefore focus on processes which do not involve overt segmental affixation, thus ruling out prosody as a confounding factor.

In the Lewis dialect of Scottish Gaelic, vowels are nasalised after initial [m], e.g. *madainn* [mãtiɴʲ] 'morning', but this is blocked in some items such as *marag* [marak] 'pudding'. Using a nasal airflow mask, I investigate patterns of nasal airflow in one 62-y.o. native speaker reading aloud from a randomised word list. By averaging across up to 36 tokens of each stimulus I create highly detailed dynamic nasality profiles of a number of items. It is found that all items in initial [m] display a high level of nasal airflow early in the vowel; however, in items such as *madainn* a moderately high level is sustained throughout the remainder of the vowel, while in items such as *marag* it rapidly decreases to zero. This suggests two *scattered* (Bermúdez-Otero 2007) nasalisation rules: one categorical phonological rule subject to lexically conditioned blocking and another more subtle gradient phonetic rule which applies without exception.

Scottish Gaelic, like all living Celtic languages, displays morphosyntactically conditioned alternations in initial consonants known as *initial mutations*. Under the *lenition* mutation, *radical* [m] alternates with *lenited* [v]. It is a matter of debate whether Celtic initial mutations involve autosegmental affixation in the phonology (Lieber 1987; Wolf 2007; Iosad 2014) or are pure morphology (Green 2006; Hannahs 2013), but it is clear that the radical and lenited grades of a given lexical item are paradigmatically related. In this study it is found that items with categorical phonological nasalisation after radical [m] (*madainn*) also display categorical phonological nasalisation after [v] in the lenited grade, while those with only gradient phonetic nasalisation after radical [m] (*marag*) display no nasalisation in the lenited grade.

These results are consistent with a modular architecture in which the phonetic component has no direct access to morphological information. I take this as evidence that dismissal of the modular architecture is premature and I claim that the search for paradigm uniformity effects in fine-grained phonetic detail should be restricted to cases where prosodic structure cannot play any mediating role, as exemplified here by the lenition mutation in Scottish Gaelic.

Prosodic Domains : Overthrowing the hierarchy

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Issues with the Prosodic Hierarchy. Although a theory of Indirect Reference, the Prosodic Hierarchy's (PH) default setting is one where prosodic(PF) and morpho-syntactic(MS) domains are isomorphic (Selkirk 1986, Nespor & Vogel 1986/2007). Mismatches are due to imperfect mapping from MS to PF; mediated through constraint rankings where violations of particular Match constraints are permitted (Selkirk 2011). One major problem for such an account of PF domain formation is that the PH is diacritic, hence disallowed in a modular phonological theory, and absent of predictive value (Scheer 2012). The second major problem for this framework is that constraints like MatchWORD presuppose "a word in syntactic constituent structure" (Selkirk 2011: 439) that phonological structure may be aligned with. In fact, all current (non-lexicalist, including Selkirk, see Kratzer & Selkirk 2007) theories of MS agree that there is no such thing as a MS word. Also, current Minimalist syntactic assumptions call into question the feasibility of head movement, with the consequence that complex X^0s are impossible derived syntactic objects (Chomsky 2000). If there is no MS word, then phonological matching is an impossible account of phonological word(PW) domains.

Alternative. This talk focuses on the PW, and an alternate definition of domain delimiters proposed in Lowenstamm (1999) and Scheer (2012). If languages vary on whether they mark particular syntactic constituents (cycles, phases) with an initial empty CV, this allows for a fully modular representational account of phonological domains that is not dependent on nonexistent syntactic entities. Additionally, the CV, being a phonological object, makes specific predictions.

Ojibwe hiatus resolution. Here we present a non-PH analysis of hiatus resolution in Ojibwe, which may either recur to epenthesis (see (1), (2)) or to the deletion of the rightmost vowel (see the last vowel of (3)). Newell & Piggott (2014) have established that the two strategies are distributed according to morpho-syntactic structure and its spell-out in terms of phases (which define computational domains in phonology): deletion is found phase-internally, while epenthesis occurs when the two vowels belong to distinct phases. Here we propose that rather than projecting a PW, phases are marked by an initial empty CV that occurs to their left. Under (1) the vP is a phase and hence generates the phonological string under (2) (where filled positions are represented by melodic segments and Cs/Vs are empty constituents).

(1) [(ga [**d**a:)(gamo)(se:) $_{vP}$]$_{TP}$] 'he will (prob.) walk in snowshoes'
ga'fut' a:gam-ose 'snow shoe-walk'

(2) g a C_1 V C_2 a C_3 a g a m o s e C_4 e

As the empty V position in (2) must be governed by the following vowel, C_2 will be licensed but ungoverned and hence strong. Epenthesis is thus a form of fortition: it only occurs in strong position in Ojibwe. Vowel-deletion, on the other hand, occurs between a root and a suffix, or between a root and a prefix that emerge in the same phase – both instances where no empty CV separates the vowels in question. This account makes a prediction that the PH account cannot come up with: in Ojibwe suffixes will always behave as if they were inside the phonological domain of the preceding morpheme even when there is a phase boundary between them. This is because there is no empty CV inserted string-finally in a phase. (3) is a case where the left and right edges of the same phase are treated differently: the nP is a phase and hence produces epenthesis at its left, but deletion at its right edge (C_4 is Governed by following 'i' ∴unrealized).

(3) a. ni**d**akw**e:**m 'my wife' [ni-[akwe: $_{nP}$]-im $_{DP}$] '1-woman-poss'
b. n i C_1 V_1 C_2 a k w e C_3 e C_4 i m V_2

Interestingly, there is a strong cross-linguistic tendency for suffixes to behave as if they were phonologically closer to their base than prefixes. The analysis herein, in addition to offering a modular and syntactically licit account of Ojibwe hiatus resolution, promises an interesting line of research in accounting for this tendency.

Syllable and Word Structure in Kaytetye

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There is only one language currently analysed as having a basic VC syllable structure – Arrernte (Breen & Pensalfini 1999). The other members of the Arandic language family, including Kaytetye, have very similar phonotactics to Arrernte. The goal of this paper is to explore syllable and word structure in Kaytetye. We show that a CV syllable analysis captures the data better than a VC syllable analysis.

The VC analysis proposes that all words are underlyingly V-initial and C-final. There are significant surface departures from these patterns. Utterance-initially, some words are invariably C-initial: e.g. [ˈkəɻə] 'meat'. Utterance-finally, there are two patterns: VCV words show a stressed final [a]: e.g. [aˈka] 'head'. In longer words, there are three potential final realizations: (i) C + voiced schwa, e.g. [aˈpənkə] 'goes'; (ii) C + devoiced schwa, e.g. [aˈpənkə̥]; (iii) C release only, no vowel, e.g. [apənk^{h}]. These three options are available for all words longer than VCV. To address these disparities, the VC analysis proposes that surface C- initial words are underlyingly /ə/-initial, and that the /ə/ surfaces utterance-medially, but not utterance-initially. Utterance-final vowels are epenthetic. Surface forms therefore involve both epenthesis and deletion: e.g. /a̪n̪ ən̪ əkəɻ**Ø**/ → [a̪n̪ən̪ əkəɻə] 'bit meat'; /əkəɻ a̪n̪ən̪**Ø**/ → [**Ø**kəɻ a̪n̪ən̪ə] 'meat bit'.

Epenthesis avoids ill-formed phonotactics (Hall 2011). However, if VC is the basic syllable, then there is no reason why C]$_{utt}$ should be ill-formed. Therefore, the proposed epenthesis for C-final words lacks independent motivation. Further, the VC analysis requires that epenthetic vowels are stressed in VCV words: e.g. 'head' /ak/ → [aˈka]. Stress on epenthetic vowels is dispreferred (Broselow 2011).

Breen & Pensalfini (1999) propose that /ə/ differs from other vowels in being targetless: i.e. it lacks place specifications, and is only specified as [-consonantal]. They propose that a /C_C/ environment is required to provide /ə/ with sufficient place specifications, and that the realization of /ə/ varies according to the adjacent consonants. The $_{utt}$[/_C/ environment is insufficient to provide place specifications, and consequently /ə/ is deleted.

We undertook a phonetic study to examine whether realizations of [ə] in the /C_C/ were determined by the adjacent consonants, or whether they showed an independent F1-F2 target. The primary data was an audio dictionary corpus, with a 41-year-old native speaker of Kaytetye producing each head word twice. Two transcribers independently transcribed a sample of these word tokens. Inter-transcriber reliability for consonants was 97.4% and for vowels 85.6%. There were 2508 vowel tokens which satisfied inter-transcriber reliability requirements. These tokens resolved into four F1-F2 target groups [i], [ə], [a], [u]. Given that [ə] has an independent F1-F2 target, the utterance-initial deletion rule /ə/ → Ø lacks independent motivation.

The CV analysis thus proposes that words may be V or C-initial, and that all words are V-final. In utterance-medial position, vowel hiatus is resolved by the most common strategy found cross-linguistically (V_1V_2 → V_2) (Casali 2011): e.g. /kəɻə a̪n̪ ən̪ ə / → [kəɻ a̪n̪ ən̪ ə] 'meat bit'. The variable realization of utterance-final vowels follows from utterance-final devoicing, which is common cross-linguistically (Myers & Hansen 2007). Utterance-finally, the pressure difference across the glottis is at its lowest, and the vocal folds widen (Ohala 1974, Lofqvist 1975, Smith 1979, Slifka 2006, Myers & Padgett 2014, Padgett 2015). The resultant poor signal quality motivates vowel reduction and deletion.

The CV analysis is therefore independently supported, whereas the VC analysis is not. Given the minimal differentiation in phonotactics between Kaytetye and Arrernte, the VC analysis proposed for Arrernte requires further investigation.

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Attested tone circles are not a challenge for rule-based phonology as they are not not circles

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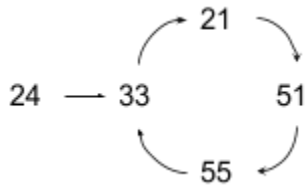
Tone circles, or perhaps more appropriately tone lollipops, are a phenomenon characteristic of Southern Min languages like Taiwanese Hokkien. In a nutshell they consist of a sandhi process in which five underlying tones, called citation tones, undergo sandhi when in non-final position, in a pattern describable as the set of pairs in (1), filled with the phonetic values from Chen (2000). Crucially this sound pattern contains a closed circle as in (2), a conventional diagram used to represent the pattern. This pattern has generated a lot of discussion in Phonology. Relevant to this paper, it has been claimed (Chen et al. 2010, Kirchner 1996, Yip 2002, Zhang et al. 2006, among others) that this pattern is problematic for rule-based phonology due to creating an ordering paradox unless very powerful representations are posited. Wang's (1967) one-fell-swoop account uses alpha-notation to create dependencies between features in ways that go beyond the powers used in SPE, and it makes the prediction about the rule behaving as one which is not borne out. Yip's (1980) account invokes abstract representations that essentially make the pattern lack a closed loop. While there is nothing theoretically wrong with these strategies, I argue in this paper that they are overkill and make the claim that *in principle* there is nothing challenging in the pattern of a lollipop such that it requires anything beyond a classical ordering of rules.

(1)

Underlying tone	Surface tone
/24/	[33]
/33/	[21]
/21/	[51]
/51/	[55]
/55/	[33]

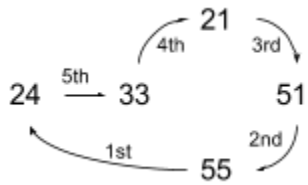
(2)



(3)

55 > 24
51 > 55
21 > 51
33 > 21
24 > 33

(4)



Zhang et al. (2006) offer an especially strong version of a passage that is familiar in discussions of this pattern: "given that the series of opacity is circular, there is no rule-ordering analysis for the pattern."

It turns out that the Taiwanese tone lollipop can be done with a minimal set of five very simple ordered rules without uncommon mechanics or special assumptions about the representation of tones. The simple set of five ordered rules is given in (3) and represented in (4). A combination of several missteps of reasoning has led astray many generations of phonologist. These errors are: ignoring the handle of the lollipop as irrelevant to the pattern, failing to see that the logical consequence of running circular rules is a lollipop pattern, and misunderstanding of the importance of rules that differ from the apparent input-output pair for rule-based phonology. These failings have led everyone to miss a relatively simple derivational pattern that accounts for the tone lollipop of Taiwanese. And surely the constant reiteration of this false belief has led many to not even search for a solution. The relevance of these errors will be discussed.

Qkuan Kambuar pre-aspiration in synchrony and diachrony

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Using data from the author's primary fieldwork, this paper gives a synchronic and diachronic account of the phonemic preaspirated velar stop /ʰk/ in the Papuan language Qkuan Kambuar (QK). Preaspirated stops are typologically rare, and phonemic preaspiration even more so (Clayton, 2010). QK /ʰk/ shows several discrepancies with the typical characteristics of preaspirates, which expands our understanding of the synchronic and diachronic behavior of this rare class of sounds.

Synchronic view: QK runs contrary to typological expectations in several ways. First, preaspiration in QK is phonemically contrastive. Preaspirated stops are typically allophonic with post-aspirates, and in phonemic contrast with voiceless unaspirated stops. Perhaps uniquely, QK has a phonemic contrast between preaspirated voiceless, post-aspirated voiceless, and voiced velar stops, as in /ʰka/ 'dog', /kʰar/ 'skin', and /ga/ 'voice'. Furthermore, QK /ʰk/ cannot be analyzed as a consonant cluster, as there is no independent glottal fricative phoneme.

Second, the distribution of the preaspirated stop differs from what is typologically expected. Cross-linguistically, preaspirates are overwhelming limited to word-medial and word-final positions. The distribution of QK /ʰk/ is restricted to word-initial position, the opposite of what is found in other languages. QK is also unusual in that there is a preaspirated stop at only one place of articulation.

Third, QK falls outside of the geographic and genetic hotspots where most languages with preaspiration tend to be found, such as Northern Europe and Uto-Aztecan. QK is the only Papuan language known to have preaspirated stops.

Diachronic view: By looking at the diachronic trajectory of QK /ʰk/, we can account for many of its typological peculiarities, as well as inform debate surrounding the factors motivating the historical development of preaspirated stops. The most common diachronic source of medial preaspirated stops is medial geminates. Data from Qkuan Kambuar and the related language Malas suggests a similar diachronic route for QK's word-initial preaspirated stop. QK /ʰk/ is cognate with /kVk/ sequences in Malas, as in QK /ʰkon/: Malas /kuken/ 'old', and QK /ʰka/: Malas /kakas/ 'dog'. Interestingly, QK /ʰk/ appears to be cognate with another rare type of segment, the coarticulated labiovelar stop in the more distantly related Amele. This is evident in QK /ʰkauv/: Amele /g͡baf/ 'bald', and QK /ʰka/ : Amele /g͡ba/ 'dog'.

The rarity of preaspiration has been attributed to difficulty in either transmission or innovation. Silverman (2003) suggests the cross-linguistic rarity of preaspirated stops is due to their low perceptibility: If a language should develop them, perceptual difficulties result in their swift elimination from the phonological system. However, Clayton (2010) argues that preaspirates are not, in fact, hard to perceive. Their prevalence in a small number of language families and geographic regions suggests instead that they are hard to innovate but, once innovated, are diachronically robust. The QK data suggests that preaspirated stops may indeed be diachronically unstable, at least in word-initial position, as they are a recent innovation, and are now on their way towards being eliminated. That preaspiration is likely to have arisen recently in QK is suggested by the fact that it is not present in related languages, and could have developed only after a relatively recent process of reduplication applied. Comparative evidence suggests that QK may have previously had a preaspirated alveolar stop /ʰt/, which has since undergone buccalization, a common "exit process" for preaspirated stops (Clayton 2010): While /kVk/ sequences in Malas are cognate with /ʰk/ in QK, Malas /tVt/ is cognate with a sibilant-stop cluster /st-/ in QK, as in Malas /tatiri/: QK /stiri/ 'chicken'.

Transparent vowels: Small cogs in large machines

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Problem. Transparent vowels, i.e. vowels that seem invisible to vowel harmony (VH), pose a challenge for feature-based and phonetically grounded accounts alike (Gafos & Dye 2011): Finnish *i*/*e* (1) are classified as [–back]/articulatorily front, yet do not pattern as such. This abstract argues that their transparency follows from their internal structure, more precisely their size: Transparent vowels are structurally small, thus invisible to VH.

Proposal. Pöchtrager (2014, 2016), dealing with the reduction of unstressed vowels (Catalan, Brazilian Portuguese etc.), argued that openness be expressed structurally: open-mid vowels (5) are bigger (contain more empty structure) than close-mid vowels (4), which are in turn bigger than high vowels (3). Vowel reduction ([ɛ]→[e], [e]→[i]) can be uniformly expressed as the loss of structure (extendable to other patterns, e.g. [ɛ/e]→[ə]). If correct, the structural difference should show up elsewhere, too. Here I argue that it plays a role in VH.

Finnish VH defines three sets of vowel: (non-transparent) front (F), transparent (T), back (B). T combines freely with any other vowel, unlike F or B, cf. (1). (3–5) give Finnish *i*/*e*/*ä*. All three contain the element **I**; openness is encoded structurally. Universally, a vowel consists of up to two projections of nuclear heads (xN in 3–7, one projection embedded in another), each with maximally two layers. T *i*/*e* only involve one projection, *ä* will require a third layer and thus a second projection, which is crucial: All F vowels have their **I** in the *higher* projection, where **I** can escape and harmonise the other vowels of the domain. B does not cooccur with F, as it would be harmonised by F. T vowels have **I** lower down, making them inert to VH.

Consider now *y* [y] (6). The combinatorial possibilities of **I** and **U** are universally restricted (Pöchtrager 2009, 2015, Živanovič & Pöchtrager 2010) and thus must be separated into two different projections, with **I** higher than **U** (also true for *ö*). This unites all F vowels (*y*/*ö*/*ä*), with **I** always in the higher projection. Note that openness is still uniformly expressed by the amount of empty structure: (3, 6) have one empty position each and thus both count as high. A B vowel like (high) *u* (7) simply lacks **I**, while F and T do have it, but differ in where it sits. The three sets are adequately characterised and "transparency" follows from (small) size.

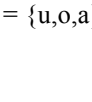
(2) shows that if a stem contains *only* T vowels, they behave as F. Assume that T vowels try to form a chain from left to right, and, if they succeed (i.e. if no F/B intervenes) they "gang up" (similar in spirit to Kiparsky & Pajusalu's 2003 "Combinatoric markedness constraint") and **I** can get out, even from the lower projection. Being small is not a problem if everyone is small; or, put differently, size is relative.

Further issues. 1. A language does not have to have T vowels: Turkish does not, which must mean that **I** is more mobile in Turkish. **2.** Further confirmation for the proposal comes from Hungarian, where only *i* [i], *í* [i:], *é* [e:] are truly T, but not the short counterpart of *é*, viz. *e* [ɛ]. This follows: The T group will have structures like (3–4), but *e* [ɛ], being more open, will be like (5). High(er) vowels are generally more likely to be transparent (Anderson 1980, Beňuš 2005). **3.** The opacity (opposite of transparency) of *a* (in languages like e.g. Pulaar) might follow from it being low, hence big, thus possibly too big for VH to get across.

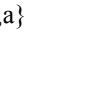
(1) stems		(2) part. case
F	*kylä* 'village'	*kylä-ä*
F, T	*täti* 'aunt', *isä* 'father'	*täti-ä*, *isä-ä*
T	*keli* 'weather'	*keli-ä (*keli-a)*
B, T	*nalle* 'bear', *melu* 'noise'	*nalle-a*, *melu-a*
B	*talo* 'house'	*talo-a*
B, F	**päta*, **patä*	

F = {y,ö,ä}, T = {i,e}, B = {u,o,a}

(3) *i*

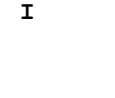


(4) *e*

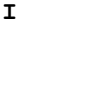


(5) *ä*

(6) *y*



(7) *u*



Lexically indexed constraints and implicational constraint rankings. Evidence from Catalan loanword phonology

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1. Introduction and goals. Word-final posttonic *-n* deletion (ND) and vowel reduction (VR) are general processes in the native lexicon of Catalan (*pla* [pláns] 'flat PL.' ~ [plá∅] 'flat SG.'; ~ [plənifiká] 'to plan'; [bósə] 'bag' ~ [busétə] 'bag DIM.'; Mascaró 1976, Bonet & Lloret 1998, Faust & Torres-Tamarit 2017). These two processes, though, tend to underapply in loanwords (*diva*[n], *eur*[o]). Interestingly enough, loans susceptible to undergo both processes show a consistent behavior across speakers in which underapplication of both processes is the most common solution (PATT1: [o]*r*[a]*nguta*[n]), followed closely by just underapplication of ND (PATT2: [u]*r*[ə]*nguta*[n]), followed by far by application of both processes (PATT3: [u]*r*[ə]*nguta*[∅]), and in which underapplication of VR and application of ND (PATT4: [o]*r*[a]*nguta*[∅]) is unattested. The purpose of this talk is to both present the results of two surveys supporting quantitatively these patterns and to formalize them within Optimality Theory. **2. Experimental survey.** A picture-naming production task containing 22 loans with the relevant structures was conducted on 25 Catalan speakers aged 18-23. The same 25 speakers where asked to answer a judgment test inquiring the naturality of the four possible patterns (presented in an audio form) of the same 22 loanwords (22 x 4 patterns = 88 items), which had to be valued in a Likert scale of 1-5 (very unnatural, quite unnatural, natural enough, quite natural, very natural). Both tests where fulfilled with 50% of distractors and were presented in a randomized way. In the production test, loans were produced following PATT1 in a 65,2% of the cases, following PATT2 in a 25%, following PATT3 in a 9,8%, and following PATT4 in a 0%. In the naturality test, PATT1 was characterized as very natural in a 50,7% of the cases and as quite natural in a 17,4% (total of 68,1%), PATT2 was characterized as very natural in a 38,3% of the cases and as quite natural in a 23,5% (total of 61,8%), while PATT3 and PATT4 were characterized as very natural only in 13% and 11,6% of the cases, and as quite natural in a 14,7% and 16,3% (total of 27,7% for PATT3 and of 27,9% for PATT4); these two last patterns received a high score for the categories very and quite unnatural (total of 57,5% for PATT3 and 58,9% for PATT4). **3. Analytical proposal.** In order to explain underapplication in loanwords we make use of the lexically indexed F constraints MAX-L (against ND) and IDENT(F)-L (against VR) (Pater 2000, Anttila 2002, Pater 2006), associated to specific lexical items (*i.e.* loanwords). MAX-L and IDENT(F)-L form a set of partially ordered constraints with respect to their respective markedness constraints (Anttila 2002): (1) MAX-L, *'Vn##; (2) IDENT(F)-L, VR. From these partially ordered constraint rankings, different outcomes are predicted. *a*) IDENT(F)-L >> VR >> IDENT(F): *no VR*; *b*) VR >> IDENT(F)-L, IDENT(F): *VR*; *c*) MAX-L >> *'Vn## >> MAX: *no ND*; *d*) *'Vn## >> MAX-L, MAX: *ND*. Note, however, that if IDENT(F)-L dominates VR, but *'Vn## dominates MAX-L, the unattested candidate *[o]*r*[a]*nguta*[∅] is selected. According to Anttila's (2002) approach to lexically indexed constraint ranking, (*i*) only unranked constraints (A >> **B, C**) can be lexically specified, and (*ii*) specific lexical items choose a ranking from the partial order (/Item1/-**B>>C**; /Item2/-**C>>B**). This model, thus, allows for indexation of constraint rankings. We propose a version of the lexically indexed constraint ranking approach in which, in the context of two distinct lexical indexes associated to the same lexical item, the satisfaction of the constraint associated to one lexical index implies the satisfaction of the constraint associated to the other lexical index. Therefore, the constraint ranking schema associated with L (IDENT(F)-L >> VR) implies the same constraint ranking schema associated with L (MAX-L >> *'Vn#). Namely, if two lexical indexes enter into an asymmetrical implicational relation of the type L⇒ L (/orangutan/-L⇒L), the satisfaction of the constraint associated to L implies the satisfaction of the constraint associated to L. If no implicational relation between the two indexes is specified in the lexicon, no specific implicational constraint ranking is imposed. According to our proposal, thus, EVAL is dependent on relations between lexical indexes.

Affix allomorphy might very well be phonologically optimizing, ALWAYS!

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Affix or function word allomorphy differs from stem allomorphy in two respects: (a) it is not associated with morphosyntactic differences (as opposed to stem allomorphy as in {/tɛl/,/təul/}, which correlates with tense differences in *tell, told*) and (b) it is characterized by strictly phonological conditioning. While many such cases lend themselves to easy analyses in terms of phonological markedness, some have been claimed to be clearly phonologically non-optimizing (Blevins 1999, Paster 2006). The issue is of utmost theoretical significance, bearing on the adequacy of OT as well as the overall architecture of grammar. The analyses proposed below aim to demonstrate that *she that seeketh findeth* an analysis in terms of phonological optimization.

A. Perfective suffixes {-eh, -oh} in Tzeltal (Walsh Dickey 1999)

The distribution of *–oh* after monosyllabic stems and *–eh* after longer stems is captured by the grammar in (1). Two constraints, one requiring main stress on the final syllable, the other requiring foot-binarity, are always satisfied. /o/ is more marked than /ɛ/ because for mid vowels, [+ATR] is marked (Archangeli &Pulleyblank 1994). The local conjunction of *{MID/[+ATR]} and PARSE-SYL (No unfooted syllables) eliminates the candidate sku.(tʃla.jóh), which violates **both** constraints. The fixed ranking *PEAK/[-round] >> *PEAK/[+round] (cf. Kenstowicz 1996 on peak prominence with respect to stress) is motivated by asymmetries as in Engl. *Hú*[tʰù:] <Hutu> vs *dú*[ɾi] <duty>, where a final round (back) nucleus always attracts stress (manifest in vowel lengthening and aspiration of the preceding /t/), whereas the unrounded (front) vowel of the same height is stressless (manifest in vowel shortness and potential flapping of the preceding /t/). The preferred alignment of the (independently fixed) word-final stress with a rounded vowel results in a default status for *–oh*. (The analysis is more restrictive than that by Trommer (2015), who assumes indexed constraints such as PERF=oh, which are clearly non-universal.)

