The Thirtieth Manchester Phonology Meeting

ABSTRACTS BOOKLET

Thursday 25th - Saturday 27th May 2023

Held at
The Core Technology Facility, Manchester

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

This booklet contains the abstracts for all the papers presented at the **Thirtieth Manchester Phonology Meeting**, held at Manchester University's Core Technology Facility, in May 2023.

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**, available on the conference website and available in hard-copy at registration, gives the details of which papers are in which room, and at which times.

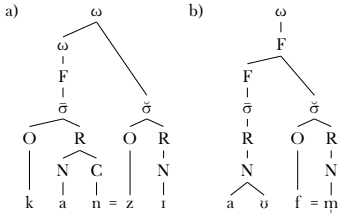
Oral papers

Prosodic asymmetries between simple and special clitics in German

Joshua Booth, University of Oxford, joshua.booth@ling-phil.ox.ac.uk

The distinction between 'simple' and 'special' clitics (Zwicky 1977)—the former productive and phonologically transparent and the latter more restricted and phonologically opaque—has a long history, but attempts to differentiate the two often focus on syntactic, rather than phonological structure. This paper provides a formal account of their phonology, arguing that the distinction results from differing prosodification. Simple clitics attach at the postlexical level, resulting in nested prosodic words (ω), e.g. (1a). However, as their more affix-like behaviour suggests, special clitics are lexically stored and attach at the lexical level, e.g. (1b).

(1) Prosodic representation of (a) [kanzɪ] (< *kann=sie* 'can she') and (b) [aʊ̯fm̩] (< *auf=dem* 'on the')



The need for recursion within the prosodic hierarchy is increasingly recognised (cf. Gussenhoven 1986; Zec & Inkelas 1991; McCarthy 1993; Booij 1995; Selkirk 1996; Wiese 2000) and this paper assumes default cliticisation in German to be left-leaning, producing a single ω comprising a lexical host and one or more unstressed function words (cf. Lahiri & Wheeldon 1997; Lahiri & Plank 2010). This is reflected in the behaviour of enclitic pronouns (see Bögel 2021 for similar findings for Swabian), which freely alternate with their full forms and—especially in colloquial speech—produce full paradigms: [habɪçs] (< *habe=ich=es* 'I have it'), [hastəs] (< *hast=du=es* 'you have it'), [hatʁs] (< *hat=er=es* 'he has it') etc. (Nübling 2010). Furthermore, simple clitics often fail to conform to phonological generalisations applying to ωs, such as the constraint against final full lax vowels. This leads Hall (1999) to assume such clitics attach directly to the phonological phrase. However, these constraints in fact appear to take the F rather than the ω as their domain; reduced forms such as [dʊ] (< /duː/ 'you') are thus accounted for by this analysis, as they are dominated by a ω, not by a F.

In contrast, special clitics *are* constrained by foot structure and are not synchronically derivable from their full forms, such as *Verschmelzungsformen* (VFn, 'fused forms'), where definite articles encliticise to prepositions (e.g. [ʦʊm] < *zu=dem* 'to the'). Although much of the literature takes a syntactic approach (cf. Nübling 2005; Hinrichs 1986), Wiese (1988) suggests that these articles attach at the lexical level, implicitly referring to a disyllabic (i.e. quantity-insensitive) trochee in describing the maximal VF. However, this is at odds with the German metrical system, which constructs weight-sensitive (moraic) trochees (Jessen 1999). Assuming that German permits a minimally recursive F, incorporating a light syllable into a F with a monosyllabic F as its sister (cf. Booij 1995; Kager & Martínez-Paricio 2018 for Dutch), one can account for the behaviour of VFn without abandoning weight sensitivity (1b). Full VFn must comprise a prosodically well-formed F, with a preference for a heavy stressed syllable; monosyllabic $[H]_F$ forms, e.g. [am], are preferable to disyllabic $[[H]_FL]_F$ forms, e.g. $[[aʊ̯f]_Fm̩]_F$. $[LL]_F$ forms, e.g. $[anə]_F$ (< *an=die*) are less desirable and trisyllabic $[[H]_FL]_FL$ forms are ungrammatical, e.g. */hɪntəʁɐ̯/ (< *hinter=der*), */ʦvɪʃənə/ (< *zwischen=die*).

This preference scale is reflected in the degree of integration of such forms into the dialects and written standard language, with $[H]_F$ forms the most lexicalised (and mostly obligatory); $[[H]_FL]_F$ forms are an optional, colloquial feature and $[LL]_F$ forms are restricted to rapid speech. The present analysis accounts for this in formal terms: whether or not VFn truly represent grammaticalisation in action (Nübling 2005), they must synchronically be accounted for in phonological terms. The present analysis explains their special phonological behaviour and their apparent reference to syllabic trochees, despite the language's weight-sensitivity. In addition, it formally accounts for the asymmetries between simple and special clitics, including the failure of certain phonological constraints to apply to simple clitics.

