The Twenty-Seventh 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-seventh Manchester Phonology Meeting**, held at Hulme Hall, Manchester, in May 2019.

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

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

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

Are phonotactically unusual words 'exceptions'?

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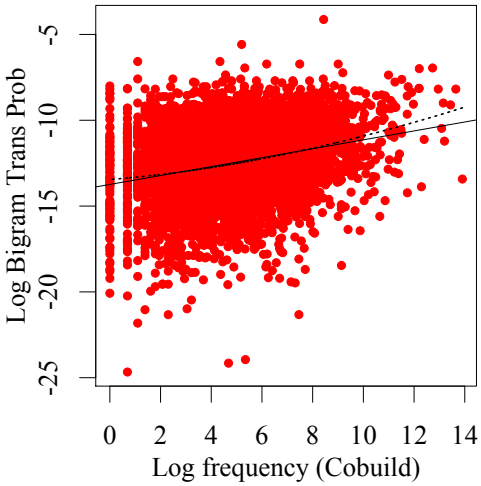
A growing body of work has advanced the hypothesis that grammatical restrictions may be gradient. In the domain of static phonotactic restrictions, this includes OCP place in Arabic (Frisch, Pierrehumbert and Broe 2004), transparent vowels in Hungarian (Hayes and Londe 2006), sonority sequencing in English (Daland et al. 2011), and numerous others. Support generally comes from probabilistic generalization: speakers are more likely accept or produce novel items that conform. Less attention has been paid to the status of existing words that fail to conform. Under the gradient grammatical analysis, these are *exceptions*. Implementations vary considerably, but most approaches to exceptions rely on listing morpheme-specific information, which blocks or exempts them from the regular grammar. The consequences of the distinction between morpheme-specific listedness vs. default status have been explored extensively for morphology, and somewhat for morphophonological regularity, but very little for phonotactic regularity. One robust finding is that irregular forms rely on high token frequency to resist regularization. Thus, a basic question is: are low frequency forms more phonotactically regular?

To answer this question, I investigated the relation between phonotactic regularity and token frequency in the English lexicon. The first set of tests examined overall phonotactic probability: do improbable words require high frequency? Three metrics were calculated: transitional bigram probability, natural class-based bigram probability (Albright 2009), and maxent harmony using the UCLA Phonotactic Learner (Hayes and Wilson 2008). All three metrics were calculated using CELEX lemmas as training data. Since phonotactic probability correlates with word length (transitional probability decreases, opportunity for constraint violations increases), and frequent words tend to be shorter, the test was confined to monosyllabic lemmas. Similar results obtained for all three models, illustrated here for bigram transitional probability: phonotactic probability shows an essentially linear positive correlation with frequency ($p<.0001$). That is, low frequency words are phonotactically less regular, contrary to predictions.



This result accords with the claim that high frequency words reduce over time (Pierrehumbert 2001; etc.), yielding a specific type of regularization. To test the irregularity hypothesis more generally, I examined the distribution of exceptions to a set of markedness constraints, including coda conditions and general inventory constraints against voiced obstruents, fricatives, and clusters. Phonotactic regularity was assessed in two ways. The first was adherence to general markedness asymmetries (*Voiced Coda). Second, the Minimal Generalization Learner (Albright and Hayes 2001) was trained to predict features of interest, and then 'wug tested' on existing words, to identify words for which the grammar preferred the incorrect output. As above, the relation between frequency and probability of irregularity was examined. The results are mixed. In coda position, many features do show a tendency towards greater regularity at lower frequencies; however, in initial position, the opposite holds. Thus, the results again run counter to the prediction that low frequency words should be systematically more regular.

What do these results mean for the hypothesis that grammar contains gradient preferences, with many exceptions? One possibility is that overregularization is weaker for phonotactics than for morphological inflection, especially in languages with standard orthographies. I also consider the possibility that phonotactic irregulars do not rely on blocking in the morphological sense, but rather are 'phonological idioms', evaluated non-compositionally (Futrell et al. 2017).

Labiodentalization in Faifi Arabic

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Honeybone (2016) argues that a change from an interdental to a labiodental is reasonably well attested as a regular endogenous (internally-motivated) sound change but the opposite change of a labiodental to an interdental is not. As Honeybone reports, the sound change of interdentals to labiodentals has been attested in some Arabic dialects such as an unconditioned change in southern Anatolian Siirt Arabic where all interdentals become labiodentals. Besides the cases in Honeybone (2016), Alfaifi & Behnstedt (2010:56) mention that in a Faifi Arabic variety spoken in southwest Saudi Arabia the interdental emphatic (pharyngealized) /ðˤ/ can be realized as [f], while /θ/ and /ð/ remain unchanged. But, Alfaifi & Behnstedt do not provide details nor offer an explanation for labiodentalization. To be clear, Faifi Arabic (henceforth, FA) and its subvarieties are understudied with the Alfaifi & Behnstedt's (2010) article *First Notes on the Dialect of Gabal Fayfa'* probably being the only publication on the dialect. In this paper we provide data that documents labiodentalization in a different subvariety of FA and posit a reason for its occurrence.

FA has 3 phonemic emphatic consonants: /tˤ/, /sˤ/, /ðˤ/. The emphatic stop /tˤ/ is realized very similarly to what is found in other dialects. The realization of /sˤ/ and /ðˤ/, however, are unique and include apparent allophonic pronunciation of [st] for /sˤ/ (not discussed here) and [θ] and [f] for /ðˤ/. The realizations of [θ] and [f] from underlying emphatics will be the focus of this paper. Our data are based on the intuitions of one of the co-authors in consultation with other native speakers of the FA dialect. The FA emphatic /ðˤ/ is often realized as [ðˤ], but when it is the first consonant of a root it can be realized as voiceless (nonpharyngealized) [θ]. The voiceless interdental realization only occurs with FA words where /ðˤ/ is cognate with Classical Arabic (CA) /ðˤ/. The general observation is that non-emphatic voiceless [θ] is the realization of /ðˤ/ when the nucleus of the syllable (or following syllable) is [i]: /ðˤifr-in/ → [θif.rin] *'a fingernail',* /m-ðˤahir/ → [mθa.hir] *'the back'*. If the vowels of the first two syllables are both low, the root-initial emphatic still devoices but does not depharyngealize (eg, /ʔaðˤfaar-in/ → [ʔaθˤ.faa.rin] *'fingernails'*, /ðˤamaaj-in/ → [θˤa.maa.jin] *'thirst'*). When /ðˤ/ is not the first root-consonant it is resistant to this alternation, as in /maħfaðˤ-ah/ → [maħ.fa.ðˤah] ⇏*[maħ.fa.θˤah] *'a wallet'*. Instances of FA root-initial /ðˤ/ that are cognate with CA /dˤ/ are almost always obligatorily realized as depharyngealized [f], exactly like the realization of the labiodental phoneme /f/. Labiodentalization can be observed in words like /ðˤabʕ-in/ → [fab.ʕin] *'a hyena'* and /m-aðˤlaaʕ/ → [maf.laaʕ] *'the ribs'*. In cases when the FA /ðˤ/ that is cognate with CA /dˤ/ is not root-initial, it is always realized as [ðˤ], exemplified by /gaaðˤ-in/ → [gaa.ðˤin] ⇏ *[gaa.fin] *'a judge'*. Thus, while the distinction between historical /ðˤ/ and /dˤ/ have neutralized to [ðˤ] in FA in non root-initial position, the distinction is maintained in root-initial position where words with historical /ðˤ/ can have a devoiced interdental as a reflex (but not [f]), while words with historical /dˤ/ can have [f] as a reflex (but not a devoiced interdental). One interesting question concerns the source of FA labiodentalization where [f] is the reflex of historic *dˤ, a sound that otherwise has the reflex [ðˤ] in FA. Watson & Al Azraqi (2011) note that in areas adjacent to where FA is spoken, the pronunciation of historic /dˤ/ is an emphatic lateral fricative [ɮˤ]. Given that /ðˤ/ undergoes devoicing (and depharyngealization) in FA when in root-initial position, we posit that in older FA, historic /dˤ/ was pronounced as [ɮˤ] and underwent devoicing transforming it into a voiceless lateral fricative. Because of the perceptual similarity between a voiceless lateral fricative and labiodental [f], we posit that listeners heard it as the FA phoneme [f]. We conclude by maintaining that the path to labiodentalization in FA does not go directly through an interdental stage as in other Arabic varieties but through the misperception of a voiceless lateral fricative as labiodental [f], thus providing a new source for labiodentalization.

The representation of ternary stress pattern in Italo-Romance languages

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Ternary stress pattern of Standard Italian and Italian dialects (henceforth Italian) is a well-known problem for classical metrical theory, which, given its definition of bounded feet, must cope to account for ternarity by means of a maximally binary constituent. The problem seems to be circumvented in more recent theories of stress and specifically in Lateral Phonology, which dispenses with the foot altogether and represents stress solely by means of the information contained at the CV level (cf. Szigetvári & Scheer 2005, Ségéral & Scheer 2008).

Although alternative descriptions exist, we maintain that in Italian the position of stress within the word is lexically established, i.e. is not determined by a metrical algorithm and must be acquired, as pairs like *príncipi / princípi, pórto / portó* clearly show. The same holds for the alleged quantity-sensitivity: to be sure, proparoxytones have almost without exception a light penult but this distribution can be directly connected to the stress rule holding in Latin, language from which the Italian lexicon predominantly derives. Interestingly, this restriction in commonly violated in the pronunciation of some new lexical entries such as recent loanwords, e.g. *Contínental* (brand name, from English). While penultimate stress is the most frequent pattern, most Italo-Romance varieties also have words with stress on the last and on the third last syllable. Binary and ternary groups may also result from secondary stress, which, if present, stays on one of the syllables preceding main stress, e.g. *vòlontári, vòlenteróso.*

The classical approach to ternary stress depends on the assumption that bounded feet are only binary. Consequently, antepenultimate stress is dealt with as a special instance of binary foot construction, with some exceptional (and often *ad hoc*) resort to representational devices, such as extrametricality or *Weak local parsing* (Hayes 1995; see Rice 2011 for an insightful discussion of this issue).

In this paper we will defend a different view, in which stress pertains to speech rhythm and belongs to a specific computational system that language shares with music (see among other Jackendoff & Lerdhal 1983, 2006). Thus, while stress reflects syllable structure at least to a certain extent, it consists in parsing into groups and assigning prominence, i.e. in building constituents and constructing hierarchical structures. Since in music units are organized into pairs and triplets, we can maintain the same for language, in which the only evident restriction is against groups of four. Accordingly, we derive the first conclusion that the restriction against ternary feet should be abandoned.

Beside stress position, Italian offers indirect evidence for ternary foot, provided by the segmental level, i.e. the shortness of the tonic vowel belonging to a trisyllabic stress group, compared to the same vowel contained in a disyllabic group. While in Standard Italian shortness can only be proved through the measurement of phonetic duration, with the limitations inherent in this procedure, many dialects provide evidence for shortness that is categorical and phonological in nature. Differing from Standard Italian, those varieties have a specialised set of vowels for short nuclei, e.g. Andria (Apulia) [ˈrɔjtə] / [ˈrɪdenə] 'I laugh / they laugh' (cf. Savoia 2015). Notice that in the standard binarist representation, e.g. [ˈrɔjtə]$_F$ / [ˈrɪde]$_F$<nə>, in which the trisyllabic domain is analysed as a binary foot followed by a non-metrified syllable, the alternation remains unexplained. These data are highly significant for our proposal, since they show that the alternation site can only be defined by referring to the dimension of the stress domain; in other terms, they show that a segmental property is strictly connected with a property of the foot. This allows us to draw a second conclusion, that the foot is an essential entity of phonological (not just rhythmic) representation. In this respect, we also depart from Lateral Phonology approach to stress, since we maintain that the foot, as an outcome of stress assignment, should be considered a fully-fledged phonological category.

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A representational alternative for lexically-specific phonology

Purpose. A number of approaches to lexically-specific phonology are currently entertained (rules cum diacritics, indexed constraints, co-phonologies). All share the idea that lexical entries are divided into groups to which computational instructions then make selective reference. Hence instruction X only applies to lexical items of group A, instruction Y to items of group B and so on. These approaches thus apply distinct computational systems to distinct sets of lexical items. In this talk we present a representational alternative where lexically- specific behaviour involves a contrast in actual lexical entries, rather than their division into groups. Based on data from external sandhi in Kabyle Berber, we show how lexically-specific phonology can be achieved with a single computational system and a lexicon that is not split into groups. We contend that a conceptual advantage of this solution is the absence of diacritics. In the computational perspective, computational instructions make reference to specific sets of lexical items: A, B, C etc. Nothing of that kind occurs in the representational alternative where only regular vocabulary insertion followed by lexically unspecific computation produces the effect.

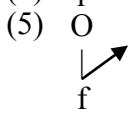
Data. In Kabyle Berber, the prepositions g "in" and f "on" show lexically idiosyncratic behaviour when followed by V-initial words. Before C-initial words, neither geminates, as shown under (1) "when she sits on the little chair" and (2) "when she sits in the room". However, when a vowel follows, f geminates ((3) "in which house will they wait for her?") but g does not ((4) "on which chair was she sitting?"). Since syntactic and phonological contexts are identical (under (1) and (2) as well as under (3) and (4)), the effect observed must stem from an idiosyncratic difference of the two prepositions.

Their contrasting behaviour may also be seen when g and f precede a w-initial word (in the syntactic position called construct state): the w- geminates on the syllabic position of the g which thus remains unexpressed (g + wasif → wwasif "in the river"), while on the contrary f geminates on the position of the initial w- (f + wasif → ffasif "on the river"). This suggests that f bears a lexical specification for gemination.

Analysis. An analysis whereby f is a lexical geminate but g is not and /ff/ degeminates before consonants is not viable since the language resolves the contact of geminates with further consonants by schwa epenthesis after the geminate: siff "sand" + rməl “to sift” → siff ərməl. In our case, though, f+C does not produce schwa epenthesis and f is not geminated. We thus translate the observation that f, but not g, bears a lexical instruction for gemination into the lexical representations under (5). Specific assumptions regarding syllable structure are not relevant for our purpose: "O" indicates an onset and the right-branching arrow that f bears but g lacks means that f comes with an extra association line that has no syllabic constituent proper but will dock onto an empty onset in case there is one to its right (when followed by a V-initial word). It will remain in its lexical state, i.e. ungeminated, before C-initial words that do not offer an empty onset.

(1)	melmi	θ-qqim	f	θkursiθ		
	when	sit 3fs	on	little chair		
(2)	melmi	θ-qqim	g	θəxxamθ		
	when	sit 3fs	in	room		
(3)	anwa	akərsi	ff	i-	θ-qqim	
	which.FS	chair FS	on	Comp	sit 3fs	
(4)	anwa	axxam	g	i	ʦ-	ruʒa-n

(5)



Prospect. Beyond being representational, based on uniform computation and a single lexicon, our analysis focuses on an understudied and underexploited ingredient of autosegmental representations: the association line. We believe that association should be considered a genuine player in the lexical and computational segments of grammar, rather than being thought of as automatic (a floater associates whenever there is an appropriate constituent). We do not contend that all cases of lexically-specific phonology have a representational solution, but the existence of a representational alternative may lead to reconsider a number of cases discussed in the literature.

Italian *Raddoppiamento Sintattico* without moras

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Introduction. So-called *Raddoppiamento Sintattico* in Italian – the gemination of a word-initial consonant caused by a preceding oxytone or by a closed class of non-oxytonic words – has received a significant amount of attention in the past few decades. In order to explain RS, prosodic requirements have often been invoked; typically, it has been interpreted as resulting from the need to make final CV syllables of oxytones bimoraic, and thus prosodically heavy (a.o. Vogel 1978, Chierchia 1986, Basbøll 1989, Sluyters 1990, Repetti 1991, Borrelli 2002), or to form a (not necessarily stressed) bimoraic foot (Kramer 2009).

Hypothesis. My goal is to argue that prosodic explanations of RS encounter problems, whereas the hypothesis of a final empty consonant in all the final syllables of oxytones and in some final unstressed syllables would better account for the whole range of data. I will discuss four cases that are troublesome if gemination is due to a prosodic requirement, but that can be straightforwarly explained assuming the presence of a final empty consonant to which the phonological features of a following consonant spread (some of the previously mentioned analyses also assume an empty final position, but usually as a consequence of the supposed necessity of a bimoraic syllable).

Data. *1) Deletion*. In Italian a final vowel or a whole syllable may be deleted under certain morpho-phonological conditions. For instance, *po'* is a shortened variant of *poco* [ˈpɔːko] 'a little', *va'* of *vai* [ˈvai] 'go-IMP', *du*' of *due* [ˈduːe] 'two' (in Florentine Italian), and so on. Unexpectedly if final stressed vowels have to be heavy, these shortened forms do not cause RS (see e.g. Absalom et al. 2002): /ˈdue gatˈtini/ → [ˈdugatˈtiːni] 'two kittens', /ˈvai lonˈtano/ → [ˈvalonˈtaːno] 'go far from here'. 2*) RS after unstressed final syllables*. As mentioned above, RS is also attested after some non-oxytonic words (some clitics and some paroxytones, such as *a* 'to' and *dove* 'where' respectively). If RS occurs to make stressed CV syllables bimoraic, gemination is unexpected after an unstressed (and in the case of *dove* also extrametrical, under some accounts) syllable. *3) Stress clash*. In Italian, stress clash is resolved retracting the first of two clashing stresses. Interestingly, a word-final vowel which has lost stress due to a clash can still trigger RS: /kafˈfɛ ˈlungo/ → [ˌkaffelˈluŋgo] 'diluted coffee' (Saltarelli 2004, with respect to the Italian of Rome). *4) Intervocalic voicing in Corsican*. Corsican has RS similar to standard Italian. However, in the northern Corsican dialect of Sisco (Chiodi-Tischer 1981) gemination across word boundaries is no longer attested (although Sischese has retained word-internal geminates). This would imply the disappearance of RS from this dialect, were it motivated by a requirement for heavy syllables. On the contrary, RS has not completely ceased to work in Sischese, as its interaction with intervocalic voicing shows. In this dialect intervocalic /k t p/ become voiced, both word-internally and across word boundaries (e.g. [ˈkaza] 'house' but [a ˈgaza] 'the house'). In RS environments, however, intervocalic voicing is blocked: [ˈtre ˈkaze] 'three houses', despite the seemingly intervocalic context.

Analysis. The phenomena discussed above are to a greater or lesser extent at odds with the hypothesis of a prosodic requirement that supposedly causes the gemination of word-initial consonants to create an additional mora in the preceding syllable. On the contrary, the hypothesis of a phonetically empty final consonant in the lexical representation of oxytones and of some other words would account for all the cases examined. Absence of RS in shortened forms would be predicted, as their full forms would not include any empty consonant; presence of RS in syllables undergoing stress shift would be expected too, as stress retraction would not alter their final empty consonant; non-oxytonic words triggering RS would simply require the same final empty consonant as in oxytones. Finally, if the underlying representation of words like [ˈtre] is /ˈtreC/, their blocking of intervocalic lenition in Sischese would be an automatic consequence; according to this hypothesis, the environment would actually not be intervocalic (/ˈtreC ˈkaze/).

(Re-)Interpreting Place Features in Feature Geometry

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At least two kinds of evidence are evoked in support of representations in phonology – those based on phonological function and phonetic grounding. In this paper, we discuss the representation of Place features in Feature Geometry (FG) in the light of new insights from research on articulation and anatomy. (**1)** Clements-Hume (1995) FG postulated a two-layer structure with C-Place and V-Place to account for long-distance interactions – such as vowel harmony, where vowels act 'over-the-heads' of the consonants, thus violating strict locality requirements. Notably, a flat Place structure as in the Halle (1995) approach, has no solution to long-distance interactions. While accounting for the phenomenon of vowel harmony, like many purely theoretical devices, the two-layer structure did not **explain** the process, and did not address the question why it is seemingly a characteristic of vowels only, and leaving consonant harmonies unaccounted for. **(2)** While the two-layer Place accounts for vowel harmonies, it creates a theoretical problem that does not exist in the single layer FG: since place features of vowels and consonants are located on different tiers, they should not interact. However, they do, with different palatalization processes being perhaps the most discussed type of counter-evidence. To resolve the problem, the mechanism of feature promotion has been proposed (Hume 1992), which seems, though, to invite potentially unlimited re-association of features across tiers. **(3)** In this paper, we propose that the distinction between C-Place and V-Place is a reflection of an anatomic distinction between the muscle groups that execute features aligned under each node, rather than a distinction between consonantal and vocalic features. In particular, the V-Place features are executed by the 'slow-twitch' muscles of which the back of the tongue and the tongue root are composed, and which produce slow, sustained movements. On the other hand, features under C-Place are executed by 'fast-twitch' muscles, that are predominant in the front of the tongue and execute rapid movements (Saigusa et al 2001, Stål et al 2003, Sanders et al 2013, Zaidi et al 2013). Thus, muscles at the back of the tongue have a natural tendency to produce gestures which – once initiated – take a long time to be executed and may produce the effect of long-distance segmental harmony. Slow-twitch muscles fibers can, in principle, also execute features that are distinctive in consonants, and the prediction is that the majority of consonantal place harmonies can be interpreted in terms of tongue dorsum and tongue root features, at least historically. For example, ultrasound cross-linguistic study on palatalization suggests that the mechanisms underlying the distinction between anterior and posterior sibilants may be – at least historically – accounted for in terms of tongue root features rather than tongue Coronal features (Cavar & Lulich 2018). **(4)** As to the consonant-vowel interaction in palatalization, we have observed a strong correlation between the collateral configuration of the front of the tongue and the gesture originally initiated by the tongue root. The collateral gesture produces a strong acoustic pattern and might be re-interpreted to be the sole carrier of the phonological distinction. This approach implies that the palatalization feature under C-Place and the palatalization feature under V-Place are indeed distinct, and that the change of the main place of articulation in the consonant results from the reinterpretation of the contrast rather than feature promotion.

Inside-out dominance patterns in grammatical tone

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Background: Many African tone languages have grammatical tone (GT): construction-specific tonological operations, including both the assignment of a construction-specific tone melody and the construction-specific application of tonal processes, like assimilation or dissimilation. These properties of GT systems are illustrated by comparing verb forms in the Present Habitual (PH) and Past Habitual (PstH) paradigms of Chichewa (Bantu N.31; Downing & Mtenje 2017; Hyman & Mtenje 1999; Kanerva 1990; Myers & Carleton 1996):

(1a) PH: *á-ma-fotokóoz*a 'they explain' (1b) PstH: *a-ma-fótókooza* 'they used to e…'
á-ma-tambaláala 'they stretch legs' *a-ma-támbálaálá* 'they used to s…'

While these two paradigms are segmentally identical, they have different tone patterns. (1) also illustrates that the normally very general process of tone assimilation (tone doubling) is construction-specific. Tone doubling does not target the PH morpheme *-ma-* in (1a), but applies normally to target the second stem syllable of *-fotokooza* and *-tambalala* in (1b). Finally, note that PH introduces a dominant GT pattern that neutralizes and replaces the root tone contrast that is realized on the final two moras of the two PstH stems in (1b).

The problem: As previous work on GT has shown, it is common for a construction to contain more than one GT-conditioning morpheme. The question then arises, as Hyman (2016) puts it, if grammatical tone patterns are in conflict, "who wins?" Work like Hyman (2016), Inkelas (1998, 2018), McPherson & Heath (2016), and Rolle (2018) has taken the strong position that tonal dominance is defined by the morphosyntactic hierarchy: grammatical tones target the base they take morphosyntactic scope over, and the hierarchically outermost/ uppermost tonally dominant morpheme "wins." GT patterns in Chichewa verb paradigms are, however, problematic for the outermost dominance principle. An innermost dominant morpheme can have an effect on the overall tone pattern, (partially) overriding the predicted effect of an outer dominant morpheme. Further, often a single morpheme does not alone determine the tone pattern in a particular verb paradigm, raising what Rolle (2018, inspired by Trommer 2011) calls "the origin problem."

Data: These points can be briefly illustrated with additional data from the PH verb paradigm. The data in (1a) suggests that the PH GT pattern is dominant, as the contrast between High-toned roots and toneless roots is neutralized. Unexpectedly, given the outermost dominance principle, the root tone contrast reappears in the negative PH, segmentally defined by the negative prefix *sí-*: *sí-ndí-má-fotokooza* 'I don't explain, toneless' vs. *sí-ndí-má-tambaláala* 'I don't stretch legs, High'. Notice, too, in these negative forms that *-ma-* is a target of tone doubling, unlike in (1a). The intensive derivational suffix, *-Its-*, can also affect the verb tone pattern. In the negative PH intensive, the intensive is dominant, neutralizing the root tone contrast: *sí-ndí-má-fotokoz-eéts-á* 'I don't explain a lot' vs. *sí-ndí-má-tambalal-iíts-á* 'I don't stretch legs a lot'. These forms clearly illustrate inside-out GT dominance. The intensive conditions a dominant, neutralizing tone pattern on the stem that is different from the potentially dominant tone pattern induced by the outer PH prefix. The intensive is not always indomitable, however. In the affirmative PH, intensive verbs have the same GT pattern as the non-intensive ones in (1a): *á-ma-fotokoz-éets-a* 'they explain a lot'; *á-ma-tambalal-íits-a* 'they stretch legs a lot'. In the negative PH, in contrast, the intensive combines with the negative and PH morphemes to condition the surface tone pattern.

An analysis: Chichewa GT patterns thus provide a challenge to what Spencer (2004) calls a "Radical Agglutination" approach to morphological exponence. I will argue that paradigm-based, realizational models like that of Spencer (2004) and Stump (2016) best account for the Chichewa data, as they allow for a combination of morphological features to define a verb paradigm as a non-hierarchical property set associated with a construction-specific tonological grammar.

Measuring Emphasis Spread in Palestinian Arabic

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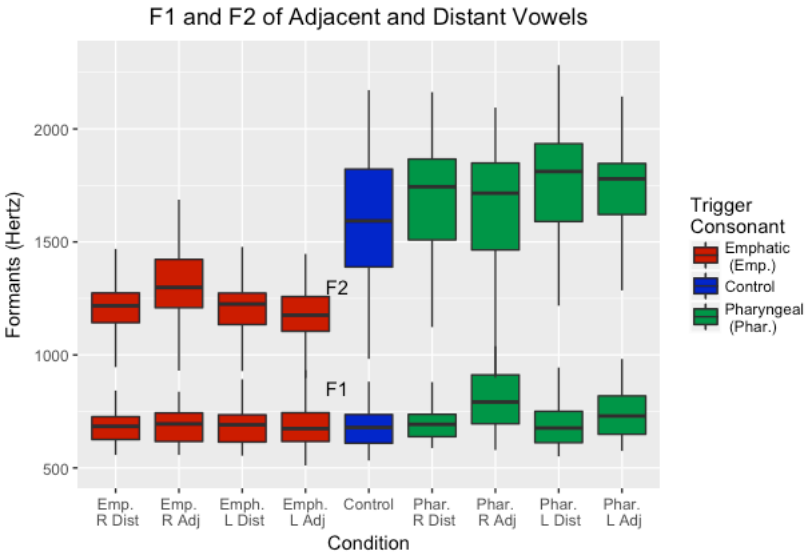
Arabic is known for the phonological process of *emphasis spread*, where emphatic consonants affect adjacent and non-adjacent vowels within the same word (Watson, 2007). Emphatic coronal obstruents, with a debated uvular or pharyngeal secondary articulation (Davis 1995; Jongman et al, 2011), contrast with plain coronal obstruents and lower F2 in adjacent vowels (Card, 1983; Jongman et al, 2011). The primary pharyngeal consonants may also cause emphasis spread (Watson, 2007), though these consonants often raise F1, not F2 (Hassan and Esling, 2011). The acoustic effects on non-adjacent vowels have not been examined in detail. This project explores the effects of emphatic and pharyngeal consonants on adjacent and non-adjacent vowels. If pharyngeal and emphatic consonants have similar effects on adjacent and non-adjacent vowels, then both cause emphasis spread and emphatics are likely pharyngealized. This experiment will also analyze the directionality of emphasis spread, to distinguish competing claims about whether it is restricted to the left or right (Davis, 1995; McCarthy, 1986).

Eight native speakers of Palestinian Arabic repeated 19 meaningful words eight times in a carrier sentence. There were five conditions based on the position of the long vowel relative to the trigger consonant (C): control (no emphatic or pharyngeal), right adjacent (cvCv:c), left adjacent (cv:Cvc), right distant (Cvcv:c), and left distant (cv:cvC). In Part A the trigger consonant was emphatic /tˤ sˤ dˤ zˤ/ and in Part B the trigger was pharyngeal /ħ ʕ/. F1 and F2 were measured at the midpoint of the long vowel. F1 and F2 in Part A and B were analyzed separately using a mixed effects model (Bates et al, 2015).



F2 was lower in all emphatic conditions than in the control, but there were no effects of emphatic position and F1 was not affected. F1 was higher than the control in vowels left and right adjacent pharyngeals, but distant pharyngeals did not affect F1. F2 was not affected in any pharyngeal condition.

Emphatic consonants had a similar effect of F2 lowering on adjacent and non-adjacent vowels, suggesting that F2 lowering is the acoustic manifestation of emphasis spread. There was no observed difference in leftward or rightward spread, though restrictions on emphasis spread may be contingent on the segments between the trigger and vowel (Davis, 1995). Vowels adjacent to pharyngeal consonants had a higher F1, not a lower F2. The effect of pharyngeals appears to be a phonetic process that decreases over time (Bessell, 1998) and is distinct from phonological emphasis spread. This claim is further supported by the observation that emphatics affected F2 while pharyngeals affected F1, which further suggests that emphatics in this dialect are not pharyngealized. This study contributes empirical evidence to the understanding of emphasis spread in Palestinian Arabic that can be used to further explore emphasis spread, such as the role of blocking segments, word and morpheme boundaries, and how spread affects perception of emphatics.

Temporarily Laryngeal Sonorants in Korean

Daniel Gleim & Hyunjung Lee, University of Leipzig

Nutshell We present novel data from Korean that show an underlying sub-phonemic laryngeal contrast in V(owel)/S(onorant)-final roots of verbs. This contrast is stable in its presence, but is volatile in its concrete realization. We argue that these particular roots contain a floating laryngeal feature in their underlying representation. We will provide an analysis in Stratal OT (Kiparsky 2000) which derives the opaque interaction with phonological processes in a straightforward fashion as a bleeding Duke-of-York gambit. **Puzzles** Korean has a three-way distinction in terms of laryngeal contrast. V and S on the other hand do not show laryngeal contrast on the surface level.

	Root	(A) /-ta/ DECL	(B) /-a/ə/ INFL	(C) {-n, ɨn} PERF	(D) /-ni/ Q	meaning
(a)	/na/	[na.**t**a]	[na]	[nan]	[na.ni]	'occur'
(b)	/na/	[na.**t'**a]	[na.**a**], *[na]	[na.**ɨn**], *[nan]	[nan.**n**i], *[na.ni]	'get.better'
(c)	/na/	[na.**t^h**a]	[na.**a**], *[na]	[na.**ɨn**], *[nan]	[nan.**n**i], *[na.ni]	'give.birth'

The laryngeal property of the V/V is, however, visible as laryngealisation only if followed by plain stop-inifial affixes (A). Otherwise the opposition between laryngeal and non-laryngeal V/Ss is preserved by blocking of phonological processes or by triggering unexpected allomorph selection. For example, (optional) coalescence/gliding between the root vowel and suffix -a/-ə is blocked (B). In addition, some (mostly S-initial) suffixes have allomorphy e.g., {n,ɨn} 'PERF'. One is used after vowels and /l/, but aspirating and glottalising roots are unexpectedly selected by the elsewhere allomorph - (C). At last, S-initial suffixes induce gemination on themselves, if they attach to a V/V roots - (D). The S-final roots exhibit the same pattern as the V-final roots. **Analysis** We propose that the laryngeal contrasts of verb-final S/V are encoded as a floating feature (Akinlabi 1996): (+F). We derive the opacity with a bleeding Duke-of-York gambit (Bermúdez-Otero 2001). The floating feature docks to any affixes, even to S/V-initial suffixes, which blocks certain processes (e.g. gliding, coalescence). Later, obstruent-initial suffixes can maintain their laryngeal specification, whereas a S/V loses it and reverts to the initial state. At the stem level, the optimal candidate O^2 violates a lower ranked constraint *V_h, which penalises aspirated vowels. The faithful candidate O^1 fails to dock the floating feature (+sg), and O^4 inserts the root node, which violates DEP •. The floating feature (+sg) blocks the gliding for two reasons: (i) if (+sg) docks only to the vowel, it violates the constraint *ν([+sg][-sg]), which penalises the diphthongs with opposing laryngeal specification - O^6 (ii) if it associates to the entire diphthong, associating to the glide with the same morphological color as the feature violates ALTER (van Oostendorp 2007) - O^5. At the word level, *V^h is ranked higher, so that the vowels neutralise their laryngeal contrasts. Here, the gliding is blocked because FAITH(σ) outranks *V.V. **Any simpler?** To assume that laryngeal contrast is encoded as full underlying segments (e.g., /coh/ instead of /co[+sg]/) avoids Duke-of-York opacity by reducing the pattern into a counter-feeding opacity. However, it is not a viable analysis for the data, as intervocalic /h/ is not deleted (/co-a-ha-ta/ → [co.**a**.ha.ta], *[ha.ha.], *[a.a.] 'like.TR').

T_1. Stem-level

I: na (+sg) – a	MAXF	*FLOAT	DEP •	ALTER	*ν([+sg][-sg])	*V.V	*V^h
O^1: na(+sg)a		*!				*	
☞ O^2: na.a^h						*	*
O^3: nwa	*!						*
O^4: na.ha			*!				
O^5: nw^ha^h				*!			**
O^6: nwa^h					*!		*

T_2. Word-level

I: na.a^h	*V^h	FAITH(σ)	*V.V
O^1: na.a^h	*!		
☞ O^2: na.a			*
O^3: nwa		*!	

Yokuts lexically-specific phonology in Direct OT

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Some morphemes violate grammatical norms that other morphemes in the same language respect. Modeling exceptions like this often involves grammatical mechanisms that encode the exceptionality in a manner unlike that of normative morphemes. Direct OT (henceforth DOT; Golston 1996; Klein 2000, 2003; Archangeli 2003; Golston & Thurgood 2003; Riad 2017) models exceptional and regular morphemes alike as *grammatical desiderata*, distinctive violations of constraints.

A simple case involves English, which has no underlying nasalized vowels or [ʔ], but has the interjections [ˈʔʌʔo] 'uh-oh', [ˈʔɐ̃ʔɐ̃] 'unh-unh (negative)', [ʔɐ̃ˈhɐ̃] 'uh-huh (affirmative)' and [hɐ̃] 'huh (confused)', which do. Rather than model these with a different phonological system, DOT models them with desiderata against the very constraints that keep [ʔ] and [ɐ̃] out of English generally. Just as *eat* violates ONSET and *CODA, while *tea* violates neither, [ʔɐ̃ʔɐ̃] violates *ʔ and *NASALVOWEL. DOT models exceptional and normative cases in the same way.