(1) skutʃlaj+{-ɛh, -oh}	*{*{MID/[+ATR]}, PARSE-SYL}	*PEAK/[-round]	*PEAK/[+round]
✓ sku.(tʃla.jɛ́h)$_\Sigma$		*	
sku.(tʃla.jóh)$_\Sigma$	*!		
skutʃ+{-ɛh, -oh}			
(sku.tʃɛ́h)$_\Sigma$		*!	
✓ (sku.tʃóh)$_\Sigma$			*

B. Definite article {a, la} in Haitian creole (Hall 1953)

a occurs after vowels (e.g. *figi*-a ‘the face’) and *la* occurs after consonants (*pitit-la* ‘the child’). The latter distribution allows for the satisfaction of the constraint ALIGN (stem, R, σ, R) without entailing the highly marked syllabification of a consonant in the coda before a vowel. (The same pattern is seen for the agentive allomorphs {*-er, ler*} in German, where *-ler* is restricted to consonant-final stems (*Nachzüg-ler* ‘latecomer’, but *Wichtigtu-er* ‘busybody’ **Wichtigtu-ler*). The default status of *a* could be due to its having less structure.

C. Nominalization in Leti (Engelenhoven 1995, Blevins 1999)

Two allomorphs /ni/ and /nia/ occur **before** vowel-initial stems ([nj]*atu* ‘knowledge’) and stems starting with a consonant cluster ([nja]*mnèsa* ‘equality’), respectively. In all other contexts **infixes** appear (e.g. *k*[nj]*asi* ‘digging’, *t*[n]*utu* ‘support’, *r*[j]*esi* ‘victory’) (The allomorphy among the prefixes and among the infixes is clearly optimizing). The question: Why violate LINEARITY instead of forming seemingly perfect **ni-nasi, *ni-nutu, *ni-resi*? Answer: These forms violate either ALIGN (STEM, L, ω, L) or a constraint prohibiting non-cohering affixation. The ranking ONSET, *COMP-ONS >> ALIGN (STEM, L, ω, L) forces prosodic integration of affixal material always and only when serving to reduce word-initial onset markedness, by supplying an onset before vowels (nj-a.tu)$_\omega$, or by supplying a nucleus to avoid complex clusters (nja-m.nè.sa)$_\omega$.

Morphosyntactic and lexical conditioning of vowel replacement in Guébie

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Introduction: Root vowels in Guébie (Kru) [Côte d'Ivoire] can be replaced with vowels of particular affixes: *bala*$^{3.3}$, 'hit' → *bɔlɔ*$^{3.2}$, 'hit him'. This vowel replacement is conditioned by morphosyntactic environment, as well as lexical class. Here I describe the vowel replacement pattern in Guébie and provide an analysis of the phenomenon relying on sublexicons for lexical specificity (Becker and Gouskova 2013, 2016; Gouskova et al. 2015) and cophonologies for morphosyntactic conditioning (Ito and Mester 1999; Anttila 2002; Inkelas and Zoll 2005). The proposed analysis demonstrates that phonological analyses must be able to refer to both lexical class and morphosyntactic environment.

The data: Syllables in Guébie are maximally CV; however, certain CVCV words are reducible to CCV on the surface, where the initial vowel is dropped. The lexical class of items that undergo vowel replacement in Guébie are exactly those which are reducible from CVCV to CCV. I term this sublexical class *reducible roots*. Certain phonological features correlate with being a reducible root. First; if the second consonant (C2) of the root is a liquid, or if C1 and C2 are consonants with the same features, reducibility is highly likely (ex: *jɪla*$^{3.3}$, *jla*^{3}, 'ask'). Tone is marked with superscript numbers 1-4; 4 is high. Second, similarity between the first and second vowels makes reduction more likely; namely, if the first and second vowel share some or all features, and if the tone on the first and second syllables is the same, the option of reduction is highly likely (ex: *bala*$^{3.3}$, *bla*^{3}, 'hit'). While these factors make CVCV reduction to CCV more likely, there are words which meet all of the above criteria but cannot reduce (ex: *ɓolo*$^{2.2}$, 'one'). I propose that reducible roots form part of a sublexical phonological grammar, characterized by certain phonological features that determine the likelihood of any new word to be part of the reducible class (cf. Gouskova et al. 2015). As in other sublexical analyses, roots are marked diacritically for whether or not they are part of this reducible lexical class.

Vowel replacement in the context of certain affixes, namely object markers on verbs and plural markers on nouns, categorically affects all vowels in the roots to which it applies. However, vowel replacement only applies to roots of the reducible sublexicon.

(1) **Vowel replacement of verb roots in the context of object markers**

	Root	**Reducible?**	**Root+Obj**	**Gloss**
a.	bala$^{3.3}$, bla^{3}	✓	bɔlɔ$^{3.2}$, blɔ^{32}	'hit'
b.	jɪla$^{3.3}$, jla^{3}	✓	jɔlɔ$^{3.2}$, jlɔ^{32}	'ask'
c.	kalalɛ$^{3.2.2}$, *klalɛ$^{3.2}$	–	kalalɛ-ɔ$^{3.2.2.2}$, *kɔlɔlɔ$^{3.2.2}$	'help'

The passive suffix on verbs has the same form as the object marker above, ɔ^{2}, and does not condition vowel replacement (ex: *bala-ɔ*$^{3.3.2}$, hit-PASS). This demonstrates that vowel replacement is morphosyntactically conditioned, not purely phonological.

Analysis: There are two obvious approaches to the reducibility and vowel replacement facts: suppletive allomorphy, and multiple phonological grammars specific to lexical class and morphosyntactic construction. I argue for the latter approach, based on words in which derivational suffixes intervene between the root and the suffixes that triggers vowel replacement. I propose a model where sublexical differences are encoded with diacritic features available to the phonological grammar, and certain morphosyntactic features trigger a constraint-based cophonology distinct from the general phonological grammar of the language to account for vowel replacement. In a novel combination of sublexicons and cophonologies, vowel replacement is then constraint-driven, lexically specific, and morphosyntactically conditioned.

Nepali laryngeal contrasts: voiced aspirates and laryngeal realism

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Theories of laryngeal realism (Honeybone 2005, Iverson and Salmons 2011, Beckman et al. 2011, 2013) argue for a tight correspondence between a segment's phonetic cues and the (laryngeal) phonological features that represent it. Consequently, the 'p'/'b' contrast in French, expressed phonetically by vocal fold vibration during the stop closure is represented by a [voice] feature whereas the 'p'/'b' contrast in English, expressed phonetically by long and short lag VOT, is represented by a [spread glottis] feature. However, it is not clear what the theory predicts for segments specified for *multiple* laryngeal cues. We test the predictions by analyzing Nepali's four-way contrast between voiceless, voiced, voiceless aspirated, and voiced aspirated, the type of system Iverson and Salmons (1995) propose is represented by the features in (1) (assumes privative features). We argue that Nepali does, with some caveats, support a realist view. We also test the extent to which two diagnostics proposed by Beckman et al. (2011, 2013) for determining feature specification support voiced aspirates as doubly-specified, for both [voice] and [spread].

(1)	voiceless (T):	voiceless aspirated (Th):	voiced (D):	voiced aspirated (Dh):
	[ ]	[spread]	[voice]	[spread], [voice]

Methods: Data was collected from 17 native Nepali speakers in Sikkim, India and consists of 20 target words with the relevant stops in initial, medial, and final position produced in a carrier phrase. Acoustic annotation/analysis was conducted in Praat (Boersma & Weenik 2016) for several phonetic cues argued to differentiate stops in Indo-Aryan languages, going beyond VOT: prevoicing duration, ACT ('After Closure Time': period between release burst and onset of voicing of following vowel) and SA ('Superimposed Aspiration': period following release burst characterized by glottalic pulsing *and* frication noise).

Results: This study considers two diagnostics for feature representation based on phonetic cues. The first is presence of a cue and its capacity to distinguish one class from another in word-initial position. We find that prevoicing duration significantly distinguishes the voiced from the voiceless classes, seemingly supporting the representation of D and Dh with a [voice] feature as in (1). Post-release duration proved to be significantly longer on the aspirated classes than the unaspirated classes, seemingly supporting the specification of [spread] on Th and Dh. However, the primary cue is ACT for Th and SA for Dh. Although this is problematic for a strict reading of laryngeal realism since the [spread] feature corresponds to different cues on different classes, this can be potentially reconciled with Ridouane et al.'s (2011) expanded definition of [spread] that combines sounds like Th and Dh due to their acoustic, if not articulatory, similarity.

The second set of diagnostics for feature specification comes from Beckman et al.'s (2011, 2013) proposal that cues corresponding to specified features (i.e. aspiration on Th and Dh) are controlled by speakers, but that cues corresponding to unspecified features (i.e. aspiration on T and D) are automatic. They provide two contexts in which to diagnose this: the effect of speech rate on VOT durations word-initially, and passive voicing during stop closure word-medially. For speech rate, Beckman et al. (2011) finds that cue durations corresponding to specified features increase as speech rate slows but that cues corresponding to unspecified features do not. For passive voicing, Beckman et al. (2013) finds that stops specified for [voice] in Russian (a voicing language) are voiced throughout the closure in intervocalic position, but stops specified for [spread] in German (aspirating language) block passive voicing from the surrounding vowels.

Initial position - speech rate: Using mixed-effect models that evaluate the effects of speech rate, laryngeal class, and their interaction on duration of prevoicing, ACT, and SA, we find mixed results for this diagnostic in Nepali. Speech rate effects are as predicted by Beckman et al. for prevoicing duration on both D and Dh classes (β=-.025, p=1.5e-06). For ACT and SA duration, the interaction between class and speech rate goes in the expected direction (β = -.016 and .191 respectively), but the effect is not signifcant (p = .64 and .186). Medial position - passive voicing: As seen in (1), Nepali has stops doubly-specified for both [spread] and [voice]. Thus, in contrast to the languages examined by Beckman et al. Nepali's stops pose conflicting predictions. We find that voiced aspirated segments behave like a stop specified for [voice], not [spread], suggesting that the [voice] feature may be stronger than the [spread] feature.

This paper thus identifies the potential challenge Nepali poses for laryngeal realism, and finds that some aspects of the theory (cue presence diagnostics) transfer to doubly-specified segments without issue, but that some raise questions for further study - namely, whether speech rate effects hold up for all specified features, and whether voicing and aspiration are both equally controlled for in voiced aspirates.

Coronal underspecification as a possible result of transmission noise

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Coronals seem to be special: they are cross-linguistically more frequent (Maddieson 1984), are acquired earlier (Stemberger & Stoel-Gammon 1991), convey less information (Hume, Hall & Wedel 2016), and assimilate more frequently than labials or dorsals (Boersma 1998). This special status led several phonologists to propose that coronals are featurally underspecified (e.g., Lahiri & Reetz 2002; Dresher 2009). We present evidence from a learning experiment supporting the underspecification of coronals, and a neural network simulating the experimental results. In this neural network, we incorporated transmission noise.

We conducted a learning experiment with German listeners. Participants ($n = 12$) were exposed to a set of syllables, either /pa/, /ta/ and /ka/, or /ba/, /da/ and /ga/; these syllables were presented in isolation, and all of them occurred 24 times in random order. Participants were asked to estimate how often they had heard the sounds. The frequencies of /ta/ and /da/ were systematically underestimated: the coronals received statistically significantly lower estimates than the other places of articulation (coronal vs. labial: $p = .009$; coronal vs. velar: $p = .007$; labial vs. velar: $p = .835$). We interpret this underestimation as evidence for the underspecification of coronals: the repeated activation of the [labial] and [dorsal] feature values may lead to higher frequency estimates, and because no feature specification exists for the coronals, their estimate falls short.

We then created a neural network simulating the acquisition of the feature combinations that appeared in the experiment. The network learns combinations of a place feature ([labial], [coronal], [dorsal]) and a voicing feature ([–voice], [+voice]), where both features correspond with phonetic continua. Additionally, we implemented the observation that in real-life learning, language transfer between the teacher and the learner is imperfect because transmission noise may scatter input tokens in the phonetic space (Ohala 1981): it may, for instance, cause an intended labial sound to be perceived as mostly labial and also slightly coronal. Now, coronal place has an advantage over the other two places of articulation: the transmission noise scatters some tokens from both adjacent categories into coronal place, while only intended coronal tokens are scattered into the adjacent places (see Fig. 1). In our network, this entails that adjacent groups of place nodes may be activated simultaneously. We ran 2,000 neural networks, each of which learnt 10,000 input tokens. Intended labials, coronals and dorsals had identical probabilities of occurring in the input. Due to the noise-induced scattering, the resulting cumulative activation of the coronal nodes was significantly higher than that of the labial and dorsal nodes (both $p < .001$). There was no such difference between the labials and dorsals ($p = .209$). Additionally, this higher activation leads to a higher output frequency for the coronals than for labials or dorsals (both $p < .001$, lab. vs. dor. $p = .923$), even if all places of articulation have equal input probabilities.

We propose that the occurrence of transmission noise plays a role in underspecification at the phonological level, for two reasons. (1) A relation may emerge between intended coronals and any place feature value, and the coronal place nodes may be activated for any intended category, so there are more mismatches between intended and perceived categories in the coronals; (2) as a result of the transmission noise, coronals are more frequent than labials and dorsals.

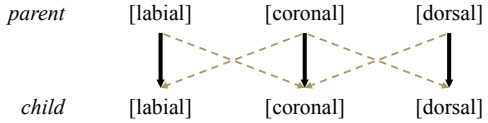

Fig. 1. *Schematic representation of the relations between intended and perceived categories: there are more mismatches for coronals (namely 3) than for labials (2) or dorsals (2).*

Interaction of Tone and Vowel Height in BCS Vowel Reduction

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Aim. I present an unattested pattern of vowel reduction in Bosnian variety of Serbo-Croatian (henceforth: BCS) in which low vowel /a/ is never reduced, and mid vowels only if they are associated with a High tone. High vowels are always reduced. I show this opacity to be a case of a gang effect (in terms of Harmonic Grammar, cf. Smolensky & Legendre 2006): deletion of both [-high] and a H tone is more expensive for the grammar than the loss of [+high] and a H tone.

Data. As shown in (1), the reduction affects short non-low vowels in open medial syllables. The mora can surface a) assigned to the preceding sonorant, yielding its syllabicity, or b) empty, later filled with a schwa at the phonetic level (Polgardi 1996). Some selected examples of the data in (1), excerpted from descriptive literature, show that in this five-phoneme system /i, e, a, o, u/, non-low vowels are subject to reduction iff unmarked – short, unstressed, non-initial or not a single morpheme (word-final vowels are inflectional morphemes). While mid vowels are skipped if they are associated with a H tone (1-b), high vowels are always affected (1-c).

(1)

	Dictionary forms	Colloquial	gloss
a.	ˈSara:jevo	ˈSara:jəvo	(N.proper)
b.	ˈʤi^{H}ge^{H}rica	ˈʤi^{H}ge^{H}r̩ca	‘liver’
	ˈde^{H}te^{H}lina	ˈde^{H}te^{H}l̩na	‘clover’
	ˈvo^{H}lo^{H}vima	ˈvo^{H}lo^{H}vəma	‘ox’ Instr.Pl
c.	goˈvo^{H}ri^{H}li	goˈvo^{H}r̩li	‘speak’ PastPart.Masc.Pl
	maˈga^{H}ri^{H}ca	maˈga^{H}r̩ca	‘donkey’ Fem
	ˈpo^{H}ku^{H}pe:	ˈpo^{H}kəpe:	‘pick up’(Perf) Pres.3Pl

The analysis is based on two approaches: first I offer an OT account, with reliance on contextual Licensing constraints Lic-Q/β (Crosswhite 2001) and positional faithfulness Ident-*Position*(F) (Beckman 1998). This can account for the data iff we assume three trigger constraints, two referring to vowels specified by [–low], (LIC[-LOW]/S(TRESS) and LIC[-LOW]/$\mu\mu$) and one referring to the feature [–high] (LIC[-HIGH]/H). The number of syllables remains unchanged, and here the syllable structure constraints syllabify sonorants and the phonotactics of the language fills the empty slots with the only non-phonemic vowel of BCS – [ə] (Stojković 2016).

(2) The Crosswhite (2001) system

/ˈvo^{H}lo^{H}vima/	IDENT-σˈ(F)	IDENT-σ_1(F)	MAX-MS	LIC[-HIGH]/H	LIC[-LOW]/S	LIC[-LOW]/$\mu\mu$	MAX-μ	SYLMARG	LIC-μ	NUCLEUS
a. ˈvo^{H}lo^{H}vima					**!	***				
b. ˈvo^{H}l$^\mu$v$^\mu$ma				*!	*	***			*	*
☞ c. ˈvo^{H}lo^{H}v$^\mu$ma					*	**			*	*
d. ˈvo^{H}lo^{H}vim			*!	*	**	***	*			

Formulated this way, the analysis in (2) is straightforward, but the issue of the triple trigger is difficult to explain. Therefore I offer an alternative account in Harmonic Grammar, by observing the reduction as a case of OO-Correspondence (McCarthy & Prince 1995) with prosodic faithfulness (McCarthy 2000). The opacity in BCS vowel reduction comes from a gang effect: violations of lower-ranked constraints are more expensive for the grammar than violating a single trigger constraint *[-low], as shown in (3) and (4).

(3) A solution in HG – mid H-toned vowel

e$^H_\mu$	*[–low]	Max-μ	Lic-μ	Max-[–high]	Lic-H	Max-H	Max-[+high]	Max-[–low]	*H*
Weights	9.0	5.0	4.0	3.0	3.0	2.0	1.0	1.0	
☞ a. e$^H_\mu$	-1								-9
b. $^H_\mu$			-1	-1	-1			-1	-11
c. $_\mu$			-1	-1		-1		-1	-10

(4) A solution in HG – high H-toned vowel

i$^H_\mu$	*[–low]	Max-μ	Lic-μ	Max-[–high]	Lic-H	Max-H	Max-[+high]	Max-[–low]	*H*
Weights	9.0	5.0	4.0	3.0	3.0	2.0	1.0	1.0	
a. i$^H_\mu$	-1								-9
b. $^H_\mu$			-1		-1		-1	-1	-9
☞ c. $_\mu$			-1			-1	-1	-1	-8

This paper makes a contribution to the under-researched area of tone and vowel quality interactions. There are only so many reports on relations of tone and vowel height; Becker and Jurgec (2013) report on an interaction of tone and ATR that occurs on mid vowels also. The grounds of this notion have been attested in the acoustic literature (cf. Ohala 1978). In that sense, vowels are more prominent with the H tone, but a H-toned high vowel is apparently too much for the system.

Consonant agreement in Frò?ò functional morphemes

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Tagbana, a Gur language spoken in Côte d'Ivoire, and more specifically the dialect called Frò?ò spoken around the town of Fronan, has consonant agreement as well as vowel and nasal harmonies in its nominal domain. Both harmonies are implemented locally, in the prosodic word. The vowels (and tones) of the suffixal class marker (CM) are a copy of the root's last vowel across a consonant:

(1) a. kà-?à 'village-CM5' b. cīɛ̄:-lɛ̄ 'women-CM2' b. ɲṵ̄-mṵ̄ 'water-CM7'

In (2), the functional morphemes belonging to the same nominal domain, agree in their articulator and [±continuant] features. These free morphemes (pronoun, identificational particle, demonstrative etc. in (2) and (3)) have their own vocalic features.

(2) a. jē-gē kī gī b. jē:-rē tí dī c. ɲṵ̄-mṵ̄ pī bī
month-CM5 PRO5 ID.5 month-CM6 PRO6 ID.6 water-CM7 PRO7 ID7
'It is the month.' 'It is the months.' 'It is the water.'

(3) a. jē-gē kì gí?í gī gā gè
month-CM5 PRO5 which5 PRE5 DEM5 CLAUSE-ENDING.PTC.5
'Which month is this?'

A lexical root X acquires its category by adjunction of a category-defining functional head, the CM in Frò?ò, that combines with the root to form a n^0 (for noun) (Distributed Morphology, Marantz 2007). In Frò?ò, a root needs an overt or covert CM to become a noun. Consonant agreement in the functional morphemes can be accounted for by an extension of Vocabulary Insertion (VI). Frò?ò has a partly non-concatenative morphology (see Faust (2012) and Kastner (2016) for proposals for Hebrew, and Bye & Svenonius for other languages). First the surface morphemes are decomposed in their consonantal and vocalic features, and number of syllables, paired with separate morphological features, see (4) for one example (class 5 of 7 nominal classes).

(4) a. [PRO] ⟺ [monosyllabic template [σ]; voiceless C; V = [i]].
b. [class 5] ⟺ [dorsal, -continuant]

The result of putting features a. and b. together is [ki] (3sg pronoun of class 5), see the table below for more morphemes and their features (the other nominal classes have other features, but are as regularly alliterative as class 5). This result is effected in the phonological part (our OT analysis), where syntax is not available.

Functional morphemes	Class Marker (CM)	Pron/ Poss	Indef. art	Demon Rel.Pro	Interrog	Deictic prt	Identif. prt
Class 5 (sg) [k/g] [dorsal], [-cont]	[g], [ŋ], [ʔ]	**kī**	kà	**gā**	**gí?í**	**gè**	**gī**
Class 6 (pl) [t/d] [coronal]	[-r]	**tī**	tà	dā	dí?í	dè	**dī**

In the talk, we will provide a morphological and phonological account of Frò?ò. The VI instructions illustrated in (4) are inputs for the phonology, and are preserved by faithfulness constraints. The remainder of the non-concatenative phonological form is taken care of by unremarkable markedness constraints, responsible for vowel and nasal harmony, sequence of the prespecified features, syllabic templates, and epenthetic glottal stop (as in *gí?í*).

Our proposal differs from those of Dobrin (1995) and for Arapesh, and of Kaye (1981), Marchese (1986, 1988) and Sande (2016) for Vata, Godié and Guébié respectively. In Frò?ò, consonant alliteration is not a copy of a reduplication of part of the noun, but rather consonant agreement. Even though consonant agreement is usually to be thought as an accident of morphology (Dimitriadis 1997), we nevertheless propose that it should be expressed in phonology by means of an Agreement-by-Correspondence account (ABC of Walker 2001 and Rose & Walker 2004) that consider all morphemes of a class in correspondence with each other.

Syllable-counting Tone Allomorphy in Bari

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Summary: In this talk, we present a new type of empirical evidence that phonologically conditioned suppletive allomorphy is not phonologically optimizing (Kager 1996, Bonet et al. 2007, Wolf 2015) and must be captured by affix-specific subcategorization frames (Bye 2008, Embick 2010, Paster 2006, 2009, 2015): tone allomorphs which are sensitive to the syllable number of their segmental bases. **Data:** Bari (Eastern Nilotic, Yokwe 1986) verbs have a rich morphological inventory marked independently by both segmental and tonal affixes. Tonal affixation exhibits a pervasive 'short-stem syndrome': short (monosyllabic) roots show in many morphological contexts different tones (e.g. passive marked by a final Low with monosyllabic roots **lók** → **lók-â** 'entrap' vs. High in longer forms **sàpûk** → **sàpúk-á** 'turn over') or differently aligned tonal exponents (e.g. final Low in Antipassives which is 'dominant' with monosyllabic roots and claims a separate syllable, but 'recessive' as part of a falling tone with longer roots: **pé** → **pé-jà** 'shoot' vs. **bóró** → **bóró-jâ** 'smear'), while segmental affixes remain constant.

(1)	**1** σ	> **1** σ
Passive	Recessive -L	Dominant -H
Antipassive	Dominant -L	Recessive -L
Benefactive	Dominant -H	Ø
Habitual	Dominant -L	Ø
Imperative	Dominant L-	Dominant L- -L
Instrumental	Recessive -L	

Table (1) summarizes representative cases. **Significance:** We provide 3 arguments that these alternations are allomorphic and not due to general tonological processes: ① Tone in affixed forms differs idiosyncratically from identical tone melodies in unaffixed forms (e.g. **mò-kín** 'smell-Benefactive' vs. **tòkû** 'preach', both monosyllabic and with underlying LHL tone). ② Both quality (H vs. L) and dominance values of affixal tones might be restricted to 1σ or to longer forms. ③ Patterns as the Antipassive are unnatural since under standard assumptions on tone mapping recessiveness (i.e. final contour tones) are expected to occur preferentially in shorter, not in longer forms. **Analysis:** We assume Stratal OT (Kiparsky 2000, Bermúdez-Otero 2011). Tone allomorphs selecting monosyllabic or longer bases differ not only in phonological content (H vs. L), but also in their affiliation to Stem (dominant) or Word-Level phonology (recessive affixes). In the Word-Level phonology, MAX | (protecting underlying association lines) is undominated and ranked above the constraint against falling tones *F(ALL) leading to adjunction of final tones as in the polysyllabic Antipassive in (3) due to τ → σ demanding association of floating tones. At the Stem Level, high-ranked *F forces displacement of already associated tones by the affix tone (dotting marks deassociation) as for the 1σ-root Antipassive form in (2):

(2) **Input:** = c.	τ → σ	*F	MAX |	DEP |
☞ a. H -L pe ja			*	*
b. H -L pe ja		*!		*
c. H -L pe ja	*!			

(3) **Input:** = c.	MAX |	τ → σ	*F	DEP |
☞ a. H -L bo ro ja			*	*
b. H -L bo ro ja	*!			*
c. H -L bo ro ja		*!		

Further Implications: Finally, we show that Bari provides an argument against capturing syllable-counting allomorphy by prosodic templates linked to affixes (Trommer 2015) which predicts preassociation of shorter tone allomorphs to feet, contradicted by cases like the passive recessive **-H** (Yokwe 1986).

When the Representations are Right, the Constraints will Follow:
Palatalisation and Opacity in Ukrainian

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This talk will discuss an interaction of two processes in (a subdialect of) Standard Ukrainian, which is transparent or opaque, depending on what segments are involved. It will argue that key generalisations follow from both constraint interaction and autosegmental representations, and it will argue for the necessity of distinguishing between epenthetic versus underlying material at the subsegmental level.

Unsurprisingly for a Slavic language, Ukrainian has pairs of palatalised and non-palatalised consonants. This palatalisation is contrastive (phonemic) only on alveolar consonants, but all consonants are also palatalised allophonically by a subsequent vowel /i/. Other front vowels /ɪ e/ do not palatalise a preceding consonant; instead, they actually depalatalise it. Palatalisation interacts with a second process, in which mid /e, o/ raise to /i/ in a word-final closed syllable. While for many speakers this raising transparently feeds palatalisation of the preceding consonant, there is a subdialect where raising from /e/ feeds palatalisation (1a) but raising from /o/ counterfeeds it (b), yielding surface instances of non-palatalised consonants before [i].