Motion capture evidence for containment in Spanish stop lenition

Karolina Broś (k.bros@uw.edu.pl) & Peter A. Krause (peter.krause@csuci.edu)

University of Warsaw & CSU Channel Islands

While stops usually undergo lenition in postvocalic position in Spanish, it is not entirely clear whether they are also weakened after other sounds. The literature on Spanish states that /b d g/ are weakened after non-nasal consonants, proposing an allophonic rule (Harris 1969, Mascaró 1984). However, phonetic studies on different dialects provide contradictory evidence, suggesting that weakening may be limited or even blocked after some consonants, especially /s/ (Amastae 1989, Eddington 2011). In this study, we focus on Canarian Spanish where all stops are weakened post-vocalically yet it is unclear what happens after consonants. Resolving this issue is especially difficult given that coda consonants are often deleted, creating derived postvocalic positions (e.g. *las vacas* [la.ba.ka] 'the cows'). It has been shown in previous work that stops in such contexts behave differently than underlyingly postvocalic stops: their weakening is at least partially blocked. Since consonant deletion is optional, we have possible triplets, such as *la vaca* 'the cow' /la#baka/, *las vacas* 'the cows' /las#bakas/ with /s/ retention and *las vacas* 'the cows' /las#bakas/ with /s/ deletion, in which the stop (here /b/) can undergo lenition (a typical effect in the first case) or not (in the third case). It is unclear, however, whether the two plural environments are in any way different from each other. Thus, we designed a study aimed at eliciting both retained and deleted consonants preceding the stops to tease the contexts of stop weakening apart. In particular, we were interested in whether stop weakening is blocked only after a deleted /s/ or also after a retained /s/ consonant. The latter should be taken as evidence against post-consonantal weakening in the dialect. If the same kind of blocking takes place after a deleted /s/, there is evidence for containment, i.e. non-deletion or non-pronunciation of the consonant (Prince & Smolensky 1993, Goldrick 1998, van Oostendorp 2006). If the root node of the consonant is still there phonologically, the lack of weakening is easily explained. A consonantal gesture can still be present despite the fact that the sound is not audible, e.g. due to gestural masking by which two gestures from two different tiers may sometimes mask each other, leading to apparent deletion (Browman & Goldstein 1990). Such effects should be investigated articulatorily, thus new methodology is used here. While most studies on Spanish lenition rely on acoustics, especially intensity, we use video recordings and extract information concerning lip movements to measure minimum lip aperture during the consonant as a proxy of degree of lenition and compare those measurements to the acoustics. To this aim, we made video recordings of 16 native speakers using an internet camera. Due to the nature of the study, we tested labials /p b/ and their surface realisations, which could be [p b̥ b β β̞]. The participants were reading out a total of 376 sentences containing 560 target words from a computer screen. These included underlyingly intervocalic contexts (VCV) and possible deletion contexts in which /p b/ were preceded by /s/ (V(s)CV). In this case, native speakers either retain the /s/ as [h] or delete it altogether, which makes /p b/ intervocalic. Sample sentences include: *La vaca de Juan cuesta mucha pasta.* 'Juan's cow costs a lot of money' (VCV); *Las Vacas Locas es una banda de música de Tenerife.* 'The Mad Cows is a music band from Tenerife' (VsCV). The results show that articulatory data are compatible with the acoustics in that more lenition is present in underlyingly postvocalic positions compared to the deletion contexts. Also, there is no difference in minimum lip aperture depending on whether the preceding /s/ was retained or completely elided, and lip aperture trajectories throughout the V(s)CV sequence confirm this result. This means that derived [VCV] sequences behave exactly like [VsCV] sequences, i.e. as if deletion never took place, which confirms the phonological blocking effect of deletion and the gestural masking hypothesis. It also shows that there is no obstruent weakening after /s/ in Canarian Spanish. An opacity effect ensues in which the consonant seems not to be deleted completely, which supports containment-based approaches to solving phonological problems. In this vein, we propose an OT analysis of stop lenition attested in the dialect, which includes projected but unpronounced segments.

Prosodic clitics in English children's speech production – an acoustic study

Rui Cai[1], Paul Boersma[1], Ivan Yuen[2], Katherine Demuth[3], Titia Benders[1]
[1]University of Amsterdam, [2]Universität des Saarlandes, [3]Macquarie University
r.cai@uva.nl, p.p.g.boersma@uva.nl, ivan.yuen@mq.edu.au, katherine.demuth@mq.edu.au, a.t.benders@uva.nl

Background. Prosodic cliticization has been proposed to be an important process during speech production (Ferreira, 1993; Levelt, 1998; Selkirk, 1988). English articles, for example, are typically chunked with the preceding monosyllabic content word to form a disyllabic foot or prosodic word (Wheeldon & Lahiri, 1997; Yuen et al., 2022). While young children also use prosodic units to organize their articles in intended utterances (Gerken, 1995; Demuth & McCullough, 2009), it has not yet been determined if and, if so, how children acoustically cliticise articles during speech planning. The present research addresses these questions by examining the acoustic properties of children's utterances under different prosodic structures.