The templatic morphology of Yokuts (Newman 1944 *et alii multi*) poses a challenge to the nowadays established view that prosodic morphology shows TETU effects (The emergence of the unmarked; McCarthy & Prince 1994). Yokuts templates are imposed by certain suffixes on the roots to which they attach. For example, agentive *–Gič'* requires that its stem contain a short vowel and a long vowel (G = V̆V̄). This looks like an iambic requirement at the left word edge, which is at odds with Yokuts' otherwise trochaic right-aligned foot structure:

root-	*agentive*		
las–	(laˈsaa)–č'–i	'chop–AGENT–ACC'	cf. (ˈlas-it) 'chopped'
homn–	(hoˈmoo)n–ič'	'greet–AGENT'	cf. (ˈhom)n-it 'greeted'
bewn–	(beˈwee)n–ič'	'sew–AGENT'	cf. (ˈbew)n-it 'sewed'

*templatic desiderata of –č': violate TROCHEE (*X]), violate DEPμ (No μ-insertion) twice.*

Monosyllabic roots surface as disyllabic with their underlying vowels copied and lengthened to give surface V̆V̄ (a.aa, o.oo, e.ee). Present *-Baʔa* requires two short vowels in the stem (B = V̆V̆), the second of which must be [a] (or [o] through rounding harmony):

hatm–	ha(ˈtam)–ʔa–n'	'sing–PRES–FACTIVE'	cf. (ˈhat)m-it 'sang'
noogm–	no(ˈgom)–ʔa–n'	'believe–PRES–FACT'	cf. (ˈnoo)(ˈgum)–taʔ 'believed'
hiš–	hiš(ˈa–ʔa–n')	'hide–PRES–FACTIVE'	cf. (ˈhiš-it) 'hides'

templatic desiderata of –ʔa: violate DEPμ and DEPLO (No [lo] insertion).

Newman calls this an A-induced suffix (as it induces [a]); Yokuts has E-, I-, and glottal-induced suffixes as well (that add [e, i, ʔ]), violating DEPMID, DEPHI, DEPCG, respectively). Finally, *–lsaa* CAUSATIVE-REPETITIVE requires an E-induced V̆V̄ foot whose second syllable 'violates the rule of vowel shortening' found throughout Yokuts; this process shortens vowels in closed syllables, but 'the *oo* or *ee* vowel of the final stem syllable is not shortened, although that syllable is closed' by a consonant (Newman 1944:52):

ʔu(ṭoo–l).(ˈs–uh).nu–ʔ 'one who makes people play music repeatedly'
play.music–CAUS.REP–AGENT–NOM

*templatic desiderata of –l.saa: violate *SUPERHEAVY (No μμμ syllables).*

Desiderata are additive: some morphemes violate just one (–ʔ NOM violates only DEPCG), most violate a suite of constraints (templatic PRES –ʔa violates DEPCG and both DEPμ and DEPLO twice, once in the root and once in the affix). Desiderata model the *emergence of the marked*; all else is TETU (McCarthy & Prince 1994). Yokuts templates resist a TETU analysis for several reasons. Vowel epenthesis in G- and B-templates leads to more marked structure, since the initial light vowel of the root is unparsed. The maximum size of syllables is bimoraic while at least one template results in a superheavy syllable (with a long vowel and a coda). Moreover, all the conflicting segmental requirements of different templatic morphemes can't all represent the unmarked. For example, *a*, *e* and *i* can't all be default vowels.

Phonology and Phonetics in Sanskrit External Sandhi

Mark Hale & Madelyn Kissock
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Sanskrit sandhi has played a role in discussions of generative phonological issues at least since Zwicky's (1965) MIT dissertation on the topic. The traditional approach to Sanskrit sandhi, generally leveraged by modern phonologists, involves a two-step derivation: (1) word-level reduction to 'permissible finals' (RPF) followed by (2) the application of postlexical sandhi rules (PSR). Modern and ancient discussion is almost exclusively limited to sandhi phenomena in Classical Sanskrit. But the application of sandhi in this (dead, learnèd) language is mechanically and artificially applied (e.g., even across change-of-speaker, a context within which actual phonological computation is excluded). During the Vedic period, when the language is still alive, the sandhi phenomena of Sanskrit take on a sharply different appearance — displaying, e.g., sensitivity to clause structure of the type demonstrated for liaison by Selkirk (1972).

The traditional derivations of /dhīras/ /tapate/ 'the wise one' 'suffers' is thus (<ḥ> writes [h]):

/dhīras/ /tapate/ $>_{\text{RPF}}$ [dhīraḥ] [tapate] $>_{\text{PSR}}$ [dhīras tapate]

This contrasts somewhat surprisingly with the treatment of word-final /s/ in cases such as /dhīras/ + /padyate/ '(the) wise (one) goes' and /dhīras/ /kupyate/ '(the) wise (one) is angry':

/dhīras/ /padyate/ $>_{\text{RPF}}$ [dhīraḥ] [padyate] $>_{\text{PSR}}$ [dhīraḥ padyate]

/dhīras/ /kupyate/ $>_{\text{RPF}}$ [dhīraḥ] [kupyate] $>_{\text{PSR}}$ [dhīraḥ kupyate]

Two important phonological issues arise. First, why does final /s/ seem to receive a different treatment before /t/ than it does before /p/ and /k/? Second, to avoid the roundabout /s/ > [ḥ] > [s] derivation in the *tapate* case, is it better to simply skip the step of 'reduction to permissible finals' and apply the sandhi rules directly to the underlying forms (i.e., is there a proper role for the word-level phonological processes in these derivations)?

The modern answer to the first question has posited a 'shared' coronal place feature between the underlying word-final /s/ and the word-initial /t/. Since this shared coronal feature occupies *both* a coda and an onset, it is not lost via the coda debuccalization which triggers [ḥ]. This has clear implications both for the theory of coronal underspecification and for the second question, since the coronal features of the word-final /s/ need to 'survive' word-level phonology in order to become linked or shared with the coronal features of the following word-initial /t/.

We argue that the sandhi facts of Vedic Sanskrit point strongly to an analysis under which a slightly modified 'reduction to permissible finals' step is still very much required, including the debuccalization of coda /s/, but must take place at a higher level of prosodic structure than that of the word (e.g., 'the phonological phrase'). The evidence for this comes from certain constituent-internal preservations of word-final /s/ before /p/ and /k/ (e.g., /divas/ + /pari/ 'heaven' + 'from' surfacing as [divas pari] rather than [divaḥ pari]). We then show that subject + verb does *not* form a 'phonological phrase' of the requisite type, and thus this modification of the 'reduction to permissible finals' step does not resolve the issue of why we seem to get preservation of word-final /s/ before word-initial /t/ in [dhīras tapate].

Finally, leveraging the external sandhi of word-final /s/ in RUKI-inducing contexts, we show the Vedic language shows three treatments: (1) /agnis/ + /te/ + /tapati/ 'fire for-you-ENCLITIC burns' > [agniṣ ṭe tapati], (2) /agnis/ + /kupyate/ 'fire is angry' > [agniḥ kupyate], and (3) /agnis/ + /tapati/ 'fire burns' > [agnis tapati]. The explanation for (1) is that this /s/ was preserved within the phonological phrase, and as with any /s/, undergoes RUKI (and spreads its retroflexion to the following /t/). For (2), we are dealing with simple coda debuccalization, as expected at the end of a phonological phrase. But what of (3)? We argue that in (3) the orthographic /s/ writes the phonetic realization of a final debuccalized [ḥ], citing data from the Indian phoneticians about the realization of [ḥ] before /p/ and /k/ as support. Since this is not PHONOLOGICALLY an /s/, it is not subject to RUKI.

Spreading and Correspondence in Huave vowel copy

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In the literature on assimilation, there is little consensus on the division of labor between autosegmental spreading and Correspondence-based approaches (Hansson 2001, Krämer 2003, Rose & Walker 2004). Disagreement over diagnostics, particularly since both have been shown to predict blocking effects (Hansson 2007), has led to lack of clarity about which phenomena are produced by which mechanism, or even whether both are needed. Gallagher & Coon (2009) hypothesize that all true long-distance harmonies are due to Correspondence and require total identity, while single-feature assimilations are due to Spreading and should obey phonetically observable Strict Locality. Meanwhile, Inkelas & Shih (2014) explore the idea that all assimilations can be unified under the umbrella of Correspondence.

In this talk I argue that both mechanisms are needed, by presenting an analysis of Huave vowel copy (Kim 2008) in which a novel blocking effect is produced by an interaction between two assimilatory processes: vowel copy (Correspondence) and CV agreement (Spreading). In Huave, epenthetic vowels copy all features of a preceding vowel only if the intervening consonant agrees for [±back] by being either plain or palatal(ized). If the preceding vowel and intervening consonant disagree in [±back], default quality is observed: either /i/ after a [-back] consonant, or /a/ after a [+back] consonant.

The main diagnostic for Correspondence for vowel copy is its all-or-nothing nature, interpreted as violability of the CORR constraints that mandate a relationship between vowels in adjacent syllables. In Huave, vowel-to-vowel assimilation is abandoned entirely if copy would produce a marked structure, even if partial assimilation would still be phonotactically legal. I show that alternative analyses are problematic. A Search-and-Copy analysis (Nevins 2010) can derive the pattern without process interaction, but must assume that rounding-height harmony is a separate process from [±back] harmony while also being parasitic on [±back], which is typologically dubious. Meanwhile, a standard feature-geometric approach requires mechanisms for the visibility and interaction of features that largely rob it of its own predictive power. Lastly, other recent Correspondence approaches to complex interactions in vowel harmony (e.g. Walker 2015, Stanton & Zukoff 2018) would fail in Huave because of the subset-superset nature of the features involved in the two processes, the lack of similarity between vowels and intervening consonants, and the asymmetry between VC and CV phonotactics. These factors add up to mean that there is no way for VCV sequences to all be part of the same correspondence set, and vowel copy is produced by VV-Correspondence.

Subsequently, I argue that CV agreement is a separate process, one of feature sharing enforced by a DEP constraint against feature insertion. Converging evidence against a separate-but-parallel Correspondence analysis of CV agreement comes from incompatibility with the regular CV phonotactics of the language, directionality reversal in vowel copy to infixes, and the non-application of vowel copy in unstressed syllables at Word level. This last phenomenon additionally points to vowel copy as being driven by a high-ranked markedness constraint against reduced (featureless) vowels in stressed syllables. Correspondence cannot capture this alternation without being parametrized for stress in a way that stipulates the generalization, but Spreading, as a repair for featurelessness that also satisfies DEP, is naturally suspended in unstressed syllables where the triggering constraint does not apply.

In sum, this talk offers phonological diagnostics for Spreading versus Correspondence in two assimilation phenomena based on their interactions with each other as well as with other phonological aspects of the language, and indicates that both are needed in phonological theory. It supports the claim that Correspondence is the underlying mechanism of vowel-copy epenthesis in general (Kitto & de Lacy 1999, Stanton & Zukoff), and contributes to the emerging issue of how multiple assimilations can interact within a language (Walker 2015, Blumenfeld & Toivonen 2016).

The Influence of Consonantal Strength on Foot Assignment in Accentual Systems

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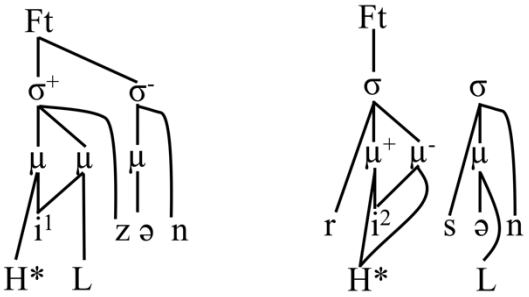
Goals and Claims. It is well known that foot-medial onsets tend to undergo lenition (e.g. Honeybone 2012, Katz 2016); conversely, we propose that word-medial consonant quality can *also* affect footing. Our main evidence comes from West Germanic (Franconian) tone-accent systems that contrast Accent 1 and Accent 2. In some dialects, the voicing quality of post-tonic onsets correlates with accent assignment; we argue that this interaction can best be captured in a foot-based approach to accent (e.g. Köhnlein 2016, Van Oostendorp 2018). As we show, our approach is comparable to the foot-based analysis of ternary quantity in Estonian and its interaction with (morphologically conditioned) consonant gradation (based on Prince 1980, Odden 1997). Furthermore, we claim that the generalizations on Franconian cannot be expressed with an approach based on lexical tones (e.g. Gussenhoven 1999), favoring a metrical analysis. Our analysis thus contributes to two ongoing debates in prosodic typology: 1. the interaction of consonant voicing and metrical structure, and 2. the phonological representation of tonal accent.

Data and Generalizations. For purposes of exposition, we focus here on the Franconian facts, using Aegidienberg (Müller 1900) and Cologne (e.g. Münch 1904) as examples. In these dialects, disyllabic words with word-medial lenis consonants (voiced obstruents, sonorants) always have Accent 1; words with word-medial fortis consonants (voiceless obstruents) typically have Accent 2 (but may have Accent 1):

(1) [i:^{1}.zən] ‘iron’ ~ [ri:^{2}.sən] ‘tear’; [ʃu:^{1}.vən] ‘push’ ~ [ʃu:^{2}.fəl] ‘shovel’ (Müller 1900)

Analysis I: Tonal Accent. Assuming Köhnlein’s and Van Oostendorp’s representations, Accent 1 is a disyllabic foot, and Accent 2 is a monosyllabic, bimoraic foot; headedness is determined at the highest level where the foot can branch (Morrison 2018 for a similar treatment of tonal accent in Scottish Gaelic). Declaratives have a H*L tonal melody, interrogatives L*H. Accent-1 feet branch at the syllable level: The first syllable is the head (σ^{+}) and licenses a tone on each of the two moras, resulting in HL (2, left) or LH. Accent-2 feet branch at the mora level: The first mora is the head (μ^{+}) and hosts a tone; the second, dependent mora (μ^{-}) is ‘weak’ and cannot host a tone. Instead, it receives its tone from the first mora via spreading, leading to H (2, right) or L in the accent syllable; trailing tones occur in post-tonic position.

(2)



Analysis II: Voicing. Words with intervocalic lenis consonants receive Accent 1 because lenis is preferably foot-medial (2, left), in line with cross-linguistic tendencies. Intervocalic fortis typically blocks the assignment of a disyllabic foot, leading to a monosyllabic Accent-2 foot (2, right). Cases where Accent 1 does occur with foot-medial fortis (e.g. [ro:^{1}fən] ‘call’) are predicted if we assume that Accent-1 feet can be lexically assigned (following Köhnlein 2016). Since both accents can have H or L pre-consonantally, the observed effects cannot be attributed to direct tone-voicing interactions, suggesting that a metrical explanation is preferable.

Asymmetric headedness and licensing constraints in English

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This presentation combines *Melody-to-Structure Licensing Constraints* (MSLCs) with the hypothesis of *asymmetric headedness*. The goal is to improve the formalisation of phonotactics and especially those related to headedness.

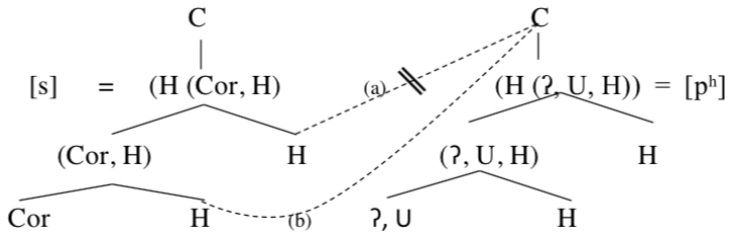
Szigetvári (2017) effectively proposes that the phonological grammar of English contains a restriction on the branching of the element |H|. This limits obstruent clusters by forcing them to contain at most a single fortis consonant. However, clusters such as /sf, ks, ps/ ([sfɪə] 'sphere', [fɒks] 'fox', [æps] 'apse') and /ft/ (before stressed syllables) seem to disprove the claim: [fɪ**fth**íːn] 'fifteen'. Although the /t/ in these /ft/ clusters is phonetically a little reduced in its aspiration, it is by no means categorically/fully lenis: *[fɪ**ft**iːn] "fifdeen", and neither does the /f/ become lenis: *[f**ɪ˞v**thiːn] "fivteen". Continuing in the same spirit as Szigetvári (2017), but with a different hypothesis, we propose that aspirates and strident fricatives form a natural class defined by headed |H| (Kaye 2000, Backley 2011). We propose an MSLC, shown in (1), that bans headed |H| from bipositional structures, effectively stopping headed |H| from branching.

(1) MSLC on |H| (English)
|H| cannot be contained by a bipositional structure
Note: Aspirates and strident fricatives (s, z, ʃ, ʒ) contain headed |H|
Non-aspirates and non-strident fricatives (f, v, θ, ð) contain unheaded |H|.

The condition in (1) immediately excludes strident fricatives from preceding or following aspirate stops (*sth, *phs, *ths...). The condition in (1) also eliminates the very well-known restriction on s + aspirate: [phlɛis] 'place' vs. /mis- + phlɛis/ → [misplɛis] ([*misphlɛis]) 'misplace'. And it also excludes the far less well-known English ban on adjacent strident consonants: [stiːm] 'steam' vs. *[stʃiːm]. The exceptions to adjacent stridents are either the class of recent derived /t + u/ sequences: [stjʉː] or [stʃʉː] or [ʃtʃʉː] 'stew', or consciously known to be loanwords: [masʒid] 'mosque' (something which we suspect could be experimentally confirmed). Crucially the MSLC restriction in (1) does not exclude non-strident fricative + aspirate sequences: fi[**fth**]een 'fifteen', [**sf**ɪə] 'sphere', [fɒ**ks**] 'fox', [æ**ps**] 'apse'. In order to work, our account relies on the *phonological* distinction between the natural class of strident vs. non-strident fricatives.

The MSLC in (1) is a grammatical condition on representations. However, we notice that the typical Element Theory representation of headedness is highly arbitrary. In place of this, *asymmetric headedness* is proposed. A headed phonological expression also necessarily includes the unheaded version of headed element (cf. Breit 2013). The innovation is to define headedness as any element that asymmetrically c-commands another instance of itself: (H (H, ʔ, U)). As shown in (2), this allows a headed structure to be linked in one of two ways, either at the level of headedness (2a) or at the level of the dependent (2b). The MSLC in (1) works by banning the kind of linking shown as (2a) for the element |H|.

(2) Asymmetric headedness and bipositionality



Evidence of Gradient Weight and Phoneme Retention

Jeffrey Lamontagne and Heather Goad (McGill University)

Prominence in French is conventionally described as being assigned to the final syllable of phrases (e.g. Jun and Fougeron 1995), but speech data from across the French-speaking world demonstrate that penults frequently host phrase-final prominence (e.g. Carton et al. 1983). Previous work on read Canadian French speech revealed that weight conditions this optional prominence shift by examining binary predictors of weight (syllable openness, presence of a bimoraic vowel) and showing that bimoraic penult vowels and closed syllables attract prominence to their syllable when in the penult or the final syllable (Lamontagne et al. 2018). However, vowels' participation in fortition (e.g. diphthongisation) and lenition (e.g. laxing) processes appears to subdivide the vowel inventory gradiently rather than into two clear groups, such that vowels' patterns are predictable based on their participation in other processes. Furthermore, the phonological status of one vowel – the schwa – as underlying or epenthetic is debated because it is near-categorically silent in final position in the dialect (Côté 2012).

In this study, we further investigate weight effects in Canadian French to test two main questions about phonological structures within the dialect. First, we examine whether prominence shifting rates suggest gradient phonological representations of weight (e.g. Ryan 2011), rather than binary categories as is commonly assumed (e.g. Crawley 1968). To do this, we test whether vowels' likelihood of triggering prominence shifts mirrors the order of weight inferred from their participation in fortition and lenition processes. Secondly, we test whether silent word-final schwas affect the likelihood of shifting prominence. If words that historically had a final schwa still pattern as though a final vowel is present by reducing the rate of assigning prominence to the penultimate realised syllable, that would suggest that the schwa is still abstractly represented despite nearly never being pronounced.

Using generalised additive mixed models and mixed-effects linear regression to analyse the pitch, duration and amplitude patterns of 8 000 tokens of polysyllabic phrase-final words from the spontaneous speech of eleven Laurentian French speakers (*Phonologie du fran]cais contemporain* corpus; Durand et al. 2002, 2009; http://www.projet-pfc.net/), we examine which of the two final syllables hosts the high-tone target and has the greatest amplitude and longest duration to infer prominence assignment. Our results demonstrate that – as suggested by the vowels' phonological patterning – vowel weight must be treated as a multi-level factor with phonemes not dividing into only two groups, but instead organising themselves into multiple groups consistent with their participation in phonological processes. Heavier vowels participate in more fortition processes, undergo fewer lenition processes, and attract prominence to their syllable significantly more often. Furthermore, silent final schwas are associated with a significantly lower likelihood of shifting prominence to the penultimate realised syllable regardless of whether the sonority profile of the final consonant sequence, suggesting a contrast between words ending in onsets of empty-headed syllables and words ending in codas.

These findings demonstrate that final schwas are still represented phonologically despite categorical absence from speakers' pronunciations, likely due to their continued participation in phonological patterns like prominence shifting, and that weight is best represented as gradient in Laurentian French. We offer a formal account of representations by expanding upon Q-Theory (Shih and Inkelas 2014), allowing us to capture prominence assignment, gradient weight effects and vowels' participation in phonological processes more simply than with other existing models capturing phonological weight (e.g. Mora Theory; e.g. Hayes 1989).

Vowel length in Friulian verbs: a case of non-linear morphology in Romance

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Table 1: NE paradigms − PI

	Conj 1 'swim'	Conj 2 'drink'	Conj 3 'understand'
1s	ˈnaːdi	ˈbeːf	kaˈpiʃ
2s	ˈnadas	ˈbeːfs	kaˈpis
3s	ˈnada	ˈbeːf	kaˈpiʃ
1p	naˈdiŋ	beˈviŋ	kaˈpiŋ
2p	naˈdaȷs	beˈveȷs	kaˈpiːs
3p	ˈnad-iŋ̂∼aŋ	ˈbeviŋ̂	kaˈpiʃiŋ̂

The Northern Friulian dialect spoken in Negrons (NE) displays an intriguing case of vowel length occurring exclusively in conj. 1 verbs. More precisely, vowel length occurs in the 1s of the Present Indicative (PI) (table 1) and in the 1-3s and 3p of the Present Subjunctive (PS) (table 2), as reported in Roseano (2015). Tables 3 and 4, in turn, show data from Central Friulian as spoken in Çupicje (ÇU), in which no vowel length ever occurs in conj. 1 verbs. New data were collected in December 2018. 4 speakers were interviewed and recorded in NE, and 5 speakers in ÇU. The survey consisted of a translation task: a question was asked in Italian to trigger an answer in Friulian in which the inflected form of the verb appeared in final position.

Table 2: NE paradigms − PS

	Conj 1	Conj 2	Conj 3
1s	ˈnaːdi	ˈbevi	kaˈpiʃi
2s	ˈnaːdis	ˈbevis	kaˈpiʃis
3s	ˈnaːdi	ˈbevi	kaˈpiʃi
1p	naˈdiŋ	beˈviŋ	kaˈpiŋ
2p	naˈdaȷs	beˈveȷs	kaˈpiːs
3p	ˈnaːdiŋ̂	ˈbeviŋ̂	kaˈpiʃiŋ̂

In Friulian nouns and verbs, vowels contrast in length only in stressed, utterance-final position (e.g. [ˈbruːt] 'broth' vs. [ˈbrut] 'ugly'; [ˈpaːs] 'peace' vs. [ˈpas] 'step'; [ˈfiːs] 'sons' vs. [ˈfis] 'fixed, dense') (Torres-Tamarit 2015). This kind of vowel lengthening is predictable from the underlying laryngeal specification of the following obstruent despite final obstruent devoicing (Vanelli 1979, Finco 2009), which turns the phonological generalization opaque (e.g. [ˈkruːt] 'raw-m-sg' vs. [ˈkrude] 'raw-f-sg'; [ˈfuːk] 'fire' vs. [fuˈgut] 'fire-dim'; [ˈnaːs] 'nose' vs. [naˈzut] 'nose-dim'). The same process of lengthening of the root vowel occurs in verbal forms that are consonant-final and have final stress in PI in both NE and ÇU (see tables 1 and 3, conj. 2). The vowel length in 2p of conj. 3 verbs is the surface outcome of /i+i/. Interestingly, the source of vowel length observed in NE conj. 1 verbs, however, is of a different kind: it does not appear in final position, but in penultimate position, and is not conditioned by the underlying laryngeal specification of the following obstruent (e.g. [ˈcaːti] 'I find').

Table 3: ÇU paradigms − PI

	Conj 1	Conj 2	Conj 3
1s	ˈnodi	ˈbeːf	kaˈpis
2s	ˈnodis	ˈbɛvis	kaˈpisis
3s	ˈnode	ˈbeːf	kaˈpis
1p	noˈdiŋ	beˈviŋ	kaˈpiŋ
2p	noˈdaȷs	beˈveȷs	kaˈpiːs
3p	ˈnodiŋ̂	ˈbɛviŋ̂	kaˈpisiŋ̂

At first sight, root allomorphy could be advocated. NE conj. 1 verbs could be lexically associated with two allomorphs (e.g. /ˈnaːd/ and /ˈnad/), and each allomorph would be inserted in a specific morphosyntactic environment. This path raises a question we cannot answer to, namely: why are only conj. 1 verbs specified as root-alterning verbs? The second possibility is to analyze vowel length as a PS T(ense)/M(ood) morpheme. If so, however, why does it also occur in 1s PI and, again, only in conj. 1 verbs? The third possibility, the one we pursue here, is the following: vowel length expresses conj. 1 Th(eme). In other words, conj. 1 Th can spell out as a melodically-empty mora, a prosodic morpheme that is realized as length on the stressed root vowel (as long as the stressed syllable is not closed: [ˈcanti] 'I sing'; and stress is not antepenultimate: [ˈliberi] 'I free').

Table 4: ÇU paradigms − PS

	Conj 1	Conj 2	Conj 3
1s	ˈnodi	ˈbɛvi	kaˈpisi
2s	ˈnodis	ˈbɛvis	kaˈpisis
3s	ˈnodi	ˈbɛvi	kaˈpisi
1p	noˈdini	beˈvini	kaˈpini
2p	noˈdadis	beˈvedis	kaˈpidis
3p	ˈnodiŋ̂	ˈbɛviŋ̂	kaˈpisiŋ̂

We claim that the conj. 1 Th morpheme in NE has the following lexically listed allomorphs: /ˈa, ˈi, a, i, μ/. Only the vowels subcategorize for specific forms (e.g. stressed vowel allomorphs subcategorize for 1p-2p forms). In the absence of subcategorization, then the default allomorph, /μ/, with any subcategorization frame, is selected. As illustrated in table (5), there is only length when the Th morpheme is not realized as a vowel. The fact that Th vowels and length stand in complementary distribution supports the hypothesis that length is in fact one of the possible phonological realizations of the Th morpheme. According to this analysis, the T/M morpheme in PS is realized as /i/, or zero when the Th morpheme is realized as a stressed vowel. In PI, only 1s exhibits vowel length. As illustrated in table (6), 1s is the only form in which Th is not spelled out as a vowel.

Table 5: NE: analysis of PS

	root	Th	T/M	ϕ-Fs
1s	ˈnad	μ	i	∅
2s	ˈnad	μ	i	s
3s	ˈnad	μ	i	∅
1p	nad	ˈi	∅	ŋ
2p	nad	ˈa	∅	i̯s
3p	ˈnad	μ	i	ŋ̂

This morphological segmentation allows for a uniform analysis of the T/M morpheme as a null morpheme across the PI paradigm in all conjugations. The terminal element /i/ in 1s PI is analyzed as a ϕ-feature morph, and crucially cannot express Th. This is independently supported by (i) /i/ also appears in 1s Imperfect Indicative after the Th vowel /ˈa/ (e.g. [nad-ˈa-v-i]), so it is reasonable not to interpret this /i/ in 1s PI as a Th vowel but as the ϕ-feature for 1s across some conj. 1 tenses; and (ii) the /i/ in 1s PI is different from the /i/ in 3p PI in that only the latter stands in free variation with /a/ (e.g. [ˈnadiŋ] or [ˈnadaŋ]), the typical Th vowel for conj. 1. This variation indirectly suggests that /i/ is Th in 3p PI but not in 1s PI. Note that the /i/ in 3p PI is also different from the /i/ in 3p PS. Only in PS /i/ expresses uniformly the T/M morpheme in 1-3s and 3p. This is the reason why there is vowel length in 3p PS, where /i/ is the T/M morph, but not in 3p PI, where /i/ (or /a/) is a Th vowel. Dialect ÇU, in turn, never displays vowel length in conj. 1 verbs because Th in this dialect simply does not include any prosodic allomorph. The present analysis shows that there is no need for an L-shaped morphome analysis of these data (Maiden 2004). In our analysis, each morph, including length, spells out a morphosyntactic feature.

Table 6: NE: analysis of PI

	root	Th	T/M	ϕ-Fs
1s	ˈnad	μ	∅	i
2s	ˈnad	a	∅	s
3s	ˈnad	a	∅	∅
1p	nad	ˈi	∅	ŋ
2p	nad	ˈa	∅	i̯s
3p	ˈnad	i∼a	∅	ŋ̂

Metrical Patterns in Arabic

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BACKGROUND: Hayes' 1995 analysis of Cairene (CA) and Palestinian (PA) Arabic stress parameters has been widely accepted, arguing both dialects use Left-to-Right moraic trochees with End Rule Right, with the following extrametrical units: final consonant and/or foot (if words ends in HLL or LLLL syllables) for PA; final consonant for CA. Phonological processes including vowel shortening, syncope, and epenthesis have been explored in both dialects (Abu-Mansour 1992, Younes 1995, Watson 2002 *inter alia*), with Brame 1973 proposing the following rule ordering for PA within Lexical Phonology: 1) Stress Assignment, 2) Stress Assignment> Syncope> Epenthesis. However, the literature lacks a comprehensive rule ordering including vowel shortening for either dialect. 4 main exceptions to the accepted Cairene stress parameters have been identified without a satisfactory solution (Watson 2011): (i) plurals with penultimate not initial stress (*liˈbisa* not **ˈlibisa* 'clothes'); (ii) 3FEMSG perfect verbs with object suffixes (*raˈmitu* not **ˈramitu* 'she threw it'*)*; (iii) inconsistent application of high vowel syncope (*kanabitu -> kaˈnabtu* 'his coffee pot' but not *katabitu -> *katabtu* 'she wrote it'*)*; (iv) unstressable clitic morphemes. **GOAL:** In this talk, I will propose alternative metrical stress parameters, present a comprehensive rule ordering for both dialects, and demonstrate how the CA stress exceptions are not exceptional at all.

RESULTS:

(1) Novel Stress Parameters: PA can be accounted for by the more typologically common extrametrical syllable only, without reference to the broader phonological environment, based on data from Elihay 2012. CA can be accounted for by an extrametrical mora only to deal with light final CVV. Mora extrametricality does not work for PA as it would predict **ʕalˈlamat* not *ˈʕallamat* 'she taught'.

(2) Novel rule ordering covering Closed Syllable Shortening (CSS), Open Syllable Shortening (OSS), Syncope, and Epenthesis is proposed: for CA, lexical rules are stress assignment>OSS>word-level syncope, then postlexical CSS>epenthesis>phrasal-level syncope>stress assignment>OSS; for PA, lexical stress assignment then postlexical CSS>syncope>stress assignment>OSS >Epenthesis.

(3) Rule ordering explains apparent Cairene exceptions: opaque surface forms follow from phonological alternations interacting with underlying morphological structures. Figure 1 demonstrates the solution for high vowel syncope (word and phrasal level syncope) and 3FEMSG perfect verbs with object suffixes (underlying long vowel reduced by postlexical OSS).

EXTENSIONS: My talk will then consider the typological implications of these results bringing in data from Iraqi and Moroccan (MA) Arabic. MA also displays other phonological alternations unobserved in the Eastern Arabic dialects, particularly in diminutive formation (*bit -> bbˁiyyət* 'room', *bəlya -> bliya* 'slippers'). Lahrouchi & Ridouane 2016 doesn't account for these in their templatic approach, and Boudlal 2001 provides an OT analysis for gender-based augmentation of the base to fit an iambic template. However, I raise concerns about OT given that the homorganicity constraint on root consonants (Cantineau 1946) contradicts OT's ROTB principle. Therefore, this talk presents a lexical phonology analysis of the diminutive integrating it into broader word formation in MA.

Fig.1: CA Derivation Showing Word-Level Syncope and OSS Ordering

[kanabit-u]	[[katab-it]u]	[saafirit]	[[ramiit]u]	UNDERLYING REPRESENTATION	
kanaˈbitu -- kanabtu	ˈkatabit -- ˈkatabit	saaˈfirit saˈfirit safrit	raˈmiit -- --	STRESS ASSIGNMENT OSS WORD-LEVEL SYNCOPE	**LEXICAL**
kaˈnabtu --	kataˈbitu --	ˈsafrit --	raˈmiitu raˈmitu	STRESS ASSIGNMENT OSS	**POSTLEXICAL**
/kaˈnabtu/	/kataˈbitu/	/ˈsafrit/	/raˈmitu/	SURFACE FORM	
his coffee pot	*she wrote it*	*she travelled*	*she threw it*	GLOSS	

Wug-testing Uyghur Vowel Harmony: trigger conflicts, variation, and distance-based decay

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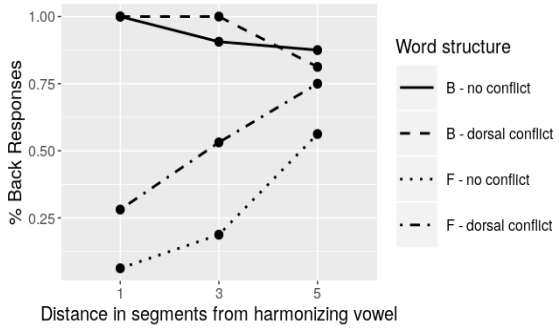
Introduction. Many suffixes in Uyghur (SE Turkic: China, Kazakhstan, Uzbekistan) harmonize for backness with the stem. Lindblad (1990), relying on written data, claims that suffixes harmonize with the final front (/æ, ø, y/) or back (/u, o, a/) stem vowel. The vowels /i, e/ are transparent to harmony. If no harmonizing vowel is present, suffixes harmonize with the final front (/k, g/) or back (/q, ʁ/) dorsal. In stems with both a harmonizing vowel and a conflicting harmonizing dorsal between the vowel and the suffix, the vowel takes precedence (e.g., *rak-ta/*tæ 'in/on shrimp'*). In the absence of harmonizers, suffix backness is specified lexically, with a preference for back suffixes. The present study tests the productiveness of this reported pattern, providing new empirical data. We show that Uyghur backness harmony is more gradient than previously described, exhibiting distance-based decay (Frisch et al. 2004, Hayes & Londe 2006, Walker & Empiranya 2006) and interactions between conflicting triggers (Kimper 2011).

Methodology. Wug words allow us to characterize the phonological pattern without influence from lexical effects. We generated Uyghur wug words with a single harmonizing vowel, varying the distance between the vowel and suffix by inserting syllables with transparent vowels, and varying whether a conflicting dorsal intervened. The dorsal always occurred word-finally. Words were vetted by a native Uyghur speaker for phonotactic plausibility. We elicited the wugs from 8 native Uyghur speakers living in Kazakhstan. Wugs were embedded in short, naturalistic paragraphs that required them to be produced with the locative suffix, which has front (/dæ, tæ/) and back (/da, ta/) allomorphs. We coded for which form of the suffix was used for each wug.



Results. The results are shown in the figure. F and B indicate words with front and back vowel triggers, and "dorsal conflict" indicates that a dorsal of conflicting backness intervenes between vowel and suffix. There is an overall bias towards back suffixes. Suffixes that conflict with the vowel become more common as the distance between vowel and suffix increases, and when there is a dorsal conflict, though there is considerable variation.