(1) Mid vowel raising and (a) palatalisation (b) opaque non-palatalisation

	nom.sg.	*gen.sg.*	*gloss*	*nom.sg.*	*gen.sg.*	*gloss*
(a)	lebʲidʲ	lebedʲa	‘swan’	pʲitʃ	petʃʲi	‘oven’
(b)	mist	mosta	‘bridge’	stiw	stola	‘table’
	ʊiz	ʊoza	‘cart’	niʒ	noʒa	‘knife’

This asymmetry poses a serious problem to standard approaches to opacity in Optimality Theory. Whatever opacity-inducing mechanism is invoked (e.g. Paradigm Uniformity, Sympathy, two-level constraints), why does it hold for instances of underlying /o/ but not /e/, barring ad-hoc fixes?

In order to avoid such ad-hockery, this talk will first establish generalisations regarding palatalisation from a representational viewpoint, assuming Feature Geometry, and then invoke constraints on representations. Following e.g. Clements & Hume (1995), palatalisation on a consonant is expressed by a {V-Place[coronal]} feature, which also characterises front vowels. Given the distribution of palatalisation on consonants, a {V-Place[coronal]} specification on a consonant is thus dependent on either a [coronal] C-Place feature on this consonant (contrastive palatalisation is limited to alveolars) or a following [coronal] vowel. {V-Place[coronal]} on consonants is thus always in a branching configuration, linked either to a subsequent vowel or sharing the feature [coronal] with C-Place. Put differently, a {V-Place[coronal]}feature wants multiple exponents, and this also accounts for the spreading of this feature from /i/ to a preceding consonant.

The failure of /e ɪ/ to act as palatalisation triggers, although they are {V-Place[coronal]}, is attributed to their additional feature make-up, which is incompatible with palatalisation on consonants. The fact that they actually depalatalise preceding consonants is analysed as an OCP-coronal effect prohibiting adjacent {V-Place[coronal]} specifications (the OCP being independently motivated in the consonantal system, where we find locally operating coronal harmony).

Returning to the opaque interaction between raising and palatalisation, raising of /e/ can feed palatalisation, as the height specification of the vowel is now compatible with palatalisation. Raising of /o/, however, involves epenthesis of a [coronal] specification, and this talk will argue that the requirement for a {V-Place[coronal]} feature to have multiple exponents holds only for underlyingly present [coronal], not for epenthetic material.

The analysis will be formalised in a version of Turbidity Theory (Goldrick 2000, van Oostendorp 2007), which can distinguish formally between epenthetic and underlying material, which will feed into a more general discussion of asymmetries between underlying and epenthetic features, found in other languages as well.

The Scales-and-Parameters approach to morpheme-specific exceptions in accent assignment

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Introduction. In this paper, I present a new take on the problem of exceptionality in the domain of accent assignment, focusing on two types of systems traditionally analyzed in terms of lexical accents: (i) lexical accent systems with accented dominant affixes, and (ii) phonological weight-sensitive systems in which certain morphemes violate the accent rule ("hybrid" systems).

Problem. The question arises how to capture regular and exceptional accent locations using the same accentual grammar, both within a given system and across the two types of systems.
Account. I introduce here the *Scales-and-Parameters theory*, a parametric, non-metrical theory which separates accent from rhythm and lacks feet (following van der Hulst 1996, 2010). I extend the notion "weight" to morphemes by treating their ability to attract/repel word accent as "diacritic weight", rather than lexical accent (see van der Hulst 1999). Now, since weight is an *ordinal* variable, it allows (unlike lexical accent) for novel types of weight *scales* containing diacritic and/or phonological weight. Thus, Central Selkup (Samoyedic), which is a lexical accent system (Normanskaya *et al.* 2011), has the "diacritic weight scale" (1a), while Eastern Literary Mari (Permic), which is a hybrid system (Reise *et al.* 2012), has the "hybrid weight scale" (1b).[1]

(1) a. diacritically superheavy > diacritically heavy > diacritically light
b. diacritically heavy > phonologically heavy > {diacritically light, phonologically light}

Weight scales are constructed through pairwise comparisons between morphemes and/or syllables, showing that the relevant weight relation is reflexive, transitive and antisymmetric, *i.e.* it is a *scale*.

Sample derivations. The weight degrees defined by the weight scale are formally represented on a "Weight Grid" (WG) in terms of relative height of the gridmark columns. Universally, *only the heaviest* morpheme(s)/syllable(s) in the form are projected onto the "Accent Grid" (AG) where one of these units is assigned accent by the Select parameter, as shown in (2) for Central Selkup.

(2) a. /tvel/ *heavy* √; /-gu/ *heavy suf*

	*	Select (***Left***)
AG	* *	Weight Projection
WG	* *	
	* *	

/tvel-gu/ [ˈtvelgu] "steal-INF"

b. /tap/ *heavy* √; /-ol/ *<u>superheavy</u> suf*; /-gu/ *heavy suf*

	*	Select (***Left***)
AG	*	Weight Projection
WG	* * *	
	* * *	
	*	

/tap-ol-gu/ [taˈpolgu] "kick-SEMEL-INF"

Conclusion. In this way, the Scales-and-Parameters approach presented above uniformly accounts for both the regular accentual patterns and the exceptions in (i) and (ii) with the *same* combination of parameter settings, as opposed to Accent Deletion, which is idiosyncratic and limited to (i).

[1] This is the standard dialect of Eastern Mari, different from other Mari dialects (discussed in Vaysman 2009, *a.o.*).

What can synchronic data tell us about diachronic change?
Regional variation as an apparent-time method for investigating sound change

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The perpetual problem with studying sound change is that we are always 'too late': by the time that it is certain that a sound change is going on, the change has often already progressed so far that it is difficult to locate unaffected individuals, which makes it difficult to study the mechanisms underlying sound change (cf. e.g. Pinget, 2015). A currently-ongoing vowel shift in Dutch, the 'Polder shift', offers a rare exception. The shift consists of three, interrelated, sound changes:

(1) the diphthongization of /eː,øː,oː/ (first noted in 1928 by Zwaardemaker and Eijkman)

(2) the lowering of the original diphthongs /ɛi,œy,ɔu/ (first noted in 1998 by Stroop, who coins the term 'Polder Dutch' for this change); this change is beyond the scope of this talk

(3) the monophthongization of diphthongs preceding [ɬ,r,ʋ,j] (attested scatteredly in Berns and Jacobs, 2012; Botma, Sebregts, and Smakman, 2012; Booij, 1995; Mees and Collins, 1982)

What enables us to study these changes in the present day, despite the fact that they are already quite old, is that they are areally stratified: while both changes have well taken hold in the Netherlands, the Dutch-speaking part of Belgium has been completely evaded by these changes (e.g. Van de Velde and van Hout, 2003, Adank, van Hout, and Smits, 2004). Thus, by studying cross-sectional differences between Netherlandic and Belgian individuals, we can investigate the progression of sound change using ordinary methods.

The talk focuses on the phonological representation of the diphthongal realizations of the vowels /eː,øː,oː/. Their interaction with change (3) suggests that these vowels have become proper diphthongs at the phonological level, as they conform to the same allophone pattern as the original diphthongs /ɛi,œy,ɑu/ do: none of these six vowels are realized as diphthongs when followed by a (coda) approximant consonant. If we follow Hyman (1976), this is to be understood as a case of phonemic reanalysis: evidently, the diachronic rule 'diphthong → monophthong' has become inverted in the synchronic grammar, and a rule 'monophthong → diphthong' already existed, hence the merger. This diachronic analysis is fortunate for the synchronic grammar, as a synchronic rule 'diphthong → monophthong / _ [+approx]' can be formalized, but in the reverse situation, no proper phonological context can be identified.

At the same time, both the diphthongization of /eː,øː,oː/ as well as the blocking of [ei,øy,ou] preceding approximants are strongly phonetically motivated (Labov, Yaeger, and Steiner, 1972 for diphthongization; references after (3) above for monophthongization). The latter restriction could be explained as a constraint on the phonetic implementation of diphthong-approximant sequences, in which case it does not automatically follow that the diphthongization of /eː,øː,oː/ is phonology proper. Under this interpretation, the Hyman-inspired argument for a phonemic reanalysis fails to materialize.

The analysis of a large-scale corpus originally reporting on the areal stratification of the diphthongal realizations helps to clarify in which of these two theoretical modules the diphthongizations should be localized. The corpus, composed by Adank (2003), consists of 5,407 tokens of 21 monosyllabic words, stratified over eight regions in the Netherlands and Belgium. Data show that the sound change is still in full progress and has not made it through either (a) the full vowel system (/eː/ seems to be ahead of /øː,oː/) or (b) the full geography. This suggests that an analysis in terms of scattered rules (Bermúdez-Otero, 2015) is appropriate: the change is in the process of being phonologized, and is hence currently both in phonetics and in phonology. We can thus observe sound change in progress in the truest sense: we are witnessing a sound change slowly ascending from the phonetic implementation grammar towards the grammar of the phonology. This shows that the synchronic variation we can observe naturally in the form of regional/areal differences can be highly informative for the field of diachronic phonology.

PREFERENCE FOR LOCALITY IS AFFECTED BY THE PREFIX/SUFFIX ASYMMETRY: EVIDENCE FROM ARTIFICIAL LANGUAGE LEARNING

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Previous work suggests that learners have a strong locality bias when learning co-occurrence restrictions (e.g., harmony systems), even when learning consonant harmony, which is often non-local in natural languages (Finley 2011, McMullin 2016). However, studies have also found that co-occurrence restrictions are easier to learn when the relevant units are at prominent edges, such as the beginning and end of a word, presumably due to processing factors (Endress & Mehler 2010).

In this study, we investigate how affix type (prefix or suffix) and stress location affect the preference for locality when learning vowel co-occurrence restrictions in an artificial language. Participants were exposed to data ambiguous between a local harmony pattern and a non-local vowel co-occurrence restriction; they were then tested on disambiguating items to determine which kind of pattern they had learned. Previous researchers argued that suffixes are less integrated with stems than prefixes are (Nespor & Vogel 1986, Peperkamp 1997). We therefore expect a stronger locality bias between stem and suffix vowels than between stem and prefix vowels.

Participants were first trained on auditorily presented nonce CVCV stems paired with corresponding affixed forms (CV-CVCV or CVCV-CV). Training stems always followed front/back harmony (front vowels: [i,e], back vowels: [u,o]). Affix vowels alternated depending on the stem vowels. The training was thus ambiguous; all training stems were harmonic so participants had no explicit information about whether the local or non-local vowel triggered the alternations in the affix vowel. Participants who learned the pattern for harmonic stems were then tested on disharmonic stems, where they were forced to choose between matching the vowel to the local or non-local vowel. Schematically, provided only ambiguous input demonstrating A-AA and B-BB, participants were required to choose between A-AB (local vowel harmony) and B-AB (non-local vowel). Affix Type (prefix vs. suffix) and Stress Location (local vowel or non-local vowel) were manipulated between-subjects.

This work is part of an ongoing project for which the same experiment will be conducted across labs in six countries, with native speakers of six different languages (Dutch, English, French, German, Greek, and Hungarian). At present, we have data from 33 English speakers and 54 German speakers. The results show a significant effect of Affix Type for speakers of both languages. Participants in the suffix group usually chose harmony with the local vowel of the stem (English: 70% local harmony; German: 79%) whereas participants in the prefix group did not have an overall preference for local harmony (English: 42% local harmony; German 56%). The near-chance means in the prefix group were not due to participants failing to learn any pattern at all; rather, the distributions show that individual participants in the prefix group tended to be consistent in their choice, but they were more likely than those in the suffix condition to choose the non-local vowel as the source of the alternations.

This asymmetry supports the view that prefixes and suffixes are structured differently with respect to the stem (Nespor & Vogel 1986, Peperkamp 1997). Specifically, suffixes are more closely integrated with the stem, motivating a strong locality bias within that domain. In contrast, prefixes are less closely integrated with the stem, which resulted in a larger trade-off in the influence of locality and edge effects (initial and final syllable prominence) when participants learned the vowel co-occurrences in the experiment. There was no significant effect of Stress Location in these data, but we plan to look at this issue in greater detail once we have data from speakers of all six languages.

Stress-triggered posterior tone sandhi

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Goals. This paper presents the case of Teochew, a six-tone Southern Min language spoken in Asia, where stress-triggered trochaic-type sandhi is found on top of its generally iambic rhythm. It serves as a language-internal platform to examine the interaction of tone and stress with the adoption of metrical structure, and the involvement of tone as a phonetic cue for prominence.

Posterior tone sandhi reveals stress. Given any disyllabic sequence in Teochew (Chaoyang dialect), either the tone on the first or the second syllable undergoes sandhi. Posterior type tone sandhi refers to the type of sandhi happening on the second syllable with the tone on the first syllable remains unchanged. For example, when ML is found to be on the second syllable of a disyllabic sequence, it undergoes sandhi as L, no matter which tone docks on the first syllable.

The posterior position is duller in tone colour than the anterior position since it only holds two different tones (L, ML), when compared with the anterior position (M, ML, H, L) and the citation tone inventory (H, HM, ML, H, LM, L). The posterior type is also more restrictive to trigger. While posterior tone sandhi in Teochew has been described as tonal neutralisation (e.g. Yip 2001), the fact that two closely related Teochew dialects, Jieyang (Cai 1991) and Shantou (Lin and Chen 1991), and other Southern Min dialects like Xiamen (Zhang 2016) still retain their post-tonic tone contrasts suggests that this is not merely a case of neutralisation, but a result of the interaction between tone and stress, mediated by rhythm type. Chen's (2000) book on tone sandhi patterns across Chinese dialects documented a range of phenomena, many of which were handled with the use of morphosyntactic rules and foot structure.

Foot parsing in disyllabic domain. Assuming tonal stability as a characteristic of accentual prominence (Chen 2000), (2a) and (2b) show that syntactic headedness does not always align with prosodic headedness. Posterior tone sandhi is found in both head-initial and head-final words/phrases, and vice versa for anterior type tone sandhi.

(2a)	Anterior tone sandhi		(2b)	Posterior tone sandhi	
i.	[gua to]	'outside pocket' HEAD-FINAL	i.	[he thĩ]	'summer' HEAD-FINAL
	L.L	base tone		L.M	base tone
	(*M*.L)	disyllabic tone sandhi		(L.*L*)	tonic prominence
ii.	[tsẽ toi]	'bottom of a well' HEAD-INITIAL	ii.	[tsẽ toi]	'inside a well' HEAD-INITIAL
	HM.HM	base tone		HM.HM	base tone
	(*ML*.HM)	disyllabic tone sandhi		(HM.*ML*)	clitic reduction

(2) becomes more accountable with phonological feet. Anterior sandhi takes place on the first syllable in both (2ai) and (2aii) despite having different syntactic structures. For posterior sandhi, tonic prominence promotes the modifier in lexicalised phrases like (2bi), leaving the syntactic head with a reduced tone. The second syllable of (2bii) functions like a clitic, with its tone reduced to the lower register. The prosodically weaker nature of the post-tonic syllable drives us to measure other acoustic properties like duration.

By hypothesising stress as the linguistic manifestation of rhythmic structure, this predicts a durational asymmetry where lengthening of stressed syllables takes place in iambic feet only (Hayes 1985, 1995). Using ten tonal minimal pairs which are found in both rhythmic types, results from two speakers show that the second syllable is proportionally longer in iambs (i.e. anterior type) than trochees (i.e. posterior type). To put it another way, the post-tonic syllables are proportionally shorter. In addition, when comparing the sandhi position of the two rhythmic types, post-tonic syllables in trochees are proportionally longer than pre-tonic syllables in iambs. The results largely agree with the durational asymmetry predicted by the rhythmic account. Further analysis will look into longer prosodic domains, and inspect potential interaction between the two rhythmic types.

Gradient symbols and gradient markedness: A case study from Mixtec tones

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Main Claim Lexical exceptions to phonological processes follow from gradient symbolic representations (=GSR; Smolensky and Goldrick, 2016; Rosen, 2016) that modulate the violations of markedness constraints. A case study from tonal phonology shows that GSR not only account for segmental alternations but also for exceptions in the autosegmental phonology.

Data As nearly all Mixtec languages, San Miguel el Grande Mixtec (=MIG) has 'perturbing' morphemes that change the tones of a following morpheme (Pike, 1944; Mak, 1950; McKendry, 2013). In MIG (tone levels high á, mid ā, low à), several morphems cause an additional H on a following morpheme (A1+A2). Goldsmith (1990) was the first to argue that those morphemes contain a floating H (marked $^{(H)}$) (cf. also Tranel, 1995). However, several exceptional morphemes don't follow such a simple autosegmental account. One example are morphemes that are non-hosts for a floating H if the preceding morpheme sponsoring the H ends in H (B2). Crucially, these morphemes are associated to floating H's of morphemes ending in L or M (B1) and floating H's can be realized after H-final morphemes for other non-exceptional morphemes (A2).

(1) *MIG: Floating tones (McKendry, 2013, 92+99)*

Preceding context		Target		Surface
A1. nūù$^{(H)}$	'face'	nūʧī$^{(H)}$	'bean'	núʧī
A2. βáá$^{(H)}$	EMPH	-tɨ̀$^{(H)}$	3.AN	-tɨ́
B1. nūʧī$^{(H)}$	'bean'	-ðē	3.MHON	-ðé
B2. βáá$^{(H)}$	EMPH	-ðē	3.MHON	-ðē

Analysis GSR states that phonological elements can have different degrees of presence in an underlying representation, expressed as numerical activities (Smolensky and Goldrick, 2016). In the original proposal, all output elements have the full activity 1.0: different underlying activities hence only have a consequence for evaluating faithfulness constraints. In contrast, it is now argued that elements retain their (weak) activities in phonological output structures and that leveling to full activity for the phonetic interpretation happens at a later stage. The crucial consequence from this assumption is that the evaluation of markedness constraints is influenced by different activities as well: they are violated/satisfied to a weaker degree if they refer to weakly active elements. If a markedness constraint *A is violated by an A that has an activity smaller than 1, *A is only violated by this number. This intuition can formally be modeled under the assumption of Harmonic Grammar where constraints are weighted, not ranked (Legendre et al., 1990). That some morphemes in MIG are non-hosts for floating H's in case the sponsoring morpheme does end in H (B1+B2) follows, it is argued, since their TBU lacks a full activation (activities in (2) and (3)=subscripted numbers). Association of a floating tone to this TBU is hence not a full solution to the demand that every tone strives to be associated to a TBU and *FLOAT (Wolf, 2007) is still violated (to the degree that the TBU lacks to the full activity 1: 1-0.5=0.5; cf. (3-b)). The other relevant constraint is the OCP penalizing two adjacent associated H's. Its weight is smaller than the weight of *FLOAT and H associates to strong TBU's (2). For a weak TBU, however, the partial satisfaction of *FLOAT is not a sufficient reason to tolerate an OCP violation and the H remains floating (3). Other exceptions in MIG follow as well under the assumption of GSR. There are, for example, morphemes whose surface form alternates between H, M, and L depending in a seemingly arbitrary way on the form of the preceding morpheme. It is shown that these alternations follow if different activity levels for underlying tones are assumed: an underlying association to two weakly active tones $H_{0.5}$ and $M_{0.6}$ predicts all the surface patterns observed for these exceptionally alternating morphemes.

(2) *H-assoc. to strong* μ

H H + L μ$_1$ μ$_1$	*FL 6	OCP 4	MAX 1	
a. H H L μ$_1$ μ$_1$	-1			-6
☞ b. H H μ$_1$ μ$_1$		-1	-1	-5

(3) *No H-assoc. to weak* μ

H H + M μ$_1$ μ$_{0.5}$	*FL 6	OCP 4	MAX 1	
☞ a. H H M μ$_1$ μ$_{0.5}$	-1			-6
b. H H μ$_1$ μ$_{0.5}$	-0.5	-1	-1	-8

Poster papers

Stress assignment and *n* flavors: Corpus-based and experimental evidence from Greek

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Greek belongs to lexical stress languages; stress is not fixed to a particular syllable, but varies depending on the internal structure of the word. In the literature, this variation is usually attributed to the idiosyncratic stress properties of lexical stems (Halle & Vergnaud 1987, Halle & Idsardi 1995, Alderete 1999, Revithiadou 1999, 2007). However, experimental studies on Greek (Revithiadou & Lengeris 2016) as well as on other lexical stress systems, such as Russian (Crosswhite et al. 2003, Lavitskaya 2014) and Hebrew (Fainleb 2008), indicate a possible connection between specific stress patterns and inflectional endings. Building on these studies, the present paper aims at providing further evidence for a relation between surface stress patterns and noun categories in Greek.

In order to establish to what extent this relation is extant in the Greek Lexicon, we conducted a quantitative research based on: (a) a type corpus (4.449 nouns) compiled from the *On-line Reverse Dictionary of Greek* (http://www.greek-language.gr/greekLang/modern_greek/tools/lexica/reverse/) (Anastassiadi-Symeonidi 2002), (b) a type and token corpus (22.806 nouns) compiled from the *Clean Corpus* (ILSP Psycholinguistic Recourse, http://speech.ilsp.gr/iplr/, Protopapas et al. 2012). The processing of the corpus data revealed a clear tendency for stress on the PU syllable. Crucially, this tendency is more pronounced (with a statistically significant difference) in masculine and feminine nouns with the Theme Vowel (ThV) /a/ (e.g., [patéɾ**a**s] 'father.MASC', [pín**a**] 'hunger.FEM') and in neuter nouns with the ThV-/i/-/j/ (e.g., /trapéz-**j**/ [trapéz**i**] 'table.NEUT'). On the other hand, PU stress is a less preferred choice (with a statistically significant difference again), compared to APU stress, in masculine and neuter nouns with the ThV-/o/ (e.g., [pólem**o**s] 'war.MASC', [óniɾ**o**] 'dream-NEUT') and in feminine nouns with the ThV-/i/ (e.g., [záxaɾ**i**] 'sugar.FEM').

Thus, the findings of the corpus analysis, which are echoed in experimental studies on Greek stress (Protopapas et al. 2006, Revithiadou et al. 2016), seem to suggest a stress-based dichotomy of Greek nouns. Interestingly, the two groups of nouns are distinguished in terms of not only stress but also semantic transparency. In the first group, masculine nouns in *-as* usually have human referents (e.g., [tamí**a**s] 'cashier.MASC'), feminine nouns in *-a* typically refer to abstract notions (e.g., [fovéɾ**a**] 'fear.FEM') and neuter nouns in *-j* [i] denote concrete objects (e.g., [psalíð**i**] 'scissors.NEUT'). On the contrary, the inflectional endings in the second group (*-os, -o, -i*) are not good predictors for the meaning of the noun. To capture this distinction, following the framework of Distributed Morphology (Halle & Marantz 1993) and building on Kramer's (2015) analysis, we put forth the claim that the ThVs in the nouns of the first group are realizations of different *n* flavors ([+human, -fem], [-human, -concrete], [-human, +concrete]) that contribute semantically to the meaning of the noun. Being grammatical exponents, they are part of the dynamic mechanisms of noun formation in Greek (see also Christofidou 2003, Anastassiadis-Symeonidis 2012), as opposed to the ThVs of the second group, which are inserted by contextually specific rules and appear in closed classes of nouns inherited from Ancient Greek.

In order to investigate whether this dichotomy found at Lexicon level is also encoded in the internal grammar of Greek speakers, we have designed and carried out a production experiment that aimed at testing how native speakers assign and process stress to pseudowords consisting of a pseudostem and an actual inflectional suffix. The experiment involved a production task, in which the participants (18-25 years old) were asked to read aloud pseudowords on a computer screen (e.g., *ΑΛΑΓΟΣ* /alaɣ**os**/). The results show that speakers' choices reflect the frequencies of the Lexicon for these groups of nouns.

Synchronic evidence for diachronic pathways of change: /g/-deletion and the life cycle of phonological processes

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North western varieties of British English are unique in their lack of ng-coalescence, with surface forms that variably retain voiced velar nasal+stop clusters, e.g. *sing* /sɪŋg/ and *swimming* /swɪ.mɪŋg/. In this paper, I claim that such variation stems from probabilistic application of a rule that deletes post-nasal /g/ in syllable codas. Using data from 24 sociolinguistic interviews conducted in the North West of England, modelled using mixed effects logistic regression, I show how quantitative analysis of this deletion indicates sensitivity to morphophonological structure in ways that are predicted by the life cycle of phonological processes (Bermúdez-Otero 2013). In doing so, I provide the first quantitative account of how synchronic variation in /g/-deletion reflects the rule's diachronic trajectory along the life cycle through centuries of linguistic change.

Assuming a modular feedforward architecture of grammar in which the phonological component is split into stem-, word-, and phrase-level strata, it is shown that the surface probability of /g/-deletion is a function of the number of cycles in which the criteria for deletion are met, determined by the morphophonological environment in the following way:

(i) **1 chance to apply**: word-internal, pre-vocalic in polymorphemic words, e.g. *singer*
- /g/ syllabified as onset at word level

(ii) **2 chances to apply**: word-final, pre-vocalic, e.g. *sing it*
- /g/ resyllabified as onset at phrase level

(iii) **3 chances to apply**: word-final, pre-consonantal, e.g. *sing verses*
- /g/ invariably in coda position in all three strata

Interestingly, /g/-deletion is strongly inhibited in pre-pausal tokens in ways that are not predicted by a purely cyclic account. I provide suggestive evidence that this environment is involved in generational change within the community, with younger speakers reanalysing the pre-pausal category as one that favours /g/-presence. The variability of pre-pausal environments with respect to their effect on /g/-deletion mirrors that of similar lenition process, e.g. /s/-debuccalisation in South American varieties of Spanish (see Kaisse 1996) and /td/-deletion in varieties of English (see Santa Ana 1991 on Chicano English and Bayley 1994 on Tejano English).

I also provide evidence from lab speech, in which tokens of /ŋg/ are elicited before varying prosodic and syntactic boundary strengths à la Sproat & Fujimura 1993, which suggests that this pre-pausal retention of /g/ seems to be a categorical effect of prosodic phrasal position rather than a gradient effect of rime duration by virtue of pre-boundary lengthening. Ongoing work aims to investigate the pre-pausal conversational tokens more closely to determine whether the same prosodic patterns are upheld in more naturalistic conditions.