Methodology. Two groups of 20 (intended sample size) typically developing children, age 3 vs. 12 years, are drawn from AusKidTalk (Ahmed et al., 2021), an audio corpus of Australian-English-speaking children's speech. The stimuli consisted of 9 utterances with 3 different prosodic structures (see the Table for one set of examples, where PW means prosodic word). Following Yuen at al. (2022), we measure cliticization using verb duration (VD). If articles are cliticized with the preceding monosyllabic verb, forming a PW such as [*hide the*], the article within the resulting PW will cause verb shortening in the Potential-Clitic compared to the No-Clitic conditions.

Utterance types	Hypothesized prosodic structures
Potential Clitic	[Boys]$_{PW1}$ [often]$_{PW2}$ [hide the] $_{PW3\ with\ Clitic}$ [gold]$_{PW4}$
No Clitic (4 PW)	[Boys]$_{PW1}$ [often]$_{PW2}$ [hide]$_{PW3}$ [gold]$_{PW4}$
No Clitic (5 PW)	[Boys]$_{PW1}$ [often]$_{PW2}$ [hide]$_{PW3}$ [dark]$_{PW4}$ [gold]$_{PW5}$

Initial results. Preliminary data from 2 12-year-olds and 5 3-year-olds have been analyzed. The mean VD in milliseconds (SD) per age group is shown in the below table. In line with cliticization as observed in adults, 12-year-old children showed shorter VD in the Potential-Clitic condition than in either No-Clitic condition (4PW, 5PW). Interestingly, 3-year-old children showed an even larger VD difference between the Potential-Clitic and No-Clitic conditions, with unexpectedly long VD for the No-Clitic utterances. While these data indicate that 3-year-old children already cliticize articles to their preceding verbs, it is still unclear why 3-year-olds showed much longer VD than 12-year-olds in the No-Clitic condition. We will complete the full analyses in the next steps.

	Potential-Clitic	4PW	5PW
3-year-old	255 (20)	424 (68)	455 (17)
12-year-old	228 (19)	260 (4)	251 (29)

Implications and future work. There are potential explanations for these preliminary results. One is that 3-year-old children compressed verbs in the Potential-Clitic condition, which resulted in smaller VD difference in the Potential-Clitic condition. Another explanation is that young children are still developing control of phrase lengthening (producing longer prosodic words than 12-year-olds), accounting for the large VD difference between the age groups in the No-Clitic conditions (Yuen et al., 2014). In order to test both explanations, future research will carry out more acoustic measurements, including the durations of articles, pauses or boundaries, and the following content word. Overall, these findings will lead to a better understanding of children's early prosodic organization, with implications for theories of language development.

Effects of morphology on consonant assimilation: Evidence from ultrasound imaging

Małgorzata Ćavar (Indiana University) mcavar@indiana.edu, Bartłomiej Czaplicki (University of Warsaw) bczaplicki@uw.edu.pl & Paula Orzechowska (Adam Mickiewicz University) paulao@amu.edu.pl

The objective of this paper is to present articulatory data on place assimilation in two-member consonant clusters C_1C_2 in Polish. Our study focuses on two questions: (i) whether assimilation depends on the morphological composition of clusters and the transparency of the boundary, and (ii) which articulatory parameters are best suited to probe assimilation (palatalization). We test the hypothesis that the more transparent the morphological boundary, the lower the degree of assimilation in casual speech. Although it is a well-established fact that casual speech processes are affected by the morphological composition of words (Shockey 2003) and that morphology contributes to phonotactic complexity (Dressler 1985; Dressler and Dziubalska-Kołaczyk 2006; Talamo et al. 2016; Schwaiger et al. 2017), the effect has not been studied in articulation. Early articulatory work on Polish involved X-rays (Koneczna & Zawadowski 1951; Wierzchowska 1967), while recent studies on the gestural coordination of clusters were related to syllable parses (Hermes et al. 2017; Mücke et al. 2010). The present study fills the gap by providing detailed kinematic measures of the tongue body and root using 3D/4D ultrasound imaging.

Stimuli were words and phrases containing C_1C_2 clusters composed of anterior fricatives and affricates, with C_1 represented by /s z/ and C_2 by /ɕ ʑ tɕ dʑ/. Five types of stimuli were designed depending on the presence and strength of a morpheme boundary within the clusters: (1) intra-morphemic C_1C_2 (e.g. /sɕ/ *w Odessie* – 'in Odessa'), (2) containing a weak morpheme boundary (e.g. /s+tɕ/ *roz+ciągliwa* 'stretchy'), (3) a strong morpheme boundary (e.g. /s++ɕ/ *roz+siadać* 'sit'), (4) a clitic boundary (e.g. /s#ɕ/ *bez ziaren* 'without seeds'), and (5) a word boundary (e.g. /s##ɕ/ *włos siwy* 'a grey hair'). All the test words were controlled for frequency using the plTenTen19 corpus. The data were collected from 8 native speakers of Polish (5 speakers analyzed so far). In the evaluation of the ultrasound images, we measured the relative fronting and raising of the tongue body and root (in relation to unassimilated tokens) using a custom Matlab toolbox WASL (Lulich 2020).