Analysis. We provide an analysis using Maximum Entropy Harmonic Grammar (Smolensky 1986, Goldwater and Johnson 2003) which is well-suited to capturing phonological gradience. The most successful model we tested, as determined by AIC (Akaike 1974), used three constraints: *SF, which disfavors front suffix forms, as well as a pair of Agree/Disagree constraints (Kimper 2011), VAGREE and CAGREE, that penalize clashes between the suffix form and the final harmonizing vowel and consonant respectively. We follow Zymet (2014) in calculating violations of these latter two constraints using a non-linear decay function $d(x) = 1/x$ that generates lower violations as the number of segments x between the trigger and suffix increases. The table below shows the derivation of frequencies for one example wug form.

	Observed Frequency	Predicted Frequency	*SF *1.23*	VAGREE *8.01*	CAGREE *0.95*
dʒøpimeʁ-da	0.75	**0.699**	0	d(6) = 1/6	0
dʒøpimeʁ-dæ	0.25	**0.301**	1	0	d(1) = 1

Conclusion. We show that Uyghur backness harmony is more gradient than previously described, and can be modeled using mechanisms proposed independently to capture distance-based decay and conflicting trigger interaction.

Formalizing the connection between opaque and exceptionful generalizations

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Since the advent of OT, there have been many proposals to account for opaque generalizations (e.g., Goldrick 2000, Bermúdez-Otero 2003, McCarthy 2007), which is normally impossible in Classic OT (Idsardi 2000, though see Baković 2011). Some of these proposals maintain that opaque generalizations are encoded in the lexicon (e.g., Mielke et al. 2003), or result from language-specific constraints (Pater 2014). Developing these latter ideas, I show that systematic opaque generalizations may arise from rankings of (language-specific) lexically indexed constraints (Kraska-Szlenk 1995, Pater 2000), without the necessity of including serial derivations (e.g., McCarthy 2007) or pressures like contrast preservation (Łubowicz 2003).

Instead of whole-morpheme, unary indices (Pater 2000, 2010), I adopt here the original exceptionality indexation mechanism from SPE (Chomsky and Halle 1968; Zonneveld 1978): binary, phonetically uninterpretable features on each individual segment. Segmentally local indices in OT had already been proposed by Temkin-Martínez (2010), Rubach (2013, 2016), Round (2017), while a form of binary indexation was proposed by Becker (2009). Here, the intersection of the two is used: instead of a representation like ab_ia_ib, where the second and third segment have index *i*, the representation used here would be $a_{[-i]}b_{[+i]}a_{[+i]}b_{[-i]}$. Following indexed constraint theory and SPE, as well as the idea of universal GEN (Prince and Smolensky 1993, McCarthy 2009) that manipulates only universal features (and, by extention, does not manipulate language-specific indices), indices are presumed to stay constant from UR to SR.

In this framework, opaque patterns require that indexed context-free markedness constraints be ranked above Faithfulness, regulating the SR of indexed segments. (1) shows opaque Canadian Raising in /ɹaɪt-ɚ/ (→ ɹʌɪtɚ) → [ɹʌɪɾɚ] (see Chambers 1973, Bermúdez-Otero 2003), where voiceless /t/ triggers raising of the preceding diphthong, but is itself realized as voiced. Raising is conditioned by a following [+T] consonant, and [+T] consonants are forced to surface as voiceless because of the ranking $*[+\text{voice}]_{[+T]}$, $*[-\text{voice}]_{[-T]}$ >> IDENT, except when V[-son,-cont,+cor]V requires that /t,d/ surface as [ɾ]. The [ɾ] in this word surfaces as [+T] (since indices are the same between UR and SR) and, thus, triggers vowel raising.

(1) /**ɹaɪt**$_{[+T]}$-ɚ/	*V[-son,-cont,+cor]V	$*[+\text{voice}]_{[+T]}$	$*[-\text{voice}]_{[-T]}$	*[aɪ](C$_{[+T]}$)	IDENT
ɹaɪt$_{[+T]}$ɚ	*!			*	
ɹʌɪt$_{[+T]}$ɚ	*!				*
ɹaɪɾ$_{[+T]}$ɚ		*		*!	*
☞ ɹʌɪɾ$_{[+T]}$ɚ		*			**

If $*[+\text{voice}]_{[+T]}$ and $*[-\text{voice}]_{[-T]}$ ranked below Ident, as in (3), raising would be lexically conditioned, as illustrated by raising before a voiced plosive in /aɪd$_{[+T]}$/ → [ʌɪd$_{[+T]}$]. In (2), on the other hand, /aɪd$_{[+T]}$/ is fed through the same ranking as in (1). In (2), /aɪ/ raises, as it is followed by a [+T] segment, but this /d$_{[+T]}$/ itself surfaces as voiceless, since $*[+\text{voice}]_{[+T]}$ is above IDENT, and [+T] cannot be changed by GEN. Thus, the ranking in (2) ensures that raising is only conditioned by voiceless segments or by [ɾ] that alternates with a voiceless segment.

(2) /**aɪd**$_{[+T]}$/	$*[+\text{voice}]_{[+T]}$	*[aɪ](C$_{[+T]}$)	IDENT
aɪd$_{[+T]}$	*!	*	*
ʌɪd$_{[+T]}$	*!		*
☞ ʌɪt$_{[+T]}$			**

(3) /**aɪd**$_{[+T]}$/	*[aɪ](C$_{[+T]}$)	IDENT	$*[+\text{voice}]_{[+T]}$
aɪd$_{[+T]}$	*!	*	*
☞ ʌɪd$_{[+T]}$		*	*
ʌɪt$_{[+T]}$		**!	

Thus, the indexation mechanism used here allows for implementing representational accounts of opacity in OT (e.g. Boersma 2007, van Oostendorp 2008) without hypothesizing universal abstract layers of representation: the addition layers of representation in this proposal are lexical indices, which are built "on the fly" by the language learner. The feasibility of this scenario is supported by existing computational demonstrations of the learnability of indexed constraints in general (Becker 2009, Coetzee 2009, Pater 2010), and of segmentally local binary classification (the format of indexation used here; Lin 2005, Mayer 2018).

Revisiting the abstractness of URs with a learning model of probabilistic representations

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Introduction: Abstract underlying representations (URs) have been assumed to be necessary since Kenstowicz and Kisseberth (1977) detailed a number of patterns which were not representable without them. Recent proposals increase the representational capacity of URs. Priority constraints (Bonet, Lloret, and Mascaró, 2003; Mascaró 2007), UR constraints (URCs) (Apoussidou, 2007; Smith, 2015), and blended representations (Smolensky and Goldrick, 2016; Zimmerman, 2018) all remove the restriction that morphologically related forms must derive from a single discrete UR. This paper revisits traditional arguments for abstract URs using a learning model which induces abstract and non-abstract UR constraints, finding that, when URs are probabilistic, abstract URs are not needed to model a case that had previously been cited as evidence for their necessity.

Background: This paper focuses on the distinction between two possible restrictions on the degree to which URs may differ from their surface forms (SRs). *Concrete URs* are URs in which the entire UR surfaces faithfully in at least one corresponding SR. *Composite URs* (term from Bowers 2015) are abstract URs in which every underlying segment exists in an SR but the set of segments do not surface together in any single SR. A number of schematically similar cases have been used to argue that restrictions placed on URs must be sufficiently permissive as to allow composite URs. Considered here is the interaction of final vowel deletion and reduction in Palauan, shown below (McCarthy, 2008), which traditionally requires a UR of the shape CVCV in which the underlying vowel qualities are specified by both the unsuffixed and /-k/ forms.

Unsuffixed	**/-k/ *my***	**/-mam/ *our***	**Gloss**
ʔ**á**b	ʔəb**ú**k	ʔəbəmam	*ashes*
ʔ**ú**r	ʔər**ɨ́**k	ʔərəmam	*laughter*

Model: The learning model uses a Maximum Entropy grammar (MaxEnt) (Goldwater and Johnson, 2003) in which URs are represented as sets of weighted URCs. Consequently there is no single UR for a morpheme but rather a probability distribution over candidate URs. In the proposed model, concrete URCs are induced directly from observed SRs, while composite URCs are generated by aligning the URs of every pair of concrete URCs and creating new constraints which flip the segments at the index of every combination of substitutions in the alignment. The grammar is fit with stochastic gradient descent and URs are treated as hidden structure which is handled with an adaptation of Jarosz (2013)'s Expected Interpretive Parsing algorithm to the MaxEnt framework.

Results: When trained on data instantiating the Palauan pattern illustrated above, the learner reliably converged on the abstract UR solution when the objective function included an L1 prior which forces the learner to use as few constraints as possible. When an L2 prior was used, which encourages low weights but not the use of few constraints, the learner reliably converged on a solution which stored a default UR of shape CVC for the unsuffixed forms and an exceptional UR of shape CəCV that is used when suffixed. Critically, both solutions make the same set of generalizations to novel forms, including predicting final vowel deletion even though the UR-alternating solution analyzes the unsuffixed forms as faithful realizations of CVC URs, and therefore never analyzes the observed data as resulting from final deletion. This is shown to be a consequence of using probabilistic knowledge to parse hidden structure and therefore predicted to be a general finding.

Conclusions: The results suggest that abstract and non-abstract UR solutions to the Palauan problem are learnable and that there is no empirical difference between the two, undermining the argument that composite URs are necessary to account for the alternation. This is not interpreted as an argument against the need for abstract URs, rather as an argument that traditional justifications for abstract URs do not hold given more complex representations.

DYNAMIC STRESS ASSIGNMENT IN TURKISH

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In a Nutshell. I claim that phonological domains for verbal stress assignment in Turkish correspond to the agreement phrase (AgrP) projections in syntax, which results in stress assignment onto the rightmost element in the lowest domain. **Problem.** Turkish has a strict rightmost stress pattern, but single-word clauses appear to behave exceptionally. The existing accounts are unable to predict the cases of stress optionality. Kabak & Vogel (2001) predict the plural to bear stress in (1), since the phonological word (PW) building operation continues until the point at which a copula appears, after which the stress would be assigned onto the right edge of the PW. Newell (2008, 2015) predicts the same result, since she considers the pre-copula domain to form a phase and the the prospective aspect marker is the highest item within that domain.

(1) Gel-ec**é**k-ler-Ø-di cf. Gel-ecek-l**é**r-Ø-di come-PROS-PL-COP-PST 'They were going to come.'

Proposal. I assume syntactic derivation is mapped onto phonology and syntactic spell-out domains correspond to phonological domains of stress assignment. Following Newell, I further assume that the word stress within predicates is borne by the rightmost morpheme within the lowest domain, if the said morpheme contains a vowel. Otherwise the stress shifts onto the preceding syllable. I propose a dynamic approach to phases, where a phase is defined as the extended projection of an AgrP. I assume that functional heads in the verbal domain are strictly ordered (Cinque 1999, 2002 et seq.). Finally, I assume that inherently focused elements such as the negation marker *-mA* and the focus enclitic *=dA=* override, and are not subject to, this focus-neutral stress assignment pattern (Göksel & Özsoy 2000).

(2) a. yap-t**í**-k) mı?
do-PFV-$1PL_K$ Q
'Did we do it?'

b. yap-tı-n**íz**) mı?
do-PFV-$2PL_K$ Q
'Did you do it?'

c. yap-**íyor**) mu-sunuz)?
do-PROG Q-$2PL_Z$
'Are you doing it?"

d. yap-ıl-s**ín**) mı?
do-PASS-$3SG_O$ Q
'Should it be done?'

(3) a. gel-d**í**)-ler b. gel-di-l**ér**) c. gel-**ír**)-ler d. gel-ir-l**ér**)
come-PFV-PL come-HAB-PL
'They have come.' 'They come.'

Discussion. The verb in Turkish selects different paradigms of agreement exponents depending on the final suffix (Good & Yu 2005). The finite stems ending with *-DI* and *-sA* select k-exponents, while the z-paradigm is selected elsewhere. Introducing the question particle *mI* in (2) reveals that there are multiple AgrPs and the z-exponents use the higher AgrP. Since a pre-copula z-exponent is strictly ungrammatical, it follows that the z-paradigm exponents always use the higher AgrP, which is why such exponents belong to the higher phonological domain. This is exactly why z-exponents are never stressed (2-c), while the k-exponents can be stressed if they contain a vowel (2-a/b). (3) shows that the PL marker that is used optionally for 3PL introduces optionality. This is because the marker can use both AgrP slots, as evidenced by the grammaticality of both *yap-ıyor-lar-dı* 'do-IPFV-PL-PST' and *yap-ıyor-du-lar*. In (1), stress is assigned depending on which AgrP projection the PL marker actually occupies. PL is in the higher domain in (3-a), but not in (3-b). Similarly, the aspectual marker is rightmost in (3-c), but not when the PL occupies the lower slot, as in (3-d). It should also be noted that nominal predicates, which partly share the verbal domain and select the z-exponents, can only use the higher slot, since the pre-copula affixes are inaccessible for nominal stems. The PL in (4-a) is not part of the verbal domain and the stress is assigned within the nominal domain, whereas the nominal undergoes S-V agreement in (4-b) and gets its stress in the verbal domain.

(4) a. hasta-l**ár** patient-PL 'patients' b. hast**á**-lar patient-PL 'they are sick'

Conclusion Based on the assumption of syntax-phonology correspondence, I have proposed an AgrP-based account for the determination of phonological domains where cyclic stress assignment would result in right predictions to account for the novel data included in this study.

Hush-hush: A structural account of vowel devoicing in Japanese

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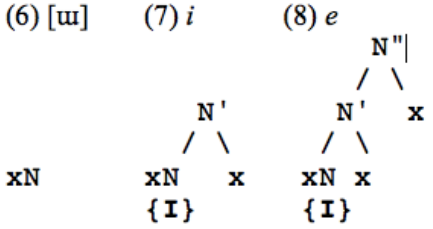
This paper offers a fresh look at Japanese devoicing (also: deletion) of high vowels *i* [i] and *u* [ɯ] in voiceless environments (McCawley 1968, Vance 1987, 2008, Labrune 2012, Fujimoto 2015). We interpret devoicing as an instantiation of Proper Government (P1) of a simple nucleus (P2) which is not required to license voicing in its environment (P3, P4). Crucially, all three factors are interrelated and follow straightforwardly from the theory employed, Government Phonology (GP; Kaye, Lowenstamm & Vergnaud 1985, 1990); in particular GP 2.0 (Pöchtrager 2006).

Data. Devoicing (common, not obligatory) creates an alternating pattern (1), excluding two devoiced vowels in a row. Devoicing affects the high vowels following a voiceless consonant and preceding another voiceless consonant or pause (2). If *i* is devoiced, (completely regular) palatalisation of a preceding consonants occurs despite devoicing. Devoicing is blocked when a voiced consonant precedes (3) or follows (4; though see below). Devoiced vowels do not support an accent (Haraguchi 1977, Y. Yoshida 1999), leading to accent shift (5).

(1) *kits̥̥tsuki ~ kitsuts̥̥ki, *kits̥̥ts̥̥ki* 'woodpecker' (*u̥̥* = devoiced *u*)
(2) *ts̥̥keru* 'to put on', *arash̥* 'storm' (3) *buta*, **bu̥̥ta* 'pig'
(4) *tsubayaku, *ts̥̥bayaku* 'to whisper' (5) *kaKUsu ~ KAk̥̥su* 'to hide' (capitals: accent)

Proposal. P1. The alternating pattern in (1) follows from the Empty Category Principle (ECP) and Proper Government (PG): A realised nucleus allows a preceding empty nucleus to remain unrealised, while unrealised nuclei cannot properly govern in turn (Charette 1991, Kaye 1990); an alternating pattern arises. This is unproblematic with *u* [ɯ], spelling out an empty nucleus (S. Yoshida 1996, Y. Yoshida 1999, Nasukawa 2010). What about *i* [i]? It contains the element **I** and is not empty. This leads to P2: why mid/low vowels do not devoice the same way as high vowels.
P2. We assume that the old element **A** is to be replaced by structure (Pöchtrager 2006, 2013, 2018). (6) gives an empty nucleus. (7) gives *i* (one empty position contained in the nucleus), (8) *e* (two of them). While originally designed for vowel reduction (loss of structure, Pöchtrager 2018), the governability of high vowels falls out from (6–8) if the ECP is tweaked slightly: Both [ɯ] (6) and [i] (7) contain a single empty slot, allowing PG to apply. What is new is that PG can apply to a slot *within* a vowel. **I** survives, explaining why *i* palatalises despite devoicing. PG applies only once and *e*, with *two* empty positions, cannot be silenced. (6–8) derive another asymmetry: *i* (but not *e*) palatalises preceding consonants ([ʃi]/*[si]). **I** in *e* is buried deep in the structure and cannot get out, in *i* it can; as also found in Brazilian Portuguese.
P3. PG fails if a voiced consonant (truly voiced in Japanese) precedes. We claim that the voicing element **L** must be licensed in the onset by its nucleus. Voiced consonants show distributional differences to plain ones (Itô & Mester 1989, 1999) and **L** has special licensing needs (Nasukawa 2005). Being busy licensing **L** in its onset, the nucleus is shielded from PG; an extension of Charette (1990) that (government-)licensing nuclei reject PG.
P4. Counter to previous accounts we assume that final empty nuclei are possible, but under the same conditions as other empty nuclei (P2–3), which explains devoicing word-finally. Another condition often mentioned, *viz.* that a following consonant must be voiceless, seems problematic, given forms like *sunawachi* [snawatɕi] 'therefore'. We remain agnostic on that issue for now.



Catalan (im)possible nativizations in the light of Weighted Scalar Constraints

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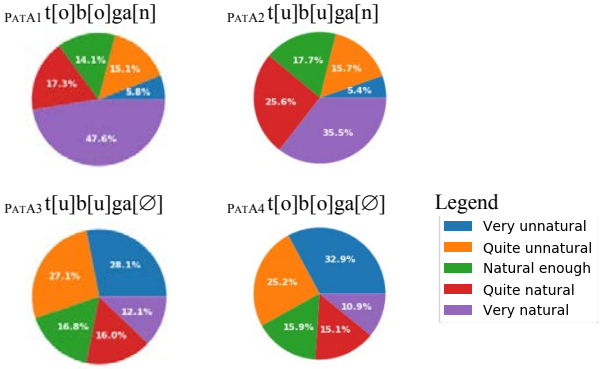
Francesc Torres-Tamarit (Paris 8, CNRS)
Vlad Martin-Diaconescu (ICIQ)

1. Data. Word-final posttonic *-n* deletion (ND) and vowel reduction (VR) are general processes in the native lexicon of Catalan (Mascaró 1976). 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 young speakers in which non-application of both processes is the most common solution (PATA1: t[o]b[o]ga[n]), followed closely by just non-application of ND (PATA2: t[u]b[u]ga[n]), followed by far by application of both processes (PATA3: t[u]b[u]ga[∅]), and in which non-application of VR and application of ND (PATA4: t[o]b[o]ga[∅]) is unattested. **2. Goals.** The purpose of this talk is to present the results of two surveys supporting quantitatively these patterns and to attempt a formalization of them under the *Weighted Scalar Constraints* version of Harmonic Grammar, following the recent proposals by Hsu & Jesney (2017, 2018). Due to space reasons, here we just outline the formal approach we are pursuing, although the results of the two surveys (a production and a judgment test inquiring the degree of the naturality of the four possible patterns in 16 loanwords with the structure in §1 conducted on 31 Barcelona Catalan speakers aged 18-23 during the period 2017-2018) appear summarized in (1) and (2). **3. Analysis.** As illustrated in (3), we assume a triple lexical stratitification for the Catalan grammar: *a*) the core one (for those speakers with application of VR and ND) (3*i*), *b*) the intermediate one (for those speakers with just application of VR) (3*ii*), and *c*) the peripheral one (for those speakers with underapplication of both VR and ND) (3*iii*). The two M constraints involved are *e,o$_{\sigma UNSTR}$ and *n]$_{WD}$, which receive respectively a stable weight of 5.5 and 2.5 across all three possible strata. Following the proposal in Hsu & Jesney (2017), we assume that faithfulness constraints can be unstable across strata, and be scaled as follows: "Given a basic constraint weight *w*, and a scaling factor *s* corresponding to distance from the core, for any input that is not realized faithfully in the output, assign a weighted violation score of *w* x *s*" (p. 255). This ensures that the F weight values increase from the core stratum (in which *s* = 1: (3*i*)), towards the intermediate stratum (which starts with *s* = 1.8: (3*ii*)), until reaching the peripheral stratum (which starts with *s* = 2.8 and covers the largest interval: (3*iii*); F values acquire, thus, a higher relevance the closer to the peripheral strata. Given the constraint weights, no scaling factor can yield the impossible nativization PATA4*t[o]b[o]ga[∅] (as it can be seen in the strata cross overpoints of (4)). **4. Further issues.** In this talk we are going to discuss the advantages of this modelization with respect to a classic OT approach based on a stratified grammar (Itô & Mester 1995, 1999), and we are going to include a discussion of parallel phenomena (such as the interaction of vowel reduction with stressed mid vowel laxing), for which we have conducted the same surveys and which further support our analysis.

(1) *Results of the production test*

	% of answers
a. PATA1 t[o]b[o]ga[n]	65,2%
b. PATA2 t[u]b[u]ga[n]	25%
c. PATA3 t[u]b[u]ga[∅]	9,8%
d. PATA4 t[o]b[o]ga[∅]	0%

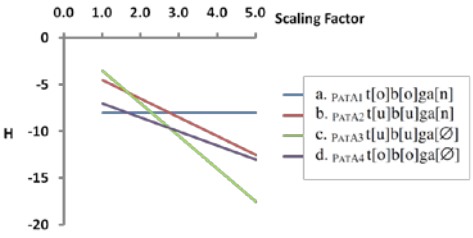
(2) *Results of the judgement test*



(3) *HG analysis with weighted scalar constraints*

i. /tobogan/	*e,o$_{\sigma UNSTR}$ w = 5.5	*n]$_{Wb}$ w = 2.5	Ident-V$_{UNSTR}$ w = 2	Max-IO w = 1.5	H	*Scaling factor for F*	*Strata*
a. [toβoγán]	−1	−1			−8	1	*Core stratum*
b. [tuβuγán]		−1	−1		−4.5		
☞c. [tuβuγá∅]			−1	−1	−3.5		
d. [toβoγá∅]	−1			−1	−7		
ii. /tobogan/	*e,o$_{\sigma UNSTR}$ w = 5.5	*n]$_{Wb}$ w = 2.5	Ident-V$_{UNSTR}$ w = 2	Max-IO w = 1.5	H	*Scaling factor for F*	
a. [toβoγán]	−1	−1			−8	1.8	*Intermediate stratum*
☞ b. [tuβuγán]		−1	−1		−6.1		
c. [tuβuγá∅]			−1	−1	−6.3		
d. [toβoγá∅]	−1			−1	−8.2		
iii. /tobogan/	*e,o$_{\sigma UNSTR}$ w = 5.5	*n]$_{Wb}$ w = 2.5	Ident-V$_{UNSTR}$ w = 2	Max-IO w = 1.5	H	*Scaling factor for F*	
☞ a. [toβoγán]	−1	−1			−8	2.8	*Peripheral stratum*
b. [tuβuγán]		−1	−1		−8.1		
c. [tuβuγá∅]			−1	−1	−9.8		
d. [toβoγá∅]	−1		−1		−11.1		

(4) *Strata cross overpoints*



Learning Hidden Structure with a Maximum Entropy Grammar

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1. Introduction: 'Hidden structure' refers to aspects of the learning data that are not provided to the learner, but must instead be inferred. In introducing this term, Tesar and Smolensky (2000) provide the example of foot structure, in which learners are given no information about foot boundaries, but must deduce them in order to predict stress assignment. They also provide a test set of 124 languages. Although there has been much previous research on the learning of those languages (see Jarosz 2013), and some prior work on learning hidden structure with Maximum Entropy Grammars (MaxEnt; Goldwater and Johnson 2003; see *e.g*. Pater et al. 2012 on hidden structure), this paper is the first to present MaxEnt results on this test set. We show that a MaxEnt grammar, trained using the L-BFGS-B optimization algorithm (Byrd et al. 1995) correctly learns a large proportion of the languages in the dataset, approaching state-of-the-art results for correctness (Jarosz 2013), with useful gains in efficiency.

2. Background: Tesar and Smolensky's (2000) 124 languages consist of patterns of stress placement on 62 strings of heavy and light syllables. For each string, a tableau provides all possible footings along with the resulting pattern of stress, and the corresponding constraint violations. In many cases, there are multiple possible footings resulting in a single pattern of stress placement; the learner is given no information about which of these would allow for a correct analysis of the whole language. Tesar and Smolensky (2000) propose that a full structure can be provided by using the current grammar to assign a footing that is consistent with the stress pattern. Jarosz (2013) compares a number of probabilistic implementations of this idea, using the Gradual Learning Algorithm (GLA; Boersma 1997) with either OT or HG (Harmonic Grammar), and three approaches to assigning the full structure. In the best results for both OT and HG, the final grammar assigns the correct stress to all of a language's forms 94% of the time.

3. Our model: We used a MaxEnt framework, with L-BFGS-B optimization (Byrd et al. 1995). The loss function used was KL-Divergence (Kullback & Leibler 1951) between the model's predicted word probabilities and the probabilities for each form observed in the training data. Since the model was blind to the foot placement for forms in the training data, the probability for each hidden structure was estimated using Expectation Maximization (Dempster et al. 1977), which scales each datum's probability by the grammar's current expectations. Unlike prior on-line approaches, this is a batch learning algorithm. It eliminates sampling in several ways: the whole dataset is used at each step rather than a sample, and the update is done with sums over probability weighted violation vectors, rather than with a sampled Winner and Loser.

4. Procedure and Results: Because of the lack of sampling, this is a deterministic algorithm, so only one run from each language was necessary to gauge our model's performance. The model was run on each language until it stopped improving on the objective function (see the documentation at scipy.optimize.minimize for how this was determined) or reached 15,000 weight updates. A language was considered to be successfully learned if the final grammar assigned a conditional probability of more than 50% to each of the correct surface forms. The model met this criterion for ***91.94%*** (114/124) of the languages in the dataset.

5. Conclusions: Although we have not conducted clock-time comparisons of our approach to the on-line models presented in Jarosz (2013), it seems extremely likely that there are huge efficiency gains in learning time. Our maximum number of updates is 15,000, as opposed to 1,000,000 in Jarosz (2013), and we use vectorization rather than sampling for each one. Furthermore, there is no need to do multiple runs to assess performance. We see these improvements not as a move to greater realism in modeling human language learning, but instead as a step towards creating useful tools for automatic language analysis for phonologists.

/t,d/ Deletion: Articulatory Evidence for Categoricity Does Not Preclude Gradient Effects

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Introduction: Since Labov *et al.* (1968) first described it as cluster simplification, the deletion of word-final coronal stops in English has enjoyed a prominent place in the sociolinguistics and variable phonology canons. Rates of perceived Coronal Stop Deletion (CSD) have been observed to be robustly conditioned by phonological environment and the morphological class of the relevant word, and as such the phenomenon has classically been treated as a categorical – phonological – process. This presumption has been critiqued as unsupported by the phonetic evidence available (e.g. Browman & Goldstein 1992; Temple 2014), but the present study is among the first to directly investigate the articulatory reality of CSD in naturalistic speech using Electromagnetic Articulography (EMA). It is revealed that inaudible stops without tongue tip raising are rare but they do exist, and further systematicity can be found in the articulatory detail.

Methods: 5 native speakers of American English performed several tasks designed to elicit naturalistic speech while synchronised acoustic and articulatory data was collected. EMA sensors were adhered at the tongue tip, tongue dorsum, and lower lip, as well as reference sensors at the upper incisors, the left and right mastoids, and the bridge of the nose. In total, 362 word-final, post-consonantal coronal stops with no adjacent coronal segments were analysed. For each token, tongue tip heights and timestamps were measured at tongue tip velocity minima corresponding to the coronal stop and articulatory targets immediately preceding and following.

Results: While 87 coronal stops were inaudible and would have been judged as deleted in a traditional analysis, only 15 (17%) of these had no tongue tip raising as would be expected from a structure-preserving deletion process. However, speakers 1, 3 and 4 have multimodal articulatory profiles consistent with non-structure-preserving allophony in terms of tongue tip height that is correlated, non-deterministically, with audibility of coronal stops (figure 1). This is consistent with what Bermúdez-Otero (2010) predicts, but a mixed-effects linear regression model of speaker- and token-normalised tongue tip raising reveals that monomorphemes show significantly less raising [$p<0.05$]. This effect parallels the well attested morphological conditioning on rates of CSD, and corroborates similar findings from Southern Standard British English (Purse & Turk 2016), but it is challenging to explain under strict modularity. Additionally, there are robust gradient effects for speech rate and task such that less tongue tip raising is found when a speaker talks faster and the task exerts less pressure to communicate clearly with an interlocutor.

Conclusions: Articulatory data suggest that rates of CSD without tongue tip raising are vastly overestimated, but categoricity is evident in the tongue tip height distributions of some individuals. This begins to address concerns about CSD as a potential challenge to strict modularity, but we also observe morphological conditioning on a gradient measure of tongue tip raising.

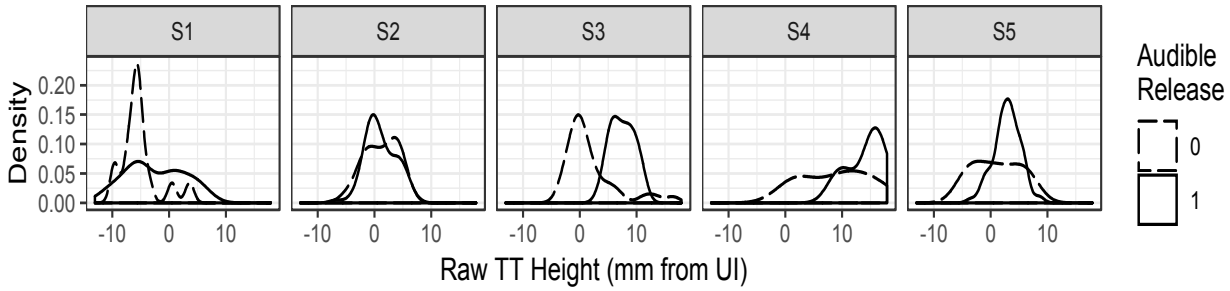

Figure 1: Raw tongue tip height distributions for each speaker.

Allomorph selection and phonology are ordered: evidence from a new universal

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Background: In phonologically-conditioned suppletive allomorphy, the distribution of multiple listed allomorphs of a morpheme is determined by phonological context. In Korean, for example, the allomorph of the nominative case suffix is /-i/ after consonant-final stems but /-ka/ after vowel-final stems. There are three main hypotheses about the interaction between allomorph selection (AS) and phonology: • **H1**: AS and phonology are distinct modules; selection is ordered before phonology in every cycle and the modules are interleaved (e.g., Paster 2006, Embick 2010); • **H2**: AS and phonology are computed in parallel in the same module; AS optimizes surface phonological constraints otherwise active in the language (e.g., Mester 1994, Kager 1996, Mascaró 2007); • **H3**: AS can be computed either before phonology (as in H1) or in parallel with phonology (as in H2) (e.g., Booij 1998, Nevins 2011, Smith 2015).
Main contribution: We identify a new universal predicted by H1 (which precludes surface-optimizing AS) but not by H2 or H3 (which do not). We report the preliminary results of a typological survey that support the universal, and thus support H1 over H2 and H3.
The universal: In cyclic architectures that follow H1, a final cycle of phrasal phonology applies once after words have been combined. If AS is ordered before phonology in every cycle, one prediction is that it can never see the output of the final phonological cycle. In other words:

(1) Universal: AS is blind to phrasal phonological processes

An example of a hypothetical pattern excluded by (1) combines syllable-counting allomorphy (as in a similiar case in Shipibo; Elías-Ulloa 2004) and phrasal epenthesis (as in some Arabic dialects; e.g., Kiparsky 2000). The repetitive suffix is [ribi] before stems with an odd number of syllables (2), [ɾabi] elsewhere (3); [i] is epenthesized into C_CC, including across word boundaries (4). Crucially, epenthesis affects the stem's syllable count and feeds AS (5).

(2) /REP-ʃuft#/ → [ribi-ʃuft#]
(3) /REP-kaʃaft#/ → [ɾabi-kaʃaft#]
(4) /ʃuft#marato/ → [ʃufi̱t#marato]
(5) /REP-ʃuft#marato/ → [ɾabi-ʃufi̱t#marato]

In contrast to H1, this pattern can be easily generated by H2 and H3, since AS can be computed in parallel with phrasal phonology and can see its output.
Typological survey. Our survey is based on Paster's 2006 survey of phonologically-conditioned allomorphy and patterns reported in Mascaró 2007, Nevins 2011, Henderson 2012, and Smith 2015, a total of ∼150 patterns. There were no counterexamples to (1). Instead, there were three classes of minimally different patterns: • **Class I**: AS is fed by a non-phrasal phonological process. E.g., in Catalan (Mascaró 2007), [ə]-epenthesis before word-initial [sC] clusters feeds *en/l* article allomorphy (*en* before C, *l* before V), e.g., [l əstíβəns] (see Lloret & Pons-Moll 2016 for evidence for epenthesis). Epenthesis applies even when the preceding word is V-final and would resyllabify the cluster (i.e., epenthesis applies pre-phrasally). • **Class II**: AS is blind to a phrasal phonological process. E.g., in Kimatuumbi (Odden 1996, Paster 2006), the perfective allomorph is *-iile* after glides (/j/ and /w/). AS ignores the deletion of /j/ before /i/, as in /naa-egelj-PFV/ → [naa-egel-iile], and deletion is phrasal (it is ordered after other phrasal processes). • **Class III**: AS is sensitive to phrasal prosodic boundaries. This is consistent with (1) assuming that prosodic domains are constructed early enough, prior to phonological processes (e.g., Nespor & Vogel 1986). E.g., in K'ichee' (Henderson 2012), certain clitics surface with a CVC allomorph (taj, k'ut) phrase-finally but with a CV allomorph (ta, k'u) elsewhere. In an analysis of the data under H1, AS is sensitive to the boundary of the intonational phrase.
Conclusion. Theories that allow for surface-optimizing AS overgenerate allomorphy patterns in which AS is sensitive to the output of phrasal phonology. A preliminary typological survey suggests that such patterns are not attested (even though minimally different patterns are) and supports non-optimizing theories such as H1.

The scope of dominant grammatical tone in Izon

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Background. This paper concerns overwriting prosody triggered by a morpho-syntactic context. On this topic, two key proposals were made independently around the same time: Inkelas' (1998) Cophonology analysis of Hausa grammatical tone as 'dominance' (*à la* Kiparsky & Halle 1977, Kiparsky 1984), and Alderete's (1999, 2001) 'Transderivational Antifaithfulness' to capture lexical accent dominance. An example of dominance is found in Hausa, where all input tone are replaced by H tones in the context of the suffix *–ìyáá* FEM. Both models establish an asymmetry: morphologically inner elements cannot be dominant over morphologically outer elements, i.e. Alderete's 'Strict Base Mutation' (and 'Stem Scope' in Inkelas & Zoll 2007).