This study lends quantitative support to the life cycle of phonological processes and adds to a growing body of knowledge regarding the behaviour of probabilistic lenition processes in pre-pausal environments.

Perceptual boundaries and features in Chilean Spanish

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Spanish is generally understood to have a five-vowel system, with a single low (and quite centralised) vowel /a/ (see e. g. Navarro Tomas 1991). It follows from this that ambiguity might be predicted in native Spanish speakers' categorisations of system-external (English-like) vowels such as /ʌ/. In terms solely of Euclidean distance, in increasing order of likelihood this could plausibly be mapped by a Spanish listener onto any member of the subset {/e/, /o/, /a/} of the Spanish inventory, but we expect (following Boersma & Chladkova 2010, 2011) mapping to be non-random and correspond to feature structure. In this paper, we present the results of a forced-categorisation task investigating the perception of /ʌ/, /ɑ/, and /ɛ/ by native speakers of Chilean Spanish (ChS).

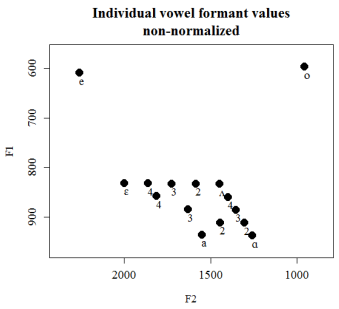

Figure 1: F1/F2 /ʌ/, /ɑ/, /ɛ/, with Spanish references {/e/, /o/, /a/}.

Experimental subjects were adult native speakers of ChS (N = 7), with little to no proficiency in non-Spanish languages and no experience of living outside Chile. Three 5-step vowel continua were synthesised in Praat based on the reference production of a phonetically-trained speaker of North American English: /ʌ-ɛ/, /ɑ-ɛ/, and /ɑ-ʌ/ – details of the resultant stimuli are given in Figure 1. Each resulting token varied in both F1 and F2; F3 and duration were equalized. Subjects were asked to categorize tokens using L1-like labels (pictures corresponding to the Spanish words 'pan', 'ron', and 'red' for /a/, /o/, and /e/, respectively). Results are presented in Figure 2.

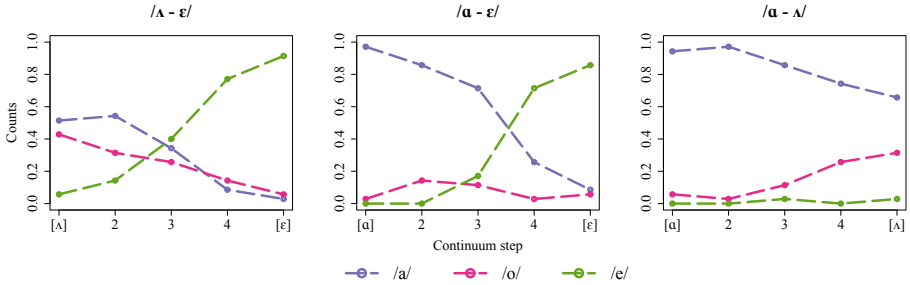

Figure 2: Results of the categorisation task: curves represent speakers' responses along the continuum.

We draw attention here to speakers' categorisations of /ʌ/. The dispreference for 'e'-labeling relative to 'o' suggests that listeners' sensitivity to [front] is sufficient to rule 'e' as a categorisation for /ʌ/ out near-entirely – and that ChS /e/ must indeed have [front] specification. Despite the relatively similar distance of both /ʌ/ and /ɑ/ from 'a', /ɑ/ is much more consistently labeled with 'a' than /ʌ/ is. We note also the approximately 60%–40% split between labeling tokens of /ʌ/ as 'a' and as 'o'. We then suggest: first (see e. g. Trubetzkoy 1969) a relative *non*-salience of rounding; second, maximisation of [low] and [back] is preferred in tokens corresponding to /a/, and more centralised tokens induce labeling as /o/. Our remarks here do not align with the observations on Spanish featural specification of Boersma & Chladkova 2010 – this we attribute to dialectology, for a comprehensive overview of which in ChS, see Sadowsky 2012. We discuss also evidence that in ChS production, /a/ is realisationally very centralised and very close to the position of the /ʌ/-stimulus presented to listeners; we argue that this perception-production discrepancy derives ultimately from listeners' preferences for prototypicality with respect to explicit *features* rather than to less categorical, input-like representations.

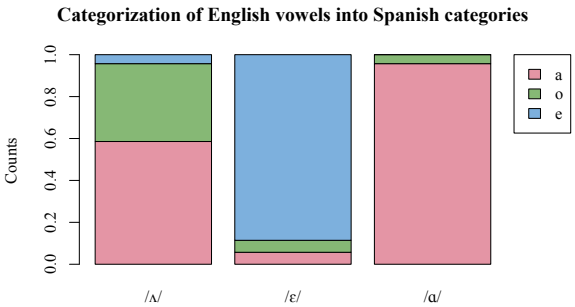

Figure 3: Proportions of Spanishlike responses (as legend) by 'endpoint' vowel.

A phonological solution for a morphosyntactic conundrum
GEN and # spell-out in Lunigiana dialects

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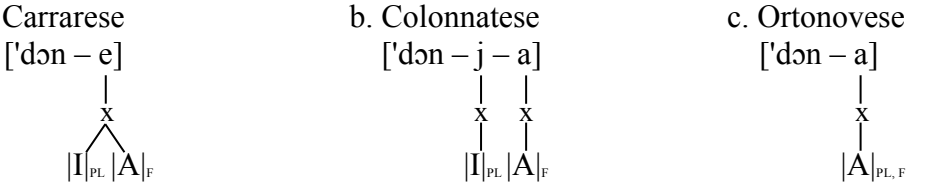
The geolinguistic domain. Lunigiana varieties represent a subset of Northern Italian dialects (NID). Similarly to other NIDs, they underwent a process of unstressed vowels (uV) reduction, both in internal and word-final position (Carrarese ['libr] < LĪBĔR-U(M) 'free.M.SG'). The degree of vowel reduction is not uniform across all the Lunigiana dialects: while uV in northern dialects are massively dropped, southern dialects, i.e. those spoken at the border with dialects that do not undergo reduction (e.g. Tuscan), feature 'milder' reduction effects. Adopting Element Theory (Backley 2011), vowel reduction can be thought of as a gradual decrease in uV melodic complexity.

Interaction with morphosyntax. In Lunigiana dialects, while word-internal uV are consistently deleted, word-final uV display a higher degree of resistance. This might result from the fact that word-final uV express inflectional information. E.g., the word-final proto-Romance *-e* expressing F.PL rarely reaches the final stage of reduction. This is illustrated in (1), with reference to the F.PL noun *women* of three Lunigiana dialects:

(1)



As shown, F and PL are spelled out *autonomously* and *syncretically* in Carrarese (1a) and *autonomously* and *analytically* in Colonnatese (1b). In Ortonovese, conversely, F and PL are spelled out by the same phonological exponent (1c).

The puzzle. The spell-out sequence of F and PL on Lunigiana NPs apparently violates the Mirror Principle (Baker 1985). Indeed, if GEN is encoded in *n* (Marantz 1994; Lowenstamm 2008), then the GEN morpheme should be overtly expressed at the right of the root. Number (#), by merging above *n*, should be spelled out at the right of the [√+$_{GEN}$] complex ([#[√+$_{GEN}$]]). However, while the GEN exponent generally precedes the number exponent (Sp. *chic*$_{ROOT}$-*a*$_{F}$-*s*$_{PL}$ 'girls'), in many Lunigiana dialects the phonological exponent of # occurs between the root and the exponent of GEN (Col. *don*$_{ROOT}$-*j*$_{PL}$-*a*$_{F}$ 'women').

Proposal. We argue that the underlying syntactic configuration of F.PL nouns in the Lunigiana dialects in (1) doesn't actually violate the Mirror Principle. The spell-out strategies of F and PL attested in Lunigiana are claimed to hinge upon post-syntactic, i.e. phonological, requirements. In Carrarese, both F and PL are spelled out by one and the same nucleus. In Colonnatese, F and PL still need to be expressed. However, since Colonnatese uV are weaker (than Carrarese) p-licensers, |I|$_{PL}$ cannot be spelled-out by the word-final nucleus, which is already 'saturated' by |A|$_{F}$. For this reason, |I|$_{PL}$ links to the preceding onset. This account builds on the hypotheses that a) |A|$_{F}$ and |I|$_{PL}$ are floating elements, b) roots come with an empty final nucleus spelling out *n*, which encodes GEN (Lowenstamm 2008; Passino 2009; Lampitelli 2014) and c) phonological objects display different templatic configurations (Bendjaballah & Maiden 2008; Cavirani & van Oostendorp 2017).

Conclusion. For the different spell-out strategies of F and PL attested in Carrarese, Colonnatese and Ortonovese, proposals have been put forward that resort to morphological rules such as Fusion/Impoverishment (Manzini & Savoia 2005) or to suspicious syntactic derivations (Taraldsen 2010). Hereby we aim at showing that this data can be given a straightforward phonological analysis, which is grounded on independently needed assumptions concerning the representation of (functional) lexical items and the licensing strength of nuclei.

Towards an articulatory based typology of laryngeal effects on vowel duration

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It is well known that in several languages vowels followed by voiced stops are longer than those followed by voiceless stops (Belasco 1953, Chen 1970, Javkin 1976, Kluender et al. 1988). Different theoretical accounts for this phenomenon, known as the "voicing effect," have been proposed. Less known is what has been called the "aspiration effect," according to which aspirated stops lengthen the preceding vowel, while unaspirated consonants do not (Maddieson & Gandour 1976, Maddieson 1976, Durvasula & Luo 2012). The aspiration effect is difficult to reconcile with the voicing effect, although a notable account for the latter is Chomsky & Halle (1968), who attributed the durational differences to the relative timing of laryngeal and oral gestures. An extension of this idea predicts that the relative timing of glottal spread should follow the hierarchy pre-aspirated > voiceless unaspirated > voiced > post-aspirated stops, where pre-aspirated stops have the earliest timing of spreading, and post-aspirated the latest. While the effects of voiceless, voiced and post-aspirated stops on vowel duration have been studied, pre-aspiration has so far been neglected. Interestingly, Ní Chasaide (1985) showed that, based on photoglottographic data, the timing of the spreading gesture in Icelandic is the same both in pre-aspirated and unaspirated stops. On the light of new data I collected on pre-aspiration in Icelandic, I will show that spreading is timed earlier in pre-aspirated stops and that pre-aspiration in fact shortens the preceding vowel, in line with the Chomsky & Halle (1968) account.

Icelandic contrasts pre-aspirated geminates stops with unaspirated geminates in word-medial and final position: for example, *tökk* 'dark' [tʰœʰk] vs. *tögg* 'dew' [tʰœkk] (other phonation contrasts in stops are neutralised in these positions; also, note that the closure duration in pre-aspirated geminates is shorter than the closure of unaspirated geminates). Five native speakers of Icelandic were recorded while reading words embedded in the frame sentence *Segðu _ aftur* 'Say _ again.' The target words were 17 Icelandic words, of the form CVCC and CVCCV (three repetitions per word for a total of 255 tokens). The results showed that vowels before aspirated consonants were significantly shorter than those followed by unaspirated consonants, as confirmed by a linear mixed effect analysis. This indicates that the onset of aspiration in pre-aspirated geminates, on average, is timed earlier than the closure of unaspirated geminates, in contradiction with the data in Ní Chasaide (1985). If aspiration is interpreted as the product of an abduction gesture of the glottis, then glottal abduction is initiated significantly earlier in pre-aspirated stops compared to unaspirated stops in the data obtained in the present study (given that glottal abduction is necessary to sustain voicelessness in non-aspirated geminates and frication in pre-aspirated geminates).

These results seem to support the hypothesis that the differences in vowel duration could be caused by differences in the relative timing between the spreading and oral gestures. An earlier spreading gesture would impinge upon the preceding vowel, making it shorter. The lengthening of vowels before post-aspirated stops in the Indic languages examined by Maddieson & Gandour (1976) could then be attributed to a later initiation of glottal spread. This account can explain the entire typology of laryngeal effects, and it makes the following falsifiable predictions. First, given that the fortis consonants of English are known to be preceded by shorter vowels (House & Fairbanks 1953, Chen 1970, Hussein 1994), it follows that these consonants should behave as the unaspirated stops of the Indic languages, and that the spreading gesture should be timed earlier than in lenis stops (fact that seems to be born out by the discovery of pre-aspiration in some varieties of English, Hejná 2015, Hejná & Scanlon 2015). Second, it is expected that the onset of the spreading gesture in the Indic languages will be timed earlier in unaspirated stops than in post-aspirated stops, since vowels are shorter before unaspirated stops.

Stress in English Long Verbs: Morphology and Syllable Weight

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This paper presents a corpus-based investigation of the stress pattern of English verbs and confronts two analyses which have been proposed in the literature. Both analyses acknowledge the crucial role of certain suffixes in determining the position of stress (e.g. *-ate, -ify*). The first (and "standard") analysis consists in claiming that the position of primary stress in verbs depends on the weight of the final syllable (Burzio 1994; Giegerich 1999; Halle & Vergnaud 1987; Hammond 1999; Hayes 1982). Final syllables which contain a long vowel or two consonants receive primary stress (i.e. if the final syllable is heavy; e.g. *molést, obéy* cp. *astónish, devélop*). The second, initially found in early generative phonology alongside the first analysis (Chomsky & Halle 1968; Halle & Keyser 1971; Liberman & Prince 1977) and later pursued in works such as Fournier (2007), Guierre (1979) and Trevian (2003) regards the position of primary stress in verbs as being largely determined by morphological structure and more specifically the presence of a semantically opaque prefix (e.g. ***ab****duct,* ***con****ceive,* ***re****tain,* ***sub****mit*). These prefixes seem to be invisible to primary stress assignment, which may lead to final stress even with light final syllables (e.g. *begín, commít, repél*). Therefore, several parameters interact in the assignment of primary stress in verbs and may conspire to produce identical stress patterns (e.g. prefixed verbs often have heavy final syllable). Our aim is to test these parameters on a large set of verbs taken from Jones (2006) and to determine if an analysis should be preferred over the other.

In a previous study on 2,544 dissyllabic verbs, we found that, if we leave out denominal verbs (half of the data), prefixed verbs with light final syllables have final stress in over 80% of cases (out of around 120 cases), including rather common verbs (e.g. *admit, become, discuss, forget*). Conversely, we found very few prefixed verbs with initial stress (e.g. *conjure, prosper, revel*) or monomorphemic verbs with a stressed heavy final syllable (e.g. *cajole, harangue, usurp*), and both these categories are made up mostly of rare words.

The present study looks at 2,100 verbs longer than two syllables. The morphological makeup of the words in this set is rather different from the dissyllabic set: it contains hardly any monomorphemic verbs (apart from a few cases such as *solicit* or *malinger*). The set contains 322 nouns used as verbs (e.g. *camouflage, meander, remedy*), which are therefore not relevant to study verbal stress. Certain morphological categories have well established stress behaviours: semantically transparent prefixed constructions tend to behave as two phonological domains, as shown by stress clashes (e.g. *dèáctivate*) or gemination (e.g. *di*[ss]*atisfy*), the suffixes *-ate* and *-ify* are associated with almost invariable antepenultimate stress and *-ize* is overall stress-neutral. As for constructions with opaque prefixes (around 120 words), stress is root-initial in 79% of cases (which supports the analysis based on morphology) and the weight-based account makes correct predictions (stress on the ultima if heavy, on the penult if the ultima is light) in 72% of cases. Therefore, it seems difficult to argue that one analysis is clearly preferable to the other. However, we claim that prefixes which are semantically opaque have to be visible to the phonology for several phenomena (vowel reduction, secondary stress in derivatives, stress placement in dissyllabic verbs). Moreover, a large body of psycholinguistic research supports the decomposition of forms such as *retain* or *submit* (see e.g. Forster & Azuma (2000; Pastizzo & Feldman (2004)). Finally, a number of mechanisms can be posited for how speakers can recognise semantically opaque structures (distributional recurrence of constituents, antonymy, root allomorphy, phonotactics).

Prosody conditioning poetic tradition. Evidence from French and Dutch poetry.

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When Dutch poets during the Renaissance tried to incorporate French alexandrine in their poetic tradition, the meter had to go through a process of adaptation, which led to a new meter only partially resembling the original. The aim of this talk is to suggest that those changes were due to the necessity of the French meter to be adjusted to Dutch phonological structure. A comparison of the prosody of Dutch and French, in relation to their Renaissance meter contributes to the understanding of the general division between "syllable-timed" and "stress-timed" languages.

Poetry. Before the Renaissance, accentual verse was the predominant meter of Dutch poetic tradition. With the blossoming of the Renaissance, Dutch poets abandoned the typical Germanic verse and started imitating, mainly, French alexandrine, which was itself an adaptation of the Italian hendecasyllable. After a number of isosyllabic attempts (where the only marked strong positions are at the end of the cola, namely before the mid-line break of the caesura and at the end of the line), it became evident that a simple imitation could not work. The meter needed to be modified in order to be utilizable. The result was a foot-base iambic meter, which, structurally speaking, had relatively little in common with French alexandrine. In (1) and (2) one example of the French alexandrine and of the Dutch foot-based iambic meter, respectively, are given:

(1) Je vous donne de **moi** la part qui est meil**leure**:
C'est l'esprit et la **voix**, qui, menés et con**duits**
(Jean-Antoine de Baïf)

(2) Met **cunst** vers**lijt** u **tien**, die **u** cunt be**mue**ien,
Der **ne**gen **Nym**phen **spel**; die **eer**tijts **waert** ge**raect**,
(Jan van Hout)

Prosody. From a prosodic perspective, Dutch and French are rather different. While in Dutch the phonological word is the prosodic level where most of the phenomena take place, in French most of the tasks are taken by the phonological phrase (Van Oostendorp 2000). For instance, Dutch has word stress and French lacks it at the level of the word; it rather occurs at the right edge of the phonological phrase. Also, French presents sandhi phenomena within the phonological phrase (such as liason), in Dutch, instead, phonological processes are limited mostly to the foot.

Proposal. I propose that, the prosodic distinction between Dutch and French is reflected in their development of the Renaissance meter (first developed by Italian poets). The two languages adjusted the meter in a way that it would fit their structure. In fact, in Dutch poetry, the foot is the fundamental unit on which the meter is based. The same role, in French meter, is covered by the colon, which corresponds, on the prosodic level, to the phonological phrase. Thus, the metrical structure of the two poetic forms resembles the prosodic structure of the languages they are written in. It can be claimed, hence, that the way the same source meter is adapted into a poetic tradition is conditioned by the prosodic structure of its language. In addition, the metrical difference between Dutch and French poetry recalls the "syllable-timed" and "stress-timed" language division (Ramus et al 1999), according to which the two languages are part of different groups. Consequently, the investigation of the way a meter is adjusted into a poetic tradition highlights linguistic typology and contributes to its further understanding.

Prosodic domain boundaries do not trigger final lengthening

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Domain final lengthening is a widely accepted phenomenon where the coda of the final syllable is longer at the end of prosodic domains in comparison to domain-medial positions (Turk & Shattuck-Hufnagel, 2007), and lengthening is greater at higher domain boundaries (Wightman et al., 1992). However, most previous experiments investigating this lengthening typically used unnatural stimuli or experimental instructions that result in unnatural speech patterns. Interestingly, Cambier-Langeveld et al. (1997), who used naturalistic stimuli in Dutch to look at multiple types of prosodic domains, found lengthening *only* in the Intonational Phrase and Utterance final positions; however, these are both boundaries correlated with pauses. This raises the question whether the lengthening is really due to prosodic boundaries or due to pauses. Here I present experimental evidence from English similarly indicating that when naturalistic sentences and contexts are used, lengthening does not occur at the end of the prosodic domains lower than the Intonational Phrase, thereby increasing the likelihood that such lengthening effects when found are due to pauses.

Ten native speakers of Michigan English read the target items in varied naturalistic sentences, designed to avoid any pauses. Target items were all monosyllabic and ended in a V_{lax}-Nasal-Stop combination. Three prosodic domains were tested: Phonological Word final (compound-medial; e.g., *the ca**mp** services will be suspended*), Phonological Phrase final (verb before object; e.g., *you should sta**mp** cigarettes out completely*), and Intermediate Phrase final (e.g., subject before verb, e.g., *the la**mp** sparked when she touched it*). [Note: Prosodic boundaries based on Nespor & Vogel (1986) and Beckman & Pierrehumbert (1986)].

Figure 1

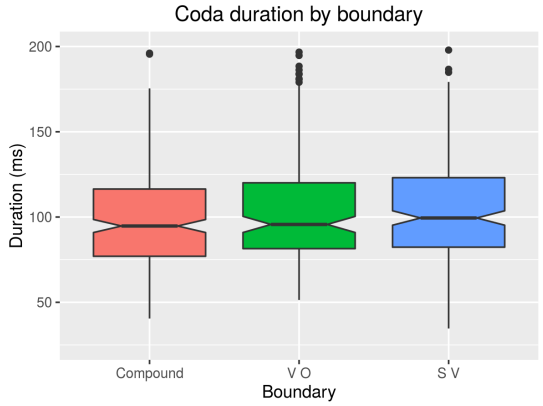
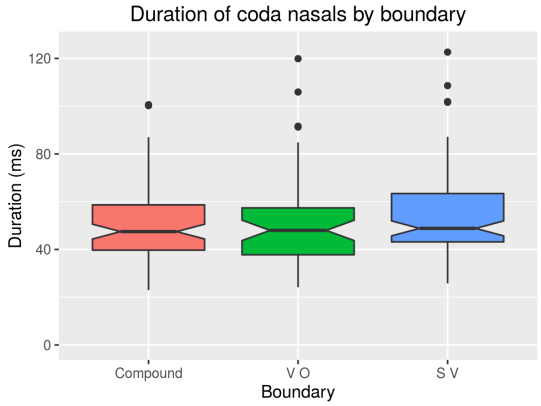


Figure 2



The overall coda durations (Figure 1) stay more or less constant across the conditions. The nasals (Figure 2) and stops (not shown) also do not increase in duration for conditions with greater prosodic domains. The main difference between this and previous experiments which found final lengthening was the avoidance of unnatural stimuli. Those experiments may have introduced confounds, such as pauses due to repetitive carrier phrases, unnatural stimuli, and inclusion of IP and U domains.

Here I have presented experimental results showing that boundary final lengthening does not occur in naturalistic stimuli in English below the IP when controlling for pauses. Given that there is a consistent absence of domain-final lengthening below the IP, it is unlikely that domain-final lengthening is caused by prosodic structure. Instead it is more likely that these effects are pre-pausal lengthening, a hypothesis that is currently being tested.

Vowel Quality, Stress Shifts and the Germanic Foot

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Germanic languages have a relatively large vowel inventory compared to other languages. In syllables with main or secondary stress, we find the full range of vowels that are part of a language, whereas only a selection of the vowels may appear in unstressed syllables. In Icelandic, for instance, all vowel qualities can be found in syllables that form the head of a foot, whereas only three vowels are allowed in non-head positions. In this paper we will show that the Icelandic foot consists of a bimoraic head which may be followed by a monomoraic dependent, i.e. the metrical foot in Icelandic is a so-called 'resolved moraic trochee' (also known as 'the Germanic Foot', e.g., Dresher & Lahiri 2005). Evidence for this foot-type in Icelandic comes from secondary stress, preaspiration and the process of u-umlaut.

The resolved moraic trochee is also the foot-form in some other Germanic languages, most notably in Dutch and German, but not – or no longer – in English. We will show that the resolved moraic trochee is assigned from left to right for main and secondary stress in Icelandic. Due to historical changes and the large number of borrowings during earlier stages of Dutch and German, main stress is assigned to the right edge in modern varieties of Dutch and German. In these languages, open syllables which are the head of a resolved moraic trochee are lengthened, i.e. tense vowels in underived and derived words are phonetically short in unstressed positions and long when they occupy the left-most position within the head of a resolved moraic trochee. We will illustrate vowel-length alternations by examples from Dutch and German words in which foot assignment – and, hence, the location of main or secondary stress – varies depending on the morphological complexity of the word. In Icelandic, Dutch, and German, vowels bear one mora. Vowel length in these languages is the result of stress assignment and vocalic length does not contribute to the weight of a syllable. In English, on the other hand, short vowels bear one mora whereas long vowels bear two moras and thus count as 'heavy'. The foot form in English is no longer the resolved moraic trochee in which length does not contribute to the weight of a syllable, but rather the moraic trochee.

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Phonetic manifestations for the phonological representation of geminate types in Arabic

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This paper reports on the phonetic and phonological patterns of geminate consonants in Tripolitanian Libyan Arabic (TLA). All consonant phonemes in TLA can be geminated word-medially. In addition to lexically contrastive geminates 'true geminates', TLA has two types of phonologically derived geminate: 'fake geminates', which are formed as a combination of two identical consonants at the juncture of a word, and 'assimilatory geminates', which are the result of total assimilation. This study examines the effect of the phonological status of a geminate on the phonetic realization to ascertain whether underlying differences are reflected in phonetic dissimilarity.

Durational and acoustic variations in geminates have been investigated for many languages (e.g. Local & Simpson, 1999; Ham 2001; Ridouane 2007; Arvaniti, 2001; Khattab, 2008; Payne 2005) and, generally, duration has been found to be the main phonetic correlation of the singleton-geminate contrast. Nevertheless, geminates have been the source of much debate in the literature concerning their phonetic implementation, as well as the way to account for their particular behaviour (Davis, 2011). In general, a true geminate is represented phonologically either as a consonant that comprises two timing units (McCarthy, 1982) or as a single mora-projecting consonant (see Hyman, 2003). A fake geminate is represented as a sequence of two identical segments each linked to its own timing slot (see Gussmann 2002). An assimilatory geminate is represented either as a true geminate or as a fake geminate depending on its behaviour in the language (Hayes, 1986). Regardless of the frameworks within which gemination has been treated and the many languages for which it has been proposed, there is extensive evidence that the phonetics, in effect, adds the quantitative dimensions to the more abstract phonological representation. In other words, phonetic implementation acts on the phonological structure (Cohn, 2003). There has been little work that specially relates the role of Arabic geminates to the on-going controversy within phonological theory regarding the representation of geminate consonants (Davis and Raghab, 2014). This study contributes to the understanding of some of the issues regarding geminate representation in Arabic.