Linear mixed effects models with morphological boundary, tempo, voice and manner as predictors were run. Random by-speaker slopes were included. The best acoustic correlates of assimilation turned out to be tongue body fronting (Fig. 1) and tongue root fronting (results not included in the abstract due to length restrictions). The differences are statistically significant for: word and intra-morphemic (p=2e-16***), word and strong boundary (p=2e-16***), word and weak boundary (p=6.24e-07***), word and clitic boundary (p=1.59e-10***), strong and weak (p=0.00743**), strong and intra (p=0.0023**), and weak and intra-morphemic (p=4.52e-07***). The effect of tempo was marginally significant (p=0.068). The results of the study confirm that consonant assimilation in Polish is morphologically-driven. The study contributes to our better understanding of the coordination of articulatory gestures in assimilation and provides new evidence in favor of the complexity of morphonotactic clusters and morphotactic transparency.

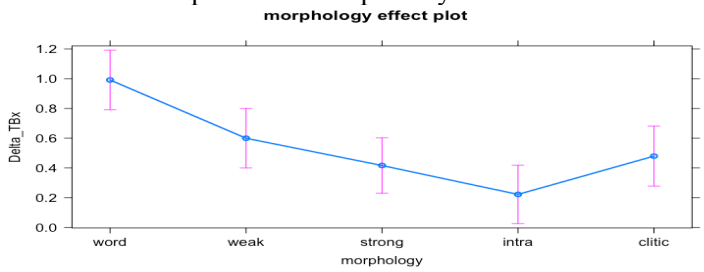


Fig. 1. The effect of morphological composition of clusters on tongue body fronting

Vowel reduction in European Portuguese: virtual length and Substance-Free Phonology

Alex Chabot–University of Maryland, College Park

Introduction Substance-free theories of phonology are principally concerned with questions about the nature of melodic representations and the rule-based processes that can operate over those representations (Hale & Reiss 2008, *inter alia*). This talk examines vowel reduction in European Portuguese (EP) as substance-free phonology in the suprasegmental domain.

Empiry The distribution of vowels in EP exhibits a tight relationship between stress (1a) and the full range of vowel contrasts /i e ɛ a ɔ o u/ (Carvalho 1994, 2011; Cavaco Miguel 2003a,b). In unstressed syllables (1b), the vowels /e ɛ ɔ o/ are never found. This is a typical pattern of vowel reduction, where /ɔ o u/ are neutralized to [u] and /a/ is realized as [ɐ] in atonal positions. Additionally, /e/ and /ɛ/ alternate with [ɨ], which can be further reduced to zero (Veloso 2007).

(1a)	Tonic	[i]	[e ɛ]	[a]	[ɔ o u]
(1b)	Atonal	[i]	[ɨ] **or** Ø	[ɐ]	[u]

This distributional situation is not just limited to tonic/atonal syllabic contexts, however. Vowels resist reduction in a number of contexts: (i.) when word initial; (ii.) when part of a diphthong; (iii.) when nasalized; (iv.) when the nucleus of a syllable closed by [ɬ].

Analysis This talk argues that the context of vowel reduction in EP can be reduced to vowels associated to a single position on the timing tier. Unreduced vowels are phonologically long, objects known as *virtual geminates* (Ségéral & Scheer 2001), their phonological status belied by their lack of phonetic duration, since virtual length is not isomorphic with its phonetic expression. The analysis builds on the idea that stress is skeletal length (Chierchia 1986, Larsen 1998, Ségéral & Scheer 2008). This insight formalizes the relationship between vowels in stressed syllables and their reduced counterparts, conceptualized as a length contrast at the level of phonological representation. The alternation between tonic and atonal vowels is a structural property: whether the vowel /o/ is realized as [o] or [u], for example, is about interpretation of melody and timing positions at the phonetics/phonology interface, not a computational process that changes melodic representations.

Consequences This analysis thus contributes to the substance-free research program, confronting it with two important questions. The first concerns the interface between phonetics and phonology, which is a conceptual necessity in a substance-free framework since interpretation of phonological objects is "non-veridical". Any theory of the interface needs an explicit account of what kind of representational material is sent by phonology to the interface—feature, segment, syllable, something else? The EP data suggests that interpretation can happen at the suprasegmental level, as virtual geminates are melodically identical to singletons, and the only difference is in their associations on the timing tier. Secondly, if a phonological length contrast can be expressed phonetically as a pattern of vowel reduction, is there any limit on the phonetic correlates of long/short vocalic contrasts? The EP relationship between phonological length and phonetic expression is abstract, but not unnatural in that there is a well-established functional pressure on short vowels to be realized as reduced allophones (Barnes 2006; Lindblom 1963). Kaqchikel Mayan exhibits a pattern of vowel quality alternations tied to stress (Chacach Cutzal 1990, Hendrick Krueger 1986), as in EP. However, the Kaqchikel pattern is phonetically unnatural in that stressed, phonologically long vowels are always realized as phonetically lax, contrasting with unstressed, short tense vowels: [tʃiˈkɔ̰p] 'animal' → [tʃikoˈpiʔ] 'animals'. The pattern in Kaqchikel thus constitutes a true "crazy rule" (Bach & Harms 1968; Chabot 2021) and contributes further evidence for a "lawless" phonology/phonetics interface where phonological length can be expressed phonetically in an essentially arbitrary way.