Both of these cases – and dominance in general – deal with word-level prosody. However, in recent years studies on tone have revealed clear parallels in phrase-level phonology, e.g. Tommo So (Dogon - McPherson 2014, McPherson & Heath 2016) and Kalabari (Ijoid - Harry & Hyman 2014). These studies reveal the same asymmetry: morphologically inner elements (such as lexical heads or inner modifiers) are never dominant over outer modifiers. Rolle (2018) calls this the 'dominant tone asymmetry', stating that in a sequence [x [y]], if x is morpho-syntactically outer compared to y, then y cannot assign a dominant prosodic pattern over x. In this way, the *scope* of this dominant pattern will always be inward material, at any constituency level.

Case study. This asymmetry acts as our working hypothesis. We test this hypothesis with an in-depth investigation of grammatical tone in Izon (Gbarain dialect), an analytic, head-final language of the Ijoid family, based on original fieldwork in Port Harcourt, Nigeria. Previous research on Ijoid establishes two tonemes, H and L (Williamson 1965, 1988, Efere 2001, Harry 2004). Harry & Hyman (2014) show that in the related language Kalabari, there is extensive dominance which complies with the dominant tone asymmetry: e.g. a demonstrative assigns a dominant LH pattern to a noun, and an object deletes tones of the verb and spreads its own.

We tested the following contexts in Izon, which could potentially show tonal dominance.

(1) a. ⟦ Mod [N] ⟧
b. ⟦ [N] Mod ⟧
c. ⟦ Mod [Mod [N]] ⟧
d. ⟦ [Mod [N]] Mod ⟧
e. ⟦ [V] TAM ⟧
f. ⟦ [O[V]] TAM ⟧
g ⟦ [[$_{OBJ}$ Mod [N]] [V]] TAM ⟧
h. ⟦ S [V] ⟧
i. ⟦ V [V] ⟧

[N=noun, V=verb, Mod=modifier, O=object, S=subject, TAM=tense/aspect/mood]

In (1a-d), N is modified by one or more pre- or post-N modifiers, while in (e-g) V appears with an overt TAM enclitic, in either an intransitive or transitive clause. [I don't discuss (h-i) here].

Results. Dominant tone patterns in Izon obey the dominant tone asymmetry. In contexts (1a,c) with pre-N modifiers, the outermost Mod assigns a dominant tone pattern to all inwardly located elements. In contrast in (1b,d), the inner N or Mod does not assign a dominant pattern to an outer Mod, which surfaces with its lexical tones. [Note that for all dominant tone in Izon, the trigger must be to the left of the target]. Parallel facts are seen with verbs: an inwardly located V cannot be dominant over an outwardly-located TAM. Note that in (f-g), the object (a noun) is dominant over the V, and if the noun is modified, the pre-N modifier is dominant over both N and V. In neither case is it dominant over the outer TAM enclitic, which surfaces with its lexical tones. This finding also suggests that objects in Izon are located in a higher specifier position, an 'outward' position compared to the head (argued for independently in Izon – Carstens 2002).

Discussion. First, we will discuss how if an outer Mod in (1b,d) or TAM in (e-g) has no lexical tone, then an inwardly-located element can readily assign it tone. This demonstrates that outer elements are not simply 'extra-prosodic' to tone assignment. Secondly, we take these results to support phrase-level inside-out cyclicity across linguistic modules (Chomsky et al. 1956, Mascaró 1976, Kiparsky 1982, Carstairs 1987, Bobaljik 2000, Embick 2010, Uriagereka 2011).

Doubly morphologically conditioned phonology in Cophonologies by Phase
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Introduction: Some phonological alternations apply only in a subset of lexical categories (Smith 2011), lexical classes (Ito&Mester 1995, 1999; Smith 2001; Pater 2010), or morphological constructions (Orgun 1996; Anttila 2002; Inkelas&Zoll 2005, 2007). This talk examines alternations that require at least two extra-phonological triggers to be present. For example, in Sacapultec Mayan (SM) (DuBois 1985), some, but not all, nouns undergo vowel lengthening when a possessive marker is present. Vowel lengthening only applies when both the appropriate lexical item and the appropriate affix are present. This talk examines multiple doubly conditioned phonological alternations from a diverse set of languages and compares analyses of these phenomena in Indexed Constraint Theory, Cophonology Theory, and Cophonologies by Phase (CBP) (Sande&Jenks 2018), demonstrating that CBP provides the most appropriate set of tools for modeling the data.

Doubly conditioned vowel lenthinging in SM: In Sacapultec Mayan, the final root vowel in some nouns (1a-e) lengthens when preceded by a possessive prefix. based on data from DuBois (1985). Other nouns fail to show this lengthening process (1f-h). Some nouns have final long vowels by default (1i), and such that the lengthening process can lead to neutralization between roots with underlyingly short and long vowels (1c,i).

(1) **Sacapultec lengthening**

a.	ak’	w-a:k’	‘my chicken’
b.	tʃ’e’	ni-tʃ’iː’	‘my dog’
c.	tʃax	ni-tʃaːx	‘my pine’
d.	ab’ax	w-ub’a:x	‘my rock’
e.	mulol	ni-mulu:l	‘my gourd’
f.	otʃ’	w-otʃ’	‘my possum’
g.	am	w-am	‘my spider’
h.	we’	ni-we’	‘my head hair’
i.	tʃaːx	ni-tʃaːx	‘my ashes’

Lengthening fails to occur in the presence of other affixes (see DuBois (1985:181-182) on the lack of lengthening following stative predicate prefixes). Both a noun of the alternating class and a possessive suffix must be present for lengthening to apply.

Doubly conditioned vowel harmony in Guébie: In Guébie (Kru, Côte d’Ivoire), root vowels show complete vowel harmony with affixes: /jɪla$^{3.3}$=ɔ^{2}/, *ask*-3SG.ACC → [jɔlɔ$^{3.2}$], ‘ask him’. This process only applies in the presence of about 1/3 of lexical roots, and in the presence of third-person object enclitics on verbs or plural suffixes on nouns. Other affixes, even phonologically identical ones, do not trigger harmony (Sande 2017).

Analysis: I analyze doubly conditioned phenomena with a weighted constraint phonological grammar which applies at syntactic phase boundaries via CBP. For example, in the default grammar of SM, the weight of DEP (no epenthesis) is 4 and LONGFINALV is 1. Possessive prefixes and alternating roots are lexically associated with the constraint weight adjustment LONGFINALV^{+2}. The presence of one of these triggers is not enough to trigger surface lengthening, but when both are present the weight of LONGFINALV (1+2+2=5) overpowers that of DEP (4) to result in surface lengthening. This cumulative constraint weight adjustment results in doubly conditioned lengthening in SM, and can account for other instances of doubly conditioned phonological effects across languages (e.g. harmony in Guébie).

A contrastivist approach to the emergence of sound inventories

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This paper explores a novel contrastivist approach to the acquisition of phonological features and speech segments. The Contrastivist Hypothesis (CH) holds that 'the phonological component of a language *L* operates only on those features which are necessary to distinguish the phonemes of *L* from one another' (Hall 2007, p. 20). This serves as a kind of null hypothesis – language learners do not posit phonological features above and beyond those that are irrefutably evidenced by lexical contrast, but this leaves open a number of fundamental questions: e.g. where do the phonemes of *L* come from and how are features selected to distinguish them? As discussed by Hall & Hall (2016, p. 4), a complete learning algorithm consistent with the CH 'would need to elaborate what it takes to identify the presence of a phonemic contrast and how the learner selects the features to assign'. I argue the crux of this problem is that the defining relationship between features and segment inventories is the reverse of that implied by the CH – that the sum of generalised features define possible lexical contrasts rather than the sum of contrasts defining a possible set of features.

Building on the insights of emergent feature theory by which abstract features are assigned according to language-specific contrasts and alternations (Mielke 2008), I demonstrate how the acquisition of phonological features and definition of sound inventories can be formalised while maintaining the basic insights of the CH. As a model of phonological acquisition, I adapt certain insights from Westergaard's (2009) model of micro-cues. The key principle is that in the course of language acquisition children generalise small pieces of abstract linguistic structures ('micro-cues') while parsing linguistic input – e.g. a cue for OV word order is generalised as $_{VP}$[DP V]. In the phonological domain, I assume that language learners posit representational micro-cues in the form of emergent, privative features [F]/[G] and prohibited/obligatory *[F, G]/[F, G] feature co-occurrence restrictions according to contrasts in salient phonetic properties, lexical meaning, and phonological behaviour (Cristà, Seidl & Francis 2011). In the way of an illustration, consider the abstract surface patterns in (1). Three representational micro-cues are necessary for the accurate generalisation and acquisition of the patterns in (1). These are i) some feature [F] to express [F] vs. non-F [a] vs. [b] contrasts and [F]-harmony in (1ab), ii) some feature [G] to define [G] vs. non-G [c] vs. [b] contrasts in (1bc), and iii) a prohibited *[F, G] co-occurrence micro-cue to express the lack of a corresponding [G] vs. *[F, G] [c] vs. *[d] contrast/harmony alternation in (1c–e).

(1) **Generalising phonological micro-cues from segmental contrasts/alternations**

	Patterns	**Surface generalisations**	**Micro-cue**
a.	[a...a...a]	[a] vs. [b] ([F] vs. non-F) contrasts/harmony	[F]
b.	[b...b...b]		
c.	[b...c...b]	[c] vs. [b] ([G] vs. non-G) contrasts	[G]
d.	[a...c...a]	[c] vs. *[d] ([G] vs. *[F, G]) contrasts/harmony	*[F, G]
e.	*[a...d...a]		

The generalised micro-cues in (1) accumulate in the course of language acquisition, the sum of which ([F], [G], and *[F, G]) defines the size/shape of the phonemic inventory: i.e. [F] /a/, [G] /c/, non-F and non-G /b/, and *[F, G] */d/. Consistent with the CH, it follows from this that the set of active phonological features and the sound inventory shape will correlate, but this method provides a much more explicit model of how the CH pairs with the emergence of features/segments and the acquisition of phonological grammars. Using a comparative study of 5V Bantu vowel harmony systems, I provide a practical illustration of this approach and its predicted typology.

Allomorph selection precedes phonology: evidence from Yindjibarndi

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Models of the phonology-morphology interface differ in their assumptions regarding the timing of phonologically-conditioned suppletive allomorphy (PCSA) and regular phonology. Some argue that PCSA is a morphological operation that precedes regular phonology (e.g. Paster 2006); others argue that both are governed by the same constraint-based phonological grammar (e.g. Mascaró 2007). This paper **(i)** discusses a case of PCSA in Yindjibarndi (Pama-Nyungan, Wordick 1982) and **(ii)** shows that a constraint-based analysis integrating PCSA with regular phonology is difficult to formalize: the ranking necessary to derive allomorph selection is incompatible with the ranking necessary for regular phonology. I conclude that the apparent failure of analyses integrating the two supports theories of PCSA where allomorph selection precedes regular phonology.

(i) In Yindjibarndi, the form of the locative case suffix for common nouns depends on prosodic and segmental factors. (The instrumental case suffix behaves identically but is not discussed here.) When attached to a stem that is C-final and/or contains 3+ moras, the suffix is /-la/ (or [-Xa] on C-final stems, where X place-assimilates to the stem's C). When attached to a shorter V-final stem, the suffix is /-ŋka/. /-ŋka/ is also subject to further alternation, as Yindjibarndi disallows sequences of nasal-stop clusters (NCs). Following an NCV-final word, the suffixal nasal deletes and /-ŋka/ maps to [-(w)a] (with [(w)] resulting from predictable lenition or deletion of intervocalic [k].)

Profile of common noun (NB: only Vs are moraic)			**Allomorph of locative suffix**				**Examples** (from Wordick 1982)	
			/-ŋka/		/-la/			
			[-ŋka]	[-(w)a]	[-la]	[-Xa]		
2μ	V-final	NCV-final		✓			[wuntu-wa]	'river-LOC'
							[waɳʈa-a]	'stick-LOC'
		Other	✓				[ŋuɾa-ŋka]	'place-LOC'
	C-final					✓	[kaɾwaɳ-ʈa]	'summer-LOC'
3+μ					✓	✓	[lo:pu-la]	'Friday-LOC'
							[ʈanpaʈan-ta]	'coolamon-LOC'

I assume that /-la/ is the default allomorph, with /-ŋka/ preferred in shorter words; prosodically-conditioned suppletion of this type occurs in many related languages (Paster 2006:174-205).

(ii) The 2μ nouns pose difficulties for a unified analysis of PCSA and regular phonology. For C-final nouns, using /-la/ is phonotactically optimizing, as suffixing /-ŋka/ in this context would yield an illicit CCC cluster. Thus cases like **(1)** show that using /-la/ for 2μ nouns (violating *2μ-/la/, a cover constraint) is better than creating a CCC cluster (violating *CCC) or deleting a C (violating MAX). The prediction is that using /-la/ should always be preferable to deleting a C from /-ŋka/, but cases like **(2)** falsify this prediction: C deletion is the preferred way to satisfy *NCVNC.

1. /kaɾwaɳ-LOC/	*CCC	MAX	*2μ-/la/
> a. karwaɳ-ʈa			*
b. karwaɳ-ŋka	*!		
c. karwaɳ-ka		*!	

2. /wuntu-LOC/	*NCVNC	MAX	*2μ-/la/
💣 a. wuntu-la			*
b. wuntu-ŋka	*!		
☹ c. wuntu-wa		*!	

Note that a proposal to rule out (1c) due to heterorganic [ɳk] is at odds with attested clusters within stems (e.g. [paɳka] 'female bungarra') and across other boundaries (e.g. [kawuɳ-ku] 'skin-OBJ').

An analysis where morphological and phonological operations are serially interleaved (à la Wolf 2008) captures (1-2) but fails due to a lookahead problem posed by the topicalization clitic /-mpa/: /-mpa/ can only be added to C-final forms if /m/ will delete to satisfy *NCVNC (/ʈaɳkaɾ-mpa/ > [ʈaɳkar-pa], but /ʈawaɾ-mpa/ > ⊙). By contrast, the analysis of these data is straightforward in a model where allomorph selection occurs in a component of the grammar that precedes phonology.

Three Patterns of Morphology in the Jiaoliao Mandarin of Chinese

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Abstract This paper describes three patterns of morphology in the Jiaoliao Mandarin of Chinese, including tonal alternation, -ə/-mə allomorphy suffixation, and retroflexion with rime change, with a goal to elucidate aspects of the morpho-phonology interface.

Introduction Jiaoliao Mandarin is spoken in the eastern Shandong province and the northeastern area of China. This study describes the morphology of Rushan, a dialect of Jiaoliao spoken in Shandong. It has very prevalent retroflexion and -ə/-mə suffixation in both derivational and inflectional contexts. In addition, it exhibits tonal alternation in word formation.

Tonal alternation: Rushan Jiaoliao has three tones: HM53, L213, and M33. Tonal alternation can express change of category and meaning: [pɛ33] '$_{V.}$ lose' > [pɛ53] '$_{Adj.}$ become on bad terms', [sɤ213] '$_{V.}$ push' > [sɤ53] '$_{Adj.}$ crowded', [tʂʰai213] '$_{V.}$ step, trample' > [tʂʰai53] '$_{Adj.}$ muddy', [nai213] '$_{N.}$ milk' > [nai53] '$_{V.}$ to breast-feed'. ***Tone deletion*** is another way to form new words, e.g., address terms: [ta33 jɛ53] 'grandfather's older brother', [ta33 jɛ] 'father's older brother', [çiau213 ʃu213] 'father's younger brother', [çiau213 ʃu] 'husband's younger brother', [ku53] 'father's sister', [çiau213 ku] 'husband's younger sister', [i53] 'mother's sister', [çiau213 i] 'wife's younger sister'. Other examples: [luo33 kuor53] '$_{N.}$ one with bent back', [luo33 ku] '$_{Adj.}$ with back bent', [tʰiau33 tsʰi33] '$_{V.}$ scrutinize', [tʰiau33 tsʰi] '$_{Adj.}$ picky'.

Allomorphy suffixation: The suffix -ə has an allomorph -mə when the stem ends with a coronal nasal /n/. The same exponence is used in both derivational and inflectional environment, (i) as a form of ***nominalization***, [tɕian213-mə] 'scissor', [tʰɛn213-mə] 'blanket', [lan53-mə] 'mountain bush', [təŋ33-ə] 'bench', [tʂuo213-ə] 'desk', which may denote change of meaning, [ciou33] 'mother's brother', [ciou33-ə] 'wife's brother', [mən53] 'door', [mən53-mə] 'household'; (ii) indicating ***progressive*** and ***durative aspects***, [kʰɛn33-mə] 'watch-PROG', [tʃʰaŋ33-ə kuor53] 'sing-PROG song', [çia33-ə çyɛ213] 'fall-PROG snow', [min213-mə tsei213] 'pursed-DUR mouth', [liaŋ33-ə təŋ53] 'bright-DUR light', [tɕi213-ə tsou] 'hurried- DUR go'. The -mə suffix can merge with the preceding syllable into the structure of (C)Vm.

Rime change: The -/r/ retroflexion may cause rime change. It expresses various grammatical meanings including: (i) ***diminutive***, e.g., [çiau213 tʃyr53] 'piggy', [çiau213 təŋr53] 'small bench', where it often co-occurs with the morpheme [çiau213] 'small, little', in contrast to the -ə/-mə nominalizing suffix. When the two overlap in nominalization such as in [tʃʰaŋ33] '$_{V.}$ to sing' vs. [tʃʰãr33] '$_{N.}$ song', [çiau33] '$_{V.}$ to laugh' vs. [çiaur33] '$_{N.}$ joke', retroflexion is always primarily associated with diminutive meaning; (ii) ***perfective aspect***, e.g., [taur33 tɕia53] 'arrive-PERF home', [çiɤr213 çin33] 'write-PERF letter', [piɛ̃r33 jãr33] 'change-PERF look'; (iii) ***verbal direction***, e.g., [wər33 kuor53] 'to put *in*-pot', [sõr nar] 'to send *to*-where'.

Analysis: Following Zimmermann (2016) and Yip (2002), this paper analyzes tonal alternation as an affixation of a morphological tone, or delinking of tonal association in tone deletion. The underlying representation of -ə/-mə allomorph has a floating labial nasal that surfaces only in the presence of a preceding coronal nasal. When the nasal suffix merges into the stem coda, it obeys the constraint REALIZE MORPHEME (van Oostendorp 2005), which requires the input morpheme to have phonological correspondence in the output. The -/r/ retroflexion is realized as rime change, which is affixation of a retroflex feature that is docked on the stem vowel. This paper supports the approach of *Generalized Non-linear Affixation* (Bermúdez-Otero 2012) that non-concatenative morphology can follow from the affixation of autosegmental elements.

Disentangling L1 and L2 effects in artificial language learning

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Artificial Grammar Learning research (AGL) has uncovered many universal learning biases: while experiments investigate only a subgroup of speakers of one language, implications are made for speakers of other languages (e.g. Finley 2012). It is far from clear that learning differences can be fully attributed to universal biases without the influence of L1 transfer. In fact, recent studies have started to address this with control groups or items (e.g. White et. al., in press). The aim of the present study is to shed light on whether we have been underestimating the importance and the specific effect of L1 in AGL and we did so by testing learners of two typologically different languages, namely German and Mandarin Chinese.

We focused on a simple consonant identity pattern which demonstrated rapid generalization by English speakers (Linzen & Gallagher, 2017). Participants were trained with pseudowords of an identity pattern (C_aVC_aV) and a non-identity pattern (C_aVC_bV) and it was found that only the identity pattern was learned. To undercover any potential L1 effects, for each language group, we carefully selected a range of C_aVC_aV and C_aVC_bV patterns across the lexical space by sampling from the lexical frequency spectrum using normalized token and type frequencies (n.b. this does not restrict us to examining only lexical frequency effects) and broadly divided the items into two frequency groups (High and Low) as a between-subjects factor. After training, participants are asked to either accept or reject a novel item (which conforms to either pattern) as part of the language.

In this talk, we will report on the German component of the study and a reanalysis of the English data. The data collection of the Chinese component is underway. 232 German participants completed an online experiment. As a first result, we can confirm for Germans what previously has been found for English: participants take up the identity pattern most readily and are able to generalize it to new contexts. To measure a learner's L1 (German) and L2 (the training pseudowords) influence on the task, we computed a number of lexical variables over the linguistic input of the learner. We approximated the L1 input with a phonetically transcribed German lexicon with frequency information and the L2 input with the mini-lexicon exposed to each learner. For both the L1 and L2 lexicons, we computed the lexical *activation diversity* variable derived from a Naive Discriminative Learning (NDL) model trained on the respective lexicons (Milin et. al. 2017). Second, we computed *neighbourhood density* using the Generalized Neighborhood Model (Bailey, & Hahn, 2001) over the L1 and L2 lexicons separately. Finally, we computed the *normalized type frequency* of our items over the L1 lexicon (not applicable for L2). Furthermore, to measure the time course of L1/L2 effects, we included trial number and reaction time as additional variables. As for the German results we observe 1) a consistent anti-L1 effect (contrary to our expectation) and 2) a consistent pro-L2 effect. We found that the higher the L1 neighbourhood density, activation diversity and normalized type frequency, the **lower** the likelihood of a pseudoword to be judged as part of the artificial language, whereas the L2 neighbourhood density and activation diversity have the opposite effect. Furthermore, the strength of the anti-L1 and pro-L2 effects interacts with the broad high-low frequency condition – we observed a stronger anti-L1 effect and a weaker pro-L2 effect in the high frequency condition and vice-versa. Time-course variables suggest that learners are less likely to accept a pseudoword over time within trials (reaction time) and across trials (trial number) which we view as a memory-decay/recency effect. A preliminary analysis of the English data set revealed similar effects.

Together, our in-depth analyses of L1 and L2 effects in three languages will not only better our understanding of L2 language learning but also on the detrimental effect of ignoring L1 when making claims on the presence/absence of any universal learning preferences with this increasingly popular paradigm in phonology.

Two geminates, one syllable: Schneider's Law is what happens when you share

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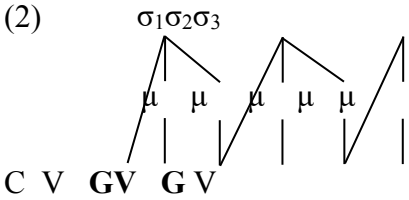
Schneider's Law (henceforth SL) has originally been proposed to describe the ban on consecutive CC-sequences in various dialects of Inuktitut (Schneider 1966; Massenet 1976), and was later re-interpreted as a ban on syllable-adjacent geminates (G), i.e. *GVG (Dresher and Johns 1995). More recently, Jaker (2012) has suggested a similar prohibition in Dogrib. SL-violating forms are repaired by degemination of the second geminate (1b).

(1) Labrador Inuttut (Rose et al. 2012)

a. *No SL*: /nunak-kkut/ → [nunakkut]	*[nunakut]	"through/across the land"
b. *SL application*: /illu(k)-kkut/→ [illu**k**ut]	*[illukkut]	"through the house"

We claim that the reasoning behind SL degemination is excessive syllable markedness; first, the existence of Gs always implies the presence of singletons (Maddieson 1984), a fact pointing to geminate markedness. Second, because the typical medial G involves a flopped structure (Hayes 1989, Davis 1999, a.o) – itself marked for a number of reasons (see Keer 1999) – that straddles syllable boundaries, a GVG sequence is thus rendered 'super-marked' in the sense that it involves a single syllable (σ_2) whose margins at both its edges (onset, coda) are occupied by two (flopped) geminates as in (2).

(2)



Seen in this light, we further propose that SL is also attested in other languages, including Trukese and Japanese. Previous accounts have treated the lack of two geminates in a word in these languages as an OCP effect, captured by a constraint like OCP-GEM (Davis and Torretta 1998; Muller 1999, Topintzi 2010, Ito et al. 2017). We suggest instead the constraint $*_G\sigma_G$ = "A syllable cannot host (parts of) geminates at both its edges". This directly explains why the ban on double Gs holds over *consecutive* Gs, but not over two Gs at longer distances. For instance, Italian [zu**kk**ó**tt**o] "a type of cake" is adapted as [zu**k**ó**tt**o] in Japanese with SL-degemination, but [pa**nn**akó**tt**a] "a type of dessert" remains intact (Morimoto 2015), because the Gs do not occupy the margins of the same syllable. Since the OCP normally allows for long-distance violations, this effect is ordinarily missed and has to be handled by stipulative formulations of OCP-GEM such as: "Geminates in successive syllables are prohibited" (Ito et al. 2017: 311).Enlistment of the OCP also conceptually views SL as a dissimilatory phenomenon, but no featural effect is at play here. Even if the feature [length] were to be invoked, its activity seems otherwise unattested in the typology of dissimilation (Bennett 2015: 330).

We conclude by offering an OT analysis of SL focussing on the Inuktitut and Japanese data, we address possible empirical complications (e.g. SL and extensive assimilation of CC-clusters in Inuktitut, initial Gs in Trukese) and discuss the factors that decide which consonant (G_1 or G_2) degeminates.

Place assimilation of sibilant fricatives in Logical Phonology

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Introduction. The main research question in this paper is the following: How to describe an aspect of an idealized Croatian speaker's phonological knowledge that accounts for place assimilation of sibilant fricatives? The paper addresses this question from the perspective of Logical Phonology (based on Bale & Reiss 2018), with the purpose of empirically testing this newly developed phonological framework.

Data. Croatian sibilant fricatives, alveolars /s, z/ and postalveolars /ʃ, ʒ/, are subjected to place assimilation in two different contexts with two different results, as shown in (1) (Težak *et al.* 2007; Marković 2013; Volenec 2018).

(1)
a. /**s**-t͡ʃep-a-ti/ → [**ʃ**t͡ʃepati] 'to grab'
b. /**s** d͡ʒep-om/ → [**ʃ**d͡ʒepom] 'with pocket
c. /ra**z**-t͡ʃlan-i-ti/ → [ra**ʒ**t͡ʃlaniti] 'to parse'
d. /i**z**-ʃar-a-ti/ → [i**ʒ**ʃarati] 'to mottle'
e. /ra**z**-ʒar-i-ti/ → [ra**ʒ**ʒariti] 'to kindle'
f. /no**s**-ɲ-a/ → [no**ɕ**ɲa] 'garment'
g. /pa**z**-ʎiʊ/ → [pa**ʑ**ʎiʊ] 'careful'
h. /ʊa**ʃ** t͡ɕe/ → [ʊa**ɕ**t͡ɕe] 'you$_{(ACC.)}$ will'
i. /kri**ʒ** t͡ɕe/ → [kri**ʑ**t͡ɕe] 'cross will'
j. /bli**z**-ɲ-i/ → [bli**ʑ**ɲi] 'close'

Before postalveolars /t͡ʃ, d͡ʒ, ʃ, ʒ/, sibilant fricatives surface as postalveolars [ʃ, ʒ] (1a–e). Before alveolo-palatals /t͡ɕ, d͡ʑ/ and palatals /ʎ, ɲ/, sibilant fricatives surface as alveolo-palatals [ɕ, ʑ] (1f–j). The alternation is fully productive and blind to morphology (Marković 2013: 60).

Analysis. Logical Phonology (LP) is a substance-free framework for describing phonological knowledge, grounded in set theory. Phonological segments are taken to be unstructured, unordered sets of valued features; natural classes are, then, sets of sets. Phonological computation works by way of logical operations. The two operations that are relevant for the present analysis are defined in (2) and (3).

(2) Subtraction (–): If *A* and *B* are sets, then *A* – *B* results in the set that contains all and only the members of *A* that are not members of *B*.

(3) Unification (⊔): If *A* and *B* are sets, then *A* ⊔ *B* results in the smallest set that contains all the members of *A* and all the members of *B*. The operation is undefined if *A* ⊔ *B* is inconsistent.

Treating place assimilation as a two-step process (Harris 1984), the operation in (4) first subtracts relevant place features from sibilant fricatives. Then, by way of set unification, the operation in (5) correctly accounts for place assimilation. Natural classes (sets of segments, in this case sibilant fricatives) are enclosed in slanted brackets, sets of features are enclosed in curly brackets.

(4) /+COR, +CONT, –SON/ – {+COR, +ANT} / __ {–ANT, –BACK, –SON}

(5) /+CONT, –SON/ ⊔ {αCOR, – ANT} / __ {αCOR, –ANT, –BACK, –SON}

Examples (1a–e) are accounted for when α is +, while examples (1f–j) are accounted for when α is –.

Discussion. Volenec (2018: §6.2) analyzed the data-set in (1) in Classical Optimality Theory, following Jun (2004), and in Harmonic Serialism, following McCarthy (2008). Jun's (2004) *universal* hierarchy PRES(PL([+CONT]_C)) » PRES(PL([STOP]_C)) » PRES(PL([NASAL]_C)), which predicts that if fricatives assimilate in place then so must oral stops, was empirically falsified by the fact that Croatian oral stops never assimilate in place, while fricatives do. McCarthy's (2008) approach was shown to require *ad hoc* inventions, namely the positing of extremely specific, phonetically and typologically ungrounded versions of CODA-COND in order to prevent overgeneration. In contrast, the operations in (4) and (5) explicitly and economically describe the phonological knowledge of an idealized Croatian speaker with respect to place assimilation of sibilant fricatives, obviating both the empirical shortcomings of Jun (2004) and the need for ungrounded, *ad hoc* constraints. LP provides a simple, logically grounded framework for accounting for the same data while avoiding problems present in corresponding OT analyses.

Serbian Pitch Accent from a Cross-Dialectal Perspective: Evidence for a Domain-Generalization Effect

Draga Zec (Cornell University) and Elizabeth Zsiga (Georgetown University)

In this presentation we investigate the realization of pitch accent in four Neo-štokavian dialects of Serbian: Novi Sad (NS, spoken in the north), Belgrade (B, spoken in the capital), Valjevo (V, central west), and Čačak (C, southwest) idioms. Specifically, we investigate the phenomenon of "retraction to stress," in which a lexically specified H tone retracts to a preceding stressed syllable. Retraction to stress does not occur in NS, occurs only as a phrase-final effect in B, occurs consistently in word-final and variably in word-medial position in V, and applies consistently in all positions in C. We thus argue for a dialect continuum, in which a change that began as a phrase-final effect of tonal crowding, as in B, is generalized to the word-final domain in V and, additionally, to the foot-final domain in C, providing further evidence for "domain generalization" as an important phonological process, as argued in Becker (1977), Hyman (1978), and Myers & Padgett (2014).

In all four dialects, the distribution of stress is predictable from the locus of H, with stress coinciding with H on the word-initial syllable (Falling accent), otherwise immediately preceding the syllable associated with H (Rising accent). We present acoustic data on the realization of pitch accent in these four dialects, focusing on the Rising accent, in which, in lexical representations, the stressed syllable *immediately precedes* the syllable with lexical H. Our results are shown in Figs. 1 – 3. In NS (black lines), pitch maxima correspond to the lexical locus of H in all positions. In phrase-final position (Fig. 1), NS is the only dialect in which lexical H is realized on the final syllable despite the presence of intonational L%. In B (blue dashed lines), H is realized faithfully in all positions other than phrase-finally, where H on a final syllable retracts to the preceding (stressed) syllable under the pressure of intonational L%. In V (green dotted lines) retraction takes place in both phrase-final (Fig. 1) and word-final but phrase-medial (Fig. 2) position, even though there is no phonological trigger in phrase-medial positon. Finally, in C (red dotted lines), retraction to stress is consistent, even when the lexical H is non-final in both the word and the phrase (Fig. 3).

In sum, the dialect continuum we present here is as follows: NS represents faithfulness to lexical specification in all positions. B demonstrates the phonetic impetus of the retraction effect under pressure from the intonational L%. In V, the phrase-final effect is generalized to word-final position, and in C, retraction to stress has become completely general. Thus unlike NS and B, V and C illustrate incremental stages of the domain narrowing of H retraction: from generalizing to word-final in V, to further generalizing to all positions in C.

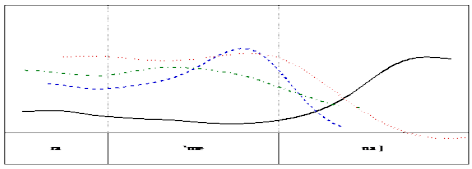

Fig 1. Lexical H on phrase-final syllable. Retraction in C, V, B but not NS.

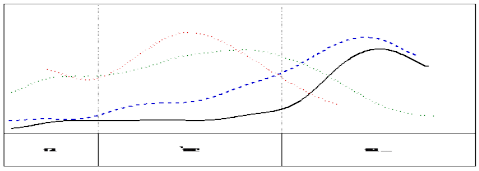

Fig. 2. Lexical H is word-final but not phrase-final. Retraction in C, V but not B, NS.

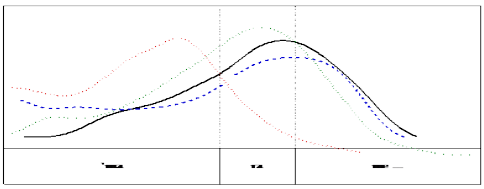

Fig 3. Lexical H is word-medial and phrase medial. Retraction in C, not in V, B, NS.

N.B. *In Figs. 1, 2, 3, pitch tracks are aligned at the end of the stressed syllable.*

First come – first served: The serial interaction of feet and tone

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Main Claim The serial interaction of optimizing metrical and tonal structure can predict positionally restricted templatic accent systems. Inside Harmonic Serialism, different orders of metrical and tonal optimization follow from whether floating tones are present (=optimization of tones first) or absent (=optimization of metrical structure first) in underlying representations.

Positionally restricted templatic accent systems (=PTAS) Many lexical accent systems restrict prominent elements to certain positions within a word. A simple account of these positions as being underlyingly stressed or tonally specified is challenged by the existence of non-local templatic systems. An example is Mayo (Hagberg, 1989, 2006; Hyman, 2009; Spahr, 2016) where the first or second vowel in every word is high-toned (1). Though this accented position is lexically determined by the stem, it is crucially not necessarily part of the stem in morphologically complex forms (1-II+III). The mirror image of this system with stem-determined accent restricted to the final or penult position which is preserved under suffixation can be found in Tagalog (Soberano, 1980; French, 1988; Hagberg, 2006).

(1) *Mayo (Hagberg, 2006, 73)*

a. 'will harvest'	b. 'will play'	
I. ch**ú**pnake	I. ponn**á**ke	TRNS
II. h**í**-chupnake	II. hi-p**ó**nnake	INTR
III. h**í**-hi-chupnake	III. hi-h**í**-ponnake	'always...'

PTAS as serial interaction of foot and tone assignment Following arguments like Hyman (2009) or Köhnlein (2019) that positionally restricted accent systems are always reanalysable as metrical, tonal, or mixed metrical and tonal systems, an account for PTAS is developed that is based on a serial interaction of foot structure assignment and association of tones to foot heads. The framework of Harmonic Serialism (e.g. McCarthy, 2008*a*,*b*, 2010; Elfner, 2009, 2016; Torres-Tamarit, 2012) straightforwardly predicts order differences of such operations since underlying structure might be optimized before inserted default structure is optimized. This derives PTAS from the ranking of independently motivated constraints on metrical structure and its interaction with tone (e.g. de Lacy, 2002). Lexical contrasts can then be reduced to a tonal contrast: If a floating tone is part of the underlying representation, it has to be associated first (2-ii-B), whereas foot structure is assigned first in case no floating tones are present (2-i-C). Crucially, this order predicts different preferred positions for tones: Ideally, tones are initial (H>#_ 'Every H wants to be associated with the initial TBU.'), but if an unmarked iambic binary foot is already present, the tone has to associate to the second TBU given that this is the head of the foot (*NHD/H 'No H on a foot-non-head.').