The findings of the current study are based on a combined articulatory and acoustic analysis of data from five native speakers of TLA (1 female, 4 males, aged 30-38), using electropalatography (EPG). Trisyllabic minimal or near minimal utterances containing the sonorant sounds /l, m, n, r/ as singletons, and true, fake and assimilatory geminates were considered. The speakers were recorded reading word-lists containing the target consonants in medial intervocalic position preceded by short and long vowels.

The results provide evidence that the singleton-geminate contrasts as well as the three geminate types are all phonetically distinct from each other when considering both the acoustic and articulatory correlates together. That is, the singleton-geminate contrast and the phonological status of geminates do have a phonetic realization. Following Ridouane's (2010) interpretations of the phonetic correlates of geminates and his proposal to implement these features in the representation of geminates, the current results suggest that, in TLA, the singletons and the three geminate types are correlated with certain enhancing features, which can contribute to the distinction between them. These enhancing features can be the behaviour of the preceding vowel, the amount of linguopalatal contact, the degree of flatness shape of the tongue, the anterior/posterior tongue configurations and the speed of the articulatory closure/release. That is, the phonological representation of gemination in Arabic should be accounted for in light of these findings. In general, the results obtained from this study are suggestive in that these phonetic traces raise the need for proposing a phonological representation in which all three types of geminates are represented differently from each other.

Linguistic interference and the structure of vowel systems in bilingual Catalan speakers

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According to the Dispersion Theory, vowel systems tend to be spread maximally, with an even distance between their elements, in order to improve the contrast while minimizing the effort (see Flemming 1995, for instance). Hence, a system with 7 elements like the Catalan stressed system (/i, e, ɛ, a, ɔ, o, u/) depicted in Figure 1, in which the distance between each pair of peripheral vowels is similar, is to be considered natural and optimal; along this line, the unbalanced 5-vowel Spanish system (/i, e, a, o, u/) in the same figure must be considered sub-optimal. The fact that the dispersion of the vowels in both systems is roughly equivalent (not shown in the figure), i.e. that the vowels in the Spanish system, with fewer elements, do not show more variation, challenges even more this approach, giving support to authors that consider that the properties of vowel systems may be influenced by 'accidents of history', so that asymmetrical or non-evenly distributed systems appear (see Vaux & Samuels 2015). The purpose of this presentation is to analyze whether bilingual Catalan speakers, which depart from a balanced 7-vowel system, restructure their 5-vowel systems (their Spanish vowel system and their Catalan reduced unstressed vowel system of 5 elements, without [ɛ, ɔ]) to restore the balance with an even distribution or if, by contrast, they simply present an incomplete version of their full vowel system.

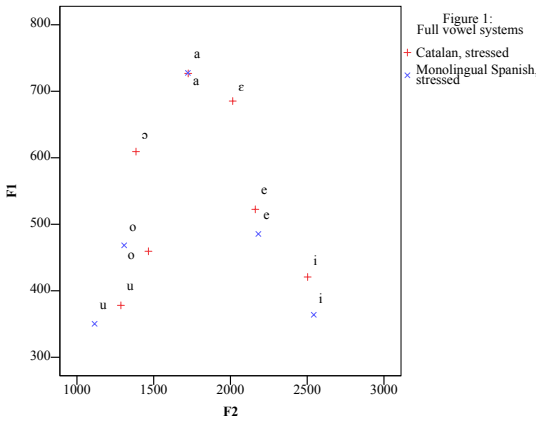

Figure 1: Full vowel systems

To study the Catalan vowel system, we recorded a group of bilingual female speakers in their 20s from Catarroja, an urban area around Valencia city strongly influenced by the Spanish language. The Spanish vowel systems analyzed came from this set of speakers and from a group of speakers with the same age, but from a monolingual region (Cuenca & Western Valencia). All the vowels were registered inside a carrier sentence, in three segmentally equivalent contexts: stressed position, unstressed pretonic position and unstressed posttonic position.

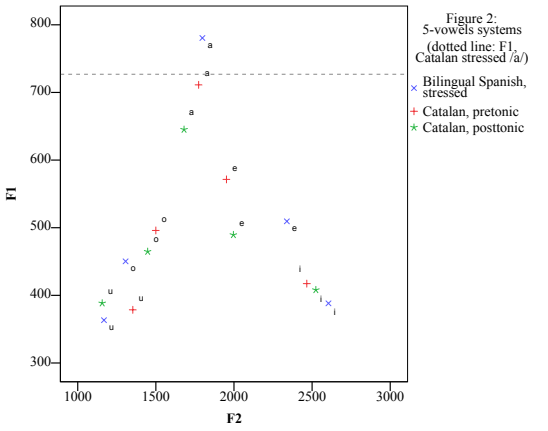

Figure 2: 5-vowels systems (dotted line: F1, Catalan stressed /a/)

As already established in the literature, Spanish vowels do not vary meaningfully from stressed to unstressed positions. In Catalan, instead, unstressed /a/ tends to rise to the position of mid-open vowels to restore balance in the system (Herrero 2010), as in the posttonic position from our sample (see Figure 2). However, in pretonic position there is no F1-changes in /a/. Hence, we end up having an unevenly distributed system, probably due to the influence of the Spanish language. There is not restructuring either when bilingual Catalan speakers produce the stressed Spanish vowel system: they simply transfer their native categories into the second language, which turns out to be a system equivalent to that of Spanish monolinguals. To sum up, although part of our data (mainly, the Catalan stressed and pretonic vowel systems) gives support to the Dispersion Theory, cross-linguistic interference (an accident of history) gives rise to models which are clearly unbalanced.

Opportunistic Centralization in Tudanca Montañés

Aaron Kaplan

In Tudanca Montañés (Romance; Spain), word-final high vowels become centralized (represented here by capitalization), and this centralization spreads to the stressed vowel (Penny 1978, Hualde 1989): [pÍntU] 'male calf' (cf. [pínta] 'female calf'); [sekÁlU] 'to dry him' (cf. [sekálo] 'to dry it' (mass)). Independently, pretonic mid vowels adjacent to labials centralize: [gwEbéra] 'egg-basket'; [bOnúka] 'weasel.' Labial-induced centralization affects non-mid vowels only in the presence of word-final/stressed-vowel centralization. The initial vowel of [pIyÍhkU] 'pinch' centralizes because (i) it is labial-adjacent, and (ii) the final and stressed vowels are centralized. But [piyíhkos] 'pinches' meets only condition (i), so the labial-adjacent [i] does not centralize.

This is a derived environment effect (DEE): "one process [word-final/stressed-vowel centralization]... creates the conditions for another process [labial-induced centralization of non-mid vowels]" (McCarthy 2003:19). But standard approaches to DEEs fail here. Comparative Markedness (McCarthy 2003) posits constraints that penalize only marked elements that are not inherited from the input, and these constraints can yield DEEs. But in Tudanca, final-vowel/stressed-vowel centralization does not introduce a new violation of the constraint that triggers labial-induced centralization (call it *LAB-[+ATR], assuming that [ATR] is the active feature in centralization (Hualde 1989)): whether or not those processes occur, an input like /piyíhku/ does not violate *LAB-[+ATR]-new.

Local conjunction also produces DEEs (Łubowicz 2002): Mark&Faith can only be violated by derived (unfaithful) marked structures. For Tudanca, *LAB-[+ATR]&IDENT(ATR) triggers centralization only when conditions (i) and (ii) are both met. The problem here is that *LAB-[+ATR] and IDENT(ATR) have different loci of violations. *LAB-[+ATR] is violated by the labial-adjacent vowel, and IDENT(ATR) is violated by the final and stressed vowels. The analysis disobeys the requirement that the conjuncts share a locus of violation (Łubowicz 2002, among others), but abandoning this principle predicts implausible DEEs (McCarthy 2003).

I propose that labial-induced centralization of non-mid vowels, which is normally blocked (DEP(–ATR) ≫ *LAB-[+ATR]), takes advantage of the [–ATR] feature introduced by final-vowel centralization (*[+hi, +ATR]# ≫ DEP(–ATR)). With *[+hi, +ATR]# compelling a violation of DEP(–ATR), satisfying *LAB-[+ATR] does not trigger another such violation: spreading the [–ATR] feature compelled by *[+hi, +ATR]# to the labial-adjacent vowel suffices. The tableaux below illustrate this, setting aside the motivation for stressed-vowel harmony.

/piyíhku/	*[+hi, +ATR]#	DEP(–ATR)	*LAB-[+ATR]
a. piyíhku	*!		*
b. piyÍhkU		*	*!
☞ c. pIyÍhkU		*	

/piyíhkos/	*[+hi, +ATR]#	DEP(–ATR)	*LAB-[+ATR]
☞ a. piyíhkos			*
b. pIyíhkos		*!	

The analysis reflects the DEE nature of the system: unless final-vowel centralization introduces [–ATR], labial-induced centralization cannot occur. But it also suggests that DEEs are more typologically diverse than previously recognized. In most DEEs, one position is the locus for both the triggering and triggered process, and the second process repairs a marked configuration introduced by the first. Tudanca's DEE has neither property: labial-induced centralization opportunistically capitalizes on the features introduced by a different process.

French influence in Breton stress patterns: a cross-generational perspective

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This paper examines the metrical structure of Breton as spoken in southern Finistère, comparing speakers from separate generations, and considering whether the Breton of younger speakers differs in terms of its stress pattern, possibly as a result of influence from French.

Breton stress is usually said to fall on the penultimate syllable; for example, ***ba****big* 'baby', *ba****la****fenn* 'butterfly' (Jackson, 1967; Desbordes, 1983). There are also a number of exceptions where the stress is on the final syllable, and these include a small set of nouns (such as *pe****moc'h*** 'pig'), several place names (such as *Kastel****lin***), certain verbal forms, and a number of adverbs and prepositions. There is also regional variation in Breton stress: the Vannetais dialects largely have final, rather than penultimate stress (Jackson, 1967). This contrasts with French, which has fixed final-syllable stress, and phrase-final stress in context (Di Cristo, 1998).

Additionally, Breton is a highly endangered language with a largely elderly population of speakers; in 2007, almost half were aged over 75 (Broudic, 2009). All speakers are now bilingual, being also fluent speakers of French. However, language revitalisation efforts have led to the establishment of Breton-medium schooling, and a new generation of speakers is now emerging. The Breton they use has been described as 'Neo-Breton', marking it out as different from the traditional Breton of the older generation. New speakers of Breton tend to use fewer loanwords from French than older speakers, preferring more 'Celtic' equivalents (Jones, 1998), but there are also other differences, such as a loss of regional variation, and word order differences. It has also been suggested that younger speakers tend to place stress on the final syllable (Madeg, 2010), possibly as a result of influence from French.

Fieldwork conducted in southwest Brittany permits a systematic investigation of Breton metrical structure. Data were collected from two separate generations of speakers: 11 older speakers, aged over 65, who had grown up speaking Breton, and 9 younger speakers, aged 20-45, who had undergone Breton-medium schooling, but who came from largely French-speaking homes. Disyllabic and trisyllabic words were elicited in response to picture prompts. The data indicate that the older generation of speakers use predominantly the expected penultimate stress pattern, and also maintain known exceptions such as *pe****moc'h*** 'pig' and *a****mann*** 'butter'. This is true of both disyllables (91.7% penultimate stress) and trisyllables (89.1% penultimate stress). The younger speakers, on the other hand, show more variability: while some maintain the penultimate stress pattern, others used word-final stress to a greater extent than would normally be expected, and this was particularly true of trisyllabic words (averages: 91.1% penultimate stress in disyllables; 74.1% penultimate stress in trisyllables).

The type of words which receive final stress is also interesting. Both generations have a greater tendency to use final stress in loanwords from French, such as *krokodil* 'crocodile'. However, younger speakers may also use final stress in words of Breton origin, and this is not something that is found among the older speakers. These findings aid our understanding of what characterises the Neo-Breton spoken by the younger generation, and to what extent they are influenced by French. The variability in the stress patterns of the younger generation also suggests that there is the potential for further changes to Breton stress as the number of older speakers declines.

On retraction and dissimilation processes in Germanic /rs/-clusters to [rʃ] or [ʂ]

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Background. The current paper starts from the observation that /s/ in the cluster /rs/ is apparently regularly realised as postalveolar [ʃ] or retroflex [ʂ] in different Germanic languages:

(1) Sw. *varsågod* [vaʂɔˈguː] (or: *var så god*, "here you are"), *fors* [fɔʂ] ("rapid, waterfall")

In some Flemish regiolects, postalveolarisation to [rʃ] appears seemingly spontaneously, and is still in free variation with non-retracted occurrences of /rs/:

(2) Fl. *dáár staat* [ˈdaːrʃtaːt] („there stands"), *er staat* [ərˈʃtaːt] ("there stands", short form)

As (1) and (2) show, this retraction also occurs across word boundaries (Kristoffersen 2000: 2). The coarticulation of /rs/ as a retroflex [ʂ] has been generalised to a phonetic rule in Swedish, Norwegian, Scottish and Faroese dialects (Eliasson 2000: 40f.), and is still productive today. In German, the retraction of /s/ to [ʃ] > /ʃ/ is no longer active but lexicalised in many words:

(3) Ge. *Arsch* [aːʁʃ] (En. arse), *Herrscher* [ˈhɛʁʃɐ] (Nl. heerser, "ruler")

While retroflexion necessarily implicates the complete loss of the /r/, clusters subject to postalveolarisation of /s/ tend to follow the path to r-loss: [rs] → [rʃ] → [ɐʃ] (i.e. vocalisation) → [ʃ], where vocalisation is an optional step (Cajot & Beckers 1979: 173). In voiced environments, the [ʃ, ʂ] are voiced to [ʒ, ʐ] (e.g. Fl. *wanneer ze* [waˈneːrʒə] "when they").

These observations raise the question whether these coarticulation phenomena reflect a particular Germanic process, or whether they are motivated by universal articulatory principles. Another question in this regard is which conditions need to be fulfilled to trigger the change, e.g. the manner of articulation of the consonants involved.

A final observation is that in some Limburgish (Dutch) dialects, retraction (and r-loss) only affected inherited vocabulary, not words which have come into the language after the arrival of uvular /ʁ/, as witnessed by the existence of doublets:

(4) *peësj* [ˈpeəʃ] ("fruit/wine press") vs. *pers* [pɛʁs] ("printing press, printed media")

Aims. Based on a small pilot study of the phonetic realisation of /rs/ in different contexts (within a word, across word boundaries, stress preceding/following etc.) in a group of Flemish speakers (of different regional origin), the current study tests the following hypothesis:

(5) 1. Alveolar /r/ triggers the retraction of a following /s/. Considering that the simultaneous articulation of [r] and [ʃ] is possible while that of [r] and [s] is not as both are [alveolar] and [continuant], retraction works as a repair strategy solving the conflict of articulation place. The *Obligatory Contour Principle* as described by van Oostendorp (2010: 12f.) provides an explanation for the retraction to [rʃ] or [ʂ] ([postalveolar]) as a dissimilation process.
2. Other types of /r/ (e.g. [ɹ] or [ʁ]) seem to block the retraction of /s/. The occurrence of retraction in clusters with e.g. uvular /ʁ/ (as in the German and Limburgish examples above) must therefore reflect remnants of a once productive rule with alveolar /r/ that has been ruled out by the arrival of uvular /ʁ/.

The data from the spontaneous retraction of /s/ or its blocking in the Flemish speakers tested in the current research support this hypothesis: varieties with uvular /ʁ/ do not show retraction, while varieties with alveolar /r/ do.

An Element-based analysis of rhotacism and spirantization in Tarifit Berber

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Tarifit Berber presents two interesting features, which standard analyses have long considered as phonologically unrelated. On the one hand, stops spirantize in various positions including intervocalic, coda and onset (see 1a). On the other hand, liquids undergo a lenition process, whereby /l/ surfaces as [r] in the onset and coda positions while /r/ deletes in the coda, resulting in a compensatory lengthening of the preceding vowel (see 1b). Putting aside the syllabic context, both spiratization and rhotacism trigger the consonants attached to only one skeletal position. When geminated or contained within a cluster, stops and /r/ remain unchanged whereas /l/ surfaces as [ʤ] (see examples in 2).

(1) a. spirantization

fu**ð**	'knee'
a**ç**uz	'weevil'
θumz**ð**	'you held'

b. rhotacism

/u**l**/	>	[u**r**]	'heart'
/**l**hna/	>	[**r**əhna]	'peace'
/dˤa**r**/	>	[dˤa**:**]	'leg'
/aʁza**r**/	>	[aʁz**a:**]	'river'

(2) a. No spirantization

ifa**dd**ən	'knees'
θa**md**i**mt**	'town'
θa**qb**i**lt**	'tribe'

b. No rhotacism

/x**ll**f/	>	[xəʤəf]	'replace (imperfective)
/f**rr**n/	>	[farrən]	'sort (imperfective)'
/u**lt**ma/	>	[ultma]	'my sister'

We provide a unified account of spirantization and rhotacism within Element Theory (Harris 1994, Backeley 2011). We argue that both phenomena result from the loss of one element in the melodic structure: the deletion of the closure element |ʔ| in stops causes spirantization. The same operation turns /l/ into [r]. When underlying /r/ loses its coronality, vowel lengthening occurs. The whole process is schematized in (3).

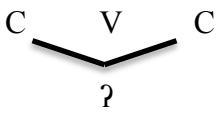
(3) a. rotacism

/l/	➔	/r/	➔	Ø
|R|		|R|		|R|
|ʔ|		|ʔ|		

b. spirantization

Stops	➔	fricatives
|ʔ|		|ʔ|

Following Honeybone (2005) and Ulfsbjorninn & Lahrouchi (2016), we also argue that stops and liquids resist lenition when sharing the closure element |ʔ| in a branching structure (i.e. attached to two skeletal positions). In other words, |ʔ| is only found in structures where it can branch into two C positions, namely in geminates and in post-consonantal positions:



An element geometry account of depressor effects in Bantu and Khoisan

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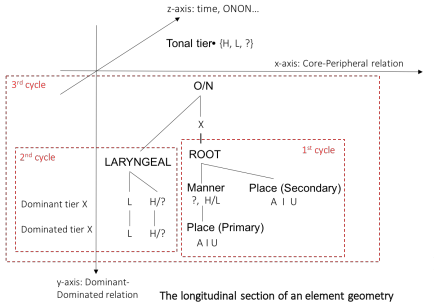
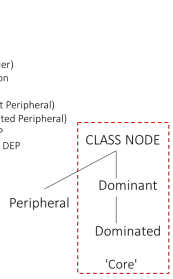
Background. Element theory currently assumes that |L| represents voicing, low tone, and nasality. A closer examination of these three properties shows that although they share the same element |L|, there is a contrast between low tone-voicing and low tone-nasality interactions, with the former more readily attested than the latter. This asymmetric segment-tone interaction is well evidenced in depressor patterns in Bantu and Khoisan. Voiced consonants are traditionally assumed to be depressors, which trigger low tone on the following vowel such as in Ikalanga, Xhosa, Swati, and Tsonga, whereas nasals are rarely depressors in these same languages. Another observation is that breathiness and aspiration also contribute to depressor effects, with the latter being surprisingly unusual in terms of its conflicting glottis status with voicing.

Problem. The above observations show that (i) an asymmetry between nasality and voicing in relation to low tone exists in depression and (ii) the triggers of depression in Bantu and Khoisan vary dramatically from voicing, breathiness to aspiration.

Solution. Rather than seeking phonetic explanations (Traill, Khumalo & Fridjhon 1987; Jessen & Roux 2002 and etc.), I aim to extend the geometry structures proposed in Clements (1985), Kula (2002), Botma (2004) and RCVP (van der Hulst 1989, 2005 etc.), as a way of unifying these seemingly unrelated triggers of depression under a single element |L| in an element geometry as presented in Figure 1.





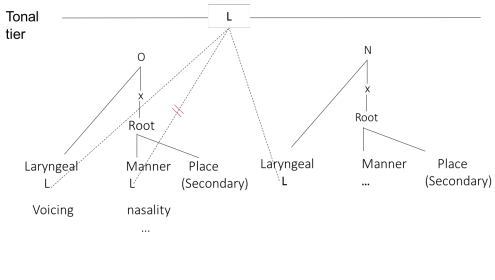


Figure 1: the longitudinal section of an element geometry Figure 2: the basic unit Figure 3: the depressor-tone interaction

In this model, I propose that the building block of subsyllabic structures is the basic unit CLASS NODE as illustrated in Figure 2, which is composed of a 'Core' structure that is further divided into Dominant and Dominated tiers, and a 'Peripheral' tier. The presence of a Dominated tier implies the presence of a Dominant tier but not vice versa. The subsyllabic structure is built up recursively into 3 'cycles' (as indicted by the red-dotted boxes in Figure 1), starting from the core ROOT, to the peripheral LARYNGEAL and to the ultimate O(nset)/N(ulcues). The 'Peripheral' property of LARYNGEAL is reflected in its Dominant tier only capable of licensing the same element on the Dominated tier, in contrast to the Dominant Manner in ROOT being able to license Dominated Place. I follow Botma (2004) (also Kehrein 2002) that LARYNGEAL is directly dominated by the prosodic unit O/N, but differs as to the degree of prosody-melody interactions. I assume that only LARYNGEAL and O/N are visible to prosody whereas structures below X-SLOTS are inaccessible. This guarantees a straightforward and clear-cut laryngeal-tone interaction in depression at the prosodic level without the involvement of segmental units. For ease of notation, the Dominated elements in LARYNGEAL are marked by an apostrophe. Hence voicing is indicated by |L|. Breathiness has a complex structure |L|-|H|. Aspirated depressors are |L|-|H|-|H'|, whereas plain voiceless aspirates are |H|-|H'|.

In the case of depression illustrated in Figure 3, the Tonal tier functions as a mediator where the most dominant element in LARYNGEAL of depressors, viz. |L|, is always projected onto this tier (indicated by the left dotted line). The projected floating |L| on the Tonal tier associates to the nearest host – the LARYNGEAL of the following nucleus and thus the high tone of the immediately following vowel is produced as low. The voicing-nasality asymmetry is evident under this model since nasality |L| in Manner for nasals is invisible to the Tonal tier.

Syllabification Dilemma in Moroccan Arabic

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There has been a remarkable increase in research on syllable structure in Moroccan Arabic (MA). Despite the different approaches adopted, there has been an agreement on certain characteristics of MA syllable structure. First, the onset is an obligatory constituent of the syllable. Second, in quadrisyllabic consonantal root (CCCC), schwa is inserted between the first two consonants and the last two consonants leading to CəC.CəC ,where schwa occurs in a closed syllable and shares a mora with the coda consonant. By way of illustration, in *wəl.dək.lək.bir* (your eldest son) each syllable has an onset and schwa occurs in closed syllables. It is worthy to note that Dell & Elmedlaoui (2002) argue that onsetless syllables can be permitted only at the beginning of a verse in poetry.

Surprisingly, a dialect spoken by monolingual Arabic speakers in Kandar, a region in the middle Atlas in Morocco, deviates from this generalization. The same example mentioned above would be syllabified as *wəl.dək.**əl.**kbir* (your eldest son) in which case the sequence of CCCC is realized as əC.CCiC. Such syllabification should not be acceptable because the onset is obligatory in MA (and Arabic in general), whereas this form results in a syllable without an onset. If we consider the last consonant of the previous syllable (/k/) to be the onset, then we will end up with a schwa in open syllable *wəl.**də**.kəl.kbir,* which is also considered to be ill-formed. That is to say, both syllabification options lead to a marked syllable structure. The dialect subject of study presents a great deal of such cases.

The present paper will provide an analysis of similar forms based on real data collected from spontaneous speech of monolingual speakers of MA spoken in Kandar. Data are analysed using PRAAT. In an attempt to make a generalization, I will discuss instances where syllabification leads not only to (i) schwa in open syllables or to onsetless syllables, but also to (ii) schwa in closed syllables or to syllables with an onset. Such instances suggest that different factors determine syllabification in this dialect such as tempo, germination, ambisyllabicity, and inflectional morphology. The present paper will only examine instances where the last two factors play a role in syllabification. I will conclude the paper by providing an Optimality theoretic account of syllabification in this variety of MA, where syllables starting or ending in schwa are perfectly acceptable as syllables with onsets or containing schwa in closed syllables.

MaxEnt does not help with phonotactic restrictiveness

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□ Hayes and Wilson (2008; HW) investigate a MaxEnt-based model of phonotactics and its learnability. They conclude that an "important advantage of our approach [is] that it has a well-established mathematical foundation [. . .]. For OT, the Constraint Demotion algorithm family of Tesar and Smolensky (1998, 2000) [also has mathematical guarantees]. However, for purposes of phonotactic learning, where the goal is to learn a maximally restrictive grammar, the algorithm does not suffice, and efforts to adapt it to phonotactic learning have been limited to adding *ad hoc* heuristics intended to rank faithfulness constraints as low as possible (Hayes 2004, Prince and Tesar 2004)." This abstract challenges the claim that MaxEnt has any advantage when it comes to restrictiveness.

□ Consider the (categorical) inventories of velar obstruents in (1a), where illicit segments are stricken out. These inventories are phonetically ***sensible***: illicit forms are phonetically worse than the corresponding licit forms (Ohala 1983). The subset of illicit forms thus coincides with the union of some markedness constraints (a markedness constraint is construed here as the set of segments it penalizes). For instance, the three obstruents [g], [ɣ], and [x] illicit according to the second inventory in (1a) are the union of the two markedness constraints *VelFric and *VoiVelStop. Call the collection of these markedness constraints $\mathcal{M}^+$. In standard OT, it thus suffices to rank $\mathcal{M}^+$ above the set $\mathcal{F}$ of all faithfulness constraints as in the ranking (2a) to derive the desired inventories. In other words, the phonotactics is entirely explained by markedness and faithfulness plays no role.