Front-back asymmetry in Bantu vowel harmony: representations and constraints

Jian Cui, Harvard University
jiancui@fas.harvard.edu

Introduction. The *front-back asymmetry* (Hyman, 1999) in Bantu can be summarised as follows: back target vowels only harmonise for height with another back vowel, whereas front target vowels can harmonise with both front and back trigger vowels. To account for it, Nevins (2010) treats front and back height harmony in Bantu as two separate sister processes and explicitly defines back height harmony as a manifestation of parasitic harmony where the back height harmony in Bantu is parasitic on the feature [+round]. However, such an account leads to very language-specific assumptions. This paper seeks to provide a fresh account of the *front-back asymmetry* by examining three Bantu languages – Kikuyu (E.51), Kimatuumbi (P.13) and Shona (S.11) and proposing a representational analysis assuming underspecified and asymmetric feature representations (based on FUL Lahiri 2018). Based on these assumptions, a single constraint (based on representations of all Bantu vowel inventories) is postulated relevant for all Bantu languages with a *front-back asymmetry*.

Data. The key manifestation of the asymmetry is a unique type of disharmonic pattern. In Kikuyu, the disharmonic string [ɛ…o] (compared to *[ɛ…ɔ]) is found in both roots and stems (cf. Table1); the front mid target [ɛ] undergoes harmony triggered by both [ɛ] and [ɔ], but the back mid [ɔ] only harmonises with [ɔ]. Similar disharmonic strings [e…u] (not *[e…o]) and [ɛ…u] (not *[ɛ…ɔ]) are observed in Shona & Kimatuumbi, respectively.

Trigger\Target	ɛ	ɔ
ɛ	ɛ...ɛ	ɛ...o
ɔ	ɔ...ɛ	ɔ...ɔ

Table 1. Stem Tongue Root harmony in Kikuyu

Analysis. Despite surface differences, the three disharmonic strings share the same underlying mechanism. Assuming underspecification of [COR], the facts fall out by assuming an asymmetric feature representation for all. I use Kikuyu data for an illustration – the feature representation of Kikuyu triggers and targets is shown in Table 2.

Kikuyu harmony	Triggers		Targets	
Features	/ɛ/	/ɔ/	/E/	/O/
ARTICULATOR (ART)				
CORONAL [COR]	√		√	
DORSAL [DOR]		√		√
TONGUE ROOT				
RTR	√	√		

Table 2. Kikuyu triggers and targets in FUL: underlying representations (shading indicates underspecification)

Following Leben (1973) and Goldsmith (1976), I propose that harmony is realised by spreading the harmonic feature from the trigger to the target and/or deleting the feature of the target if it is lexically required to be specified for the feature. For Bantu, which is normally formalised as Tongue Root (TR)/Tongue Height (TH) harmony, an additional match/mismatch asymmetric procedure for the ARTICULATOR features of vowels is essential. In case of Kikuyu (see Fig.1), [DOR] (trigger) does not *mismatch* unspecified [COR] (target), but [COR] (trigger) *mismatches* specified [DOR] (target).

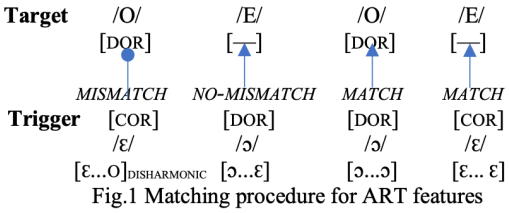


Fig.1 Matching procedure for ART features

In Fig.2, the spreading of [RTR] should have occurred to achieve the TR harmonic string [ɛ…ɔ]; however, the resulting *[COR] (trigger)* mismatches the specified *[DOR] (target)* and blocks the TR harmony procedure, leading to a surface disharmonic [ɛ…o] sequence in Kikuyu. For the other three matching conditions, no blocking effect on TR harmony is triggered and harmonic sequences can be observed as are expected (Fig.1). A general ART constraint based on the matching procedure is postulated: *The unidirectional* ART *mismatch ([COR]-≯[DOR]) between the trigger and the target blocks the potential spreading and/or deletion procedures for the harmony in the language.* I propose that the *front-back asymmetry* in Bantu vowel harmony is rooted in the asymmetric feature representations of vowels leading to *match/mismatch* asymmetry. Both Shona and Kimatuumbi data can be neatly addressed in this proposal.