(2)

	i. No H	ii. Floating H
A. Morpheme Concatenation		
	h i - p o n n a k e	H h i - c h u p n a k e
B. Floating H-association: *FLTT ≫ PRSσ		
	h i p o n n a k e	H h i c h u p n a k e
C. Foot assignment: *NHD/H ≫ FTBIN		
	(h i p o n)$_\Phi$ n a k e	H (h i)$_\Phi$ c h u p n a k e
D. Insertion of H on foot head		
	H (h i p o n)$_\Phi$ n a k e	H (h i)$_\Phi$ c h u p n a k e

Discussion Parallel accounts have problems in deriving PTAS since they need to lexically specify a templatic accent that 'floats' away from the morpheme it was underlyingly part of. Existing accounts thus rely on cyclic models with opposing accent assignment rules in the cyclic and non-cyclic component of one language (Hagberg, 2006). In contrast, this HS account straightforwardly predict PTAS from a single ranking of standard constraints on metrical structure and tones. This serial account can also be extended to other challenging positionally restricted accent systems like Goizueta Basque where H- or L-tones occur in metrically restricted positions (Hualde et al., 2008). The asymmetrical preference for certain accent types in Goizueta Basque can follow if floating L- and H-tones have different default positions resulting from being optimized at different stages of the derivation.

Poster papers

Diagnosis of vowel intrusion versus vowel epenthesis in two Arabic dialects

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Speakers of Arabic dialects are known to insert vowels to break up illicit consonant clusters (Broselow, 1991; Kiparsky, 2003; Watson, 2007) but in fact, these vowels have been shown to vary in their underlying status as epenthetic or intrusive. An epenthetic vowel is a phonological unit used to modify illegal structures whereas an intrusive vowel is a phonetic transition "produced between consonants through a retiming of existing articulatory gestures" (Hall, 2006, p.388). In this paper, we investigate the distribution and status of inserted vowels in two Saudi varieties: Bisha Arabic (BA) for the first time, and Makkah Arabic (MA).

Hall (2006) lists some diagnostics of intrusive and epenthetic vowels. The two main diagnostics are: i) intrusive vowels should be a schwa or a copy of the nearby vowel whereas epenthetic vowels are not restricted to schwa (although they could be a copy of nearby vowels); ii) intrusive vowels generally occur in heterorganic clusters, but epenthetic vowels are not affected by the place of articulation of consonants.

Using these diagnostics, consonant sequences in different positions were tested in BA and MA. We present here the results of qualitative (auditory impression) analysis of the presence versus the absence of a vowel to break up potential consonant clusters in word-initial, medial and final position in BA and MA. Two groups of male speakers (25 BA/ 29 MA) aged 18-22 years produced 42 target items in which the sonority slope of potential clusters was systematically varied, first in isolation in a picture-naming task, and then in connected speech in a sentence context (presented in Arabic script).

Table 1: % of clusters.

	Site	% of clusters
BA	onset	51
	coda	55
	med.	20
MA	onset	17
	coda	51
	med.	13

Table 2: Sonority effect on % clusters.

	Site	Sonority		
		Fall.	Plat.	Ris.
BA	onset	35	66	51
	coda	100	62	4
	med.			
MA	onset	14	21	16
	coda	100	50	2
	med.			

Table 3: Vowel quality (as % of all inserted vowels).

	Site	Intrusive	Epenthetic			
		[ə]	[ə]	[u]	[a]	[i]
BA	onset	97				
	coda			8	19	24
	med.		100			
MA	onset	85				
	coda			27	14	13
	med.				92	

As presented in table (1), results indicate that BA allows onset clusters to a greater extent than MA. These clusters are affected by sonority slope especially plateau sonority clusters (e.g. [kta:b] "book") as shown in table (2). Word-finally, both dialects allow sequences with falling sonority but ban complex codas with rising sonority. Plateau sonority clusters are exhibited in both dialects especially obstruent-obstruent clusters as in [misk] "musk". Word-medially, consonant clusters are banned in both dialects as shown in table (1).

As for the quality of inserted vowels, Table (3) shows that word-initially the inserted vowel is largely [ə] in both dialects, which matches the diagnostics of instrusive vowels: it is schwa and it breaks up heterogenic clusters. Word-medially, schwa is employed by BA speakers whereas MA used the low vowel [a]: [gult.lih < gul.təlih ~ gul.taluh] "I said to him". We propose that these word-medial [ə, a] are both epenthetic vowels because they occur to break up a homorganic potential cluster [t-l] and insertion of the vowel is not optional. In word-final position, the vowels [i, u, a] seem to be lexical vowels (apart from three outlier items: [ʃibil] "cub", [xuʃum] "nose", [baħar] "sea"): in all other cases they fit the diagnostics of epenthetic vowels because they are copied from nearby vowels and break up marked clusters.

In sum, the phonotactics of BA and MA are parallel, apart from their treatment of potential onset clusters, which are less restricted in BA than in MA. The inserted vowels are mainly lexical and epenthetic, for coda and medial clusters. However, the vowels inserted to break up potential onset clusters in MA and BA fit the diagnostic properties of intrusive vowels, which in turn suggests that both dialects allow underlying complex onsets.

Conspiracies in California: A reconsideration of Yokuts

Samuel Andersson (Yale), Ollie Sayeed (Penn), Bridget Samuels (USC) and Bert Vaux (Cambridge)

Introduction. The term "conspiracy" describes a situation in which separate phonological processes 'conspire' to achieve a homogeneous target. "[T]he conspiracy problem constitute[d] the single biggest phonological influence on the emergence of OT" (McCarthy 2002: 54), which provides a unified account of conspiracies by separating phonological targets from repairs. A classic case study of conspiracies is Yokuts syllable structure (Newman 1944: 27-28, Kisseberth 1970), driven by *Complex. We identify some empirical problems with the Yokuts analysis, and two general challenges for OT accounts of conspiracies. In a conspiracy, "the same markedness constraint [is] satisfied in different ways" (McCarthy 2002: 95; see also Kager 1999, Gouskova 2009 for the requirement of a *single* high-ranked constraint); the same constraint triggers different repairs in different environments. If *multiple* markedness constraints (in addition to *Complex; Heinz 2008) are required to derive the surface patterns of Yokuts, then it does not have a conspiracy because it does not show "homogeneity of target" (McCarthy 2002: 94ff).

Empirical problems. Yokuts processes conspire towards CVV or CVC syllables (Newman 1944: 27-28; Zoll 1993). This cannot be accounted for by using *Complex alone. With this constraint highly ranked, the grammar does not rule out onsetless syllables (which requires Onset), nor CVVC syllables (which requires *Superheavy). *Complex does not define the targets of the conspiracy on its own. Additionally, nativized loanwords can violate *Complex, e.g. [eskwela] 'school' (Weigel 2005: 77; see Blevins 2004 for additional violations of Yokuts phonotactic restrictions). High-ranked *Complex is neither sufficient to drive the conspiracy, nor justified by the Yokuts data.

Acquisition and subconstraint obviation. OT learning algorithms (Boersma & Hayes 2001, Prince & Tesar 2004, Tesar & Smolensky 1993) do not contain biases towards functional conspiracies. The learner mechanically reranks constraints until the grammar generates the input data. If OT does not predict that learners *innovate* conspiracies, OT has no explanation for the existence of conspiracies compared to a rule-based alternative.

Languages with CCVC syllable structure (e.g. Darai; Kotapish & Kotapish 1973) require ranking of *Complex subconstraints such that *ComplexCoda >> F[aithfulness] >> *ComplexOnset. Yokuts disallows both #CC and CC# (Kisseberth 1970: 291, 294), meaning both more specific constraints are highly ranked, yet *Complex should still be assumed to exist (see Padgett 1995, Ito & Mester 2003). Unless *Complex outranks these subconstraints, it cannot be said to drive the conspiracy. Under the algorithm of Tesar & Smolensky (1993), the child would learn that all members of the complex coda constraint family are tied in the top stratum, meaning *Complex is not always responsible for the surface pattern. Alternatively, with a fixed scale partition (Clements 1992) and Paninian ranking, the subconstraints will always outrank their parent.

Conclusion. The Yokuts case is not a true example of "homogeneity of target" (McCarthy 2002), and requires multiple markedness constraints to generate the surface pattern. This is equivalent to rule-based approaches, which require multiple rules to generate the surface pattern. According to the currently available learning algorithms in OT, specific subconstraints will either end up tied with the more general *Complex, or even outrank it. Moreover, if learners lack any bias towards grammars involving conspiracies, apparent conspiracies should not be more common under OT than under a rule-based theory. If this type of reasoning can be extended beyond Yokuts, it would cast doubt on the traditional implementation of conspiracies using single OT constraints.

Is free variation always free? Evidence from Greek, Italian, and Hebrew

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This paper offers a cross-linguistic account for variation phenomena conditioned by register. We focus on (a) the realization of the high vowel /i/ in hiatus environments in Greek and Italian and (b) the processes of manner dissimilation and voice assimilation affecting adjacent obstruents in Greek and Hebrew. Our analysis is couched within the *Noisy Harmonic Grammar* framework (NHG, Coetzee 2009; Coetzee & Pater 2011; Boersma & Pater 2016).

The data: In hiatus environments, the vowel /i/ in Greek is normally realized as [i] and contrasts with the glide /j/, which is realized as [j] or further strengthened to a fricative consonant (e.g. Topintzi & Baltazani 2016). This contrast is demonstrated by minimal pairs, e.g. [áð**i**a] (/að**i**a/ 'leave') vs. [áð**j**a] (/að**j**a/ 'empty.FEM.SG/NEUT.PL'). However, in everyday language the distinction is difficult to notice, since /i/ may be pronounced as [j] or even [j̟] next to a vowel: *i àð*[i]*á mu* vs. *i áð*[j]*a mu* / *i áð*[j̟]*a mu* 'my leave' (Fliatouras & Anastassiadi-Symeonidi 2004). Similarly, in some Italian varieties, although the usual practice is to pronounce such vowel sequences with a glide, e.g. *avv*[ja]*mento* 'start', *d*[já]*logo* 'dialog', in careful and/or slow speech /i/ may resist glide formation and surface as a high vowel, i.e. *avv*[ia]*mento*, *d*[iá]*logo* (van der Veer 2006: 74; Krämer 2009: 88; *DiPI*).

Another example that instantiates the importance of register in grammar processing comes from cases of manner dissimilation between adjacent voiceless obstruents in Greek. For instance, while in everyday speech the standard pronunciations of /katara**kt**is/ 'waterfall' and /**fθ**inos/ 'cheap' are [katará**xt**is] and [**ft**inós], respectively, in formal contexts the faithful realizations [katará**kt**is] and [**fθ**inós] are also attested (see Anastassiadi-Symeonidi & Fliatouras 2004; Mitsiaki 2014). Comparable variation patterns are found in Hebrew, where adjacent consonants with different values for [voice] may undergo assimilation in everyday speech, e.g. [ji**sg**ór]~[ji**zg**ór] (/ji**sg**or/ 'he will close'); [ji**dk**ór]~[ji**tk**ór] (/ji**dk**or/ 'he will stab') (Bolozky 1997: 290; see also Samokhina 2004; Dekel 2014).

The analysis: Adopting NHG, we posit that the weight of a constraint may be modified by adding *noise*, which in our case formalizes an extra-grammatical factor, i.e. register. For a given input, the constraint system may yield two different, equally harmonic outputs (e.g. [áðia]~[áðj/ja], [diálogo]~[djálogo], [kataráktis]~[kataráxtis], [jisgór]~[jizgór]) due to the balanced violation of markedness constraints (i.e. *VV, OCP[cont], *$C_{[a\text{voi}]}C_{[b\text{voi}]}$) on the one hand and faithfulness constraints (i.e. IDENT[voc], IDENT[cont], IDENT[voi]) on the other, thus allowing free variation to emerge. However, if noise reflecting formal register is applied to the relevant markedness constraint thus decreasing its weight, this balance is disturbed, as the harmony value of the output that violates this constraint (i.e. [áðia], [diálogo], [kataráktis], [lisgór]) increases significantly. As a result, despite being more marked compared to the less faithful variant, the faithful output ends up having a greater probability to be selected. In other words, the free choice between two well-formed outputs offered in neutral contexts is limited when formal register comes into play.

Final Obstruent Devoicing and Vowel Length in Northern Italo-Romance Varieties.

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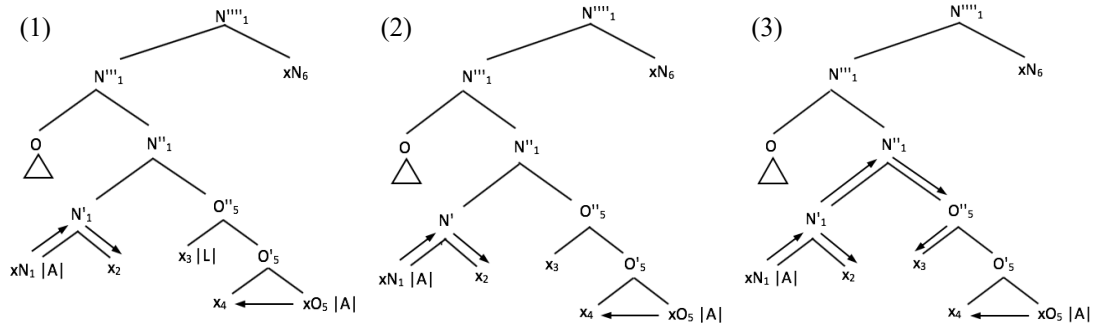
This paper considers the relationship between vowel length and final obstruent devoicing in Northern Italo-Romance varieties with the aim to investigate its phonological properties and formalisation, and to shed light on the interaction between segmental properties (voicing) and structural ones (length). Whereas some scholars have entertained the hypothesis that there is no interaction between vowel length and final obstruent devoicing (Loporcaro 2015 a.o.), others advocated a more direct interplay between the two (Vanelli 2005, Iosad 2012, Torres-Tamarit 2015). I propose that there is a direct and non-arbitrary connection between final obstruent devoicing and vowel lengthening and that a formalisation couched within Government Phonology 2.0 (*GP 2.0*, Pöchtrager 2006, Kaye / Pöchtrager 2013) is better suited to capture this. The testing ground for my proposal is specifically provided by Friulian.

Vowel length in Northern Italo-Romance varieties has phonological status (Loporcaro 2015): [naːs] ‘nose’ / [nas] ‘she is born’ Milanese (Lombard); [goːt] ‘forest’ / [got] ‘drop’ Surmeiran (Romansh); [maːt] ‘alone’ / [mat] ‘crazy, m.’ Marebbano (Central Ladin); [liːs] ‘worn out, m.’ / [lis] ‘smooth, m.’ Friulian. In Friulian the presence of a long vowel is always predictable (with obstruents) based on the voicing of the following consonant: lengthening ensues when the following consonants gets devoiced word-finally (final obstruent devoicing is still active in Friulian): [ˈlade] ‘gone, f.’ / [laːt] ‘gone, m.’; [fuˈgut] ‘small fire’ / [fuːk] ‘fire’; [uˈlive] ‘olive, f.’ / [uˈliːf] ‘olive tree, m.’; [peˈza] ‘to weight’ / [ˈpeːs] ‘weight’. In a rule-based account (Vanelli 2005), the interaction between length and final devoicing is captured by a rule as: V → Vː | __ /C[+voi]/ #. As the author points out, the rule is arbitrary, as there is no reason why a melodic property like voicing should have any effect on the length of the preceding vowel. One of the main principles of Government Phonology is the Non-Arbitrariness Principle, that requires every phonological process to have a direct connection with its environment. To establish a non-arbitrary connection between final devoicing and vowel lengthening, I propose the following formalisation within *GP 2.0*. One of the main proposals of *GP 2.0* is to replace the elements |ʔ| and |H| (responsible for stopness and voicelessness) with structural configurations (Pöchtrager 2006). Taking [laːt] as representative, we start with the structure for /lad/ in (1), where |L| (voicing) annotates x_3. In *GP 2.0* x-slots represent structural space, similar to skeletal points in the Autosegmental Model. xNs and xOs represent Nuclear and Onset projections (vowels and consonants).

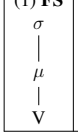
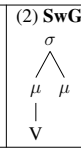
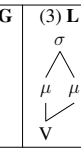
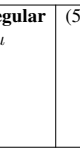


In (2) final devoicing applies, deleting |L|. Since in *GP 2.0* every element occupies a structural position, |L|-deletion results in an unannotated empty position (x_3) that needs licensing (every empty x-slot must be licensed). In (3) the resulting empty x-slot gets licensed by the domain head xN_1 via m-command (the structural relation shown by the arrows from xN_1 to x_3). In *GP 2.*0 length is encoded by how many x-slots are “taken up”. When x-slots (structural space) are m-commanded, length ensues. Here, xN_1 ends up m-commanding x_3, resulting in a long vowel. In conclusion, this account predicts a direct link between final devoicing and vowel lengthening, as the data show, while establishing a non-arbitrary connection between the two.

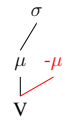
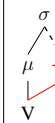
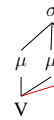
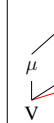
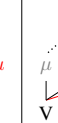
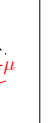
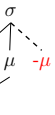
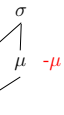
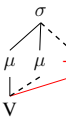
Shortening and lengthening via moraic down-affixes in Shilluk

Mike Berger (Universität Leipzig)

Problem: Shortening *and* lengthening within one language challenges theories of concatenative length-manipulating morphology. As affixation must do both, authors have used e.g. moraic circumfixes (Trommer 2015), defective integration of moras and syllables (Zimmermann 2017), or indexed constraints (Flack 2007). **Claim:** Moras with lexical links to the segmental tier easily handle some such patterns. **Data:** In Shilluk (Western Nilotic), vowels are short, long or over-long (Remijsen et al. 2016). Among transitive verbs, Fixed Short (**FS**) stems remain short (*ŋɔ̀l ~ á-ŋɔ́l̀* PST-cut.CFUG 'Someone went to cut'); Short with Grade (**SwG**) stems lengthen to over-long, skipping short (*càm ~ á-cáaam̀* PST-cut.CFUG 'Someone went to eat'); Long (**L**) stems lengthen or shorten (*mâaa̰t ~ á-máaa̰t̀* PST-eat.CFUG 'Someone went to drink', *á-mâ̰t-ì* PST-eat.BEN 'Someone drank for'). Also puzzling is the divergence of FS and SwG stems despite their stem-level surface identity - this sets Shilluk apart from related Dinka and Anywa.

Stems			Affix moras	
(1) **FS**	(2) **SwG**	(3) **L**	(4) **Regular**	(5) **Down-affix**
				

Analysis: FS stems are monomoraic (1), L stems bimoraic (3). SwG stems (2) are defective: the syllable dominates two moras, of which by default only one is linked to the vowel, and the other dangling. The underlying presence of syllables is supported empirically by restrictions on vowel complexity, which must be stated over syllables. Affix moras may lexically lack (4) or contain (5) downward links to segments. I use Containment (van Oostendorp 2008): GEN can only add epenthetic nodes and links (dashed), or erase them phonetically (dotted, gray), not actually delete them. In this system, a regular μ may or may not become linked to a segment, while a 'down-affix' $\mu\downarrow$ is always linked to one (visibly or not). {**MAX**(Edge) bans erasing links at edges; **CONTIGUITY**(μ,ω) bans non-fully integrated or invisible moras surrounded by fully integrated visible ones within the prosodic word} $\gg$ $\mu\leftarrow\sigma$ pressures all moras to be dominated by syllables $\gg$ $*\sigma_{2\mu}$ bans any syllable dominating two moras $\gg$ $*\overline{\sigma_{3\mu}}$ bans only syllables *visibly* dominating three moras $\gg$ **FAITH** bans adding or erasing links. **A.** FS stems never lengthen (6) since a second mora would be fatal (7). Yet $*\sigma_{2\mu}$ is mute on SwG and L stems since these always violate it; so do any unfaithful candidates, as $*\sigma_{2\mu}$ also sees erased σ-μ links. **B.** When L stems take -$\mu\downarrow$, fully integrating -$\mu\downarrow$ under the syllable yields lengthening to over-long at the cost of $*\overline{\sigma_{3\mu}}$ (8), since erasing a medial (9) or edge σ-μ link (10) violates CONTIGUITY and MAX(Edge), respectively. **C.** When L stems take a regular -μ, -μ must link to the syllable (13), but in order to satisfy $*\overline{\sigma_{3\mu}}$ (12), the stem's medial σ-μ link is erased ((11), CONTIGUITY is satisfied as -μ is not fully integrated). In C, -μ's defective integration causes erasure of a medial σ-μ link, whereas -$\mu\downarrow$'s forced full integration due to $\sigma\leftarrow\mu$ in B prevents erasure of any σ-μ links. **D.** With SwG stems, full integration of -$\mu\downarrow$ under the syllable alone would violate CONTIGUITY (15), so the medial dangling mora exceptionally links to the stem vowel, too (14). **Conclusion:** $\mu\downarrow$ derives the co-existence of lengthening and shortening by enriching moraic affixes with something independently needed, μ-vowel links, without disjoint constraint sets, co-phonologies or indexed constraints. It thus supports the Concatenativist Hypothesis. I also treat exceptions, and discuss the predictions of $\mu\downarrow$, and how to constrain it.

A. FS remains short Input = (1) + -$\mu\downarrow$ = (6)		**B. L lengthens to over-long** Input = (3) + -$\mu\downarrow$			**C. L shortens to short** Input = (3) + -μ			**D. SwG lengthens to over-long** Input = (2) + -$\mu\downarrow$	
(6) Winner	(7) Loser	(8) Winner	(9) Loser	(10) Loser	(11) Winner	(12) Loser	(13) Loser	(14) Winner	(15) Loser
									
short	long	over-long	long	long	short	long	long	over-long	long
$*\sigma_{2\mu} \gg \mu\leftarrow\sigma$		{CONT, MAX(Edge)} $\gg$ $\mu\leftarrow\sigma$ $\gg$ $*\overline{\sigma_{3\mu}}$			$\mu\leftarrow\sigma$ $\gg$ $*\overline{\sigma_{3\mu}}$ $\gg$ FAITH			CONT $\gg$ $*\overline{\sigma_{3\mu}}$	

A count effect in Warlpiri vowel harmony

Margit Bowler (University of Manchester) & Jesse Zymet (UC Berkeley)

Overview: This paper examines variable root-internal rounding harmony in nominals in a corpus of Warlpiri (Pama-Nyungan, Australia). It identifies a seeming count effect whereby the grammar assimilates the vowel occurring the least number of times in the word—in particular, the data are consistent with many-to-one harmony[1] or majority rules harmony.

Data: The data are drawn from a text corpus of Warlpiri called the *Warlpiri Dictionary Project* (WDP). The WDP data were collected by a number of linguists (primarily Ken Hale and Mary Laughren) in central Australia in the 1970s and 1980s. Disharmonic nouns were identified in the WDP, and their frequencies were calculated from Warlpiri sentences.

Background: Warlpiri has three vowels: [i a u]. The high vowels were previously shown to trigger progressive and regressive cross-boundary rounding harmony; moreover, [a] is not subject to harmony, and can block it (Nash 1980, Harvey & Baker 2004).

A count effect in roots: If a noun root contains tier-adjacent disharmonic high vowels, it can optionally undergo harmony, with both directions attested (1-3). 337 disharmonic noun roots were identified, of which 77 exhibited variable harmony. The 51 nouns with equal numbers of /u/'s and /i/'s vary lexically in whether the optional harmonic form displays progressive or regressive harmony, with no clear tendency in one direction ((1)): 23 types show progressive harmony, while the other 28 types show regressive harmony. The 26 nouns with unequal numbers of /u/'s and /i/'s display a count effect: 22 of them harmonize to the majority vowel ((2)), while the other four can harmonize to the minority vowel ((3)). All but one of the forms with unequal vowels have a single minority vowel; the one form with two minority vowels also follows the majority pattern (ɟuɟumiɲimiɲi ~ ɟiɟimiɲimiɲi = 'decongestant plant'). In our data, we see no clear effect of blocking by intervening [a].

(1) Equal numbers

miɲuɾa ~ miɲiɾa 'ceremonial fat'
wiɾinkuru ~ wiɾinkiri 'spindle'
maɾluɾi ~ maɾliɾi 'claypan'
miɲipuru ~ muɲupuru

(2) Unequal with count effect

kulkuri ~ kulkuru 'middle'
ɟuwiɳti ~ ɟiwiɳti 'wild currant'
warupiɲi ~ waripiɲi 'grass seed'
puluki ~ puluku 'calf'

(3) Exceptions to count-based harmony

ŋuʈiɲinpa ~ ŋuʈuɲunpa 'child'
jurini ~ jurunu ~ jirini 'weariness'
kuʈiɟi ~ kuʈuɟu 'circumcision'
kuʈiɟiŋiɟiŋi ~ kuʈuɟuŋuɟuŋu ~ kirdiɟiŋiɟiŋi 'crab'

Consequences for theory: The data lend support for a symmetric AGREE constraint (Lombardi 1999, Baković 2000), and the existence of a system in which such constraint dominates IDENT, with IDENT dominating directional harmony constraints. We provide below tableaux of a Harmonic Grammar analysis of these forms (Legendre, Miyata & Smolensky 1990).

/ɟukuɾi/	*H*	AGREE(rd) *w* = 1	IDENT(rd) *w* = 1
☞ ɟukuɾi	1	*	
☞ ɟukuɾu	1		*
ɟikiɾi	2		**

/ɟuwiɳti/	*H*	AGREE(rd) *w* = 1	IDENT(rd) *w* = 1
☞ ɟuwiɳti	1	*	
☞ ɟiwiɳti	1		*
ɟuwuɳtu	2		**

[1] We thank Andrew Lamont for help with data count early on in the project, and for raising the possibility of the many-to-one interpretation (p.c.). For his views on the data, see Lamont (2019).

Phonological computation and non-symbolic representations are a part of FLN

Alex Chabot, Université Côte d'Azur

In the wake of Hauser, Chomsky, & Fitch (2002), phonology has been excluded from the Faculty of Language (in the narrow sense) (FLN), and accorded the same status as as any general sensory-motor system, or even general knowledge about the world, such as the fact that ideas cannot dream furiously. This point of view is made possible by two assumptions: 1) the FLN is unique to human beings and 2) consists only of recursion. In turn, in Samuels (2011a, b) it is argued that since many aspects of phonology can be found in non-human species, phonology lies outside of FLN. In her view, phonology can be entirely explained by Third Factor principles, and thus is not a part of Universal Grammar. This paper presents arguments against both of the above assumptions.

In the Minimalist Program as described in Chomsky (2015), language is a computational system and a lexicon. The Minimalist Program conceives of the FLN as consisting of a single computational system which is syntactic in nature, this paper argues that phonology consists of several components, including a computational system that operates over symbolic objects with no real-world referents. It is argued that phonological computation fulfills the requirements for a Minimalist conception of FLN

This paper assumes a Substance-Free (Hale & Reiss, 2008) phonological approach, where phonology is viewed as a system of computation over phonological primes, and nothing else. There are abstract representations, and there are operations (computation) over those representations – typically taken to be universal substantive features, which are neither acoustic nor articulatory in nature but can be directly "transduced" into acoustic or articulatory objects by UG. This paper argues that, in contrast with Hale & Reiss' (2008) position, but in line with other phonologists (Odden 2006, Hall 2007, Blaho 2008, Samuels 2011, Iosad 2012), the universal set of substantive features should be replaced by language specific features which are learned by speakers based on Third Factor Principles.

On the one hand, phonology consists of cognitive objects (such as phonological primes) with a domain general association to real-world objects which are modality independent and not a part of FLN: the phonological lexicon. Evidence from phonetics-phonology "mismatches" (Hamann 2014), from "crazy classes" (Mielke 2005, 2008), and from cross-linguistic rhotic patterning (Chabot 2019) are rallied in support of a phonology in which the relationship between real-world acoustic objects and their mental representations (phonemes) is a symbolic and arbitrary one.

On the other hand, phonology also contains symbolic objects, such as syllabic nuclei which have no real-world correlates. Such symbolic objects must be the product of the human genome. The same goes for computation over phonological primes. Whatever is the product of the human genome is human language, and must be a part of FLN.

Computationally, this paper presents an argument from "crazy rules" (Bach & Harms 1972) used to bolster the claim that phonological computation is symbolic. Crazy rules such as (1-4) show that phonological computation can turn anything into anything:

(1) **Nez Perce** (Aoki 1970): tç → s / __n
(2) **Yawalapiti** (Carvalho 2017): p → r / i__
(3) **Xhosa** (Bennet & Braver 2015, Braver & Bennet forth.): b → ʤ / __w
(4) **Sardinian** (Molinu 2009, Scheer 2015): l → ʁ / V__V

In order to account for crazy rules, it is argued that 1) phonological computations must be unconstrained (i.e. are ungrounded) in their operation and 2) phonological representations must be encoded in a vocabulary that is abstract and independent of the physical objects (sounds or gestures) of speech. It is through phonological spell-out (Scheer 2014), or the *association* between real-world objects and cognitive objects that phonological primes are given life, in spoken or signed languages. Everything else in phonology: computation and non-symbolic objects, is derived by UG, and thus a part of FLN.

Markedness and the learning of e/e and e/-e stress patterns

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* University of Texas at Austin, USA; ** University of Agder, Norway

Research in metrical phonology has produced a well-articulated typology of stress patterns and theories of metrical markedness (e.g. Prince 1983; Hayes 1995; Halle & Vergnaud 1987; Kager 1992). Despite this solid base, however, little experimental research with humans has explored the relationship between markedness and the formation of inferences about stress. In particular, little or no research has studied how adults learn contrasting attested patterns whose markedness we cannot fully evaluate. The present study examines the relationship between competing stress-attracting word edges in contingent *e/e* (edge/same-edge) and *e/-e* (edge/opposite-edge) patterns. In a quantity-based *e/e* pattern, stress targets the leftmost or rightmost heavy syllable, if present, and defaults to the light syllable at the same edge when there are no heavies. A left-edge *e/e* pattern allows the forms *paté:ko:* and *páteko* (for ex.), and the mirror-image right-edge pattern allows *pa:té:ko* and *patekó*. In a similar *e/-e* pattern, stress defaults to the opposite edge, if no heavies are present. (For ex., if stress falls on the rightmost long V, *pate:kó:*, then it defaults to the left edge in *páteko*.) But we do not yet understand the relative markedness of the patterns in the {*e/e, e/-e*} typology. Are *e/e* patterns unmarked relative to *e/-e* patterns? Or, are left-edge patterns unmarked, and if so, is the left edge privileged for the special (e.g. QS) or the default pattern? And can ease-of-learning evidence bear on these issues?

We are conducting an artificial language learning study in which two groups of subjects hear and repeat nonce trisyllables which have at most one long V. For Group A, stress falls on the long V (*paté:ko*), or on the initial V in all-short-V words (*páteko*). In review trials, subjects hear word pairs consisting of a training item plus an incorrect foil (*paté:ko-páte:ko*), and must decide which item in each pair was in the training set. After training and review (2 rounds), participants are tested on novel pairs with the same structure (trisyllables consistent with all training patterns, each paired with an incorrect foil). The purpose is to test whether subjects have learned that a long V attracts stress, when present. However, accuracy on the familiar patterns alone does not reveal any covert generalisation subjects may make about the "edgeness" of the quantity-sensitive pattern. To study this, the final test includes crucial items that were withheld in training: pairs of trisyllables with two long Vs, e.g. *kó:pa:te-ko:pá:te*. A bias favouring *kó:pa:te* would suggest that without specific training, participants have inferred an *e/e* pattern, while more *ko:pá:te* decisions would suggest an *e/-e* pattern. *We predicted a bias favouring stress on the leftmost long V (kó:pa:te), and this outcome is supported by the early Group A findings* (Table 1).

But the Group A preference for stress on the leftmost of two long Vs does not necessarily entail a preference for an *e/e* (over an *e/-e*) pattern. It might instead reflect a preference for more phonologically salient syllables to come earlier in the word, a "leftward" positional prominence effect. To tease apart these two possibilities, subjects in Group B (February, 2019) will be trained/tested exactly as described for Group A, except that stress in all-short-V words will be on the rightmost syllable (*patekó,* not *páteko*). A bias favouring stress on the leftmost of two long Vs in Group B would bear on markedness: double left-edge patterns may be unmarked in the *e/e* typology, but right-default/left-special may be marked in the *e/-e* typology.

Table 1. Proportion correct/predicted decisions for (a) old patterns and (b) for new patterns in Group A (final test).

	(a) Familiar patterns				(b) New patterns		
Predicted →	SSS	LSS	SLS	SSL	LLS	LSL	SLL
Prop. "correct"	.67	.79	.66	.56	.63	.77	.69

The results of this study promise to be interesting for both theoretical and methodological reasons, as they can bear not only on metrical markedness, but are also expected to encourage us to learn about markedness by studying covert phonological generalisations.

On the role of morphology, syllable structure, frequency and spelling in English vowel reduction

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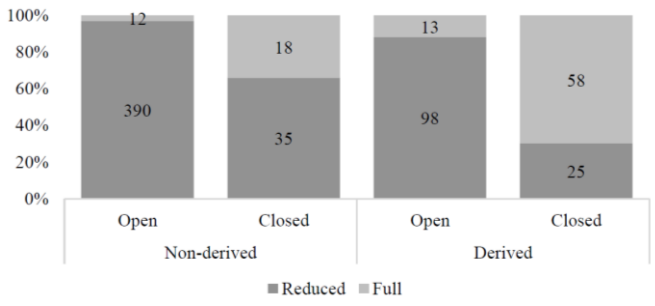
It has been known since at least Chomsky & Halle (1968) that unstressed vowels tend to undergo vowel reduction in English (e.g. *declaim* /dɪˈkleɪm/ ~ *declamation* /ˌdekləˈmeɪʃən/; *eponymous* /ɪˈpɒnɪməs/ ~ *eponym* /ˈepənɪm/), but that it is not always the case (e.g. *aspect* /ˈæspekt/ ~ *aspectual* /æsˈpektuəl/). Previous research has put forward a number of determining factors: syllable structure (Halle & Keyser 1971; Fudge 1984; Burzio 1994), the nature of coda consonants (Fudge 1984; Burzio 1994; Pater 2000; Dahak 2011), morphology (Chomsky & Halle 1968; Liberman & Prince 1977; Guierre 1979; Selkirk 1980; Pater 2000), spelling (Deschamps 1994; Deschamps et al. 2004; Dahak 2011) and word frequency (Fidelholtz 1975). However, there has not been any large-scale empirical evaluation of these parameters and their possible interactions. The aim of this paper is to conduct such an evaluation and to discuss the theoretical consequences of the results.

The parameters listed above are investigated in two positions, the initial pretonic position (e.g. ***a**rríve*) and the intertonic position (e.g. *rèl**a**xátion*), using pronunciation dictionary data (Jones 2006; Wells 2008). The datasets contain 9415 words and 678 words, respectively. The results confirm the relationship between vowel reduction and syllable structure, spelling, word frequency and morphology. We also found vowel reduction to be much more common in the intertonic position than in the pretonic position. The effects observed for spelling, frequency and morphology call for specific comments.

First, these results show the importance of controlling for spelling effects so as not to miss generalisations that a purely phonological analysis would fail to capture. That being said, the effect observed in our data raises the question of the nature of the relationship between spelling and vowel reduction: is spelling a trace of a former stage of the language, where vowels that did not reduce were represented orthographically with a digraph, or is there a synchronic effect of spelling on vowel reduction?