(1) a. [g k ɣ x], [ɡ̟ k ɣ x] b. [ɡ̟ k ɣ x]

(2) a. $\mathcal{M}^+$ / $\mathcal{F}$ / remaining $\mathcal{M}$ constraints

b. Ident[voice], *VoiceVelarStop → *VelarFric → Ident[cont]

□ I now turn to the velar inventory in (1b). According to UPSID (Maddieson 1984), it is attested in ten languages: Abipon, Highland Chinantec, Chukchi, Khanty, Kawaiisu, Koryak, Maung, Quechua, Selkup, Tiwi. Yet, it is phonetically ***counterintuitive***: it has [ɣ] but not [x], despite [x] plausibly not being phonetically more marked than [ɣ] from any perspective. To derive this inventory (1b) through a ranking such as (2a) would require a markedness constraint penalizing [x] but not [ɣ]. This constraint would violate Hayes and Steriade's (2004) *grounding hypothesis* and it would be impossible to learn from articulatory experience (Hayes 1999). Yet, no such unlearnable and phonetically unreasonable markedness constraint is needed in OT because the inventory (1b) corresponds to a ranking such as (2b). It captures the intuition that [ɣ] survives at the exclusion of [x] not because [ɣ] is less marked than [x] relative to any markedness constraint but rather because /ɣ/ is harder to repair than /x/: in fact, /x/ can be neutralized to [k] (violating only the low ranked Ident[cont]) while /ɣ/ cannot be neutralized neither to [g] (because of the high ranked *VoiVelStop) nor to [k] (because of the high ranked Ident[voice]). The two rankings in (2) are crucially different: (2a) makes no use of faithfulness while (2b) crucially requires a specific relative ranking of Ident[voice] and Ident[cont] to model the fact that only certain neutralizations are allowed.

□ We are thus faced with the following conundrum. **Either** markedness does not suffice for phonotactics and faithfulness is needed instead, because counterintuitive inventories such as (1b) are indeed attested and require the relative ranking of faithfulness constraints as in (2b). In this case, HW's MaxEnt approach is useless because it crucially rests on the assumption that phonotactics can be modeled using only markedness but no faithfulness constraints. And any attempt to tamper the model by adding underlying forms and faithfulness constraints would undermine its mathematical guarantees in terms of restrictiveness. **Alternatively**, phonotactics is indeed a matter of markedness only (as HW implicitly conjecture) because counterintuitive inventories such as (1b) are unattested (*pace* UPSID) and all (categorical) phonotactic patterns can be accounted for through rankings such as (2a), which crucially does not require $\mathcal{F}$ constraints to be ranked relative to each other. Yet, in this case the purported advantage of HW's MaxEnt proposal as a mathematically well founded model of phonotactic restrictiveness evaporates. In fact, once we restrict the search space to target rankings such as (2a) which do not require any relative ranking of the faithfulness constraints, restrictiveness is very easy to achieve, to the point that I can prove that, in this case, even a gradual version of Constraint Demotion with all markedness constraints initially ranked above all faithfulness constraints is guaranteed to converge on a phonotactically restrictive final ranking.

Analyzing the phonological typology for quantity-sensitive stress

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'Quantity-Sensitivity' describes the distribution of stressed 'Heavy' (H) syllables in a language; for background, see the WEIGHT-TO-STRESS PRINCIPLE (Prince 1990; Hayes 1985) and its instantiation as an OT constraint 'WSP' (Alber 1997/1999) (among others). For example, in Khalkha (Walker 2000), every H is stressed: words containing adjacent H syllables have stress on both syllables (2s:HH→ [(áː.)(rúːl)]). Contrastingly, in Tamil (Christdas 1988), not every H is stressed: in words containing multiple, adjacent H syllables, only the leftmost H is stressed (2s:HHL→[(váː.daː)dɯ]). Tamil is less quantity-sensitive than Khalkha because it requires fewer H to be stressed.

In analyzing the phonological typology for quantity-sensitive stress, the simplest target is a binary contrast between quantity-sensitive languages (QS), where some or all H 'attract' stress—disrupting the default pattern—and quantity-insensitive languages (QI), where no corresponding H attracts stress. As Hyde (2008) shows, producing this contrast is not a trivial matter. In the typology analyzed by Hyde, languages *cannot* be truly quantity-insensitive because at least some H attract stress, in every language. I will show that this pathology arises because of the inclusion of the constraint FTBIN 'assign a violation for each foot that is not bimoraic or bisyllabic'.

This paper analyzes an alternate OT typology modeling the phonological typology of quantity-sensitive stress; some key assumptions of the stress theory follow Alber, DelBusso & Prince (2016). Significantly, the proposed OT typology successfully represents the QS/QI contrast. A portion of this typology, consisting of only languages with default initial stress, is shown in (1). All languages have initial stress in words containing only Light syllables (L+ forms); they differ in words containing H (where {H, L}+ stands for words with H and L and H+ for words with only H).

- Pitjantjatjara represents quantity-insensitive languages; every word has initial stress.
- The complementary set, {Kashmiri, Tamil, Khalkha}, represents quantity-sensitive languages; in some words containing H, stress is not initial but falls elsewhere in the word.
- Kashmiri and Tamil are partially quantity-sensitive (c.f. Alber 1997), stressing only the initial H in 2s: HH→[(ˈHH)]; whereas Khalkha is fully quantity-sensitive, stressing every H, which gives rise to stress clash in 2s: HH→[(ˈH)(ˈH)].
- Kashmiri requires trochaic feet (ˈHL); Tamil requires an initial foot, either (ˈHL) or (LˈH).

(1) Empirical support for an OT typology for Quantity-Sensitivity incl. only default initial stress

QS/QI	*Language Support*	*{H, L}+*		*H+*	*L+*
		2:LH	4s: LHLL/LLHL	2s: HH/ 3s: HHL	3s: LLL
QI	Pitjantjatjara	[(ˈLH)]	[(ˈLH)LL]	[(ˈHH)]	[(ˈLL)L]
	(Tabain et. al 2012)	*No data*	[(pú.lang).ki.ta]	No data	[(.mú.la).pa.]
Partially QS, 1	Kashmiri	[(ˈLH)]	[LL(ˈHL)]	[(ˈHH)]	[(ˈLL)L]
	(Walker 2000)	[(sá.laːm)]	[ma.ha(.rə́ ːni)]	[(.dáː.naː)]	[(.phí.ki.)ri]
Partially QS, 2	Tamil	[(LˈH)]	[(ˈLL)HL]	[(ˈHH)]	[(ˈLL)L]
	(Christdas 1988)	[(pəláː)]	[(.pá.lə).x aː.r ə̃]	[(. váː.ɖaː.)dɯ.]	[(pɯ́.d u.)su.]
Fully QS	Khalkha	[(LˈH)]	[LL(ˈHL)]	[(ˈH)(ˈH)]	[(ˈLL)L]
	(Walker 2000)	[(ga.lúː)]	No data	[(áː.)(rúːl)]	[(.ún.ʃi).san.]

A key component of the analysis is that a language is defined by the free combination of two kinds of phonological properties: one kind applies only to words containing H and the other characterizes properties for the default pattern, exemplified using L+ words. This analysis explains why Khalkha, which ordinarily has a single initial stress, allows multiple stresses in words with multiple H.

Formal properties of stringent constraint systems

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A primary challenge for the phonologist is that factorial typologies often opaquely encode linguistically salient categories and generalizations of languages in the systems under investigation. An approach to the opaqueness issue is to simplify and exclude from consideration a subset of the data and analyze the reduced system. Problematic with this tactic is the difficulty in re-incorporating the reduced into the full system and exploiting the insights gained in the simpler system in the more complex.

In this paper, we analyze two systems, a *basic stringency system* (BSS), and a *complex stringency system* (CSS). We show how a complete analysis of BSS, using Property Theory (Alber & Prince 2016), provides fundamental insights into the more complicated CSS which BSS is a simplification of. A *property analysis* is a set of *properties* that divide the languages of the typology in such way that each language and its grammar can be identified uniquely by its property values. Such an analysis identifies the crucial rankings among constraints that distinguish all grammars of the typology so that languages that share property values share extensional traits.

BSS generalizes systems in which there is one stringency hierarchy (e.g. de Lacy 2006's typology of sonority-driven unstressed vowel reduction or Alderete's 2008 analysis of stress in the Pama-Nyungan language family). The constraints of BSS consist of four markedness constraints and one faithfulness constraint. The markedness constraints form a stringency hierarchy in which each markedness constraint is in a stringency relationship with every other markedness constraint. For constraints X and Y to be in a stringency relationship we mean $X(\alpha) \leq Y(\alpha)$ for all candidates α of the system. This stringency hierarchy imposes a markedness hierarchy on the forms of the system in which every form of the system has a unique position on the markedness hierarchy. This yields a total order on the forms. We then show, using Property Analysis, that each grammar in the typology is completely determined by the lowest unfaithfully mapped form on the markedness hierarchy. This result applies to all stringency systems in which there is one stringency hierarchy.

CSS is an analysis of the system presented in Krämer & Zec (2017)'s typology of manners in the syllable coda. There are seven constraints in the system, one faithfulness constraint and two stringently ordered sets of markedness constraint, an F-scale set and a P-scale set, each comprised of three constraints. The F-scale consists of a constraint against fricatives, one against fricatives and liquids, and one against fricatives, liquids and nasals. The P-scale follows the same building principle based on the category of stops. Each of the stringency hierarchies imposes an independent markedness hierarchy on the forms of the system. We give a property analysis of CSS in which the properties are organized in a parallel manner to the properties of BSS. The basic system embeds in CSS in that each stringency hierarchy in CSS has a set of properties associated with it that are structurally identical to the properties of BSS. As in BSS, a grammar's mappings in CSS are determined by where on each of the markedness hierarchies the language is first unfaithful. This shared extensional trait in BSS and CSS manifests as structurally identical properties.

Stringency systems vary in their complexity from the number of classes they refer to, to how they interact, either with another orthogonal and conflicting stringency set (e.g., Alber 2001's analysis of regional variation in glottal stop insertion in German), with one conflicting constraint (e.g., the vowel reduction patterns alluded to above) or another parallel stringency set and a conflicting constraint (e.g., the coda manner typology). In this paper we show how the structure of a maximally reduced stringency system is reproduced in the more complex system via its properties. Understanding the relations that inhere between systems is central to explicating larger typologies that defy easy analysis. Here we show how the analysis of the simpler system BSS elucidates the structure of the more complicated CSS.

Investigating the phylogenesis of phonological features

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Phonological inventories differ vastly in size and shape (Crothers et al. 1979, Maddieson 1984, Maddieson & Precoda 1990, Moran 2012). But if spoken language is in some form older than modern anatomy and cognition afford, then it must have lacked the impressive phonetic range that we observe in today's languages (Lieberman 2002). Furthermore, if the phonological system evolved gradually over time under the assumption that language evolves through processes of natural selection (Corballis 2009), then different aspects of the phonological system are likely to have different relative ages (Hurford 2011). In this paper we ask if can we identify which phonetic features are younger or older.

The most ancient aspects of linguistic behavior are shared with other mammals, e.g. the frequency code (Ohala 1983). But more recent evolutionary precursors might be found in communication systems of great apes, our closest living ancestors (Lameira 2014). For instance Chimpanzees use so-called lip smacks. Lip smacks resemble acoustically voiceless bilabial plosives, which are found in all human languages. If there is evolutionary continuity in the phonological system, not necessarily as far back as great apes, but within the more recent lineage of *Homo*, then we may expect to observe evolutionary precursors (articulatory fossils) in the form of shared (i.e. species-wide) features in modern human languages.

Language is biologically endowed, but this genetic endowment has had a slow biological evolution in *Homo*. After 2M years of divergent evolution, the orofacial cavities of modern humans has decreased in size in head shape, lips, tongue and jaw (Emes et al 2011). This decrease in size probably led to more precise and finer tuning of the articulators (Hurford 2011), as can be witnessed during human ontogeny. Pressures of natural selection further selected for groups with successful communication strategies in our species; the human vocal tract seems to be clearly adapted for speech, perhaps even more recently shaped by it (Hiiemae 1984, Lieberman & McCarthy 2007).

In recent work we have shown that certain features, including [continuant, coronal, dorsal, front, high, labial, nasal, voice, syllabic, sonorant], are diachronically preferred. That is, there is a universal pressure -- statistically neither genealogical nor areal – to keep, or to innovate, these features. However, although phonological universals (and near-universals) hint at articulatory fossils that may be evolutionarily older, they may also be more recent adaptations due to other factors, such as non-linguistic pressures. Speech is in fact a cultural tool transmitted from generation-to-generation via vocal learning, which has spanned some 100k years or more. Successful transmission of language is selected for, so recent innovations due to non-linguistic factors may propagate through languages and become (nearly) species wide. In other recent work, we provide evidence for establishing younger features due to adaptations in diet leading to a post-Neolithic global change in languages' phonetic inventories.

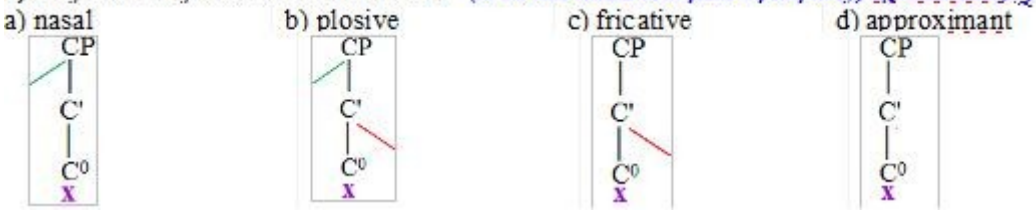
In this paper, we disentangle biologically new and biologically old features of phonological inventories (Hurford 2011) and we present a preliminary phylogeny of phonetic features.

Valence and saturation in phonology *Filiz Mutlu, filizmutlu@yandex.com*

Aim: I propose a theory of phonology which aims to derive the entire system from one principle, viz. *asymmetry*, in a non-stipulative way (cf. Kayne 1994, Di Sciullo 2005). I discuss four manner-related phenomena which are not predicted from a principle in existing models.

Hypothesis I: The composition of syntactic phrases and consonants is basically identical. A consonant is the projection of a consonantal head C^0. The valence (combining power) of C^0 yields manner and phonotactic strength. (Strength determines, for instance, where a consonant can sit in consonant clusters.) Plosives (strongest manner) have both spec and comp (1b), while approximants (weakest) have neither (1d). I assume comp is stronger than spec since it sister-c-commands the head. This asymmetry is relevant for the remaining manners: Fricatives (stronger) must have comp (1c) and nasal stops (weaker) must have spec (1a).

1) *Projections of a consonantal head C^0* ***(x in the head is a place property, eg: labiality.)***

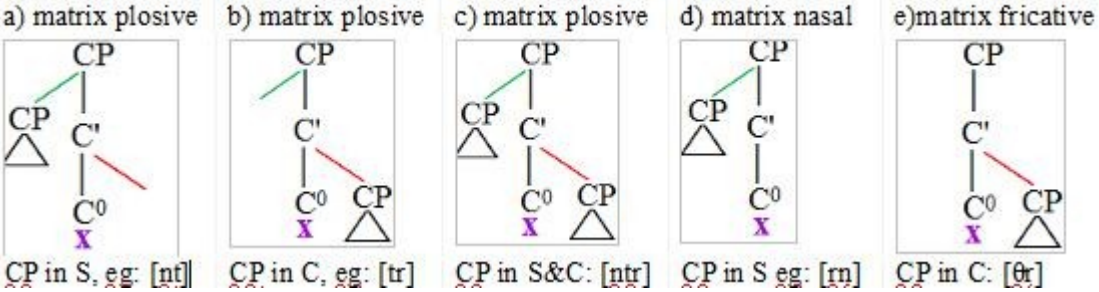


Predictions: (i) In this model, pure stopness (spec alone) is interpreted as a nasal stop, not a plosive. Combining it with pure friction (comp) yields a *plosive*, hence the lack of nasal (not nasalised) fricatives. **(ii)** Crucially, this is the **only** model to derive phonotactic strength directly from structure. Elements/features do not encode strength asymmetries. In models where manner is represented as structure, (Steriade 1993, Pöchtrager 2006), strength is not linked to structure either: Nasals and plosives have the same basic structure, yet not the same strength. **(iii)** Also, an XP has four possible configurations, which correctly yields four simplex manners.

Hypothesis II: Argument positions (spec/comp) can be *saturated* by another phrase. This yields consonant clusters in phonology: A weaker CP saturates the stronger CP (2). Eg: embedding [n] in the spec of [t] yields [nt] (2a) and embedding [r] in the comp of [t] yields [tr] (2b).

Prediction: Nasals have only spec and fricatives only comp, thus they can be saturated in those respective positions only: eg: [rn, sl] (2d, 2e). This means, their reverse, [nr, ls], cannot stand in a direct relation as there is no position to plug in the liquid. [nr, ls] are really part of the larger structures [n(d)r, l(t)s] respectively (2c). The matrix plosive head is empty and therefore possibly silent. It is realised iff it shares the head (place property) of an embedded CP. Thus it is predicted that an *emergent stop* can appear between [nr, ls].

2) *All and only the possible cases of saturation:* **(S: spec C: comp)**



This is the only phonological (vs phonetic) model that predicts *emergent stops* in the correct environments **from the representation of consonants themselves** (cf Recasens 2011, Ohala 2005). At least four seemingly unrelated phenomena follow from the asymmetry of spec/comp.

Domain boundary marking is parametric

Kuniya Nasukawa & Phillip Backley (Tohoku Gakuin University)

Speech sounds have two functions (Trubetzkoy 1939): they encode lexical contrasts (distinctive function) and they express information about the location of prosodic domains (delimitative function). Regarding the second of these functions, it has been argued that knowing where prosodic domains begin/end allows hearers to segment the speech stream more efficiently (Peters 1985); it may also benefit infant language learners as they build their lexicon (Mattys & Jusczyk 2001). For spoken language to perform this delimitative function, certain segments must serve as prosodic cues or 'boundary markers'. These allow hearers to locate the edges of prosodic domains such as the foot, the prosodic word, and the phonological phrase.

Segments functioning as boundary markers are relatively salient or prominent, cf. their realisation in a non-boundary position. One view is that this salience is achieved by exaggerated articulatory gestures (e.g. Fougeron & Keating 1996), e.g. more linguopalatal contact, more lip rounding, or stronger aspiration. Another view claims it is acoustic salience that characterises boundary markers, where boundary segments show a greater modulation of the carrier signal than is found in the equivalent non-boundary-marking realisations or in neighbouring sounds.

This paper adopts the latter acoustics-based view, arguing that boundary-marking segments achieve their maximum effect by being as acoustically distinct as possible. In Element Theory terms (Harris & Lindsey 1995) this means that they should contain headed |H| or headed |ʔ|, as these two elements are inherently voiceless—they stand apart from all other elements which, like human speech in general, are spontaneously voiced. In general, languages prefer segments with |H| or |ʔ| at prosodic domain boundaries.

Most languages place boundary markers at the left rather than the right edge of prosodic domains (Fougeron & Keating 1997). However, data from languages such as Kaqchikel and Lezgian challenge the universality of this generalisation, since they show a clear bias towards right-edge marking. In Kaqchikel, for example, the boundary-marking property is |H|, which represents intense or prolonged noise; it is realised phonetically as aspiration or frication (and *not* just voicelessness, as confirmed by acoustic analysis). This produces patterns in which the domain-final fricatives [ɬ ʂ ɸ ç] alternate with, respectively, the sonorants [l ɾ w j] in non-final positions. Also, the aspirated stops [pʰ tʰ kʰ qʰ] are restricted to word-final position, their plain counterparts [p t k q] appearing elsewhere.

Behaviour like this suggests that domain boundary marking is parametric rather than universally fixed: while left-edge marking may be more beneficial to speech processing (cf. right-edge marking), we cannot rule out right-edge marking as an alternative (albeit, marked) possibility. If the grammar can refer to a left boundary, then it should also be able to refer to a right boundary. The claim is that languages such as Kaqchikel and Lezgian are cases in point.

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Nasal spreading and syllabification in Kamaiurá

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Kamaiurá is a Tupi–Guarani language spoken in the Upper Xingu region of Brazil. In her grammar, Seki (2000) briefly mentions the presence and effects of nasal spreading but does not develop a formal analysis of the phenomenon. Using Seki's data, I show that nasal spreading in Kamaiurá is best interpreted as the regressive propagation of [+nasal] within the word which is blocked by any intervening segments that are specified as [-nasal] but not by all other segments (i.e. [+nasal] and unspecified segments).

Following the example of work such as Walker (1995, 2003; see also references therein), the ranking of the constraint SPREAD(+nas) relative to those constraints which penalise the nasalisation of segments of different manners of articulation (here: plosives (P), liquids (L), semi-vowels (SV) and vowels (V)) helps explain the observed facts of the language. This is further refined by the ranking of the faithfulness constraints IDENT(son) and IDENT(nas), the first dominating SPREAD(+nas), the second being dominated by it. Implementations of these constraints, along with NOGAP and ALIGN^{NAS}L, are given below in (1) and (2) with the examples /kujã/ 'mulher [woman]' and /akaŋ/ 'cabeça [head]'.

(1) Input: /kujã/	NoGap	*NasP	Ident(son)	Spr(+nas)	Ident(nas)	Align^{Nas}L	*NasL	*NasSV	*NasV
[kuja]				***!	*				
[kujã]				***!					*
[kuŋã]				**!	*				*
☞ [kũŋã]				*	**			*	**
[kũjã]	*!			**	*				**
[kũ̃ŋã]		*!			***			*	**
[ŋũŋã]			*!		***			*	**

(2) Input: /akaŋ/	NoGap	*NasP	Ident(son)	Spr(+nas)	Ident(nas)	Align^{Nas}L	*NasL	*NasSV	*NasV
[akaŋ]				***!					
☞ [akãŋ]				**	*				*
[ãkãŋ]	*!			*	**				**
[ãk̃ãŋ]		*!			***				**
[ãŋãŋ]			*!		***				**

An additional detail of nasal spreading in Kamaiurá is that it can be *initiated* only by a nasal nucleus or coda. The example in (3) demonstrates that spreading is not triggered by onsets.

(3) /pa.ɾa.na/ → [pa.ɾa.na] (*[pã.ɾã.na]) 'rio [river]'

However, once it has begun, nasality may propagate leftwards out of the syllable until stopped by an opaque segment or word boundary, as shown in (4).

(4) /ka.wĩ/ → [kãw̃ĩ] (*[kaw̃ĩ]) 'mingau [porridge]'

One might then expect that, upon the affixation of a vowel-initial suffix, nasal spreading caused by a word-final nasal would be prevented; however, this is not the case as resyllabification occurs *after* nasal spreading, as can be seen in (5).

(5) /a.kaŋ-.e.te/ → a.kãŋ.e.te (*a.ka.ŋe.te) → [a.kã.ŋe.te] 'cabeçudo [large headed]'

Though this is a somewhat unusual pattern, additional constraints are able to account for this.

In sum, the data from Kamaiurá discussed here add weight to the typology of the nasalisation hierarchy whilst also diverging slightly from the more commonly cited examples.

Mora structure of geminates in Sinhala animate nouns

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Geminates in Sinhala display their moraic weight through segmental alternations. To explain these alternations for inanimate nouns, Davis posits a high ranking Input-Output Faithfulness constraint that stipulates the mora structure of input forms should match that of output forms (Davis, 2003). Geminates never appear word finally in Sinhala, which suggests there is a phonotactic restriction barring geminates from word final positions:

1a. wattə 'estate-sg' 1b. watu 'estate-pl'

2a. pættə 'area-sg.' 2b. pæti 'area-pl'

When a geminate consonant undergoes shortening, a floating mora is created in output forms (Davis, 1999). A vowel is epenthesized word finally in the plural forms 1b and 2b, which will attach to the floating mora, and preserve IO-Mora Faithfulness (Davis, 2003).

The present study extends Davis's analysis of inanimate nominal alternations to animate alternations. The goal of this study is to reference mora faithfulness as a means of predicting the vowel quality of plural animate nominal suffixes. Doing so will require some degree of serialism in our OT analysis.

Plural animate nouns seem to always have a geminate consonant preceding the final vowel, although the quality of the final vowel is not apparently predictable (data from Feinstein, 1979):

3a. putaa 'son-sg' 3b. puttu 'son-pl'

4a. pissa 'madman-sg' 4b. pisso 'madman-pl'

There has been much debate about the correct suffix of animate plural nouns (Feinstein, 1979; Parawahera, 1990). Some researchers have attempted to explain the vowel qualities of plural animate nouns by creating different morphological classes which will in turn select either [-u] or [-o] as a plural suffix (Parawahere, 1990). In this analysis, I explain that under the moraic view of geminate consonants, it is unnecessary to posit additional morphological classes within the animate nominal class. These alternations can be explained fully by phonological operations.

I argue that root form of 3 is *put-*. The plural animate suffix is /-wu/, as originally proposed by Feinstein, 1979. The glide *-w* assimilates to preceding consonant during affixation, making forms such as 3b, *puttu*. Alternatively, the root form of example 4 ends with an underlying geminate consonant, *piss-*. I propose a high ranking *CCC_{Gem} constraint that prohibits a segment from assimilating to a geminate consonant. The glide of the plural morpheme /-wu/ affixes to the root is not allowed to assimilate to moraic consonants. This creates an opaque environment, where we would expect to see **pisswu*. However, we never see the high back vowel [u] following [w] in Sinhala, suggesting a phonotactic constraint lowers /u/ to [o] to avoid a *w-u sequence. Thus, we have an intermediate form *pisswo*. At a later stage in the derivation, glides are deleted following consonants, producing the correct surface form of 4b, *pisso*.

Turning to singular animate nouns, I propose that the suffix is /-aa/, which is shortened following geminate consonants. This violates moraic faithfulness, but satisfies a higher ranking markedness constraint, *GemV:.

The opaque relationship created by the blocking of glide assimilation necessitates that phonology applies at two derivational levels in Sinhala. This contributes to literature that suggests parallel OT is not equipped to explain typological patterns without multiple levels of derivation. However, with the inclusion of this serialism, animate nominal alternations can be explained fully without reference to arbitrary morphological classes.

Onset Effects on a Tautosyllabic Vowel: Implications for Weight

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The current study investigates if different types of onset trigger different phonetic values (i.e., pitch and vowel duration) in the speech of English (which has intrinsic stress patterns) and Korean (without lexical stress). It is suggested that onset also affects syllable weight by triggering differences in phonetic values such as syllable duration and the perceptual energy (Davis 1988, Gordon 2002, 2005, Ryan 2014, Topintzi 2010). For instance, Gordon (2002, 2005) shows that less sonorous onsets are heavier than more sonorous onsets by suggesting that syllables with voiceless onsets are heavier than those with voiced onsets.

In the current study, six different types of onsets were tested, expanding the dichotomous voicing distinction in Gordon (2005). There were 36 target syllables (6 onsets with different sonority × 6 tokens) in a bi-syllabic word for English, and as for Korean, the 36 target syllables were placed in a tri-syllabic word. The recordings of 14 English native speakers and 20 Korean native speakers were obtained and analyzed using Praat script and software. Based on previous studies, it is expected that syllables with less sonorous onsets are higher in pitch, longer in vowel duration, and louder in intensity.