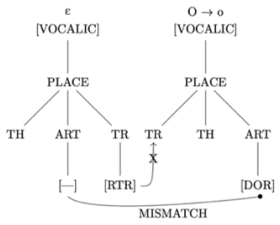


Fig.2 [ɛ…o] in Kikuyu

Morphological gradience in phonology

Quentin Dabouis, Université Clermont Auvergne – LRL (UR 999)

There has been increasing evidence for gradience in morphology (Hay & Baayen 2005), but reference to morphological structure in phonological models is largely still done in a categorical manner. One of the ways that morphological gradience has been tested in phonology is through what has been called "the segmentability hypothesis" (Hay 2001, 2003; Collie 2008; Dabouis 2019), according to which more easily segmentable derivatives are more likely to preserve the phonological properties of their base than less easily segmentable derivatives. Segmentability is assumed to be based on factors such as the frequency of the base and derivative, semantic transparency, affix productivity or the type of base (free vs. bound). Collie (2008) reports that relative frequency is a significant predictor of accent preservation failure in English (e.g. *antícipate → ànticipátion*), and so she proposes a Stratal OT analysis in which the base may be absent from the input of the computation of the derivative if that derivative is more frequent than the base. Dabouis (2019) finds similar results for clash-generating accent preservation (e.g. *depártment → depàrtméntal*) but also finds that the frequency of more deeply embedded bases (e.g. ***collect*** *→ collective → collectivity*) also appears to play a role.

In this talk, I propose to explore the following hypotheses:

- All embedded bases are present in the input of the phonological computation of their derivative, along with a stored representation of that derivative (following Bermúdez-Otero (2012), I assume that this is necessary to protect exceptions from regularisation). This is in line with models of lexical access in which accessing a word also activates its morphologically related set, although to a lesser extent than it activates the word itself (Burani *et al.* 1984).
- The presence of these forms in the input is gradient, and the different "strengths" of these input forms is a function of their (log-transformed) frequency.

This predicts that cumulative base frequencies should be better predictors of phonological preservation than the frequency of the local base alone. I will present data of two phonological processes which support that prediction: clash-generating accent preservation and inter-tonic vowel preservation (e.g. *condénse → còndn*[e]*sátion*). For example, when we study the data in Dabouis (2019), we find that relative frequency is a significant predictor of clash-generating stress preservation in binary logistic regression. When the local base and derivative frequencies are entered in the regression model as separate variables, there is no significant effect of local base frequency. However, we do find a significant effect of cumulative base frequencies.

I will then propose an analysis of these processes using Gradient Harmonic Grammar (Smolensky & Goldrick 2016) and Max-Ent-OT (Goldwater & Johnson 2003). The "strength" of the input forms will be called *activity*, following the idea developed in Gradient Harmonic Grammar that any representation is potentially gradient. The activity level of an input form is assumed to be indexed to its log-frequency, and it interacts with faithfulness constraints so that the penalty assigned to a candidate that is not faithful to a given input form is the product of the weight of the faithfulness constraint and the activity level of that input form. For example, *connective* has a log-frequency of 4.4, and if we assume that the constraint IDENT-ACCENT has a weight of 0.8, then the penalty will be 4.4*0.8=3.52 for a candidate of *connectivity* which does not preserve the accent of *connéctive*. Max-Ent-OT then allows us to derive the probability of a candidate to surface based on the harmony of the different candidates.

Ghost /ə/ and its manifestations in the French Croissant

Noam Faust (Université Paris 8/ CNRS SFL), Tobias Scheer (Université Côte-d'Azur/ CNRS BCL)

In the speech of Saint-Pierre-le-Bost (a moribond Romance variety from the French linguistic Croissant, a contact area of Occitan and French in the center of France), the IND.SG does not carry any overt suffix; in many cases, this form is therefore homophonous with the parallel noun (1a,b). TR-final (T=non-sonorant C, R=liquid) stems such as (1c) are of interest. In verbs, they *always* show a vowel [ə] between the T and the R; in parallel nouns, the R is consistently deleted. Finally, verbs like (1d), whose stems end in a Consonant-Glide sequence, consistently *do* involve what seems to be a suffix [e] in the IND.SG. Note that the parallel noun is quite distinct, with no suffix and an initial cluster.

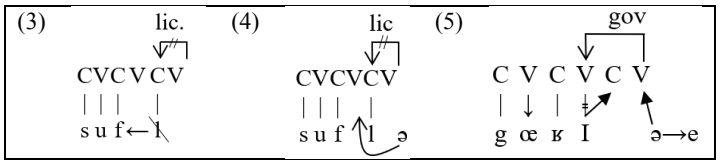
(1)	a. 'advise'	b. 'load'	c. 'sugar'	d. 'grill'
INF	kõsɛj-a	ʃaʁʒ-a	sykʁ-a	gəʁj-a
IND.SG	kõsɛj	ʃaʁʒ	sykəʁ	gəʁj-**e**
IND-1/3PL	kõsɛj-ã	ʃaʁʒ-ã	sykʁ-ã	gəʁj-ã
NOUN	kõsɛj	ʃaʁʒ	syk	gʁij

We offer a unified account of these alternations, assuming that information regarding the lexical category or the paradigmatic relations of an item is not available to the phonological grammar.

We hypothesize that all IND.SG forms carry a suffix /-ə/, as in (2a-d). Since this is an inflectional suffix, it is absent from the parallel nouns as in (2e-h). There is a general ban on the realization of /ə/ in open syllables in the language, e.g. [kaʁəl] 'tile.IND.SG', [kaʁl-a] 'tile-INF' (here, the /ə/ cannot be epenthetic, cf. [yʁl] 'scream.IND.SG'). Because of this ban, the suffix /ə/ cannot be realized in the final position: it thus remains unrealized in (2a-b). Under (2c), however, the suffixal /ə/ intrudes into the stem in order to save the /l/ from deletion, yielding [sufəl]. This explains why a different solution for the illegal TR# is attested in nouns like (2g), where there is no lexical suffix /ə/. Finally, cases like (2e) are due to an independently-motivated constraint against homorganic vowel-glide (HomVG) sequences: */ij, uw, yɥ/ are realized as [j,w,ɥ] (syneresis). The empty nucleus thus created requires government, which the suffixal /ə/ can only provide if strengthened to [e].