Second, we only found effects of absolute frequency. It has been claimed before that the existence of a morphological base in which the vowel is stressed can reduce its chances to reduce (Chomsky & Halle 1968: 112, e.g. *reláx* → *rèl**a**xátion*), even more so if that base is more frequent than the derivative (Bermúdez-Otero (2012: 32), after Krazka-Szlenk (2007: §8.1.2)). Although we found less reduction in such derivatives than in simplex words (as shown in the figure above), no effect of frequency could be found. This finding is in line with previous work on the effects of segmentability, many of which have not found effects of relative frequency, suggesting that other measures of segmentability are needed (see Plag & Ben Hedia (2018) for a review).

Finally, the results show the relevance of semantically opaque prefixes (e.g. *ab-, ob-, re-* in *abstract, obstruct, retain*) on the phonology, while most analyses of English phonology analyse words that contain them as morphologically simple words.

Rhyming with unstressed syllables: demonstrating English prosodic foot in verse

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English poetry presents something unusual line-finally: a final unstressed syllable of a proparoxytonic word can metrically behave like a stressed one. This appears to never be allowed in quite similar poetic traditions, like, for example, the Dutch one. The present article proposes that this peculiarity of English poetry and its difference from other forms reflects an aspect of English unstressed syllables, which is not shared by their counterparts in other languages; those syllables are "weak" (Burzio 1994:16) and can be either metrified or extrametrical. Consequently, in poetry, this gives the possibility of having weak syllables metrified as heads of line-final feet. The way verse is shaped constitutes evidence for prosodic foot structure.

Unstressed syllables in poetry. English Renaissance meter, and Germanic Renaissance meters in general, are built on a metrical template of iambic feet (Halle & Keyser 1972, Kiparsky 1977). In iambic verse, stressed syllables commonly fill the prominent position of each poetic foot. An increasing of metrical strictness towards the end of the line (i.e. Strict End Hypothesis (Kiparsky 1968, Hayes 1983, Prince 1989)) makes the occurrence of a stressed syllable line-finally a strong requirement. Interestingly, even within Romance Renaissance meters, which are not strictly foot-based, a stressed syllable on the line-final prominent position appears to be obligatory. Usually, in case a proparoxytonic word is placed at the end of a line, its stressed syllable fills the prominent position and the two following unstressed syllables constitute the feminine ending (see the Dutch example in 1). This is not the case for English meter, which, instead, allows line-final prominent positions to be filled by the last unstressed syllable of a proparoxytone word (Hanson 1996) (see the example in 2); this can occasionally be the place of secondary stress, nevertheless, it still remains an extremely rare metrical practice line-finally within Renaissance meters.

(1)Omschaduwt Maurits niet met wapens van zijn ***va***deren \\
En heerschappij-en, een vergangkelijcke pracht, \\
Maer met de deughden, die in eenen helt
ver***ga***deren, \\ (Vondel, *Op Joan Maurits*)

(2)Thou art more lovely and more *tem*pe**ra**te:
Rough winds do shake the darling buds of May,
And summer's lease hath all too short a ***da***te:
(Shakespeare, Sonnet XVIII)

Evidence from rhyme shows that, also in more recent poetry, English verse can allow unstressed syllables to be placed where a stressed one would be expected. In fact, proparoxtone words can rhyme with non-paroxytone ones in a way that the last unstressed syllable of the former rhymes with the stressed syllable of the latter, as can be observed in 3 (A and B indicate the rhyme scheme):

(3) Her tawny eyes are onyx of *thought*less**ness**, (A)
Hardened they are like gems in time-long *pru*de**ry**; (B)
Yea, and her mouth's prudent and crude ca***ress*** (A)
Means even less than her many words to ***me***. (B)
(Lawrence, *The hands of the betrothed)*

Similar cases can be found also in contemporary poetry, such as, for example, the rhyme *aggregate-slate* in D. Patterson's *The passing*

Proposal. I propose that the anomalous behavior of proparoxytone-word-final syllables in English verse is the consequence and evidence of a peculiarity of English foot. It relates to what Burzio (1994:16) defines as "weak syllables", which can be either metrified or extrametrical. I suggest that this aspect allows, in poetry, the possibility of metrifying a weak syllable as a head of a line-final foot. A perception experiment is going to test the degree of naturalness to the readers' ear of this type of rhyme, in order to give support to the hypothesis of it being evidence for the English prosodic foot structure. By analysing meter and rhyme, it is possible to find evidence for phonological properties.

Mobile Lexical Parentheses in Metrical Grids

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We propose that the Simplified Bracketed Grid (SBG) theory of metrical structure (Idsardi 1992; Halle & Idsardi 1995; Halle 1997) needs to distinguish parentheses associated with lexical markings from other types of parentheses, and must include parentheses that move.

In (1), we give sample words in three languages; all have convention Edge Right that assigns a right parenthesis at the right edge of Line 0. (1a) is a language with lexical accent (e.g. Russian). The first syllable of the stem (e.g. *koróv-* 'cow') is underlyingly unaccented (mnemonic U), as is the suffix; the second syllable (A) has a lexical accent. Accented syllables project a left parenthesis on Line 0, designated (^{L}. Heads of Line 0 constituents are on the left, and they are projected to Line 1. The main word stress is projected to Line 2.

(1) a. Lexical accent

x	Line 2
(x	Line 1
x(^{L}x x)	Line 0
U A + U	Syllables

b. QS

x	Line 2
(x x	Line 1
x(^{L}x x x(^{L}x x)	Line 0
L H L L H L	Syllables

c. QI and ICC

x	Line 2
(x x x	Line 1
x x)x x)x)	Line 0
S S S S S	Syllables

In a quantity-sensitive (QS) language like Khalkha (1b), heavy syllables (H) project a left parenthesis (^{L}, and heads are again on the left, adjacent to the parenthesis. Classical SBG does not require this kind of adjacency, however. In Maranungku (1c), Iterative Constituent Construction (ICC) from the left puts a right parenthesis after every two grid marks. Line 0 heads are on the left, not adjacent to the ICC parentheses. Dresher (1994, 2016) argues that heads must be adjacent to (^{L} or ^{L}), as in (1a, b). Allowing heads of (^{L} to be on the opposite side would fail to account for the inherent prominence of accented and heavy syllables, and would result in an unattested kind of 'anti-QS' where stress tries to avoid H syllables.

Lexical parentheses must also be allowed to move. There are East Slavic noun paradigms that put stress on the stem in the singular and on the suffixes in the plural, or on the suffixes in singular and on the stem in plural. Osadcha (2019) shows that such 'shifting stems', which are very common in Ukrainian and Belarusian and also occur in Russian, cannot be accounted for by the mechanisms of classical SBG theory. Rather, such stems must be marked with a lexical parenthesis labelled (^{S} which is subject to the rule in (2):

(2) Shifting rule: In the plural, move a (^{S} parenthesis minimally to an adjacent morpheme.

Thus, the metrical lexical, or underlying, representation (UR) of a stem like Russian *gorod-* 'city' is (^{S}x x-: it is accented in SG, and post-accenting in PL (3a). The stem *kolbas-* 'sausage' has the metrical UR x x(^{S} -: it is post-accenting in SG and accented on the stem in PL (3b).

(3) a.

NOM SG	NOM PL	
(^{S}x x	x x (^{S}x	Line 0
gó rod	*go ro d + á*	

b.

NOM SG	NOM PL	
x x(^{S} x	x (^{S}x x	Line 0
kol ba s + á	*kol bá s + y*	

There are also edge parentheses that move. Roca (2005) and Doner (2017) show that Spanish stems have a variety of edge marks. *almíbar ~ almíbares* 'syrup' and *carácter ~ caractéres* 'character' both have Edge Right. In (4a), ICC and Head Left apply as expected, but in (4b) edge marking must apply at the word level to yield the PL. We propose that this stem has the UR xxx^{W}), where ^{W}) must move to the end of the word. SBG with mobile parentheses is thus a unified theory that can account for the complex stress patterns of East Slavic and Romance.

(4) a.

SINGULAR	PLURAL	
x	x	Line 1
x (x x)	x (x x) x	Line 0
al mí bar	*al mí bar + es*	

b.

SINGULAR	PLURAL	
x	x	Line 1
x(x x^{W})	x x(x x^{W})	Line 0
ca rác ter	*ca rac tér + es*	

Do branching onsets need specific representations?

Guillaume Enguehard & Mohamed Lahrouchi

The aim of this talk is to propose a representation of branching onsets (TR) based on very basic autosegmental principles. Addressing the case of Latin stress placement in Strict CV (Lowenstamm 1996), Scheer & Szigetvári (2005) show that V-positions are equivalent to weight units in CVCV. If we blindly and naively follow this parallel, we should accept that the a branching onset is a bipositional expression with no embedded V-position (1).

(1)

However, the original feature of Strict CV is a strict periodicity between non-nuclear and nuclear positions due to the repetition of a universal CV syllable (2a). Carvalho (2002:22-23) points out that the periodicity between C- and V-positions strongly echoes a well-known phonological constraint: OCP (Leben 1973, McCarthy 1979, 1986). He thus suggests that periodicity results from a dissimilation between skeletal positions (2b).

(2) a.

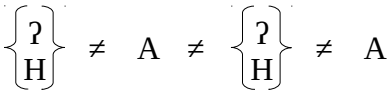
C V + C V + C V

b.

C ≠ V ≠ C ≠ V

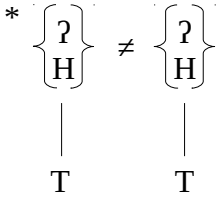
Such an OCP effect between skeletal positions supposes that these must be likened to melodic units. Following Jensen (1994), Szigetvári (2004), Nasukawa & Backley (2005), Pöchtrager (2006) and Passino (2017), I assume that C- and V-positions correspond to melodic elements. C is the representation of the root node (Nasukawa & Backley 2005:83), and V is the representation of |A| (Nasukawa & Backley 2005:86). Thus, (2b) and (3) are equivalent.

(3)

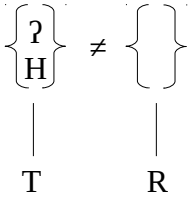


Since C-positions represent Root nodes, two C-positions can be distinct *iff* they host consonants with different articulation modes. If two consonants have identical articulation modes, the nuclear position between them cannot be omitted (4a). But if two consonants have distinct articulation modes, the nuclear position between them can be omitted (4b). Now, recall that the naive representation in (1) is a just simplified representation of (4b).

(4) a.



b.



In conclusion, I showed that the main property of branching onsets can be derived from OCP. In that sense, this proposition represents a theorem of branching onsets, not a theory.

Contrast Preservation and Maximization in Mandarin R-Suffixation

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The paper proposes a novel dispersion theoretic analysis of two surprising stem-vowel alternations that arise from suffixation of the Mandarin diminutive. The diminutive suffix, /-ɻ/, attaches to a noun stem that can also be a stand-alone word, in a process called r-suffixation (Hsueh 1980).

Two questions arise from r-suffixation. **1.** Why do the two nasal codas, /n/ and /ŋ/, react differently to r-suffixation? They both get deleted next to /-ɻ/, but the alveolar nasal is preceded by an oral vowel (1a&d), the velar nasal by a nasalized vowel (1b&e). **2.** Why are non-high vowels in open syllables backed in r-suffixation (1c&f)?

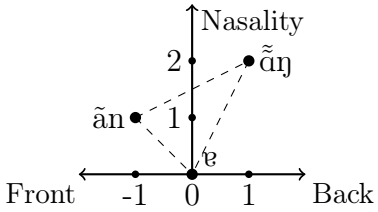
(1)	Stem	Dim	Gloss		Stem	Dim	Gloss		Stem	Dim	Gloss
(a)	pan	paɻ	'plank'	(b)	t^hɑŋ	t^hɑ̃ɻ	'soup'	(c)	pɐ	pɑɻ	'handle'
(d)	ken	keɻ	'root'	(e)	k^hɤŋ	k^hɤ̃ɻ	'pit'	(f)	kə	kɤɻ	'song'

To answer the first question, Zhang (2000) claims that the vowels in the unsuffixed forms are already nasalized by the nasal coda, be it alveolar or velar. His aerodynamics study found less nasalization on the vowel followed by /n/ compared to /ŋ/ in the unsuffixed forms. He argues that the loss of the nasalizing segment transforms the contrast between [CṼn] and [CṼ̃ŋ] into one between oral and nasal vowel.

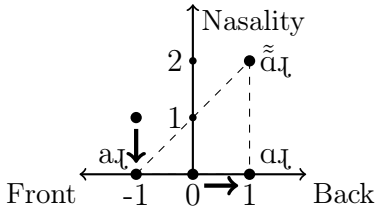
I believe that the answer to both the first and second question lies in the exact values of the mid and low vowels in the unsuffixed forms, which are determined by their codas in a process called Rhyme Harmony (Duanmu 2008). It dictates that an alveolar nasal coda must be preceded by a front vowel, and a velar nasal by a back vowel. Non-high vowels in open syllables must be central. Therefore there is a three-way contrast in the unsuffixed forms for each vowel height: [ãn - ɐ - ɐ̃ŋ] and [ẽn - ə - ə̃ŋ].

I argue that the changes in vowels in the r-suffixed forms are the result of contrast preservation and contrast maximization. In the suffixed forms, the burden of contrast is shifted from the coda to the vowel, where the three-way contrast is preserved as [aɻ - ɑɻ - ɑ̃ɻ] and [eɻ - ɤɻ - ɤ̃ɻ]. To maximize perceptual contrast, the nasalization is lost on the front vowels, which in turn pushes the central vowels backwards to enhance the contrast in F2. Although the backing of central vowels neutralizes them with the originally back vowels, the two are still contrastive in another dimension, nasality. This is illustrated in the two-dimensional F2-Nasality vowel space below.

(2a) *Unsuffixed forms*



(b) *R-suffixed forms*



MinDist constraints (Flemming 1995) are used in my analysis. Contrast preservation is captured by an output-output MaximizeContrast constraint, while contrast maximization by MinDist=VD:2. Competing suffixed output scenarios that satisfy both contrast preservation and contrast maximization are ruled out with the help of three output-output faithfulness constraints, Ident[Front]-OO, Ident[Back]-OO, and Ident[Nasal]-OO, as well as a markedness constraint *V_{NAS}. They ensure that the optimal suffixed output scenario is the one where the front vowel preceding alveolar nasals loses its nasalization and the central vowel moves backwards. Thus, the two questions raised by r-suffixation are answered in one stroke.

Voicing and Voice Assimilation in Swedish Fricatives

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In the literature of generative phonology, there has been considerable interest in the question of what features are involved in laryngeal contrasts and what types of assimilation of laryngeal features occur in the languages of the world (Cho 1994, Harris 1994, Iverson & Salmons 1995, Honeybone 2005, Keating 1984, Kingston & Diehl 1994, Lombardi 1999, Wetzels & Mascaró 2001, Ladd & Schmidt 2017, among others). Swedish has been of interest because it has been shown (Helgason & Ringen 2008) to have a stop system that has been claimed to be typologically unusual or nonexistent (Lisker & Abramson 1964). Second, it is a clear case in which there is assimilation to voicelessness. This bears on the issue of what features are involved: [-voice] or [spread glottis].

With few exceptions, discussions of Swedish have been based on impressionistic transcriptions or flawed phonological or morphological analyses. When careful acoustic and accurate phonological and morphological analyses are undertaken, the results are quite different from those repeatedly claimed in the literature. In this paper we present new experimental data on Swedish voicing based on careful phonological and morphological analyses.

Helgason & Ringen (2007) report on clusters of stops followed by either a /t/ (supine or neuter sg. adjective/past participle) or /s/ (genitive or passive voice). They found that there is regressive assimilation of voicelessness in stop-stop clusters. But the results for the stop-fricative clusters show that there is essentially no consistent regressive voice assimilation when a voiced stop precedes /s/ as in words such as *bröds* brö/d+s/ 'bread-GEN'. They also considered cases like *läste* /lɛ:s+de/ 'read PAST' to determine if there is ever voicing of the stop in the suffix following /s/. In cases like *läste* the devoicing of the suffix /d/ was complete. They conclude that while there was no regressive assimilation of a stop to a voiceless fricative with the genitive and passive /s/, there is progressive assimilation of a stop to a *preceding* /s/. They suggest that the genitive or passive /s/ are clitics which are outside the prosodic word and hence do not cause devoicing.

In the experiment reported in this paper, we considered the voiced fricatives, /v/, /j/. We recorded forms with 5 examples of /v+d/, /j+d/, /v+t/, /j+t/, /v+s/ and /j+s/. Six subjects read a sentence list twice, resulting in 10 tokens of each type of sequence for each speaker. Our preliminary analysis suggests that /v/ is fully voiceless (indistinguishable from /f/) before the /-t/ suffix. Before the /-s/ clitic, /v/ is partially devoiced (rather than fully voiceless) suggesting the devoicing is phonetic as claimed by Cho (1994). In contrast, we have found no evidence of devoicing in /j/ in any of the tested contexts. However, this latter result should not be taken as evidence that /-t/ does not always induce regressive devoicing in fricatives. As Riad (2008: 55ff) points out, the pronunciation of /j/ in Swedish "is typically [j]" although fricative productions are also observed. Thus, from the point of view of pronunciation there is scant empirical support for assigning /j/ to the fricative category. Since the results of this experiment show that /j/ patterns phonologically with approximants, whereas /v/ patterns with obstruents, our data suggest that /j/ in Swedish is better regarded as an approximant than a fricative. Our results also provide new data about the behavior of the voiced fricative /v/ in clusters in Swedish. Like voiced stops, it devoices before suffixes beginning with voiceless stops, but it does not devoice before /s/ clitics.

Slave Coalescence as Gradual Coda Reduction

Shay Hucklebridge · UMass Amherst

This paper proposes that gradual simplification of coda consonants is responsible for Athabaskan (Dene) D-effect coalescence in Slave (Dene, Canada). This account builds off of McCarthy (2008), which proposes that cluster simplification is gradual, and that features targeted by CODACOND must delete prior to deletion of the root. I propose that, in Slave, progressive assimilation triggered by CODACOND results in the "transfer" of features not permitted in the coda to an adjacent onset segment. After this, the coda consonant reduces and deletes, giving the appearance of fusion. There are three main benefits to this analysis: a) it expands the empirical coverage of the gradual deletion approach to include coalescence. B) It provides an explanation for why the coda features which survive in Slave coalescence are exactly the features banned from codas in other environments (something not addressed in previous work: (Howren 1971, Lamontagne & Rice 1994, Wilhelm 2000). C) It contributes to the typology of place assimilation by giving an example of progressive place assimilation emerging where onset faithfulness constraints do not apply.

Slave coalescence occurs when classifier /t/ or 1st person /wìt /- are prefixed to a verb stem:

(1) a. t + stop or affricate = no effect
t + ts → ts, t + k → k

b. t + coronal fricative = affricate
t - s → ts, t - ɬ → tɬ

c. t + dorsal fricative = velar stop
t - x → k, t - w → k^{w}

d. t + glottal stop = alveolar ejective
t - ʔ → t^{ʔ}

Usually, the only feature contributed by the coda (/t/) is [-continuant]. Additionally, coda place is preserved in 1d. Elsewhere in the language, codas reduce to /h/ where they cannot be resyllabified as onsets. By the definition of CODACOND, features banned in the coda (Place and [-continuant]) can either be deleted or linked to an onset segment to avoid a violation.

(2) CODACOND: *Assign one violation mark for every token of Place (or -continuant) that is not associated with a segment in the syllable onset* (adapted from McCarthy 2008: 279)

Under McCarthy's account, progressive assimilation (linking) is unavailable because it requires onset Place to be deleted before assimilation (presumably on account of a constraint barring multiple Place values). Such deletion is unmotivated, and would not result in harmonic improvement. Therefore it is the coda Place feature that deletes, in response to CODACOND. This accounts for 1a-d, where the onset Place feature is maintained:

(3)

		Reduction		*Deletion*
t + k = tk	→	ʔk	→	k

However, deletion of onset Place is not required for linking if the onset is Placeless. If ʔ lacks a place feature, then this permits progressive place assimilation to occur into ʔ onsets:

(4)

		Linking		*Delinking*		*Deletion*
t + ʔ = tʔ	→	tt^{ʔ}	→	ʔt^{ʔ}	→	t^{ʔ}

Delinking here is motivated by *MULTILINK, which prohibits features with multiple links, and deletion by *CC, which prohibits clusters. In order to account for progressive assimilation of the [-continuant] feature, I propose that no deletion of onset [+/-continuant] is necessary for linking to occur, as segments may have more than one [+/-cont] feature (affricates). When [-continuant] would create an affricate banned in the language, a ranking of FAITH$_{[-cont]}$ over FAITH$_{[+cont]}$ resolves this:

(5)

		Linking		*Delinking*		*Deletion*		*+Cont Deletion*
t + x = tx	→	t͡kx	→	ʔ͡kx	→	k͡x	→	k

In summary, CODACOND triggers reduction of the coda through deletion or linking, and this creates the appearance of coalescence. Linking is permitted where progressive assimilation is not prohibited by onset faithfulness constraints: place assimilation therefore only surfaces when with ʔ, while [-cont] assimilation is consistent. This accounts for why the coda features that surface in coalescence are the ones prohibited in codas elsewhere in the language.

Morphophonological gradience in Korean n-insertion

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The present study explores the probabilistic application of a morpho-phonological process. A morpho-phonological process is typically conditioned by phonological and morphological factors. Such linguistic factors categorically distinguish words that can undergo the process from those that cannot. In contrast, non-linguistic factors such as word frequency typically have a gradient effect. They affect the process only probabilistically within the set of potential target words. However, some recent research (notably Zuraw 2010) shows that phonological and morphological factors may have a gradient effect, contributing to the overall probability of the occurrence of a morpho-phonological process. The present study addresses the questions of what factors may have such a gradient effect in application of a morpho-phonological process, how they interact, and which of the gradient effects speakers are aware of, by investigating the variation patterns of Korean n-insertion.

In Korean, /n/ is optionally inserted at the juncture of two morphemes, M_1 and M_2, under the condition that M_1 ends with a consonant and M_2 begins with a high front vocoid /i, j/: for instance, /com+jak/ [comnjak] 'mothball'. I conducted surveys on existing and novel Korean words, employing speakers of two dialects of Korean, Seoul and Kyungsang.

From the results of the survey on existing words, several interesting tendencies emerged: for instance, n-insertion is less likely after an obstruent than after a sonorant (sonorancy effect). Some of these tendencies vary depending on the morphological category of the morphemes involved: for instance, sonorancy effect is weak for words consisting of free stems, as opposed to bound roots.

I found a constraint weighting to explain the distribution of n-insertion in the existing word data, using a maxent (maximum entropy) learner implemented in the maxent grammar tool (Hayes 2009). The results of the existing word survey were employed as the input to the simulation, and the simulations were conducted separately for Seoul and Kyungsang data. All the significant tendencies of existing words are reflected in the learned weights of the corresponding constraints. The correlations between observed and predicted rates of n-insertion of the test words are relatively high and significant: Seoul ($r = 0.679$, $p < 0.001$, $n = 293$); Kyungsang ($r = 0.689$, $p < 0.001$, $n = 293$).

Most of the observed gradient tendencies in existing words were mirrored in the results of a survey involving novel words, suggesting that Korean speakers are aware of the differential influence of phonological and morphological factors on the probability of the application of n-insertion. Some of the tendencies observed in novel words were found only in a sublexicon consisting of existing words with free stem, not bound root, morphemes. This may suggest either that speakers attend particularly to the generalizations among words with free stems rather than bound roots, or that Korean speakers are well aware of how phonological tendencies vary across morphological categories. The latter interpretation is possible, given that M_1 morphemes used in the novel word survey were loan words, and should be recognized as free stems by the survey participants.

Extending the articulatory model of tone: the case of Valjevo Serbian

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Serbian (srp) is a pitch-accent language with two pitch accent melodies: "falling", where stress is on the same syllable as the lexical H, and "rising", where stress is one syllable to the left of the lexical H (Inkelas and Zec, 1988). In many dialects, the F0 peaks of rising accents phonetically occur on the immediately post-tonic syllable; however, in Valjevo Serbian, they occur early, often retracted to the tonic syllable (Zec and Zsiga, 2018). In this study, I show that the timing of the F0 peak in Valjevo Serbian rising accents is affected by the syllable onset of the post-tonic syllable, and thus that the phonetic retraction of the H is not indicative of a phonological shift. I also propose an extension of the gestural model of tone to account for these early peaks.

Five (4F, 1M) native speakers of Valjevo Serbian produced 150 frame sentences in random order with a target word in focus. Target words were formed using a real word (e.g. *mrämora* 'marble.GEN') and varying a syllable onset to create five rhyming words (***r***ämora, ***l***ämora, ***m***ämora, ***mr***ämora, ***ml***ämora). There were three loci of onset variation: 1. `DualLocus`, where the varied syllable phonologically bears stress and H (falling: ***mr***ämora /ˈmra$_H$mora/); 2. `HLocus`, where the varied syllable bears only H (rising: *ò**ml**adinu* /ˈo.mla$_H$dinu/); and 3. `StressLocus`, where the varied syllable bears only stress (rising: ***mr***àvinjak /ˈmra.vi$_H$ɲak/).

The varied onsets have distinct durations (`OnsDur`) in all word types, /r/ < /l/ < /m/ < /mr/ < /ml/ (all $p < 0.0001$). A linear mixed effects model shows a positive effect of `OnsDur` on the location of the F0 peak relative to the acoustic left edge of the phonologically H syllable (`PeakDelay`) ($\chi^2(1) = 188.69$, $p < 0.0001$) in `DualLocus` and `HLocus` words only: peaks occur later with longer onsets (β = 1,034 ms, SE = 68.1 ms; see panels 1 and 2 of Figure 1). There is no similar effect of `OnsDur` for `StressLocus` words: the effect is fairly small and negative (β = -240.2 ms, SE = 62.2 ms), i.e., `PeakDelay` is slightly smaller when the stressed syllable onset is longer (see panel 3 of Figure 1). Thus, `DualLocus` and `HLocus` words pattern together, while `StressLocus` is distinct. This suggests that, despite phonetic retraction of the peak, the H is associated to and receives timing information from the post-tonic syllable in rising accents.

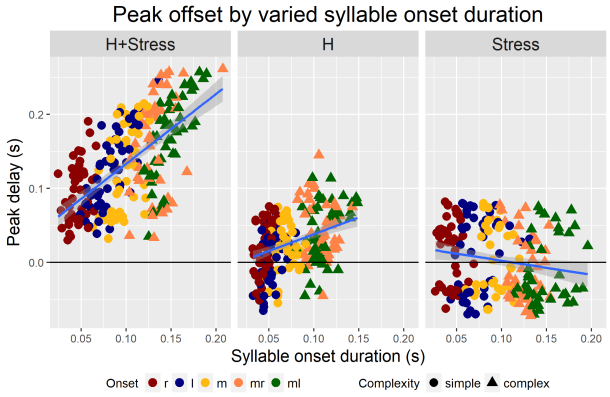

Figure 1: Scatter plots of `PeakDelay`

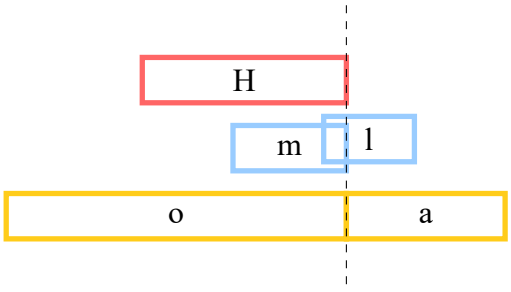

Figure 2: Gestural score of Valjevo /ˈo.mla$_H$/

I propose a gestural model where the H gesture *target* (peak) in rising accents is coordinated with the c-center of the post-tonic syllable onset (Figure 2). In this configuration, the phonological association is derived from the presence of the coordinative relationship, and the peak (H target) occurs early relative to the TBU. This proposal adds to the possible coordinative structures hypothesized for tone: previous models (Gao, 2008; Karlin, 2014) show only tone gesture *onsets* coordinated as an additional C-like gesture in a c-center structure, producing relatively late peaks.

A typological model of sibilant inventories and the principles which shape them.

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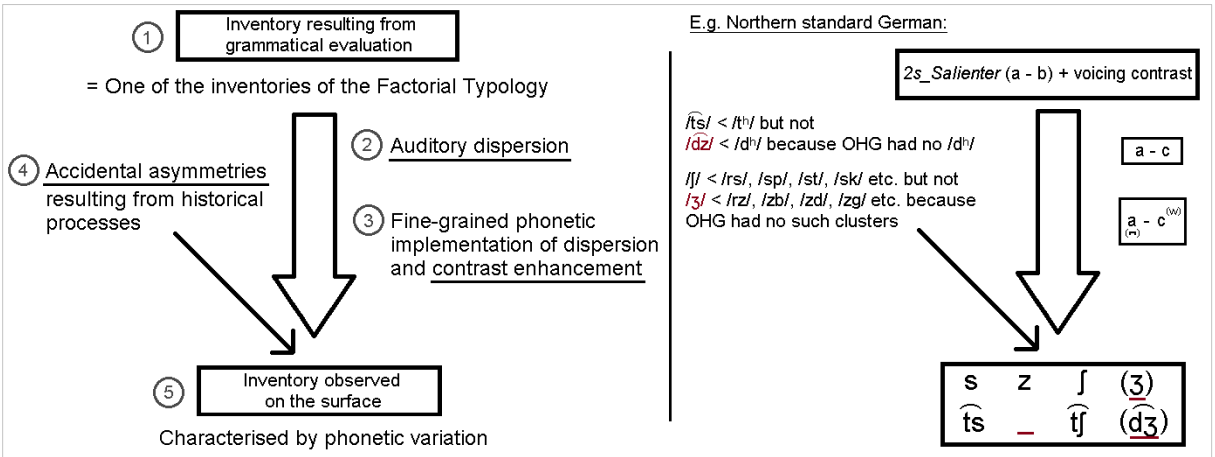
With the emergence of rule-based (Chomsky & Halle 1968) and constraint-based (Prince & Smolensky 1993/2004) generative phonology, the study of phoneme inventories has come to receive less attention than in earlier frameworks (e.g. in Trubetzkoy 1969 [1939]). Research on inventories receives again attention in recent years (Clements 2009: 19f.), although having to deal with the implausibility of teleologicity and of speakers evaluating entire inventories (e.g. Flemming 2002 et seq.). Despite approaches tackling this problem successfully (Boersma 2003, Boersma & Hamann 2008), large-scale studies on inventories in OT remain rather scarce.

We propose here an analysis which predicts and explains all sibilant inventories attested in natural languages, by means of an OT typology and Property Analysis (Alber & Prince in prep.). Its results are compared with the languages in the UPSID database (Maddieson 1984) and a (more accurate) database set up by the author containing 132 sibilant inventories as of 28/01. Beyond the accurate matching of predicted with attested languages, this study highlights how inventories resulting from grammatical evaluation are linked to their surface realisations by dispersion and diachronic processes (see 2-4 below), thereby contributing to the literature on symmetry and gaps (Boersma 1997) as well as phonological representation (Kehrein 2002).

1. Based on the principles which are posited to shape sibilant inventories, a basic typology built in OTWorkplace (Prince, Tesar & Merchant 2007-2019) yields six languages resulting from the interaction of constraints implementing faithfulness, articulatory markedness (favouring central sibilants) and perceptual saliency (favouring front sibilants), e.g. one with two sibilants:

2s_Salienter	abcd -> abbb (/s/ - /s̠/)	NoCD ≫ Faithfulness ≫ Centralisation & NoBCD

2. Building further on Boersma & Hamann (2008), it is shown how auditory dispersion spreads the phoneme categories of the six languages apart from each other in perceptual space and **3.** how this auditory distance is implemented phonetically by a set of articulatory strategies. **4.** We demonstrate that the symmetry between sibilant fricatives and affricates (supported by 86.56% of 290 languages in the UPSID) is due to their derivation from one same grammar, whilst accidental gaps emerge from independent diachronic processes, not from the grammar.



The results show that out of 65536 theoretically possible inventories, 3433 are predicted by this model to be possible ones; 97.72% of the inventories in the sibilant database belong to these predicted inventories. Not only do the results fit the typological reality, but more crucially (Prince 2016: 12), this analysis provides a better understanding of the logic behind the typology of sibilant inventories, whilst also avoiding the evaluation of entire inventories.

The variable vocalic nature of syllabic consonants

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Syllabic consonants are often subject to severe phonotactic restrictions and, compared with vocalic nuclei, may be defective in a variety of ways. They may systematically lack either the onset, or the coda, or both; or may be confined to specific positions within words. In some cases, however, syllabic consonants are well integrated into the vowel system. We show here that this is a gradient phenomenon, ranging from highly restricted defective consonantal nuclei to their full vocalic functionality, including stressability, lengthening under stress, and participation in vocalic length and tone contrasts.

The syllabic consonants most likely to be integrated into vocalic systems are rhotics and sibilants, while nasals are less likely vocoids and laterals the least likely. This asymmetry cannot be explained by acoustic properties, since laterals (and nasals) exhibit continuous air flow and clear formant structure, which rhotics often lack, when realized as flaps and trills.

We compare syllabic consonants in selected languages and analyze the typology as the interaction of two markedness hierarchies, one on stressability and one on nucleus compatibility, which deviate from the generally assumed order in the sonority hierarchy (e.g., Parker 2002, 2011 and references therein) and which we ultimately break down into markedness of features.

In English, for example, liquids and nasals can be syllabic. However, only the rhotic can be stressed (e.g., American English *pervert* [ˈpʰɻ̩vɻt]). While rhotics can serve as nuclei in monosyllables, as in *burn* [bɻ̩n], laterals cannot (cf. Hayes 1995). This implicational relation is of a more general nature. In Ślovak, the liquids /r/ and /l/ can be syllabic, and are integrated into the vocalic system: they contrast in length and can be stressed. In Serbo-Croatian and Yurok (Robins 1958) only /r/ but not /l/ is syllabic. Yurok /r/ patterns as a consonant, participating in the plain vs. glottalized contrast restricted to consonants, and also patterns as a vowel, participating in the vocalic length contrast. Lendu (Tucker 1967) distinguishes a rhotic and a lateral liquid, but allows only the rhotic and a sibilant in the syllable nucleus. While nasals can carry tone in word-initial position when preceding a voiced stop and are thus at least moraic, no words with a stressed nasal have been reported. However, syllabic sibilants and rhotics can be stressed and also participate in length contrasts; and the sibilants can bear tone.

In Senoufo (Mills 1984), syllabic nasals (the only syllabic consonants) pattern with vowels by contrasting in length and being stressable. In Chiricahua Apache (Hoijer 1963), which has no rhotic, both the lateral and nasals are syllabic, and both are tone bearing, but only the nasal participates in a length contrast also found in vowels. However, in Nabak (Fabian & Fabian 1971, 1998), nasals are the only consonants that can be syllabic, yet these nasals are not quite integrated into the vowel system. Word-initial stress falls both on vowels and word-initial syllabic nasals. However, some Nabak speakers augment the forms with a stressed syllabic nasal with an epenthetic vowel, yet no epenthesis occurs after unstressed syllabic nasals.

The variation in syllabicity suggests that, cross-linguistically, the sonority ranking may vary for nasals, rhotics and sibilants, but not for laterals, whose sonority is lower than generally expected. We propose that Kenstowicz' (1996) markedness hierarchy for quality sensitive stress, which includes only vowels, be extended to also include consonants, but with laterals of higher markedness than in the usual sonority ranking, and a flexible ranking of stridents, rhotics and nasals:

... ›› *ˈNuc(lateral) ›› *ˈNuc(strident), *ˈNuc(nasal), *ˈNuc(liquid) ›› *ˈNuc(highV) ›› ...