Onset effects for pitch and vowel duration were significant in both languages (no significant difference was found in intensity). In English, a decrease in the sonority level of the onset is compensated by the increase in pitch values (highest to lowest pitch: /t/ > /s/ > /d/ > /v,n,l/). The classification of onsets is based on the significance from the repeated-measures ANOVA. Korean also satisfies the assumption that less sonorous onsets (aspirated or tense; /t^h, t', s^h/) have higher pitch than more sonorous ones (lax; /t, c, n/). In addition to pitch, vowel duration was also longer for less sonorous onsets in English except for onset /s/ (longest to shortest vowel duration: /t/ > /d/ > /v,n,l/ > /s/). Likewise, Korean speakers had longer vowel duration in syllables with stop onsets (/t^h, t', t/) than with other onsets (/c, s, n/) with more sonority.

The results show less sonorous onsets trigger syllables to have higher pitch and longer vowel duration. Moreover, Figure 1 shows the overall compensatory relationship between onset and vowel duration: as onset duration of a syllable becomes shorter, its vowel duration is lengthened (Figure 2). This indicates that onset affects the rhyme part or vice versa. As the sonority of onset triggers compensatory lengthening or shortening of the rhyme (vowel duration), onset must also be considered as one of the units that indicates syllable weight.

Figure 1. Mean onset/vowel duration (in ms)

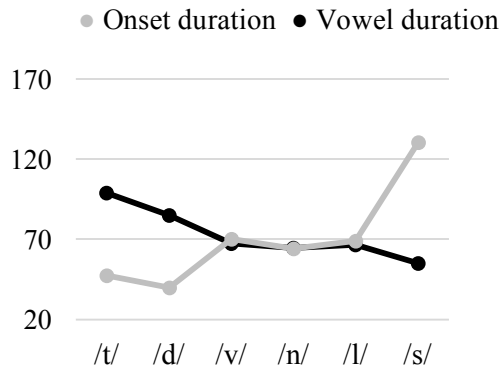
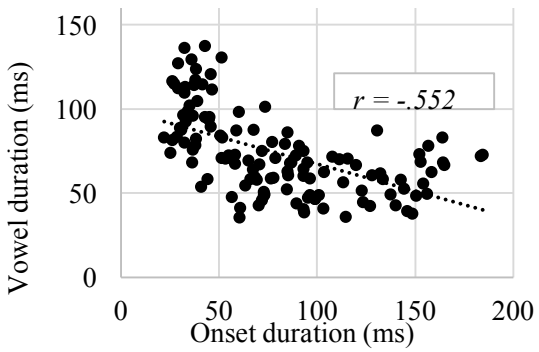


Figure 2. The correlation plot for onset/vowel duration



Voicing on the edge. A case study of maps to determine grammar

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In this study, voicing phenomena in two different border areas in Europe are studied in detail and used to show what geographic patterns can teach us about phonological variation and its interaction with external factors. It will be shown that contact between two areas that have a different phonological system (a) sometimes leads to merger of contrast in a a border area, (b) at other times leads to not much variation at all, but rather an abrupt change.

Data. The Dutch-German dialect continuum involves a change between voicing and aspiration languages. These two language types are represented by a different phonological contrast (a.o. Iverson & Salmons 1995): in voicing languages like Dutch lenis plosives are marked [voice] while fortis plosives are unmarked; in aspiration languages like German fortis plosives are marked [spread glottis] while lenis plosives are unmarked. These two systems are incompatible. Mapping the plosives' phonetic realisations in the entire continuum shows that in the border area speakers show phonetic characteristics of both contrast types, while a phonological contrast is absent. The second region studied is the northern-central Italian dialect continuum, which shows a transition between dialects with (north) and dialects without (centre) intervocalic /s/-voicing (e.g. Krämer 2005). The north has a predictable, allophonic distribution of voiced and voiceless fricatives, while in the centre the distribution is phonological. There is an abrupt change between the two systems: to the north of the border speakers consistently show intervocalic /s/-voicing, to the south they clearly do not.

Issue. The two regions show very different behaviour around the borders: one shows a gradual transition while the other changes abruptly. As both phenomena are voicing-related, the differences are rather unexpected. The question is thus how we can explain these different patterns from a linguistic point of view, keeping in mind that the way speakers deal with variation does not depend on the language they speak, and why speakers in the Dutch-German continuum show variation in the phonetics, while it is absent in the phonology.

Analysis. Part of the first question is explained by the different linguistic characteristics of the phenomena: one concerns the nature of a phonological contrast while the other concerns the distribution of the two members of the contrast. A bigger part, however, may be explained by language acquisition. The absence of a phonological contrast in the middle of the Dutch-German continuum and the presence of a phonological contrast in the entire Italian continuum can be explained by the distribution of phonetic values in the linguistic input the language-learning child receives: the Dutch-German child will not find evidence for a phonological contrast while the Italian child will. It will be shown that language acquisition can also account for the presence of phonetic variation in the Dutch-German transition zone, which is unexpected considering the absence of a phonological contrast.

Implications. The present data show that variation need not always occur: in the Italian continuum it is absent, even though it could potentially occur. This may partially be explained by the presence of a province border (which used to be a state border before the unification of the country), but considering the fact that the Dutch-German state border does not inhibit the presence of variation this cannot be the only reason. The linguistic characteristics of the phenomenon might also play a role. The Dutch-German area, on the other hand, shows that variation is constrained: speakers want to include characteristics of both language types but can only do so on the surface. The two systems cannot be combined in the phonology, as they are incompatible.

Overapplication in Seereer is not backcopying

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Claim This paper provides a phonological account of consonant mutation overapplication in Seereer. The core idea of the proposal is that continuancy mutation in Seereer is not driven by the need of a floating feature to be realized, but by a constraint demanding a root node (•) to dominate the unmarked feature [-c(ontinuant)]. When such a floating feature is introduced by some morpheme, more than one • can hook onto it, creating the impression of "backcopying".
Data Seereer (Atlantic) has a three-grade consonant mutation (voicing, continuancy, nasality). Agent nouns are formed by prefixation of a CVː-sized copy of the first stem syllable and a noun class prefix *o-*. This class prefix regularly triggers cont. mutation on an adjacent C (e.g. /o-fad/ → *opad* CL1-slave 'slave'). The important observation is that cont. mutation in agent nouns optionally appears on the base C as well (Mc Laughlin, 2000, 334):

BASE	AGENT NOUN			
fec	o-pee-fec	∼	o-pee-pec	'dance / dancer'
riw	o-tii-riw	∼	o-tii-tiw	'weave / weaver'
xoox	o-qoo-xoox	∼	o-qoo-qoox	'cultivate / farmer'

Analysis My analysis is couched within Colored Containment (van Oostendorp, 2006). Reduplication is triggered by a segmentally underspecified bimoraic syllable $\sigma_{\mu\mu}$, following the program of Prosodically Defective Morphology (Saba Kirchner, 2010; Zimmermann, 2014). I assume an undominated constraint against spreading of underlying [c], i.e. cont. mutation is made possible by the presence of a floating feature [-c] belonging to the noun class morpheme. However, the primary mutation trigger is not a constraint of the shape [-c]→ •, RM or MaxFlt. Instead, the trigger is a simple markedness constraint [-son]→[-c]: * for every non-sonorant not associated to a [-c] feature. Crucially, epenthesis of [-c] and unbounded ATB spreading (*xoox* ↛ **o-qoo-qooq*) are ruled out by high-ranked DEP and the structural markedness constraint $*\bullet_\alpha[c]\bullet_\alpha$: Assign one * for each [±c] linked to two root nodes of the same color. An important tenet of this analysis is that the No Crossing Constraint (NCC) must be violable (cf. Kimper 2011), at least for cases in which a deleted association line is crossed by an epenthetic line. The optionality of mutation overapplication is due to the variable ranking of [-son]→[-c] and the NCC: if NCC ≫ [-son]→[-c], mutation can only apply locally, otherwise it overapplies.

	o [-c] + μ μ + fec	σ ←μ	$*\bullet_\alpha[c]\bullet_\alpha$	[-son]→[-c]	NCC	[-c]→ •
	a. ofec	*!*		*		*
(☞)	b. o peː fec			*(!)		
(☞)	c. o peː pec				*(!)	

Discussion Mutation overapplication in Seereer informs a long-standing debate about whether or not the phenomenon of backcopying is an empirical reality and how purported cases of backcopying should be analyzed. While the empirical fact of mutation overapplication cannot be denied (cf. similar cases in Fox, Kinande, and Siroi), I argue that there is in fact no need for a grammatical building block such as the BR-Faith constraint family that is specifically devised to deal with such cases, contra McCarthy and Prince (1995), Mc Laughlin (2000), and Zimmermann and Trommer (2011). Rather, "backcopying" overapplication follows from general markedness constraints that can be easily motivated independently. Curiously, albeit being phonological in nature, my analysis follows the same trajectory as the strictly morphological theory of Inkelas and Zoll (2005) in this respect.

Stress, Weight, and Rhythm in German: Where are we now?

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Since the earliest generative accounts of German stress, syllable weight has been implicated in the placement of main stress, less so in the placement of rhythmic secondary stress; these two aspects of the German stress system have often been discussed as separate issues (e. g. Fery 1998, Alber 1997). A minority of researchers (Wiese 2000, Kaltenbacher 1994, Eisenberg 1991) have argued that German stress is quantity insensitive (see Jessen (1999) for a summary). The most recent literature (Röttger et. al. 2012, Domahs et. al. 2014) supports quantity sensitive accounts based on experimental data, and recent work on Low German (Prehn 2012) parallels the Standard German accounts.

One factor that has kept primary and secondary stress issues distinct is the set of patterns observed in loan vocabulary that involve antepenultimate and ultimate main stress. This led earlier accounts (e. g. Wurzel 1970, 1980) to posit distinct stress systems for the native and loan lexical inventories. In the native and most of the loan vocabulary, penultimate stress dominates. For any account, there are distributional challenges with final stress, since some presumably heavy syllables attract stress while others are skipped in favor of placement further left. This is usually handled by lexically-stipulated stress, along with varied systems of weight. In a study of loanword stress doublets, Noel Aziz Hanna (2002) identifies typical nativization strategies; among other things no new final stresses are produced. *Pelikan* shows variation in stress placement that reflects the evolution of borrowed final stress: [ˌpeːliˈkɑːn], but [ˈpeːliˌkɑːn]. It is proposed here that final main stress is borrowed as a lexically stipulated degenerate foot. A bias against this structure leads to reanalysis to antepenultimate or the default penultimate placement over time.

There is a native model for the antepenultimate cases of the type [ˈpeːliˌkɑːn]. Compound stress in German shows left word dominance with secondary stress to the right, as in *Báhnhòf*. Unlike the case of simplexes, clash is tolerated in these forms, i. e. between distinct prosodic words. The same is true of a class of derivational suffixes: *Kíndhèit*, *Éigentùm, spársàm*. German shows a number of native simplex forms with these characteristics: *Kléinòd, Ántwòrt, Démùt, Hérzòg, Hérbèrge*. Simplexes of this type all descend etymologically from compounds or affixed forms, but their morphology no longer requires a complex prosodic word structure. It will be argued in this paper that simplexes of this type end with a lexically-specified prosodic word. This same lexical template will be taken as the model for loan simplexes of the [ˈpeːliˌkɑːn] type. Final main stress is thus the product of a final lexical foot, and final secondary stress results from a lexicalized prosodic word at the right edge of the lexical form.

Given this revised treatment of final and antepenultimate stress, the analysis positing quantity-insensitive right-to-left trochaic feet advanced in Wiese (2000) will be shown to predict both primary and secondary stress patterns in both Standard German and Low German, with some updates to guarantee initial secondary stress in odd-parity words ('binary plus lapse,' Gordon 2002). This basic system accounts for the dominant distribution of penultimate main stress over antepenultimate or final, as well as the rhythmic pattern of secondary stress.

Those are complex times: Portuguese (EP) nasal vowels are phonological diphthongs

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European Portuguese (EP) nasal vowels are a complex topic both for phonetic description and phonological analysis. It has been proposed that nasality is phonologically associated (a) to the vowel /Ṽ/ (Hall Jr 1943, Rogers 1954); (b) with an underlying nasal consonant in coda position /VN/ (Câmara 1953, Bisol 2013); (c) with the second member of a complex nucleus /VṼ/ (Parkinson 1983, Carvalho 1988). This study brings additional evidence for hypothesis (c).

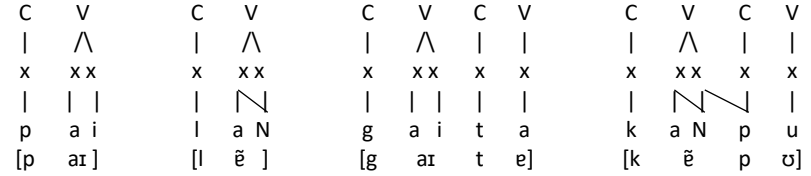
A closer look at the behaviour of nasal vowels allows to eliminate proposals (a) and (b). First, nasal vowels behave as heavy rhymes; secondly, the fact that nasality is not resyllabified in external sandhi (e.g. *lã azul* [lɐ̃.ɐ.zuɬ], not *[lɐ.nɐ.zuɬ] 'blue wool') makes it different from closed syllables, whose coda is resyllabified (e.g. *mais ou menos* [maɪ.zo.me.nuʃ] 'more or less'). This leads to proposal (c), since both nasal vowels and oral diphthongs are heavy rhymes, and are not resyllabified. Accordingly, nasal vowels and oral diphthongs should have a similar length.

Phonetically, previous studies on the properties of Portuguese nasal vowels vis-à-vis oral monophthongs have shown that nasal monophthongs have a diphthong-like acoustic pattern (Teixeira, Vaz & Príncipe 2000, Teixeira & Vaz 2001, Hajek & Watson 2007), although the so-called nasal murmur seems to partially occupy the time allotted to the following consonant (Moraes & Wetzels 1992, Medeiros 2011). To my knowledge, duration of EP nasal vowels has never been compared to that of complex nuclei.

To assess the respective length of nasal vowels and oral diphthongs, I compare the duration of oral vowels (V), nasal vowels (Ṽ) and oral diphthongs (VG) in three contexts: word-finally (_#), before plosive (_t) and before fricative (_s). Six EP speakers were recorded reading a list of carrying sentences containing words and nonce-words with the test sounds (V, Ṽ or VV), covering all five EP nasal vowels (/ã, ẽ, ĩ, õ, ũ/) and respective oral vowels (/a, e, i, o, u/) and diphthongs (/ai, ei, iu, oi, ui/). The target word appeared twice in each carrying sentence, and each sentence was repeated six times by each speaker, making a total of 3240 tokens. All targets belonged to a stressed syllable.

Results show that in final context V is statistically shorter than VG ($p < 0.001$), which has the same duration as Ṽ ($p = 0.83$). In non-final contexts, both VG and Ṽ are longer than V, but Ṽ is also longer than VG (Ṽ > VG > V). Interestingly, while there is no significant difference between the duration of onset consonants following V and VG, onset consonants that follow Ṽ are significantly shorter, and if we add the duration of the following consonant, the difference between Ṽ and VG disappears. Overall duration shows that VC < ṼC = VGC.

I propose that the difference between VG and Ṽ results from interaction of nasality with the following consonant, which fails to occur both in final context, and when the second position in the nucleus is occupied by an oral glide.



In conclusion, not only are EP nasal vowels longer than oral vowels, but also the /VṼ/ representation proposed is phonetically grounded in terms of timing.

Emergence of the unmarked in the adaptation of Polish onset clusters by native speakers of English

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It is well known that vowel epenthesis is one of the most common repair strategies used in loanword adaptation to nativize foreign consonant clusters (e.g. Kang 2011). Given an illicit CC onset sequence, it is possible to insert an epenthetic vowel either before the cluster (prothesis), with C_1 syllabified as the coda of the initial syllable and C_2 as the onset of the following syllable ($VC_1.C_2$), or between C_1 and C_2 (anaptyxis), with both consonants syllabified as onsets ($C_1V.C_2$).

This paper addresses the prothesis-anaptyxis asymmetry in the adaptation of Polish CC onset clusters by native speakers of Southern British English. We report on the results of an online loanword adaptation study in which 30 native speakers of Southern British English reproduced 100 monosyllabic Polish words with CC consonant clusters not permitted in English. The present study is modelled on Davidson's (2001) and Haunz's (2007) experiments focusing on Polish and Russian non-words respectively.

Our results demonstrate that the vast majority of words with onset sequences are nativized by vowel epenthesis between C_1 and C_2. Such an adaptation is optimal in terms of the universal syllable markedness constraints, i.e. *COMPLEX, ONS and *CODA. However, certain items with onset clusters undergo prothesis rather than anaptyxis. These include sequences with /r/, /w/ or /z/ as C_1. In these cases, the /C_1C_2V/ → [$VC_1.C_2V$] adaptation is usually selected rather than /C_1C_2V/ → [$C_1V.C_2V$], even though it is suboptimal with regard to ONS and *CODA. The divergent behaviour of /zC/ clusters seems unsurprising given their structural similarity to /sC/ sequences, which exhibit a cross-linguistic tendency to be repaired by initial rather than internal epenthesis, as observed by a number of scholars (e.g. Broselow 1992, Gouskova 2001, Yildiz 2005).

The main focus of this paper is on the adaptation of Polish /rC/ and /wC/ clusters, where both /r/ and /w/ are syllabified as the coda of the initial syllable rather than its onset. We argue that the most likely reason behind the divergent behaviour of these segments is that they make better codas than onsets. In accordance with the Sonority Dispersion Principle (Clements 1990), singleton sonorants constitute better codas than onsets because sonority drop between the nucleus and the coda should be minimized, while sonority rise from the onset to the nucleus should be maximized. We provide a formal analysis of the data based on Baertsch's (2002, 2012) split margin approach to the syllable. Prothesis in /rC/ and /wC/ clusters is shown to result from FAITH demotion below the constraint against rhotics in M_1 Hierarchy, i.e. *R_1. If FAITH is ranked below *R_1, then only laterals, nasals and obstruents will be able to surface in the syllable onset. Segments of higher sonority will be syllabified either into the nucleus or the coda, depending on interaction with other constraints.

Our analysis thus claims that prothesis in /rC/ and /wC/ is an instance of an emergence of the unmarked effect in loan adaptation as foreign items are made to conform to stricter structural restrictions than native English vocabulary, where both /r/ and /w/ can occur in onset position. We argue that FAITH reranking can account for a number of phenomena observed in loan adaptation, including importation and different degrees of nativization (as proposed by Ito and Mester 1995, 1999, 2001) as well as emergence of the unmarked effects.

Evidence for contrastive feature hierarchies in Old Norwegian height harmony

Jade Jørgen Sandstedt

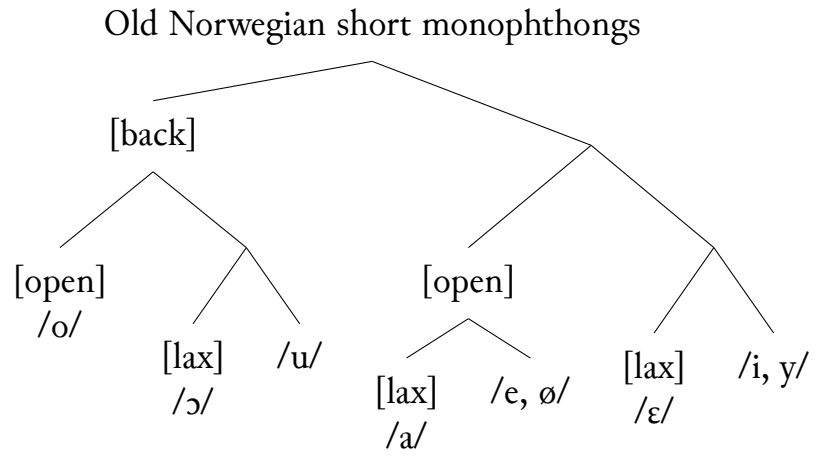
I provide a new analysis of rare transparent and blocking harmony patterns in Early Old Norwegian which raise fundamental questions about the role vowel contrastivity, sonority, and locality play in harmony processes. Old Norwegian featured rightwards height harmony, resulting in regular alternations in non-initial syllables (1a). Two forms of neutral harmony are attested: the mid vowels [ɛ, ɔ] fail to initiate height harmony and are always followed by high vowels (1b) while low vowels block and do not undergo height harmony and are invariably followed by non-high vowels (1c).

(1) **Old Norwegian height harmonic [-i]/[-e] and [-um]/[-om] alternations**

a.	['huːs-i]	*['huːs-e]	house-DAT.SG.	['skip-um]	*['skip-om]	ship-DAT.PL.
	['orð-e]	*['orð-i]	word-DAT.SG.	['seɣl-om]	*['seɣl-um]	sail-DAT.PL.
b.	['hɔvð-i]	*['hɔvð-e]	head-DAT.SG.	['skɛpn-um]	*['skɛpn-om]	shape-DAT.PL.
	['kvɛld-i]	*['kvɛld-e]	evening-DAT.SG.	['jɔrð-um]	*['jɔrð-om]	earth-DAT.PL.
c.	['land-e]	*['land-i]	land-DAT.SG.	['undr-að-e]	*['undr-að-i]	wonder-PRET.3.SG.
	['maːl-e]	*['maːl-i]	matter-DAT.SG.	['dyːrk-að-e]	*['dyːrk-að-i]	worship-PRET.3.SG.

Similar neutral harmony patterns have been attested in a small class of unrelated languages which Nevins (2010) has analyzed as the result of the relativization of the harmony procedure to featurally contrastive vowels (e.g. harmonically paired /i–e/) which can be blocked by non-contrastive segments over certain sonority thresholds (e.g. harmonically unpaired low vowels). These patterns are therefore potential counterexamples to the Contrastivist Hypothesis (Hall 2007) which holds that only contrastive features are calculated by the phonology since Nevins' (2010) analysis requires the manipulation of non-contrastive features which can be additionally limited by special constraints on vowel sonority.

I provide an alternative analysis which derives the same effects in Old Norwegian using the following privative contrastive feature hierarchy (Dresher 2009). On this analysis, contrastivity is defined by feature domains, and height harmony is initiated only by vowels within the scope of [open], excluding non-contrastive [ɛ, ɔ]. This analysis dispenses with the need for additional locality or sonority constraints and provides further evidence that harmony processes compute only contrastive features, cross-linguistic variation being a consequence of differences in feature ordering.



There is no such thing as [voice]

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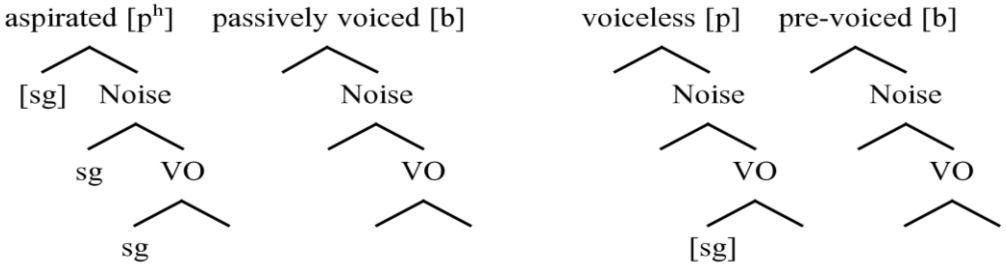
Most of the debate inspired by Laryngeal Realism (LR) has concerned the question of whether the feature [voice] is binary, or should be replaced by [spread glottis] ([sg]) in 'aspiration' languages. In this paper, I argue that [voice] should be eliminated even in 'voice' languages, and that the VOT typology encoded by LR may be represented in other ways. The elimination of [voice] is a logical extension of Modulation Theory (MT; Traunmüller 1994; see also Harris 2009). In MT, speech perception entails the extraction of linguistically relevant acoustic features that modulate a carrier signal, which also bears affective and personal properties idiosyncratic to the speaker. If we consider the transmission potential of periodic signals for conveying both linguistic and speaker-specific information (e.g. Wright 2001), we must assume that the carrier is voiced. Therefore, in an MT-inspired view of phonological representation, voicing is an element of the carrier; it is not a primitive phonological feature. This outlook raises two questions: (1) what if any empirical evidence is there for eliminating [voice] and (2) how can we represent what is usually encoded in terms of the feature [voice]?

Relevant to the first question are instances in 'voice' languages in which voicelessness is phonologically active (e.g. Rubach 1996; Wetzels & Mascaró 2001), or pre-voicing is not obligatory (van Alphen & Smits 2004 for Dutch; Coetzee et al. 2014 for Afrikaans). Another case is 'equivalence classification' (Flege 1987) between pre-voiced and unvoiced /bdg/ in L2 speech. For example, Polish users of English fail to suppress pre-voicing in L2, while their acquisition of aspiration is much more successful (Zając 2015). These facts suggest that the aspirated stops are 'new' and more easily acquired in accordance with Flege's (1995) Speech Learning Model, while the lenis stops are confused with L1 /bdg/. However, LR incorrectly predicts that both lenis *and* fortis English stops should be new to L1 speakers of voice languages, since both are said to have different representations.

Voicing as carrier rather than feature may be represented with the hierarchical structures of the Onset Prominence framework (OP; Schwartz 2010 *et seq*.), in which obstruents have internal structure (cf. Steriade 1993, Pöchtrager 2006) containing voiced CV transitions encoded as the Vocalic Onset (VO) node. Aspiration vs. voice systems are represented as in (1), in which aspiration is due to [sg] assignment at the highest level of structure (Closure), and the phonological equivalence between pre-voiced and unvoiced /bdg/ is evident. In addition to discussing evidence against [voice] in true-voice languages, this presentation will also illustrate the OP mechanisms for representing what is usually referred to as 'voice assimilation', and hint at further implications of the proposal.

(1) Aspiration (left) vs. voice systems in the Onset Prominence framework



Modelling variable adaptation in English loanwords in Mirpuri Pahari

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This paper offers a phonological analysis of the position of stress in English loanwords into Mirpuri Pahari (MP), framed within Optimality Theory (OT), to illustrate competition between 'faithfulness' to stress position in English as source language (SL) and markedness constraints governing position of stress in MP as target language (TL) (Davidson & Noyer, 1997; Broselow, 2009). Instances of variable adaptation, according to age and/or level of education of the MP speaker, are then presented, and an alternative phonological analysis, within Message Oriented Phonology (Hall, Hume, Jaeger, & Wedel, 2016), is proposed to capture both sets of data without direct recourse to external sociolinguistic factors.