(2)	Verbal IND.SG				Noun		
a.	/kõsɛj-ə/	=>	[kõsɛj]	e.	/kõsɛj/	=>	[kõsɛj]
b.	/ʃaʁʒ-ə/	=>	[ʃaʁʒ]	f.	/ʃaʁʒ/	=>	[ʃaʁʒ]
c.	/sufl-ə/	=>	[sufəl]	g.	/sufl/	=>	[suf]
d.	/gʁij-ə/	=>	[gœʁje]	h.	/gʁij/	=>	[gʁij]

The formal analysis is couched within Strict CV (Lowenstamm 1996, Scheer 2004). The R of a TR cluster must be licensed, but cannot be in either the noun (3) or the verb (4). In the noun, this leads to deletion of the R; in the verb, the /-ə/ can intrude into the stem. (5) illustrates why fortition of the schwa, rather than intrusion, occurs with /gʁij/: the /-ə/ attaches to the final empty nucleus because the preceding nucleus is occupied by the I. When syneresis applies, the penultimate nucleus needs a governor, which triggers the fortition of the schwa. Once the vowel of the HomVG is eliminated, the first V-slot of the root is ungoverned and must be realized through epenthesis. To explain why fortition is unavailable for TR (4), we assume a hierarchy among repairs: fortition is applied only when intrusion cannot occur; and the most dramatic repair, the loss of R (2g, 3), is observed when neither intrusion nor fortition are possible.



The analysis is confirmed by the behavior of infinitives. The verbs in (1) are all of group 1, characterized by [-a] in infinitives. Verbs of the other two groups, like [finiʁ] 'end' and [kʁeʁ] 'believe', carry an infinitive suffix [-ʁ]. A third group seems to carry no infinitival suffix: [mɔʁd] 'bite', [kunɛt] 'know'. Our account explains why: these do carry a suffix /-ʁ/, but this suffix cannot be realized because, as in nouns, the R is genuinely final (there are no inflectional suffixes on infinitives).

The plausibility of feet in two stress languages

Guilherme D. Garcia (Université Laval), Heather Goad (McGill University)

We compare English and (Brazilian) Portuguese, and empirically demonstrate that word-minimality, metrical consistency as well as weight effects can help us determine the plausibility of the foot as a prosodic domain in these two languages.

Background. In languages where prominence is characterized as 'stress', it is computed in the phonological word (PWd) and realized in the foot (Selkirk 1984). English is a language of this type: in non-verbs, left-headed weight-sensitive binary feet (moraic trochees) are built from the right edge of the PWd, coupled with final extrametricality (Hayes 1982): $[ə_{\mu}(ˈ\widehat{dʒ}ɛ_{\mu}n_{\mu})_{Ft}\langle də_{\mu}\rangle]_{PWd}$ 'agenda'. Simply put, stress is penultimate if the penultimate syllable is H(eavy), and antepenultimate if it's L(ight). At first glance, Portuguese looks like English, aside from final extrametricality: in non-verbs, moraic trochees are built from the right edge of the PWd: $[pa_{\mu}(ˈpɛ_{\mu}w_{\mu})_{Ft}]_{PWd}$ 'paper', $[sa_{\mu}(ˈpa_{\mu}tʊ_{\mu})_{Ft}]_{PWd}$ 'shoe'. The languages look even more similar once we observe that 12% of Portuguese non-verbs have antepenultimate stress, which, under a footing analysis, suggests that the language permits exceptional final syllable extrametricality: $[pa_{\mu}(ˈtɛ_{\mu}ti_{\mu})\langle kʊ_{\mu}\rangle]$ 'pathetic'. Comparing the languages more carefully, though, we notice important differences between them. First, in English, binary feet play a role in regulating minimal word size: no subminimal lexical words exist in the language, and truncation, including hypocorization, never results in monomoraic forms: 'chemistry' → [kɛm], *[kɛ]; 'Susan' → [su], *[sʊ]. Second, in English, there is general consensus that the language builds moraic trochees. In Portuguese, in contrast, the range of patterns attested in the language cannot be captured by a single foot type—although weight is acknowledged to regulate stress, foot-based analyses have employed trochees (Bisol 1992), iambs (Lee 2007), and/or dactyls (Wetzels 1992), with no single analysis emerging as optimal. These differences may suggest that the foot plays a different role in the two languages: stress assignment in English is uniformly captured by binary trochees; in Portuguese, the foot plays a less important role and may be absent altogether. We explore this further by experimentally examining weight effects in antepenultimate position in HLL and LLL words in the two languages.