This hierarchy, with language-specific rankings of the constraints separated by commas, captures not only the potential of consonantal nuclei to bear stress, but more generally, their potential to be integrated into the vowel system. Together with a parallel less specific hierarchy on nuclei (e.g., adapted H-Nuc hierarchy, Prince & Smolensky 1993: *Nuc(obstr) ›› *Nuc(lat) ›› *Nuc(strdnt), *Nuc(nas), *Nuc(lqd) ›› ...) this explains the gradience effects in the typology of syllabic consonants, including the vowel-like behavior of rhotics but not laterals, as well as the restriction of vowel epenthesis in Nabak to stressed rather than all syllabic nasals. In conclusion, rhotics, sibilants and nasals inhabit a grey zone in the Sonority Hierarchy between vowels and consonants where each of them can lean towards either major category or both.

The Emergence of Phonemes and Phonological Contrasts

Jeffrey Lamontagne (McGill University)

Introduction. High-vowel laxness in Quebec French (QF) is typically analysed as allophonic (e.g. Poliquin 2006) because laxing is often predictable and does not distinguish minimal pairs at the word level, while others argue that unrepaired borrowings from English provide evidence of phonemicisation (Côté 2012). QF speakers consistently pronounce final-syllable high vowels as tense before specific coda consonants ("lengthening consonants", /v z ʒ r vr/) and word-finally, but as lax otherwise (Poliquin 2006), as in [vi] *vie* 'life' and [vɪt] *vite* 'fast', respectively. High-vowel laxing is variable in non-final syllables, however; laxing may be triggered by the presence of a later high lax vowel (Poliquin 2006), as in [lɪmɪt]~[limɪt] *limite* 'limit'. Given the acoustic similarity between high tense and high lax vowels, testing high vowels directly is challenging. Instead, we test whether vowel-on-vowel coarticulation in penults is sensitive to high-vowel laxing in final syllables (where it is predictable). We show that laxing agreement mediates the degree of coarticulation and suggest a reanalysis of the four-way height contrast (e.g. Nguyen et al. 2004) as being a three-way height contrast with a separate laxing contrast.

Methods. We extracted 26 000 penultimate mid vowels (/e ø o ɛ œ ɔ/) from 67 native QF speakers in the *Phonologie du français contemporain* corpus (Durand et al. 2002, 2009; http://www.projet-pfc.net/), with speakers ranging from young adults to seniors. F1 was measured at the midpoint as a proxy for vowel height, then phonological features of both the penult's mid vowel and the final syllable's vowel (height, rounding, backness, laxness) were coded. Finally, we used mixed-effects linear regression to predict the normalised F1 of the penult's mid vowel, including random effects for speakers and words in addition to factors capturing the speakers' age, final vowel's height and whether features were shared by the penultimate and final vowels (ie. identical rounding, backness and/or laxness values).

Results. Phonological similarity modulates coarticulatory effects: mid vowels show more coarticulation with following vowels' height when they agree in rounding and backness. We find that young adults raise tense mid vowels more before tense high vowels, and lax mid vowels more before lax high vowels. This asymmetry is especially crucial: lax high vowels are articulatorily lower than tense high vowels, therefore finding more lax-vowel raising before the former series cannot be explained by coarticulation without phonological mediation. The laxing result is only found for young adults, suggesting a change in apparent time.

Discussion. Since phonologically similar vowels show greater coarticulation and laxness patterns this way for young speakers, we propose that laxing has become contrastive for those speakers. We suggest that meaning-affecting differences at the phrase level could play a role in favouring phonemicisation, as illustrated in (1), which may result from this domain being the equivalent of the word level for processing due to this also being the domain of prominence in the language (e.g. Jun and Fougeron 1995). Finally, our results illustrate that coarticulation can argue for phonological analyses where other evidence (e.g. minimal pairs) is absent or debated.

(1) High-vowel laxing can affect meaning

	[lɔmkɪlavy]	[lɔmkilɑvy]
L'homme qui l'a vu 'The man who saw him'	✗	✓
L'homme qu'il a vu 'The man that he saw'	✓	✗

Structural Adaptations in Moroccan Arabic

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This papers deals with adaptation of syllable structure in loanwords from French to Moroccan Arabic (MA). Particularly, it examines irregularities manifested in the adaptation of syllables without onset and provides a unified account for the phenomenon. Data sets are taken from three donor languages: Berber, French and Spanish.

Literature shows diverging accounts concerning phonological borrowings. While some researchers claim that adaptations occur in phonology (Paradis & Lacharité; 1997; 2009) others argue that they are perceptually motivated (Peperkamp et.al, 2008). A third trend shows that both phonetics and phonology play a role in adapting sounds and sound structures (Boersma and Hamann; 2009, Kenstowicz; 2013). Regardless of the approach adopted, several works defend the claim that insertion is the default adaptation/ repair, and that deletion is resorted to only in special cases.

The three donor languages considered in this study are different from one another in several respects. However, they all allow syllables without onset, whereas MA does not. Foreign words starting in a vowel must satisfy the onset requirement in MA. Ill-formed syllables are either equipped with an onset or deleted altogether. The first case is found in borrowings from French and Spanish (but not Berber). For instance, Fr. /oriʒin/-> MA [duriʒin] ‘matches’, Fr. /avoka/ -> [labuka] ‘lawyer’, Sp. /enʧufe/ -> MA [linʧufi] ‘plug’; these show not only satisfaction of the onset requirement in MA, but also inconsistency of the consonants occupying the onset position which is an indicator that the onset is not supplied by insertion. The second scenario where the initial onsetless syllable is not present in MA is found in adaptations from the three donor languages. Examples include Fr. /elastik/->[lastik] ‘rubber’. Br, /ataras/-> [taras] ‘trouble’, Sp. /armarjo/ -> [marijju] ‘closet’. Several questions are raised: why is there irregularity in adaptation within and across the donor languages? Why is adaptation by -what seems to be- insertion a possibility in French and Spanish but not in Berber? What controls the borrower’s preference to one onset or another?

This study will show that neither insertion nor deletion play a role in these adaptations. The asymmetry is subject to such factors as the nature of the input, frequency of collocation, the way the foreign words were transmitted from the three donor languages, to name but a few. I will show that these factors influence the way MA phonology interprets foreign structures, and, hence, fixes the ill-formed syllables of the donor languages. Finally, I will adopt the framework of Optimality Theory (Prince and Smolensky, 1993) to show how the seeming irregularities are generated by one grammar.

Nasality and voicing in a modulated-carrier model of speech

Kuniya Nasukawa and Phillip Backley (Tohoku Gakuin University, Japan)

Establishing the strong cross-linguistic correlation between nasal consonants and true voiced obstruents, Nasukawa (2005) demonstrates the advantages of treating the two properties as different phonetic realisations of a single nasal-voice feature |L|. The question of whether this feature manifests itself as nasality or true obstruent-voicing is determined by the status of the feature in a given phonological structure.

Using a traditional Element Theory approach, Nasukawa & Backley (2009) claim that nasal expressions and voiced obstruent expressions be distinguished in terms of a difference in headedness: the nasal-voice feature |L| is phonetically interpreted as true voicing when headed, while the non-headed version manifests itself as nasality. Thus, the structure containing headed |L| (for true obstruent-voicing) is acoustically more salient than the structure containing non-headed |L| (for nasality).

In contrast to this position, Ploch (1999), Kula (2002) and Breit (2013) maintain that the reverse structure is correct: nasality is the realisation of the headed nasal-voice feature while voicing is the phonetic outcome of the same feature in its non-headed form. This view contradicts Nasukawa & Backley (2009) by asserting that the headed structure for nasality is acoustically more salient than the non-headed structure for obstruent voicing. This claim is made chiefly with reference to the sonority scale.

In the interests of universality, we investigate which of the above analyses provides a better basis for accounting for recurrent phonological phenomena. In fact, the direction of the debate will depend on the working hypothesis we choose to adopt and on how we see the nature of the language faculty as a whole.

Without committing to either of the above views, this paper considers which of the two properties in question is phonetically the more salient. The existing literature on nasality and voicing takes a somewhat simplistic view of the phonetic evidence: it assumes that voicing is a fundamental property of human language, and as such, should be regarded as the more basic. However, this approach ignores other types of phonetic evidence such as acoustic salience. To address this point, this paper considers relative salience in the context of a modulated-carrier model of speech (Ohala 1992; Ohala & Kawasaki-Fukumori 1997; Traunmüller 1994, 2005; Harris 2009).

Comparing acoustic salience in voiced obstruents and nasal consonants, we show that the size of modulation of the carrier signal in nasal consonants is smaller; this derives from the fact that nasals have a vowel-like formant signature, despite being weakened by antiformant effects associated with the presence of nasal murmur. By contrast, the size of modulation of the carrier signal in voiced obstruents is much bigger, since the existence of aperiodic energy, in principle, eliminates any vowel-like formant structure. The result is a significant deviation from the carrier signal. In addition, the fact that the energy of the fundamental in voiced obstruents is slightly weaker than in nasals leads us to conclude that there is a greater perceptual distance between the voice bar and the carrier signal in voiced obstruents than is observed in nasals. According to a modulated-carrier-based analysis, therefore, nasality is considered to be less salient than obstruent voicing. This contradicts the established sonority-based view, in which nasality is considered to be more salient than obstruent voicing because of their relative positions on the sonority hierarchy.

An exploration of vowel-pair frequencies in five-vowel Bantu languages

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Here I examine vowel-pair frequencies in six Bantu languages and consider more closely the implications of the frequency data for one of these languages in particular, namely Lozi. In the larger sample, of particular interest is the disparity in the frequencies of two non-height-harmonic vowel pairs: unrounded /e.i/ and rounded /o.u/. Rounded /o.u/ is consistently less frequent than unrounded /e.i/. The more detailed discussion of Lozi suggests that there is a cross-part-of-speech phonotactic restriction on the vowel pair /o.u/.

The data used are lexica of Chewa, Kalanga, Lozi, Makhuwa, Pende and Yao from CBOLD. From these I obtained the observed frequencies, expected frequencies (based on the frequencies of each vowel phoneme) and observed–expected ratio for each vowel pair in each language. Chewa, Kalanga and Yao exhibit canonical Bantu height harmony (à la Hyman 1999) in which vowels in verbal suffixes are lowered from high to mid by preceding mid vowels (and the same is generally true within verb roots). In addition, this process is asymmetric with respect to rounding: /i/ is lowered after /e/ and /o/ but /u/ is only lowered after /o/. In Pende, the only difference is that /i/ is also lowered to /e/ after /a/ (and /u/ does not lower to /o/). However, in both Lozi and Makhuwa, the only change is from /u/ to /o/ when preceded by /o/.

The results, visualised in Fig. 1, show that, regardless of the language's harmony system, both /e.i/ (red/left) and /o.u/ (blue/right) are less frequent than expected in nouns but also that /e.i/ is consistently less frequent in nouns than /o.u/ (statistically significant, $p < 0.001$, according to a generalised linear mixed-effects model using the observed frequency data). In some cases this could be interpreted as a gradient version in nouns of the categorical rule of height harmony found in verbs (cf. the under-representation of heteromorphemic geminates in English; see Martin 2011). However, this cannot be the case for Lozi and Makhuwa and furthermore there also appears to be an additional bias driving the difference between /e.i/ and /o.u/.

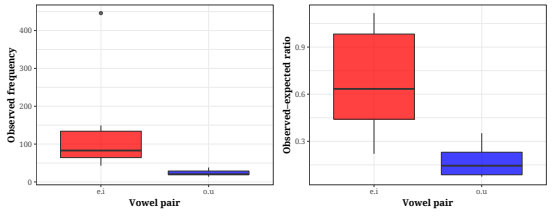

Fig. 1: Observed freq. and ratios for /e.i/ and /o.u/

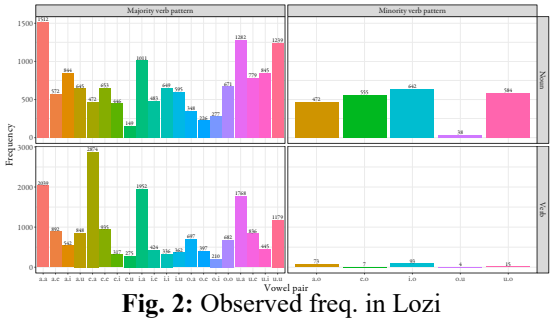

Fig. 2: Observed freq. in Lozi

Fig. 2 shows the full counts for Lozi (top row, pairs in nouns, bottom in verbs; first column, majority-pattern pairs in verbs, second column minority-pattern pairs in verbs. As expected, the minority-verb-pattern pairs are all extremely uncommon in verbs, with /o.u/ being almost entirely absent. However, /o.u/ also is also extremely infrequent in nouns, whereas the other minority-verb-pattern vowel pairs are not.

This suggests that, in Lozi, there is a synchronically active phonotactic process that militates against /o.u/ and is blind to part of speech. However, although still extremely infrequent, instances of /o.u/ are commoner in nouns than verbs; this is likely down to higher levels of lexical innovation in nouns than verbs. Moreover, such instances are not entirely random. For example, 63% have intervening labial consonants, 16% an intervening /l/. Thus, there are potential phonetic reasons that may lead to violations of a ban on /o.u/. Nevertheless, there are many counter-examples even in these environments; that is, in the vast majority of cases where /o.u/ might occur, /o.o/ is found instead.

Standard Croatian pitch accents – theory and practice

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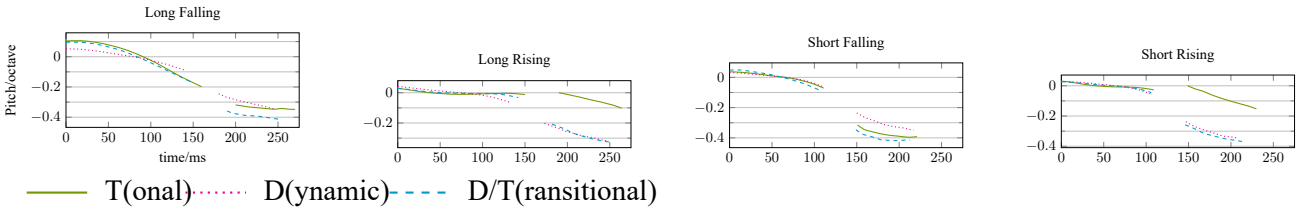
'Croatian' is a sub-group of South Slavic dialects spoken across present-day Croatia. A distinctive feature of much of this dialect continuum is the use of pitch accents.

Croatian has a normative standard dialect. This has a 'four-accent system' of stress and pitch: short falling (SF: [dɔ́bàr] *dȍbar* 'good'); short rising (SR: [dánás] *dànas* 'today'); long falling (LF: [dîːvàn] *dîvan* 'pretty'); long rising (LR: [dǔːʃá] (in actuality [dúːʃá]) *dúša* 'soul'). Long vowels can also occur (lexically) anywhere after the accented syllable, but not before. The four 'tones' and other length are marked in dictionaries, but not in usual orthography. They are also not marked in school texts, though children are taught about them around age 12–13.

The standard has high prestige, so most of those in public life aim to acquire it, but its pitch-accent system is found only in *Štokavian* dialects, native to around 40–50% of Croatians. The similarly populous *Kajkavian* dialects, including the socially prestigious and politically important Zagreb dialect, have a simple dynamic stress accent and no length (in Zagreb). Hence the normative standard is hard to acquire for half its putative speakers. The question arises, then, what is it in reality?

We present pitch-accent data from 89 younger educated speakers of 'standard Croatian', from all regions and all major cities. They read a frame sentence containing exemplars of the four standard accents. The 41 test words were common, disyllabic with initial accent, and mostly with an open accented syllable. They were balanced so far as possible across onset places and manners.

We found that speakers fell into three major statistically distinguishable groups. 36 T(onal) speakers (mostly Štokavian) showed a clear 4-accent system per standard. 30 D(ynamic) speakers did not produce recognizable pitch-accents. 23 D/T(ransitional) speakers (coming from all major dialects) lost the SR/SF contrast but maintained LR/LF either robustly (for 7) or sporadically (for 16). The following overview of the acoustics displays the average pitch contours (relative to speaker baseline) for the four normative accents, as realized by each of the three groups.



Phonologically, Inkelas and Zec (1988) analyse the T system as a moraic representation with two tones: SF $\underline{\acute{\mu}}.\grave{\mu}$, SR $\underline{\acute{\mu}}.\acute{\mu}$, LF $\acute{\mu}\underline{\grave{\mu}}.$, LR $\grave{\mu}\acute{\mu}.\acute{\mu}$. It is claimed that F tones are only initial, so there are simple underlying representations with just high tone linked to the tonic syllable for F and to the post-tonic for R: $\underline{\acute{\sigma}}.\sigma$ and $\underline{\sigma}.\acute{\sigma}$. Phonetic rules spread the H to achieve the traditional description.

However, as shown above (and observed by others), LR has a level or declining tone profile, not rising, while LF does have a clear falling contour, and LF and SF have a (further) drop to the post-tonic. That is, two-level surface realizations appear to be H.L, H.H, HL.L, HH.H. It is also not (Vermeer 1984 85) true, currently or historically, that F accents are only initial (we also have counter-examples). Additionally, in the multi-mesolectal environment, perceptions of dynamic stress are confused with perceptions of pitch accent. As Kapović (2018) discusses, Zagreb speakers shift their stress position to match the standard accent position, while Zagreb stress is barely distinguishable from Štokavian short falling.

Smiljanic and Hualde (2000) argued that Serbocroatian has length, stress, and a lexical distinction between 'rising' and 'falling' on words with initial stress. Modifying their system, we propose that standard Croatian has segmental length, stress, and a lexical (unrestricted) pitch feature, which is absent from D speakers, and modifies only long vowels in D/T speakers. Since the D/T speakers differ from the D speakers in the LF accent, there is an argument for a privative 'low' feature rather than a binary 'high/low' feature.

Perceptual cues to coda voicing contrasts

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What are the cues to coda voicing, and are they language specific? Influences on perceived voicing include preceding vowel duration (Raphael 1972), F1 and transition duration (Summers 1988), and F0 (Gruenenfelder & Pisoni 1980), as well as voicing during the constriction; there are some language-specific differences in the realization of these correlates (e.g. Chen 1970). I present a perceptual study examining identification of coda stop voicing when major cues to voicing are removed or obscured; native English listeners are significantly better than chance at identifying voicing, and are more accurate with English stimuli than Hindi or Telugu stimuli, suggesting language-specific differences in the realization of voicing as well as suggesting additional relevant cues.

19 native English speakers heard VC nonce words and decided which of two written items matched the auditory stimulus. Final consonants were stops, with the closure, release and most of the transition removed (piloted to target 75% accuracy for place). Vowels were manipulated to have 2 durations (230 ms, 160 ms). Half of trials tested voicing contrasts, and half tested place contrasts. There were three blocks (in randomized order), differing only in the speaker's L1: (a) English; (b) Hindi; (c) Telugu.

Table 1: Accuracy of decisions, by language and contrast type

	Place	Voicing
English	75%	72%
Hindi	76%	62%
Telugu	77%	59%

Stimuli were designed to elicit similar accuracy for place of articulation decisions across the language conditions; there were no significant differences by language in accuracy for place of articulation.

However, accuracy for voicing contrasts was significantly higher for the English stimuli than for stimuli from Hindi or Telugu ($p < 0.001$).

Vowel duration also influenced responses; vowels given long duration were more likely to be identified as having following voiced codas than vowels with short duration: 57% vs. 38%, $p < 0.001$. The effect was parallel across language conditions.

As most of the major voicing cues were controlled or obscured, the results suggest that listeners use additional cues to voicing. Lower accuracy for Hindi and Telugu stimuli than for English stimuli suggests language-specific differences in the effects of voicing on preceding vowels, and points towards what cues listeners are using. There are large differences between voiced and voiceless environments in the English stimuli in HNR and jitter (Figs. 1 & 2). Other characteristics associated with voicing (F1, F0, spectral tilt) exhibited smaller effects of coda voicing and less difference across the three languages.

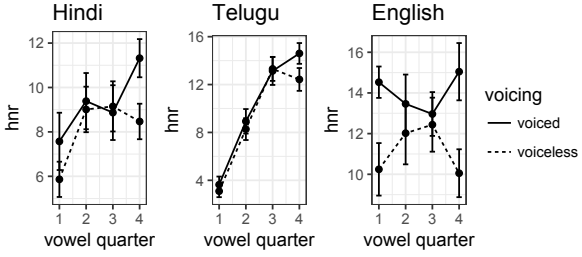

Figure 1: HNR by coda voicing and lang.

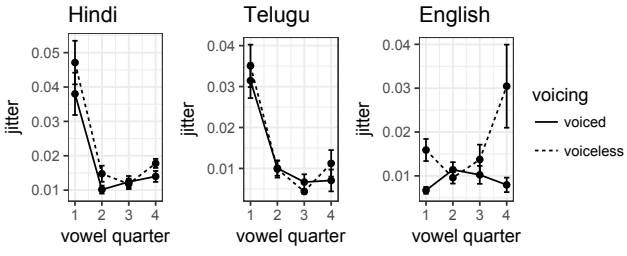

Figure 2: Jitter by coda voicing and lang.

These results provide a closer look at language-specific realizations of voicing and how they influence listeners, as well as suggesting that jitter and HNR are components of coda voicing contrasts, at least in English. Indeed, English coda voicing largely manifests in characteristics of the preceding vowel. Given the differences across languages, the correlates of voicing must be part of the learned systems, even if they are physically motivated; listeners are most accurate with stimuli from their language's voicing system.

Representing cross-language differences in the synchronicity of ST clusters

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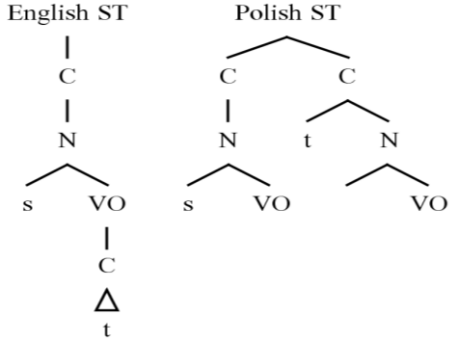
There is little consensus in the literature on the representation of sibilant-stop (ST) clusters. This presentation describes two pilot acoustic studies of Polish and Polish-accented English bearing on this issue, in particular language-specific differences in the phonetic synchronicity of the cluster (cf. Hermes et al. 2013).

In English, the post-/s/ context is familiar as a position in which aspiration does not occur. Acoustic studies (e.g. Cho et al. 2014) have shown that post-sibilant /ptk/ closely resemble initial /bdg/, with short-lag positive VOT. In Polish, voiceless plosives are described as having short-lag VOT, yet the 'short' VOT in Polish /ptk/ appears to be longer than the short VOT in both English lenis plosives and English fortis plosives after /s/ (Keating 1979; Schwartz & Wojtkowiak 2017). Therefore, a question that remains is what if any VOT shortening may be observed in Polish ST clusters relative to initial /ptk/. Our first study compares VOT of post-/s/ stops with initial /ptk/ in Polish. 38 monolingual speakers produced two pairs of stop-initial (p, t) and cluster-initial (sp, st) words in sentences controlling for vowel context and prosodic position. Results show a small degree of post-sibilant VOT shortening for /p/ (mean difference of 5 ms), but not for /t/. Compared to English, Polish appears to show minimal VOT shortening effects.

These facts have implications for the acquisition of L2 English ST clusters by L1 Polish learners. Proficient learners are expected to show more VOT shortening. The second study compares L2 English VOT in ST clusters in two groups of L1 Polish speakers. First year students (N=16) and university-level English teachers (professors and PhD students: N=16) produced /st/ and /sk/ initial words in English (a total of 256 items). The vowel context was always /æ/. The more proficient group produced significantly shorter VOTs of the stops after /s/ (mean difference of 15 ms, and no interaction with consonant place) than the students' group. These results provide preliminary support for the claim increased L2 English proficiency is associated with VOT shortening in ST clusters.

In Schwartz (2018), VOT shortening in English ST clusters (left) is a weakening resulting from a recursive structural configuration in which the stop is embedded in the representation of the sibilant (see Figure 1). While descriptions of English talk about post-/s/ laryngeal neutralization, the weakening interpretation, and not neutralization, is compatible with phonetic findings that post-/s/ fortis plosives raise f0 more than initial lenis plosives in English (Hanson 2009). Conversely, Polish ST clusters (see Figure 1) are claimed to have a different configuration in which the sibilant and stop are adjoined at a higher level of structure. The Polish stop is not prosodically weaker than the sibilant, and VOT shortening is expected to be minimal. The longer VOT in English ST by less proficient L1 Polish speakers constitutes transfer of the L1 structure. The slight shortening effect observed for L1 Polish /p/ might be attributable to a smaller degree of coarticulation resistance (Pastätter & Pouplier 2017) – when C2 in a cluster is labial, we may find tighter articulatory coordination.

- Figure 1 – ST clusters in English (left) and Polish (after Schwartz 2018)



Categories, root complexes and default stress: Slovenian nominalisations revisited

Marko Simonović, Karl-Franzens Universität Graz

Marvin (2002) presents a detailed analysis of stress assignment in Slovenian nominalisations as a function of Phasal Spell-out. A key property of the discussed nominalisations is that some of them inherit the prosodic pattern of the base (1), but others have a different prosodic pattern (2).

(1) Stress-preserving nominalisation

Nominalisation	Base	Nominalisation	Base
stár-ost	stár	anketíran-ec	anketíran
old-ost		interview.PASS.PCPT-c	interview.PASS.PCPT
'oldness'	'old'	'interviewee'	'interviewed'

(2) Stress-shifting nominalisations

Nominalisation	Base	Nominalisation	Base
star-ást	stár	odpirál-ec	odpíral
star-ost		open.PAST.PCPT-c	open.PAST.PCPT
'old age'	'old'	'opener'	'opened'

I observe several generalisations which hold of all data discussed in Marvin (2002) but are not capitalised on in the original account. First, all stress-preserving nominalisations incorporate an adjective (as passive participles behave as regular adjectives in Slovenian). On the other hand, the stress-shifting group contains no items with an adjectival structure: *star-ást* is analysed as a root nominalisation, and what is traditionally called past participle is an all-purpose impersonal form which does not behave as an adjective. Finally, the second group actually displays the same stem-final stress pattern, which gets obscured in the citation form (NOM.SG) because some of the NOM.SG forms contain an overt case ending and the affix *-c* triggers vowel epenthesis. In (3) the nominalisations from (2) are repeated in GEN.SG, where all nouns have an overt case ending.

(3) starást-i odpirálc-a
old age-GEN opener-GEN

My reanalysis is couched in a recent revision of Distributed Morphology in which all categorial heads are divorced from phonological material, so that derivational affixes become category-free root material (Lowenstamm 2014). Both Lowenstamm (2014) in his original proposal on English and Nevins (2015) in an elaboration on Catalan find that there is a special process of prosody assignment in root complexes (constellations in which roots select roots or √Ps).

The main points of the reanalysis of the Slovenian nominalisations are as follows:

- *l,* the elsewhere allomorph in the Slovenian verbal inflection, also surfaces as a root which selects vPs (e.g. in *odpiralec* $[[[[\text{ODPIRA } v]_{vP} \text{L}]_{\sqrt{P}} \text{C}]_{\sqrt{P}} n]_{nP}$.
- Unlike English, Slovenian allows root complexes higher up in the structure. Root complexes trigger default (stem-final) stress assignment, wherever in the structure.
- The prosodic specification of the affixes which are generally seen as nominalisers (in the examples above: *ost* and *c*) plays no role in deciding the prosodic shape of the resultant word.

Apical agreement in Norwegian consonant clusters

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In Norwegian, there is a process whereby a rhotic changes a following coronal into corresponding retroflex (apical) segment with subsequent deletion of the rhotic. This process applies in simplex words but also across morpheme and word boundaries. Some exceptions to this are found in Urban Eastern Norwegian where a /r+d/ fails to undergo retroflexion if followed by a stressed syllable: a. Word-internal/bound morpheme: /barn/→ba:ɳ, /sur+t/→sʉ:ʈ b. Word boundary: /har du/→ha:ɖʉ: c. Stress alternating: /'garde/→garde/*gaɖe but /for'di/→fo'ɖi: The phenomenon has received some attention in the literature since there is no consensus regarding their phonological status in addition to what the driving factors behind the process are. Some phonologists regard non-alternating retroflexes as underlying segments (Kristoffersen 2000) while others take them to be clusters of rhotics and coronals underlyingly (Uffmann 2007). The process itself has traditionally been assumed to be driven by articulatory considerations, resolving articulatory distance by assimilation. The analysis presented here assumes that retroflexes are underlying clusters, as they do not contrast with their historical origin. However, it deviates from the traditional view that articulatory ease is what drives the process. The view that is advocated focuses instead on the prosodic aspects of retroflexion. More specifically, it is argued that retroflexion is driven by a need to avoid rhotics in coda position and that the exceptions are governed by stress and considerations of syllable weight. The analysis itself is based on the insights from Correspondence Theory, which explicitly invokes a correspondence relation between the elements in input strings and output strings. This correspondence relation allows us to evaluate the input/output mapping. By positing the retroflexes as underlying clusters, we create a more economical representation of the phonology of Norwegian and it puts us in a position to capture the generalisations that characterise the process, meaning that the pattern as well as its exceptions can be described with the same tools without "outsourcing " anything to pre-phonology (i.e. the lexicon). The view of retroflexion that is advocated in this analysis is cluster simplification made possible through spreading of apicality. Thus, retroflexion always makes complex consonant clusters less complex by deleting the rhotic under the condition that apicality of the rhotic can be preserved in other ways. The exceptions to this, as seen from the failure of /r+d/ to undergo the process, are governed by constraints requiring faithfulness in phonologically prominent positions, e.g. stress. This also captures the dialectical variation, as the process is stress-sensitive in only one main dialect area.

/'gar.de/	Uniformity Stressed σ	Max(apicality)	*Coda/r	Max(r)
☞'gar.de			*	
'ga.ɖe	*!			
'ga.de		*!		*

With this analysis, the retroflexes in Norwegian are deprived of their underlying status, reducing them to phonetic manifestations of phonological processes. This in combination with shifting the view of the driving force as prosodic rather than articulatory enables us to account for the process as well as its exceptions in a more coherent way, deriving everything from prosodic factors. Competing articulatory accounts that allow retroflexes to be underlying are blind to this as they split the phenomenon between the lexicon and articulatory factors.

Magnet effects in monolingual and bilingual perception

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Studies investigating the internal structure of phonological categories have demonstrated an inverse relationship between category goodness and discriminability, such that the "best category exemplars" or "prototypes" are the most difficult sounds to discriminate from similar sounds (e.g., Grieser & Kuhl, 1989; Aaltonen *et al.*, 1997). This phenomenon has been called the "perceptual magnet effect" (PME), as the prototype functions like a magnet by drawing similar sounds toward it in the perceptual space (Kuhl, 1991; Iverson & Kuhl, 1995). In monolinguals, the PME has been shown to be modulated by individual linguistic experience, such that it only manifests for the categories of the language to which one is exposed (Kuhl *et al.*, 1992). Recently, it has been suggested that PMEs in bilinguals might play a role in contact-induced sound change (Blevins, 2017). To date, however, it is not known whether PMEs can develop for multiple languages in bilinguals.

The present study utilizes a series of perceptual experiments to investigate the existence of PMEs in Turkish-English late bilinguals (n = 20) compared to American English (AE) monolinguals (n = 20). These groups were chosen because the Turkish phonological inventory contains /y/, which is absent in AE; and the AE inventory contains /æ/, which is absent in Turkish. By examining only these two vowels in these two groups, therefore, the linguistic source of any observed PMEs can be confidently designated as one or the other language. 25 variants of each vowel were synthesized. The first and second formants of the [æ] variants, and the second and third formants of the [y] variants, are varied by steps of 30 mels. For each of the vowel matrices, participants complete a category goodness rating task (Task 1) and an AX same-different discrimination task (Task 2). Evidence for PMEs will be measured using two criteria: (a) a minimum in discriminability near the best-rated exemplar, and (b) a negative correlation between goodness and discriminability (Iverson & Kuhl, 2000).

To date, n = 10 AE monolinguals have completed Tasks 1 and 2 for the [æ] stimulus matrix. Mean goodness ratings (z-transformed) and discrimination sensitivity values (d': Macmillan & Creelman, 1991) are displayed in Figures 1 and 2, with darker shading indicating higher goodness or decreased discriminability. Regarding criterion (a) of the PME, there is a *local* minimum in discriminability at the best exemplar E1, but this pattern does not hold for the entire stimulus set. Regarding criterion (b), there is no significant correlation between goodness and discriminability (r = .11, p = .59). We propose a number of possible explanations for this largely null result: (1) that the PME is not robust enough to be apparent with our currently small n; (2) that the PME is limited to certain areas of the vowel space (e.g., Sussman & Gekas, 1997); or (3) that the PME is simply an artifact of categorical perception (Lively & Pisoni, 1997).

Figure 1: Category goodness ratings

	1	2	3	4	5
A	-1.11	-0.67	-1.39	-1.72	-1.45
B	-0.05	0.06	-0.28	-0.83	-0.99
C	0.45	0.61	0.45	-0.11	-0.61
D	1.12	0.89	1.06	0.56	-0.67
E	1.78	1.45	1.34	0.89	-0.78

Figure 2: Discriminability (d')

	1	2	3	4	5
A	0.78	1.19	0.37	0.51	0.17
B	0.74	1.3	0.19	0.91	0.77
C	0.61	1.47	0.43	0.69	0.51
D	0.77	0.93	0.38	0.65	0.96
E	0.54	1.08	0.76	0.11	0.68

Data collection is currently ongoing for both participant groups in both vowel matrices. Further results will clarify the nature and extent of the PME, as well its potential role in sound change.

An Afrikaans Origin Hypothesis of the KIN/PIN Split in South African English

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The mechanism by which diachronic phonological changes are actuated and subsequently spread throughout a speech community is a notoriously difficult object of study; such mechanisms may involve a complex interplay of endogenous and exogenous factors (Thomason & Kaufman, 2001). Endogenous factors may include properties such as language specific phonotactics which may promote or inhibit certain structures. This presentation discusses how the researcher has experimentally replicated how English-specific endogenous factors might have historically interacted with outside influence from Afrikaans in order to activate and propagate a unique feature of South African English (SAE).

In South African English (SAE), the words 'kin' and 'pin' do not rhyme (Lanham, 1979, Wells, 1982, Lass, 2002, Bowerman, 2008). In the word 'pin', the English /ɪ/ vowel is realized as [ə]. In words such as 'kin', the English /ɪ/ vowel is pronounced as a high close nearly-cardinal [i]. This is a regular allophonic alternation which is conditioned by the place of articulation of the preceding consonant; labials such as the /p/ in 'pin' condition a [ə], while [i] surfaces in all other environments. This alternation is thus ultimately dependent upon the place of articulation of the syllable onset – if the onset is labial, [ə] will surface; otherwise, almost cardinal [i] surfaces in SAE (Lanham, 1979). While it may be the case that in other varieties of English the /ɪ/ vowel found in 'kin' and 'pin' do systematically differ due to low-level phonetic effects conditioned by the place of articulation of the onset consonant, SAE can be distinguished by the large acoustic distance between the two variants. This alternation is generally referred to as the KIN/PIN split and is considered a shibboleth of this variety (Wells, 1982).