Mirpuri Pahari (MP) is a non-tonal variety of Western Punjabi spoken by approx. 4 million in Pakistan, and 500K in the UK, and has no written form (Stow, Pert, & Khattab, 2012). Stress in MP is assigned to a final superheavy syllable, otherwise to the penult (Shafi, in prep); a ban on degenerate feet prevents open light syllables bearing stress, and monomorphemic words are maximally trisyllabic. A corpus of 1200 loanwords was created by the first author, who is a native speaker of MP, based on elicitation of data from family members living in Pakistan of different generations. Taking position of stress as a case study (in a subset of the corpus), we find four adaptation patterns, as shown below:

A	no competition: ✓English ✓MP	public	ˈpʌb.lɪk	ˈpəb.lək
B	competition: ✓English; structural change > ✓MP	decision	dɪ.ˈsɪ.ʒən	də.ˈsiː.ʒən
C	competition: ✓English ✖ MP	vaccine	ˈvæk.siːn	ˈvæk.siːn
D	competition: ✖English ✓ MP	glucose	ˈgluː.kəʊz	gəl.ˈkoːz

These generalisations are amenable to phonological analysis within OT, by means of ranked constraints: loan-specific faithfulness (to English SL input) and markedness (as in TL MP).

The data above was elicited with younger MP speakers in Pakistan educated to high school level at least and who thus learned English as a foreign language at school. Older speakers with a lower level of education, who have not learned English at all, produce some loanwords differently e.g. [vək.ˈsiːn] 'vaccine'. For young, educated speakers, the proportion of loanwords in which the English stress position is preserved (by some means or another), i.e. the sum of tokens in categories A-C, is 85% (306 cases out of 361 total). In the smaller set of data from less educated speakers, who also use loanwords less frequently, the proportion of loanwords in which English stress is preserved is lower, with no tokens of type C at all: in 100% of cases the MP stress rules are respected.

This variation can be modelled within OT by proposing that less-educated speakers have a different grammar, in which constraints are re-ranked so as to result in a different outcome in type C cases where competition was resolved in favour of English for young/educated speakers. In this analysis, the choice of which ranking holds is driven by external factors (age/level of education). A more promising approach is to model this variable adaptation in terms of degree of 'mere exposure', and specifically, in terms of the contents of each speaker's lexicon (Hall et al., 2016). We assume a shared lexical space, between SL and TL; as the number of English SL lexical items in the lexicon grows, so the influence of the stress patterns in those words on the stress rules increases. This approach predicts both inter- and intra-speaker variability in the realisation of stress in MP loanwords, which we expect to be able report at the conference (arising from data collection taking place in April-May 2017).

Textsetting Evidence for Trochaic Metrical Structure in Standard Chinese

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Background The phonological distribution and phonetic realization of tones and segments in Standard Chinese (SC) support the trochaic metrical structure hypothesis of SC (Sui 2015, 2016, Duanmu 1995, 2000, 2014, Chang 1992), but native speakers' prominence judgements do not always agree with the trochaic hypothesis (Deng 2010, Wang 2003, Yan et al. 1988, Lin et al. 1984, Hoa 1983, Chao 1968). It may be due to the fact that stress is not contrastive in SC, hence speakers are not sensitive to stress, moreover, prominence judgement is influenced by a variety of factors, especially tone and final lengthening effect (Sui 2013). This study provides a new type of phonological evidence from textsetting for the trochaic metrical structure of SC.

Introduction Textsetting is the alignment of syllables in linguistic text with the rhythmic patterns in singing and chanting. It does not directly request speakers' prominence judgements while speakers employ their implicit metrical knowledge to perform the task. The ability of text setting is not only productive but predictable. It is found in English that textsetting obeys the constraint that stressed syllables in the lyrics are mapped to strong rhythmic positions in the music tune (Halle & Lerdahl 1993, Halle 1999, Hayes 2005).

Hypothesis Assuming that SC textsetting obeys the general constraint of aligning stress to strong rhythmic positions, the stressed syllables in linguistic text identified by the trochaic metrical structure hypothesis are expected to align with strong rhythmic positions in music.

Methodology The study conducts textsetting experiment to set new text to given musical rhythmic patterns. It chooses the folk song *Hóng Hé Gǔ* 'Red River Valley' as the rhythmic patterns. The song is in 4/4 meter, consisting of four stanzas and two couplets in each stanza. The text consists of 45 sentences with varying lengths and syntactic structures. The sentences were quantitatively studied with respect to prosodic phrasing by Shen (1998). Native speakers of SC sing the text to the musical rhythm. The textsettings are recorded and transcribed to metrical grid representations (Liberman 1975).

The research questions are: (1) what kind of syllables (i.e. stressed or unstressed) in linguistic text are aligned to strong and weak musical rhythmic positions respectively? (2) if misalignment occurs, when does it occur? (3) is there correlation between linguistic prosodic phrasing and music phrasing (Lerdahl & Jackendoff 1983, Hayes & Kaun 1996, Halle 2004)?

Results The textsettings exhibit a predominant tendency of aligning stressed syllables in text to strong rhythmic positions in music and unstressed syllables to weak rhythmic positions, which accounts for 73 percent of the total alignment. A Pearson's correlation test indicates a strong positive correlation between the two variables of *syllable being stressed* and *syllable being mapped to strong metrical position*, $r = 0.45$, $df = 2109$, $p < 2.2e\text{-}16$. Misalignment occurs when unstressed syllables are set to strong rhythmic positions to satisfy the constraint that strong rhythmic positions require syllable alignment, whereas stressed syllables are mapped to weak rhythmic positions only with a surplus of stressed syllables in the local textsetting domain. The constituency matching tendency between linguistic prosodic phrasing and musical phrasing is confirmed by Pearson's correlation test ($r= 0.203$, $df= 307$, $p= 0.0003372$).

Conclusion SC textsetting obeys the general constraint that stressed syllables in lyrics are aligned with strong rhythmic positions in music. Trochaic metrical structure must be assumed for SC in order to account for the alignment tendency. Textsetting provides a new type of phonological evidence for the trochaic metrical structure hypothesis of SC.

Poetic Rhyme in Greek: insights from a pilot database

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Our paper focuses on poetic rhyme, that is, the sound correspondence between one or more syllables at – usually – the ends of poetic lines. The phenomenon, reminiscent of reduplication in the general phonology of languages, has received less attention in the literature in comparison to other metrical components (Köhnlein & van Oostendorp 2014). Greek rhyme in particular is, besides few extant philological studies (Kokolis 1993), completely unexplored.

The research outlined here aims to start filling this gap. Specifically, we report on the on-going construction of a pilot database (to appear at http://greek-rhyme.web.auth.gr/index.php), that contains a sample of rhymes as they appear in the poetic works of diverse Greek poets, including Karyotakis, Solomos, Valaoritis, Varnalis, among others. While the database constitutes the first attempt to quantify aspects of Greek rhyme, ultimately it aims at supplying the material that will enrich our understanding of both the phonology of Greek and its rhyme patterns, but also of the typology of rhyme as a general phenomenon.

Through the database, the user is able to extract plentiful information on the type of rhyme (e.g. masculine, feminine penultimate or feminine antepenultimate), its qualitative aspects, such as whether it is perfect or imperfect (where consonants or vowels alternate between the rhyming pairs), rich (i.e. inclusive of the onset of the stressed syllable) or not, as well as the corresponding frequency of occurrence in the corpus of data. To this end, the database management software MySQL is employed with the integration of numerous project-specific algorithms. These mainly comprise rule-based methods for the phonetic transcription and syllabification of the poems as well as the automatic detection and classification of the rhymes. The latter is achieved through rules that exploit an extensible and adaptable prototypical syntax which minimizes the core application code modification needs. In order to validate and test the design considerations of the detection/classification system, rhyme rules covering the majority of the typical as well as several atypical and rare cases are proposed. Error tracking and corrections are manually handled by the project administrators. The output of this analysis is going to be accessible to the end user through a simple web-based interface that will allow searching through the database utilizing several criteria, such as rhyme types and frequencies according to poets, specific poems, rhyme patterns etc. Key features of the database are the provision for future expandability, its open-access nature and the use of open-source software.

Beyond accomplishing the descriptive aims of our project, we seek to explore in what way the database findings are phonologically informative. For instance, pairs like *vasília/madíʎa* 'kingdoms/scarves' are easily perceived as perfect rhyme pairs (indicated through underlining), despite the [li] vs. [ʎ] (from an underlying /lj/) difference within the rhyme. This possibility may be seen as a result of the neutralization of contrast between /i/ and /j/ that is otherwise observed in comparable contexts in Greek (cf. Topintzi & Baltazani 2016). Examination of Greek rhyme is typologically relevant too. It shall enable us to potentially corroborate Holtman's (1996: 32) claim, based on Middle English, that languages with rich inflectional morphology prefer feminine over masculine rhymes. Similarly, we consider whether instances of imperfect rhyme, illustrated with the bolded consonants of the pair *anθró**p**us/pó**n**us* 'men-ACC/pains-ACC' found in Valaoritis' Kyra Frosyni (vs. a perfect rhyme pair, such as *anθró**p**us/kó**p**us*), follow any systematic patterns, and if so, whether these are comparable to the structure of imperfect rhymes of other traditions, e.g. sonority-based as in Irish (Kern 2015), or different.

Vowel length alternations among Czech nouns

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In Czech, as shown in (1), the length alternation of root-/stem-final vowels are observed (the qualitative changes accompanied by length alternations will not be discussed).

(1)

a. lengthening: obl**a**k ‘cloud’ ~ obl**a:**ʧ-ek **(**dim.); ɦil**a**v-a ‘head’ ~ ɦil**a:**v-k-a (dim.)

b. shortening: d**u:**m ‘house’ ~ d**o**m-u (gen. sg.), d**o**m-ek (dim.); mr**a:**z ‘frost’ ~ mr**a**z-u (gen. sg.), mr**a**z-i:k (dim.); kr**a:**v-a ‘cow’ ~ kr**a**v (gen. pl.), kr**a**v-k-a (dim.)

These processes can be regarded as a length exchange (Anderson and Browne 1973) in terms of the phonological condition: vowel length alternates bi-directionally when syllable structure changes.

Featural exchange is problematic especially in output-based phonological theory such as Optimality Theory (cf. Wolf 2006). In contrast, Scheer (2003) argued that the length of root vowels is determined by the moraic template for a given category. According to this paper, three morae are weighed to diminutives (morae on coda consonants are not counted here). As can be seen in (1), however, the lengthening of two-vowel roots and the shortening before /-(e)k-/ do not obey to the three-mora template.

The present work conducted a survey on an online Czech dictionary (*Slovník spisovného jazyka českého*: http://ssjc.ujc.cas.cz/) in order to clarify the tendency of the length alternation in the nominal declension and the diminutive derivation. The following generalizations can be deduced from the results. (i) Shortening was observed in few nominal declension cases (/a/: 6.0%, /i/: 10.8%, the emergence of the other long vowels are restricted in general in the native phonology), and lengthening was never. (ii) Nouns were likely to undergo shortening in the diminutive derivation if they underwent it in the declension also (70.2% vs. 1.4%, if no shortening in the declension). (iii) Lengthening before /-(e)k-/ was frequent among masculine (64.4%) and neuter (77.9%) nouns, and not among feminine ones (15.8%). (iv) Lengthening was never observed before /-i:k-/.

This presentation proposes that the given length alternations should be uniformly attributed to the underlying (or lexical) phonological property of nominal roots and/or diminutive affixes. First, root-final vowels undergoing shortening possess no underlying morae, and vowel length is assigned by a given nominal theme and/or case-number suffix. One mora is assigned to masculine nouns (e.g. mr**a**z-u), and one more to nominal singulars (e.g. mr**a:**z). The other nouns receive two morae (e.g. kr**a:**v-a), one of which is linked to coda consonants in genitive plurals (e.g. kr**av**). In other words, the shortening in nominal declension is attributed to the property specific to several nominal roots. That is why this process is infrequent and does not extend to loanwords: shortening is blocked in most nouns in order to preserve the original length.

The diminutive affix /-(e)k-/, in contrast, should possess an underlying floating mora, which triggers lengthening of preceding vowels. This can be supported by the productivity of the lengthening in the diminutive derivation (note that it also occurs in some loanwords such as telef**o**n ‘telephone’ ~ telef**o:**nek). Infrequency of the lengthening among feminine nouns may be conditioned morphologically such as by a certain feminine feature. Note that the above assumed moraless root-final vowels emerge as a short vowel in the diminutive derivation due to the underlying mora in the affix.

In summary, the length alternations in Czech nouns is shown to be a simpler process than it seems. There is no ‘length exchange’, and the given sound alternations are conditioned by lexically-specified phonological properties such as moraless vowels and a floating mora underlying in the diminutive affix. On the other hand, observed exceptions suggest that multiple factors should be relevant to the alternation patterns.

Cyclic spell-out and the interpretation of Polish resultative participles

Sławomir Zdziebko, Catholic University of Lublin

Polish verbs in *-e-* and *-ej-* display an alternation of the thematic vowel /a/ with /e/ in the masculine-personal forms, e.g. *wyłysiał* - *wyłysieli* 'he has gone bald - they have gone bald, m-pers.'. Traditionally, vowel /e/ has been assumed to undergo the rule of Backing and Lowering (B&L) to /a/ if it is followed by a non-palatal consonant (here /ł/). The rule must be ordered after the rule of Palatalization that derives /l/ from /ł/ (see Gussmann 1980). Thus Palatalization should bleed B&L. This does not happen in resultative participles related to verbs in *-ej-*, where /l/ follows /a/, c.f. *wyłysiali starcy* 'elderly men that have gone bald'.

The B&L account is also falsified by a set of alternating athematic or Ø-verbs such as *sia+Ø+ć* 'to sow' - *siej+Ø+ę* 'I sow' - *sia+Ø+li* 'they sowed, m-pers' or *grza+Ø+ć* 'to heat up' - *grzej+Ø+ą* 'they heat up' - *grza+Ø+li* 'they heated up, m-pers.'. In such verbs /a/ is also attested before palatal segments such as the tense/participle exponent /l/ and infinitival exponent *-ć* /t͡ɕ/. This is not expected if B&L is blocked before palatal segments.

The counterbleeding opacity attested in resultative participles might be accounted for by assuming that Backing and Lowering is a stem-level/1st cycle rule, while the observed instance of Palatalization takes place only at the word-level or a subsequent cycle, when the inflectional ending /i/ is introduced. Such an analysis, however is not available for the set of athematic alternating verbs because verbal stems must be computed together with the person-number endings for the B&L account to make sense in the first place.

I will claim that the /a/-/e/ alternation in Polish is not due to the working of Backing and Lowering. In the case of verbs such as *sia+Ø+ć* 'to sow' or *grza+Ø+ć* 'to heat up' the thematic element in the past tense and the Infinitive is not an empty set but rather an autosegment that anchors onto the stem vowel and triggers the mutation of /e/ to /a/.

In the participles of *ej*-verbs the said counterbleeding effect is the consequence of the identity of theme vowels being sensitive to cyclic spell-out (Embick 2010). The insertion of thematic element /e/ is conditioned by the availability of the feature [masculine-personal]. The feature may be referred to in the exponence of the verb but is not available in the case of the participle. As opposed to verbs such as *wyłysieli* 'they have gone bald, m-pers.', participles contain the categorizing head Adj(ective), which triggers the interpretation of its complement. Since feature [masculine-personal] is introduced above the Adj-head, it is not present at the point of the derivation where the thematic suffix is realized. Instead, the default thematic vowel /a/ is inserted.

Embick's (2010) approach to cyclic spell-out does not only account for the exponence of the resultative participles but also predicts the possible patterns of allosemy observed in Polish adjectives. Whereas root adjectives such as *ślepy* 'blind' or *biały* 'white' may change their meaning depending on the noun they modify, e.g. *ślepy nabój* 'blank cartridge', *biała broń* 'cold steel', this is not possible with participles build of the same roots: *oślepły* may mean only 'one that has gone blind' and *zbielały* means only 'one that has become white'.

The allosemy observed in root adjectives such as *ślepy* 'blind' is possible under Embick's approach to cyclic spell-out as the roots of the adjectives that modify the nouns and the nouns themselves undergo interpretation at the same cycle. This is not the case with resultative participles which contain a verbalizing V-head dominated by an Adj-head. It has been argued by McIntyre (2013) and Bruening (2014), that the arguments of verbs on which adjectival participles are based are extracted from the participles and play the role of the nouns modified by participles. Since the extracted arguments are merged higher than the spell-out triggering Adj-head, the nouns do not undergo interpretation together with the roots from which participles are built and cannot trigger the allosemy of the relevant roots/participles.

Dissimilation of Mandarin Tone and its Perceptual Consequences

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Phonological alternations, particularly those involving dissimilations, pose challenges for speech perception. This study investigated Mandarin tone3 'sandhi' which, despite its terminology, involves dissimilation rather than assimilation. Here a sequence of T3T3 surface as T2T3. We argue that in the case of dissimilation, the relevant features need to be specified – else the context for dissimilation is not met. The question is then how do listeners respond to the output of the neutralisation? Therefore our goal was to investigate (i) whether or not and (ii) when a surface tone2 can activate the canonical tone3. Two alternative hypotheses were tested: if tone3 is underspecified (c.f. Politzer-Ahles, 2016), tone2 should prime tone3 targets regardless of context; if tone3 is specified, tone2 should prime tone3 targets under certain phonological contexts.

Four lexical decision experiments were conducted in Beijing with audio-visual cross-modal priming design, two with semantic and two with form priming designs (see Table 1). In the mediated semantic priming (Experiment1, N = 52), critical targets were related to the auditory primes through a mediating sandhi item. For example, participants listened to [da2] 'answer', [da3] 'beat' and [da4] 'big' and saw [qing1 li3] 'to clean up'. The targets will be pre-activated by the prime only if the mediating item /da3 sao3/ 'to clean' is activated. Results showed that both the [T2] and the [T3] primes led to significant priming. In the synonym priming (Experiment2, N = 52), only [T3] primes showed facilitation, but not [T2] primes.

Form priming experiments showed parallel results. In Experiment3, where critical targets were sandhi words, both [T2] primes and [T3] primes facilitated the lexical decisions compared to the [T4] control primes. In addition, [T3] primes led to significant faster responses than [T2] primes. In Experiment4 where targets were non-sandhi targets, only [T3] showed a significant priming effect.

Table 1. Designs for the four experiments.

Condition	Prime	Experiment1		Experiment2
		mediating sandhi	Target	Target
Citation	[**da3**] 'beat'	/**da3** sao3/ to clean	清理 /qing1 li3/ to clean up	攻击 /gong1 ji1/ to attack
Surface	[da2] 'answer'			
Control	[da4] 'big'			

Condition	Prime	Experiment 3	Experiment 4
Citation	[**fan3**] 'opposite'	反响 /**fan3** xiang3/ repercussion	反射 /fan3 she4/ reflection
Surface	[fan2] 'annoying'		
Control	[fan4] 'meal'		

Converging results show that tone2 and tone3 primes map differently onto the underlying representation depending on whether the target contains appropriate phonological information to justify the neutralisation. When such information is present, both tone2 (surface tone) and tone3 (canonical tone) activate the lexical entry, whereas when relevant contextual information is absent, only tone3 activates the lexical entry and tone2 does not. We argue that these results are in line with predictions made by the tone3 specification hypothesis and propose that surface variation is resolved by a re-writing rule (Zhou & Marslen-Wilson, 1997) along with restrictions posed by phonological constraints.

Special session

Typology and phonological theory

Should phonologists do typology? Phonologists have long sought to test their hypotheses on the widest possible set of languages, and OT has made factorial typologies an explicit part of testing analyses, but the set of languages considered in such work is often limited in practice and geographically biased. Would it change our notion of the 'canon' of data to be explained, or of what is marked and unmarked, if we aim to base generalisations on a representative sample of languages? Which aspects of phonological systems are most (or least) amenable for typological research? Is it actually important, though, how frequently a particular phenomenon occurs in languages? Should we account for what is probable in phonology, or only worry about what is possible, so that rare patterns are as informative as common ones? Or should we even conclude that typology is undermined by the fact that it can only consider those languages which exist, not those which could exist? If phonologists should be doing typology, how should it be done? Inductively via large databases, or deductively via formal tools such as factorial typologies, or both? What are the results of typological study? Are there absolute universals in phonology? Or only statistical likelihoods? What kinds of explanations should we adopt for these results - functional or formal accounts? The invited speakers and discussants in this session will address these and other related questions.

What can Typology offer to Phonology?

Mark Donohue (Language Intelligence)

Phonology has been described as an 'inherently typological' sub-discipline of linguistics (Hyman 2014). Despite that, it is much less commonly represented in work on linguistic typology than is work on morphosyntax. While there is much that phonology can offer typology in its many aspects, the opposite question – *What can Typology offer to Phonology?* – also deserves examination. If phonology is inherently typological, though, what does typology have to offer that phonology hasn't already provided to phonology in the first place?

Typology offers different analytical techniques in addition to those found in phonology; it also offers the chance to empirically test hypotheses against large amounts of data. This talk draws on the material in the World Phonotactics Database (Donohue et al. 2013) to examine some of the empirical benefits that typological databases can offer to phonological investigation, focussing on tone, phonation and syllable structure, and showing how 'universal' preferences in phonology are frequently realised in genealogical or areal clusters.

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Typological Analysis in Optimality Theory

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Theorists aiming at investigating linguistic typologies must, first and foremost, reach a thorough understanding of the predictions and the interpretations their theories have to offer with respect to typological systems.

In Optimality Theory, formal factorial typologies predict sets of abstract languages which can be compared to the typologies found in the world's languages. In this respect it is useful to keep in mind that the relationship between formal typologies and natural language typologies is bidirectional: natural language typologies display patterns which the formal typology ideally matches. Likewise, the (often very detailed) predictions of the formal typology can encourage research of so far neglected patterns in the typologies of natural languages.

The issue of matching is however only one of many interesting questions theoretical investigations can address. Of equal interest is the analysis of formal typologies themselves. With the adequate analytical and computational tools (in this talk: OT-Workplace, Prince, Tesar & Merchant 2007-2017) it is now possible to investigate the structure of complete, formal typological systems, to observe their variation, as assumptions about constraints and candidate sets change, and to determine the source of

variation, in terms of modifications in the ranking conditions defining the grammars of the languages of the system.

A higher level of understanding of typological systems is reached once the Typological Properties of formal typologies are extracted and analysed (Alber & Prince, in prep., see also Alber, DelBusso & Prince 2016, Bennett & DelBusso, to appear, Danis 2014, DelBusso 2015, McManus 2016, Merchant & Prince, to appear). We define Typological Properties (TypProps) as the ranking conditions necessary and sufficient to generate every language of a typological system. They thus form the inventory of ranking conditions which fully determine and classify a typology. Under our hypothesis, TypProps come with two values, one the logical opposite of the other. They are facts of the system as it has been defined, in terms of its constraints and candidate set. They can be uncovered upon examination of the system (we find them), but they are not something we impose on the system. Thus they are part of the predictions, not part of the assumptions of our theory.

Take as an example the formal typology of nGo, representing one possible typology of stress patterns (Alber & Prince, in prep.). The five constraints of this typology are Trochee, favoring trochaic feet, Iamb, favoring iambic feet, Parse-s, requiring syllables to be parsed into feet, and the alignment constraints AFL and AFR, requiring feet to be left or right aligned. The set of possible outputs of the system contains strings which do not parse any foot at all as well as strings where at least one foot is parsed. These assumptions about the constraint set and the candidate set define the typology completely and as a complete system its structure and defining features can now be studied in detail.

Analysis of nGo yields six defining Typological Properties. Among these we find obvious ones, such as FtType: Trochee < > Iamb, where the ranking Trochee > Iamb can be found in the grammar of all trochaic languages in the system, while the logically opposite Property value Iamb > Trochee is part of the grammar of the iambic languages in the typology. In the same typology, we find the less immediately obvious TypProp of Have-a-Foot: Trochee & Iamb < > Parse-s. Have-a-foot distinguishes between languages which do not parse any feet at all and languages parsing at least one foot. In the foot-free languages, both Trochee and Iamb dominate Parse-s (Trochee *and* Iamb > Parse-s), asserting that not parsing any foot is better than having even a single foot, since any foot, whether trochaic or iambic, will necessarily violate one of the two foot-type constraints. In the grammars of foot-full languages, the logically opposite value of the Property holds: Parse-s dominates one of the two foot-type constraints to guarantee that at least one foot can be parsed (Parse-s > Trochee *or* Iamb).

(1) Examples of Typological Properties in the stress typology nGo

Property	**Definition**	**Values**	**Trait**
FtType	Trochee < > Iamb	trochaic: Trochee > Iamb iambic: Iamb > Trochee	distinguishes trochaic from iambic lgs.
Have-a-foot	Tr & Ia < > Parse-s	no feet: Tr and Ia > Parse-s at least one foot : Parse-s > Tr or Ia	distinguishes lgs. with no feet from lgs. with at least one foot

The full set of TypProps of nGo, containing 4 more Properties, (referring e.g. to edge orientation of feet) defines every single grammar of the system, through combination of the various property values. TypProps thus are not random observations about certain features of a typology, but define the whole of it.

Typological Properties reveal a classification of a typological system which *explains* how its natural classes come about (e.g.: languages without feet are the victims of the ranking Trochee and Iamb > Parse-s, which is part of their grammar), allowing thus for a non-arbitrary classification of the typology, far from the classification that can be obtained by observing output forms alone. Once we have uncovered the Properties of a typological system we can therefore claim to have truly *understood* the typology.

Analysis in terms of Typological Properties thus allows us (1) to see how explanation unfolds and what the substantive factors are that explain our observations, (2) to advance, now fully informed, to further levels of explanatory hypotheses.

In this talk, the explanatory power of typological analysis in terms of Typological Properties will be illustrated by discussing some stress pattern typologies (joint work with Alan Prince, Alber & Prince, in prep.) and a typology of word truncation (joint work with Sabine Arndt-Lappe, based on Alber & Arndt-Lappe 2012). Both types of typologies have been studied in detail by linguists and the distribution of their patterns among natural languages are generally well understood. Their respective formal typologies furthermore display many relevant features and intricacies which are of interest to Property Analysis.

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ROA = Rutgers Optimality Archive: roa.rutgers.edu