The language-specific property that I propose as the ultimate source of the KIN/PIN split is a well-established property of English acoustic phonetics. In some varieties of English, for which detailed phonetic analyses are available, relative to velar contexts, the initial portion of post-labial vowels is somewhat centralized (Hillenbrand & Clark, 2001; Strange *et al.* 2007). I propose that two language independent principles played a major part in accentuating this phonetic difference and phonologizing it in SAE. The first principle is the phenomenon known as 'compensation for coarticulation', where speakers normalize for predictable coarticulatory effects given enough experience (Pisoni, 1992); however, some speakers who have less experience (such as second language learners) may not compensate in the same way native speakers do (Ohala, 1989). The second principle relies upon the mechanisms by which second language learners associate L2 phonological phones with L1 categories (Flege, 1987; Best, 1995; Kuhl, 2000; Escudero, 2005). Crucially, /ə/ and /i/ are distinctive phonemes in Afrikaans.

I propose that the coarticulatory process presented above (a more centralized /ɪ/ following labials as opposed to this same vowel following velars) served as 'a pool of synchronic variation' (Ohala, 1989) for which inexperienced Afrikaans speakers of English failed to normalize. If it is indeed true that the coarticulatory effect of velars and labials on the English /ɪ/ vowel is greater than as is found in similar vowels in Afrikaans, it might follow that Afrikaans learners of English would not compensate for this predictable property of English in the same way as native English speakers do. In this presentation, data is presented from perceptions experiments with a developed experimental protocol for simulating the historical period in which English first came into large-scale contact with Afrikaans. The results of these experiments suggest a differential phonemic association of subphonemic alternations due to low-level phonetic processes already present in English with a phonologized phonemic split based on the full phonemic status of /i/ and /ə/ in Afrikaans.

Overwriting and Markedness Reduction in Nimboran Vowel Mutation

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Claim: Nimboran (isolate; Papua, Indonesia) exhibits a pattern of vowel mutation that consistently affects multiple phonological features on outer and inner affixes in two different domains in the word. This runs counter to the concept of Strict Base Mutation (Alderete 1999) – a central prediction of Paradigm-Based approaches and Cophonology Theory (Inkelas 1998). I argue that it is possible to unite the two domains in an analysis based on the interplay between floating features, a MCONTIGUITY constraint (Landman 2002, Trommer 2015), and more general markedness requirements

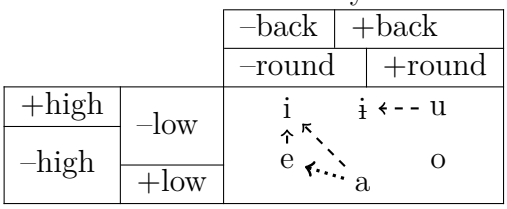
Data: Vowel mutation in Nimboran affects the final vowel differently from all preceding affix vowels – stem vowel are not affected (Anceaux 1965; Inkelas 1993). Non-final low vowels are fronted to mid front vowels. Final vowels become high and unrounded. In (1), we see that the non-final /a/ becomes [e] if the durative suffix *-te* occurs. Additionally the final /a/ is raised to /i/. Note also that the prosodic structure mirrors the morphological structure: there is exactly one stress on the stem and another one on the affixes. I take this as evidence for the foot structure indicated by the brackets in (1). The Nimboran vowel inventory is shown in (2) with non-final mutations indicated by dashed lines and final mutation by dotted lines. Since /o/ does not occur in affixes at all and /u/ does not occur in non-final affixes, we lack evidence here for the effect of vowel mutation.

(1) Final and Non-Final vowel mutation

a. (ŋgedúo)(-man-t-ám)
draw.SG-INCL.DU.S-PRS-INCL
'You (sg) and I draw here.'

b. (ŋgedúo)(-*te*-men-t-ím)
draw.SG-DUR-INCL.DU.S-PRS-INCL
'You (sg) and I are drawing here.'

(2) Nimboran vowel inventory



Analysis: The non-final vowels are fronted by a [–back] simulfix (⟨–b⟩- ⟨–b⟩-, cf. Bickel & Nichols 2007) attaching before the last foot and before the last vowel (cf. Yu 2007). It is forced to overwrite any [+back] features due to a high ranked MCONTIGUITY constraint (cf. 3b vs. 3a). This constraint penalizes back features between exponents of the same morphological affiliation (given as color in the following). Floating [–round,+high] features (-⟨–r⟩⟨+h⟩) are suffixed at the end of the word. The docking of the [+high] feature is allowed, because it reduces the violation of the markedness constraint against [-high] features (cf. 3b vs. 3c). The TWINSISTERCONDITION ensures that ⟨–r⟩ only attaches to round vowels and ⟨+h⟩ only to non-high vowels by prohibiting a structure where one node is associated with the same feature twice (cf. 3b vs. 3e). In the following tableau, docking floating features are indicated by underlining. As shown in candidate (3d), overwriting of high features violates the MAX(high) constraint for each overwritten [high] feature – fatally.

(3) Evaluation of /iá-⟨–b⟩ke-mem-bá-⟨–b⟩e⟨–r⟩⟨+h⟩/ [iákemembéi] 'You two ask him above.'

	⟨–b⟩ke-mem-bá-⟨–b⟩e⟨–r⟩⟨+h⟩	MCONT(bk)	TSC	MAX(hi)	*–hi
a.	⟨–b⟩kemembá⟨–b⟩e⟨–r⟩⟨+h⟩	*!		*	****
☞b.	kemembéi⟨–r⟩		*	*	***
c.	kemembée⟨–r⟩⟨+h⟩		*	*	****!
d.	kemembée⟨+h⟩		**!	*	****
e.	kimimbíi⟨–r⟩		*	**!*	

Discussion: In Nimboran vowel mutation an inner affix consistently affects outer affixes in two different domains with two different effects. This counterexample to Strict Base Mutation is derivable with floating features but poses a challenge to other locality theories.

GENDER-CONDITIONED PROSODY IN ENGLISH NICKNAMES: A STUDY OF NIGERIAN TERTIARY INSTITUTIONS

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Abstract

Nicknaming is a unisex practice, fashionably intended to perform the functions of acquaintance, endearment, casualness, and even ridicule between a user and the named, who may be family, friends, mates, colleagues, et cetera. Nicknames may be truncations or lengthened modifications of a person's real name, depending on the bearer's gender; or just intimate or sarcastic names not related to one's given name. This work examines nicknames of the former category as used by students of tertiary institutions in Nigeria. Here, we explore the paradigm in the prosodic structure of English-based real-name-derived nicknames with specific attention to differences in gender. Data for the study were gathered from Nigerian university and polytechnic students in the six geo-political zones that make up the country (four universities in the South-south, North-central, North-west and North-east and two polytechnics in the South-east and South-west). Thirty students were randomly selected from each of the six institutions, and ten nicknames derived from given English personal names were elicited from each of these one hundred and eighty students. Findings show that the nicknames used by the students are mostly unary and binary footed, with very few ternary-footed cases. The unary-footed nicknames are mainly bi- or tri-moraic, while all categories of binary footed names have the heavy-light and light-light trochees. For instance, the di-syllabic female names 'Mary' /mɛə.ri/ and 'Maurine' /mɒ.rin/ respectively have the nicknames /mɔ:mɔ:/ and /me:me:/ with a rising intonation on each of the two syllables. The poly-syllabic name 'Cecilia' /se.si.li.ə/ takes as a nickname, /si:si:/ with a high intonation on the first syllable and a rising intonation on the second syllable; or /se.si/ with a high intonation on the first, and a low intonation on the second syllable. In a similar manner, "Victoria' /vik.tɔ.ri.ə/ is nicknamed [vi.ki], also with a high intonation on the first, and a low intonation on the second syllable. One commonality in all of this is that, irrespective of the syllable make-up of the personal name, the derived nicknames are constantly disyllabic with either a heavy-heavy or light-light foot; implying that none of them bears less than two moras. The male name 'John' /ʤɔn/ becomes /ʤɔ.nee/ (with a low intonation on the first, and a falling intonation on the second syllable) as nickname; while 'Victor' is nicknamed /vi:k/ (falling intonation) or /vi.ko:/ (low intonation on the first, and falling on the second syllable). Again, none of the male-related nicknames is less than two moras, but they distinctly have a falling intonation pattern as against the rising pattern for female-related nicknames. In addition, the female-related nicknames tend to be pronounced in softer tones. Since this is an on-going work, we are, among other things, still working on possible socio-phonetic and phonological explanations for these exceptionalities in their trochaic make-up. The implication of the study is that similarities or differences in the foot structure and intonation patterns of the nicknames are along the lines of gender of the bearers from which these nicknames are derived.

Indo-European ablaut and the trap of the leftmost column

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This paper is concerned with the vowel alternations (ABLAUT) observed in the singular/plural neuter noun pairs in (1), which are standardly reconstructed for Proto-Indo-European (PIE) on the basis of comparison of its daughter languages and presented as such with NOM.SG atop the left column (PIE forms in IPA; supporting IE data in conventional transliteration):

(1) a. *[dʱér-mn̥-∅] : *[dʱér-moːn] > Ved. Skt. *dhárma* : *dhármā(ṇi)* 'custom(s)'
b. *[wód-r̥-∅] : *[wéd-oːr] > Hitt. *wātar* : *widār* 'water(s)'

The traditional analysis of this pattern (since Schindler 1975a,b) is primarily morphological: each noun belongs to two distinct inflectional classes (defined templatically), shifting from a class characterized by suffixal /∅/ (a. "proterokinetic"; b. "acrostatic") in the singular direct cases (NOM, ACC) to another characterized by suffixal /o/ ("amphikinetic") in the plural, where the surface long vowel derives from */oR-χ#/ (/-χ/ = PL; /R/ = sonorant consonant) by regular deletion of the word-final fricative and compensatory lengthening (CL) of the preceding vowel (SZEMERÉNYI'S LAW; Szemerényi 1962).

I propose instead a phonological analysis of this pattern: the nominal suffixes in (1) have an underlying /o/ vowel (i.e., */-ˊmon-/, */-or-/), which surfaces in the NOM/ACC.PL (with lengthening), but is deleted in the inflectionally zero-marked NOM/ACC.SG due to a PIE process deleting post-tonic short mid vowels before a tautosyllabic sonorant. Support for this process comes from the systematic absence of reconstructible {e,o}R]$_\sigma$ sequences (except for theme vowels) and from alternations like (2–3) ("–ˊ" indicates a pre-stressing suffix).

(2) a. PIE */bʱréχter-s/ → *[bʱráːt-r̥s] > Ved. *bhrā́tur*, Merc. OE *brōður* 'brother's'
b. PIE */bʱréχter-es/ → *[bʱráːter-es] > Ved. *bhrā́taras* 'brothers'

(3) a. PIE */gʲenh-ˊtor-bʱi/ → *[gʲénəh-tr̥-bʱi] > Ved. *jánitr̥bhis* 'with the begetters'
b. PIE */gʲenh-ˊtor-es/ → *[gʲénəh-tor-es] > Ved. *jánitāras* 'begetters'

Suffixal /o/ in (1a) is supported by two pieces of morphological evidence. First, PIE had suffix-stressed animate nouns derivationally related to neuters like (1a) with clear suffixal /o/-vocalism, e.g., (4); these may be derived from (1a) as in (5) simply by a shift of stress one syllable to the right, which is an established PIE word-formation process (cf. AGk. *tómos* 'cutting$_N$' ⇒ *tomós* 'cutting $_A$/cutter $_N$'). Unlike neuters, the derived animate nouns avoid syncope in their NOM.SG because they are marked with an overt inflectional suffix */-s/ (which like */-χ/ in (1) triggers deletion + CL). In addition, this analysis allows */ˊ-mon-/ to be unified at the prosodic level with the functionally similar PIE neuter-noun forming suffix */-ˊos/; both are pre-stressing suffixes with /o/-vocalism, but this vowel surfaces in NOM/ACC.SG in (e.g.) (6a) because the suffix ends in a sibilant rather than a sonorant.

(4) PIE *[dʱer-móːn] : *[dʱer-món-es] > Ved. *dhar-mā́* : *dhar-mā́-ṇas* 'custom-keeper(s)'

(5) PIE *//dʱér-mon-//$_{NEUT}$ ⇒ PIE /dʱer-món-s/$_{ANIM}$ → *[dʱer-móːn] > Ved. *dharmā́*

(6) a. PIE */men-ˊos-∅/ → *[mén-os] > Ved. *mánas*, AGk. *ménos* '(mental) power'
b. PIE */men-ˊos-χ/ → *[mén-oːs] > OAv. *manå*, Ved. *mánāṁsi* '(mental) powers'

I integrate the proposed deletion process within a constraint-based analysis of PIE stress-conditioned vowel deletion, which also targets */e, o/ in pretonic position (e.g., Kiparsky 2010). This analysis is argued to capture Schindler's (1975b) original insight that the neuter nouns like (1a) and (6) are diachronically related, but also to improve upon it, connecting these noun classes within the synchronic grammar of PIE and accounting for their vowel alternations without reference to arbitrary inflectional classes.

Derived-Environment Effect of the Velar and Uvular Voicing Restriction in Kazakh

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Most Turkic languages have velar and uvular consonants. These consonant inventories can vary but many of them exhibit a voicing restriction at the morpheme boundary. The aim of my paper is to bridge the gap in the literature by looking at velar and uvular consonants in Kazakh.

There are four main findings regarding the velars and uvulars in Kazakh. First, the dorsal oral consonant inventory [k], [g], [q], [ʁ] and [x] is asymmetrical. Second, velars appear in front vowel environments and uvulars appear in back vowel environments (place restrictions) (Muhamedowa, 2016). Third, the velars and uvulars are restricted in voicing depending on where the dorsal consonant appears in the word. Voiceless dorsal consonants appear in word-final position and voiced dorsal consonants appear in stem-final position intervocalically when followed by a vowel-initial suffix (Kara, 2002). Fourth, the fifth dorsal consonant [x] occurs in loanwords and can appear adjacent to front or back vowels. This segment can vary freely with [q] ([xɑt] ~ [qɑt] 'letter') (Bekturova & Bekturov, 1996).

The existing descriptions contain limited amounts of data. This does not allow generalisations to be drawn about the voicing distribution so the following questions remain unanswered. Are velars and uvulars contrastive intervocalically? What happens to [x]: does it alternate with [q], [g] or [ʁ]. How do we account for the voicing distribution theoretically?

To answer the questions, I conducted elicitation-based experiments with native Kazakh speakers. The results revealed the voicing alternation found in real words was productive and extended to nonce words. Participants produced voiceless velars in front vowel environments and voiceless uvulars in back vowel environments in word-final position in real words. Participants produced voiced velars in front vowel environments and voiced uvulars in back vowel environments in stem-final position with a following vowel-initial suffix in real words. This included the stem-final [x], whereby [x] voiced to [ʁ]. Participants also produced voiceless dorsals in word-final position and voiced dorsals in stem-final position when followed by a vowel-initial suffix in nonce words regardless of whether the target dorsal appeared in a front or back vowel environment. The fricatives revealed the most fascinating results. First, word-final [ʁ] did not neutralise to [q], as expected, but to [x] instead. Second, stem-final [x] voiced to [ʁ] when followed by a vowel-initial suffix. Maintaining manner is favoured over maintaining place.

The data suggest a derived-environment effect (Burzio, 2011). Intervocalic voicing occurs at the local domain of the suffix and fails to occur in the identical environment word-internally. Thus, the morphological boundary conditions the phonological process. This pattern can be accounted for within the OT framework (Prince & Smolensky, 1993/2004) using an indexed-markedness constraint (Pater, 2007) and Local Conjunction (Smolensky, 2006). I propose the indexed-markedness constraint *VTV$_{SUFFIX}$, which doesn't allow morpheme specific voiceless consonants to appear intervocalically, outranks IDENT(voi) to ensure voiced dorsals surface. To account for /ʁ/ voicing to [x], I employ two lower ranked faithfulness constraints whereby maintaining manner (IDENT(cont)) is ranked higher than maintaining place (IDENT(hi)). To account for /q/ voicing to [ʁ], whereby maintaining place is favoured over maintaining manner, I propose the locally-conjoined constraint IDENT(hi)&*VC$_{[+hi]}$V$_{SUFFIX}$ to ensure simultaneously place is maintained and a morpheme specific intervocalic velar is not permitted. This constraint must outrank IDENT(cont) because faithfulness to place and preventing an intervocalic velar at the morpheme boundary is favoured over faithfulness to manner and must be ranked below *VTV$_{SUFFIX}$ for intervocalic voicing at the morpheme boundary to be favoured. Ultimately, it is okay to change place as long as it does not result in a velar intervocalically.

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A formal account of how L1-Mandarin learners treat the L2 Portuguese rhotic

European Portuguese (EP) single-time trill /ɾ/ is notoriously problematic for L1-Mandarin learners. Zhou (2017) showed that its acquisition is conditioned by prosodic position: while in onset learners substitute /ɾ/ with [l], in coda they delete the segment, insert a schwa (and thus create an onset), or substitute it with the Mandarin rhotic [ɻ].

In this study, we formalise the observed prosodic effect for /ɾ/ in a generative model that integrates not only phonetics and phonology (BiPhon; Boersma 2011) but also orthography (Hamann & Colombo 2017). In line with the idea that initially learners use their L1 grammar to interpret L2 input (Full Transfer Hypothesis; Escudero 2005), we created a perception grammar based on formant and duration values for Mandarin liquids (from Smith 2010) and let it categorise the EP auditory form [ɾ] in onset and coda position, see tableaux (1) and (2) for *duro* 'hard' and *porco* 'pork'. Input is here restricted to the third formant (F3):

(1)

[2542 Hz]	*/l/$_{Coda}$	*[2542] /ɻ/	*[2542] / /	*[ ] /ə/	*[2542] /l/
☞ /du.lu/					*
/du.ɻu/		*!			

(2)

[2542 Hz]	*/l/$_{Coda}$	*[2542] /ɻ/	*[2542] / /	*[ ] /ə/	*[2542] /l/
/pɔl.ku/	*!				*
/pɔɻ.ku/		*!			
☞ /pɔ.ku/			* (!)		
☞ /pɔ.lə.ku/				*(!)	*

In (1), [ɾ] is **categorized as /l/** because its F3 value is closest to /l/, and only cue constraints, evaluating the mapping between auditory and phonological surface form, play a role in this decision. In (2) the input is still perceived as /l/ according to the cue constraints, but the high-ranked phonotactic constraint banning /l/ in coda position in Mandarin (Duanmu 2007) results in **deletion** or **epenthesis** (depending on the exact ranking values of constraints 3 and 4; given in Tableau (2) as unranked). These perceived surface forms are then stored faithfully and used as such in the production process.

Substitution with Mandarin **rhotic** [ɻ] in coda position as observed by Zhou cannot be explained by perception, as [ɾ] is not categorized as /ɻ/ by L1-Mandarin listeners (Tableaux 1 and 2; and see the experimental results by Patience 2018). We therefore propose orthography plays a role: the grapheme <r> represents both EP /ɾ/ and Mandarin /ɻ/ (in Pinyin). Unlike children acquiring their L1, Chinese learners acquire the sound structure of EP words in parallel with the written forms, the latter being stored along with the underlying phonological representation in the lexicon. In the production process, both phonological and orthographic representations are activated and compete in the creation of a surface representation, see the example in Tableau (3), where underlying and orthographic form (reduced here to <r>) both serve as input. Mapping between grapheme <r> and surface /ɻ/ is regulated by the L1 orthographic constraint (in green), which rules out all candidates except the surface form with /ɻ/. Deletion in coda position is not permitted in phonological production, but it is likely to be triggered by an articulatory constraint in phonetic implementation (because Mandarin speakers have difficulties with the articulation of the EP trill).

(3)

|pɔku| <r>	*/l/$_{Coda}$	MAX	<r>/ɻ/	DEP
/pɔl.ku/	*!		*	*
☞ /pɔɻ.ku/				*
/pɔ.ku/			*!	
/pɔ.lə.ku/			*!	**

We conclude that only a bidirectional language model that integrates phonetics, phonology and orthography can appropriately account for the L2 speech learning process.

Exceptions to left-dominance? A metrical analysis of light-initial tone sandhi in Suzhou, Wu Chinese

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The issue. Based on a first-time acoustic analysis of the checked-tone sandhi patterns in Suzhou (Northern Wu; our fieldwork), this paper addresses a key debate in prosodic typology, viz. the interaction of tone, segments, and metrical structure (Kehrein et al. 2018 for overview). Our main empirical findings are two-fold: (i). so-called 'checked tones', traditionally assumed to be glottalized, are (at least synchronically) plain short vowels in monomoraic syllables (unusual in Chinese languages, where syllables are typically bimoraic, Duanmu 2007); (ii). in sandhi patterns, the second syllable can play a role (counter to previous descriptions), but *only* following monomoraic syllables/'checked tones' – we refer to this as 'light-initial sandhi'.

Previous phonological analyses of multiple Northern Wu languages adopt left-headed binary feet built on syllables as the tone sandhi domain: tones from the second syllable are irrelevant as they are neutralized; the first (head) syllable spans its tone across the whole sandhi domain (Duanmu 1999, Shi & Jiang 2013, among others). The light-initial sandhi patterns present a challenge to these traditional phonological analyses of Wu. We argue that left-aligned, binary trochaic feet built on *moras* rather than syllables (based on Kager 1993, Kager & Martínez-Paricio 2018) account for all sandhi patterns, including the novel data on light-initial sandhi.

Data. Suzhou has seven lexical tones. Voicing dictates the beginning of each tone: Tones 2,6 and 8 start with voiced consonants and L; Tones 1,3,5 and 7 start with voiceless consonants and H (Suzhou lacks T4 due to a historical merger). For reasons of space, we focus here on the novel empirical facts, i.e., disyllabic words with initial checked tones / light syllables – T7 and T8 (the analysis covers all 7*7 patterns). (Rows: first syllable; Columns: second syllable; Shaded cells: tones with voiced onsets)

(1)

	T1	T2	T3	T5	T6	T7	T8
T7	[H.L]		[H.HL]		[H.L]	[H.H]	
T8	[L.HL]					[L.H]	

The variation in the above table shows that the second syllable influences the sandhi form to some extent when the initial syllable is monomoraic.

A reanalysis – representations. Instead of rejecting the otherwise largely successful typological claim that left-dominant feet are the tone sandhi domain in Wu, we propose that the monomoraic status of T7 and T8 explains their unusual behavior. A reanalysis of underlying tones in Suzhou is given in (2). Tones in parentheses are floating.

(2)

	T1	T2	T3	T5	T6	T7	T8
Representation	Ø μμ	/(H)/ μμ	/HL/ μμ	/H(LH)/ μμ	/L(HL)/ μμ	/H/ μ	/H/ μ
Surface tone in isolation	[H]	[LH]	[HL]	[HLH]	[LHL]	[H]	[LH]

T7 and T8 are identical underlyingly, but get their contrastive status ([H] vs. [LH]) due to onset voicing. Other tonal structure predictable by voicing is also omitted (e.g. T1 is toneless; see Shen 1995 for a similar treatment). In addition, we propose that left-aligned bimoraic feet – (μ.μ)μ (second mora of second syllable unfooted) or (μ.μ) – are the relevant metrical structure for light-initial words.

A reanalysis – grammar. Below we list all relevant generalizations of light-initial tone sandhi:

(a). Moras are the TBUs; tones are associated one-to-one, left-to-right.

(b). All tonal material (either licensed by voicing or underlying) from the initial morpheme (syllable) must be preserved.

(c). Unfooted moras never carry H tones on the surface.

(d). Pre-associated tones are preserved; floating ones can be deleted.

(e). Every mora has to have a tone; toneless moras receive a default L.

The patterns in T7-initial words arise from preserving pre-associated tones while deleting floating ones: T7+T126 surface as [H.L]: T1 does not have any underlying tones while the floating H tones in T26 are deleted. T7+T35 result in [H.HL] since the first H is associated in both T35 and is licensed by the bimoraic foot (μ.μ)μ. Lastly in T7+T78, preservation of pre-associated tones leads to [H.H] in both cases.

T8-initial words have to begin with a L-toned monosyllabic syllable. The H tone from initial T8 is associated with the second mora, and the second mora *only*. This creates a uniform pattern: [L.HL] in T8+T12356 (third mora unfooted; receives L) and [L.H] in T8+T78.

To summarize, our analysis captures all the surface facts by adopting bimoraic feet as the relevant sandhi domain. We show that the seemingly problematic light-initial sandhi patterns can still be successfully analyzed as left-dominant if feet are built on moras rather than syllables.

Special session

Is there lexically-specific phonology?

Generalizations about sound inventories, phonotactics, and alternations can apply exceptionlessly across the board or within very broadly defined domains such as the grammatical word. Often, however, they hold or fail to hold within relatively specific environments, such as particular lexical items (or classes of lexical items) or particular morphosyntactic constructions (or classes or constructions). In these cases, the question arises as to how much of the observed behaviour reflects phonological computation, as opposed to morphosyntactic structure or lexical storage. This session therefore asks: is there item-specific and/or class-specific phonology? If so, how does it work? And what can count as an 'item' (or 'class') in this connection? If not, how should apparent item-specific phonological behaviour be described and explained?

Invited speakers

- Claire Moore-Cantwell (Simon Fraser University & UBC)
- Jennifer L. Smith (University of North Carolina, Chapel Hill)
- Jochen Trommer (Universitaet Leipzig)

Invited discussant

- Ricardo Bermudez-Otero (University of Manchester)

The new status of exceptions when phonology is probabilistic

Claire Moore-Cantwell, Simon Fraser University & UCLA

This presentation will discuss the status of lexical exceptions in relation to probabilistic phonological generalizations. When a variable phonological pattern exists in the lexicon of a language, phonologists have observed over and over again that participants in wug-test experiments 'probability match' when they pronounce novel words, producing a distribution of output forms which matches the distribution found in the lexicon. For instance, stress in English tends to be on a word's first syllable. Around 80% of words follow this rule. When experimental participants must choose a stress for a word they have not heard, they choose initial stress about 80% of the time, matching the lexical statistics. Participants do not behave as if their grammar consisted of categorical rules, to which exceptions must be listed in the lexicon. (If they did, they would choose initial stress 100% of the time.) Rather, they behave as if their grammar itself is probabilistic in nature. Phonological models such as Maximum Entropy Grammar, Partially Ordered Constraints, Stochastic OT, and Noisy HG are designed on the basis of this observation.

However, adopting the view that the Phonological Grammar is inherently probabilistic requires us to rethink the status of exceptions. In a probabilistic grammar, exceptions like *guitàr* are not qualitatively distinct from non-exceptions (like *pènny*). Under a rules-plus-exceptions system, only the behaviour of exceptions must be stored in the lexicon. Words that follow the rule can be simplified in the lexicon, their predictable aspects left unspecified (*/penny/* → *pènny*). The phonological grammar thus allows the speaker to save on storage space, maintaining an efficient lexicon. If the phonological grammar is probabilistic, though, all words' behaviour whether high- or low-probability must be stored. We are left, then, with redundancy between the lexicon and the grammar.

This talk will present evidence that probability matching behaviour does in fact reflect the Phonological Grammar. In light of that, I will discuss the issue of redundancy, and address the question: How is probabilistic phonology useful to us as language users? In particular, how does it shape our lexical storage choices? I will discuss three different theoretical proposals for how the lexicon and the (probabilistic) phonological grammar interact: Simple lexical listing, Constraint Indexation, and Representational Strength Theory.

Sources of asymmetries in category-specific phonology

Jennifer L. Smith (University of North Carolina, Chapel Hill)

This talk focuses on the typology of phonological patterns that are sensitive to lexical category, and various implications of such patterns. In particular, two typological asymmetries have emerged among category-sensitive phonological phenomena:

(a) There is a bias toward noun privilege, more specifically a hierarchy N>A>V, and possibly, even more specifically, a continuum from 'prototypical designators' (proper N) to 'prototypical predicates' (agentive V). I argue that this is a bias internal to the grammar, although it may arise from general factors in language acquisition, and may not necessarily be innate. Supporting evidence for the noun (and proper-noun) bias as an emergent effect comes from a series of experiments on novel lexical-blend formation by English speakers.

(b) There is a bias toward prosodic rather than segmental/featural phenomena among those phonological patterns that are category-sensitive. I argue that this is a case of channel bias, presenting evidence based on a surfeit-of-the-stimulus experiment to show that humans are capable of learning category-specific segmental/featural patterns.

I consider also various formal implications of category-specific phonology and its characteristics. For example, what would any phonological framework have to address in order to model category-specific phonology? Given the category hierarchy in (a) above, how does category-specific phonology contribute to our general understanding of markedness scales across linguistic domains (sonority scale, animacy hierarchy, etc.)? What are some additional implications of category-specific phonology for the interface of phonology and morphosyntax?

Rich Representations: A Tonal View on Lexical Exceptionality

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In this talk, I will make a case for the claim that many phonological alternations which are apparently lexically restricted are simply the consequence of two well-established cornerstones of phonological theory: Underlying representations that are potentially fully neutralized in output representations and the rich phonological representations, made available by standard Autosegmental Phonology (Leben 1973, Williams 1976, Goldsmith 1976). Basing my argument on tonal morphophonology, I will also show that this provides an especially rich empirical testing ground for theoretical approaches to lexically specific phonology (in the following: LSP).

The Basic Approach: Imagine two morphemes in the same language L, M_1 and M_2, which in a specific phonological context C_1 (say utterance finally) are realized by an identical tone pattern, say all low such as [màtà] and [pàtà], but have a different tonal shape in an other context C_1 (say utterance-internally), where M_1 is still low ([màtà], but M_2 is high ([pátá]). Underlying representations provide the straightforward explanation for this pattern under the assumption that M_2 is underlyingly high, but subject to a process of final lowering. Crucially, autosegmental representations dramatically multiply the set of potential underlying forms. To cite just a few possibilities, a form like [màtà] might have two underlying low tones linked independently to the morpheme's syllables, one underlying L linked to both, or no underlying tone at all, where the output Ls are provided by default. An implicit research strategy of much work in Classical Autosegmental Morphophonology that I will continue here is the assumption that this representational richness is not an embarrassment of the theory but rather a natural explanation for the fact that apparently similar morphemes exhibit a high degree of different behaviors, or in other words, lexically specific phonology. A case in point would be a morpheme M_3 in L which is [ràtà] utterance-finally, but assimilates tonally to a following word if utterance-internal, captured naturally by underlying tonal underspecification.

Putting Rich Representations to the Test: I will assume that there are three crucial touchstones for approaches to lexical conditioning, and show that the Rich Representation (RR) approach has interesting advantages over competing approaches.

- **Locality:** Lexically specific processes typically apply in narrowly defined locality domains (intuitively: close to their lexical trigger). While classical Construction Phonology (CP Inkelas 1998) and Indexed constraint (IC) accounts (Pater 2007) of LSP make simple testable locality restrictions, these are likely to be too coarsely grained, witnessed by the proliferation of recent proposals to substantially weaken them (see Sande and Jenks 2018 for CP, and Jurgec and Bjorkman 2018 for IC). I will show that a RR account makes more differentiated predictions, where locality effects fall out directly from phonological locality, and apparent violations of locality (e.g. categories of lexical morphology influencing phrase-level phonology) reflect the fact that phonological material (hence also rich representations) may persist across grammatical levels, and exhibit long-distance effects typical of autosegments and especially tone.

- **The Internal Structure of Exceptionality:** LSP patterns in a given language are typically not independent from each other: morphemes which are exceptional for one process often also follow suit for other processes. In more complex cases, lexical items form hierarchies of exceptionality, where lexical specificity for one process implies special behavior for another process, but not vice versa. I will argue, based on classical data from

Kikuyu (Clements 1984) and Margi (Pulleyblank 1986) that RR not only allows for an elegant modeling of this structure, but also often provides principled explanations for them not available in IC and CP accounts. Thus in Kikuyu a floating L tone accounts both for downstep in one context and the shielding of H-tones from phrase-final lowering, both effects expected from a L-tone.

- **The Demarcation of phonological and morphological operations:** In RR just as in Inkelas-style CP there is a fuzzy boundary between non-concatenative morphology and LSP. I will show that in contrast to CP, RR in tonal morphophonology allows to maintain the standard assumption that phonological processes are restricted to minimize markedness and morphological operations to the addition of phonological material.

Facing the Abstractness Challenge: RR approaches to LSP often face the objection that they introduce excessive and opportunistic abstractness into underlying representations posing problems for learnability and obviated by more "surface-oriented" approaches such as IC and CP. Here, I will argue that standard aspects of RR in tone are to the contrary, typically close to surface phonetics and the observed facts: Floating tones of a specific pitch are not per se more or less abstract than segments of a specific pitch, and tonal underspecification of segmental material ideally simply corresponds to the fact that this material shows unstable tone in different environments.

Extending the Coverage: A major methodological asset of RR is that it ties the possible typology of LSP to the theoretical modeling of phonological representations themselves, allowing for progress in both areas in tandem. I will illustrate this with examples from a central research area in tonal representation, the question whether single tones such as Low and High are decomposed in more basic features for melody and register (Yip 1989, Hyman 1993, McPherson 2017). I will show that the assumption of tonal sub-features using the system of Snider (1999) allows for a more fine-grained modeling of lexical exceptionality in tone corresponding closely to observed patterns with data from Konni (Cahill 1999), Tenyidie (Meyase 2016), Gã (Paster 2003), Kikuyu (Clements 1984) and Margi (Pulleyblank 1986).

References

Cahill, M. (1999). *Aspects of the morphology and phonology of Konni*, volume 141. SIL International and the University of Texas at Arlington publications in linguistics.

Clements, G. (1984). Principles of tone assignment in Kikuyu. In Clements, G. and Goldsmith, J., editors, *Autosegmental Studies in Bantu Tone*, pages 281–340. Foris Publications, Dordrecht.

Goldsmith, J. A. (1976). *Autosegmental Phonology*. PhD thesis, MIT, Cambridge, MA.

Hyman, L. M. (1993). Register tones and tonal geometry. In Snider, K. L. and van der Hulst, H., editors, *The phonology of tone: the representation of tonal register*, pages 75–108. Mouton de Gruyter, The Hague.

Inkelas, S. (1998). The theoretical status of morphologically conditioned phonology: a case study from dominance. *Yearbook of Morphology 1997*, pages 121–155.

Jurgec, P. and Bjorkman, B. M. (2018). Indexation to stems and words. *Phonology*, 35:577–615.

Leben, W. (1973). *Suprasegmental Phonology*. PhD thesis, MIT.

McPherson, L. (2017). Multiple feature affixation in Seenku plural formation. *Morphology*, 27:217–252.

Meyase, S. (2016). *A Morphological Investigation into the Tonal Phonology of Tenyidie*. PhD thesis, English and Foreign Languages University Hyderabad,.

Paster, M. (2003). Floating tones in Gã. *Studies in African Linguistics*, 32(1):17–39.

Pater, J. (2007). The locus of exceptionality: Morpheme-specific phonology as constraint indexation. In Bateman, L., O'Keefe, M., Reilly, E., and Werle, A., editors, *Papers in Optimality Theory III*, pages 259–296. Amherst MA: GLSA.

Pulleyblank, D. (1986). *Tone in Lexical Phonology*. Reidel, Dordrecht.

Sande, H. and Jenks, P. (2018). Cophonologies by phase. *Proceedings of NELS 48*.

Snider, K. L. (1999). *The Geometry and Features of Tone*. The Summer Institute of Linguistics and The University of Texas at Arlington, Dallas.

Williams, E. S. (1976). Underlying tone in Margi and Igbo. *Linguistic Inquiry*, 7(3):463–484.

Yip, M. (1989). Contour tones. *Phonology*, 6:149–174.