Predictions. If binary trochees regulate English footing, two logical possibilities are predicted for weight-sensitivity: (a) weight effects are negative, i.e., LLL words are more likely to bear antepenultimate stress than HLL words (ĹLL > ĤLL), because ĤLL requires an uneven trochee or a medial unparsed syllable. (b) Weight effects are not active in antepenultimate syllables, i.e., a LLL word is just as likely to bear antepenultimate stress as a HLL word (ĤLL ∼ ĹLL). If Portuguese does not build feet or if the foot plays a less important role than in English, then we predict positive weight effects in antepenultimate position (ĤLL > ĹLL).

Experiment and results. Native speakers of Portuguese ($n = 26$) and English ($n = 25$) listened to pairs of nonce words that differed only in stress location. The stimuli in both experiments (n = 240 (Pt); n = 180 (En)) were generated based on weight profile (HLL, LHL and LLL, plus LLH for Portuguese). Maximal hierarchical Bayesian regressions found a positive weight effect in antepenultimate syllables for Portuguese ($\hat{\beta} = 0.34$, 95% highest density interval = $[0.04, 0.64]$, replicating the results in Garcia (2019)), but no weight effects were found for English (ĤLL ∼ ĹLL). In addition, we captured a sonority effect for Portuguese (but not for English), where sonorant codas appear to be heavier and thus more stress-attracting ($\hat{\beta} = 0.40$, 95% HDI = $[0, 0.82]$). These results strengthen the plausibility of the foot for English and further question its status for Portuguese. Our findings may lend support to previous studies that challenge the universality of certain prosodic domains (e.g., Pierrehumbert 2003; Blevins 2004; Harris 2007; Schiering et al. 2010; Özçelik 2017).

Accounting for Pauses-in-Clauses

Chris Golston, Zach Metzler, Alec Chan-Golston, Michael Shepherd

Intonational phrases arise from a large number of seemingly disparate sources (Trager & Smith 1951; Green 1973; Downing 1970; Nespor & Vogel 1986). Alongside main clauses, intonational phrases arise with adverbials (*I went, too*), secondary conjunction (*Jack hit, and also kicked, Bill*), parentheticals (*He lied, as you know*), non-restrictive relative clauses (*The boy, who lives alone, worries*), tag questions (*He lied, didn't he?*), vocatives (*Karen, you lied*), expletives (*Shit, he lied*), moved elements (*Yesterday, he lied*), appositives (*Alec, my son, left*), and conjuncts with null heads *(Lisa, Bruce, Junko & Armin*). These pauses-in-clauses show that intonational phrases don't just correspond to clauses (cf. Ishihara 2022). Selkirk (2005) argues convincingly that intonational phrases are better understood as 'comma phrases' given the many types of syntax they encompass, but how to define comma phrases remains difficult.

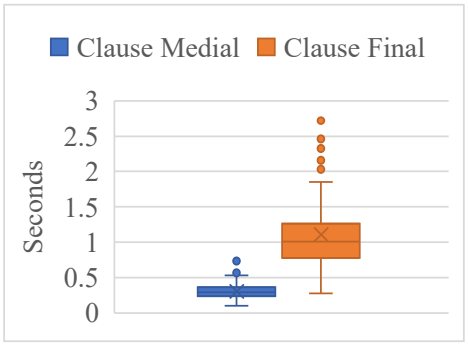
We propose a theory of pauses-in-clauses based only on *adjuncts* and *null heads*. We hypothesize that each of these introduces a silent μ and that a pair of silent μμ yields a pause. We predict (i) where pauses-in-clauses occur and (ii) how long they are phonetically. The proposal is meant for all languages, though we show it here only for a corpus of English data.

A null head (eg, DECLARATIVE FORCE in A) is realized as a silent μ. Subjects (*John*) are adjoined to predicates (Kayne 1994) and are thus followed by a silent μ, as are adverbial phrases (*yesterday*). The silent μs in A do not result in pause because they are not adjacent—two silent μs are required for a pause, *ex hypothesi*. A is spoken as one intonational phrase and written without a comma. Fronting *yesterday* in B, however, yields silent μμ and thus a salient pause and written comma.

A ((DECLμ (*John*)μ (*baked cookies*) (*yesterday*)μ) no pause/comma

B ((*Yesterday,*)μ DECLμ (*John*)μ (*baked cookies*)) pause/comma after *yesterday*

Deriving pauses-in-clauses from silent μμ makes an immediate prediction about pause duration: silent μμ should be twice the length of a spoken μ. To test this, we predicted pause lengths from a written text (*The Selfish Gene*, Dawkins 1976) and compared them to measurements from the author's audiobook. The first paragraph contains 454 moras and last for 75 seconds, which amounts to .165 sec/μ. If pauses-in-clauses arise from pairs of silent μs, audiobook pauses should average .33 seconds (2 x .165). Based on 364 pauses-in-clauses, the average actual pause length is .31 seconds. We take the close fit of model to data as confirmatory evidence for our analysis.



Pauses-*after*-clauses, on the other hand, are thrice as long as pauses-in-clauses (see chart). And whilst pauses-in-clausers are tightly grouped (SD = 0.1 sec.), pauses-after-clauses have a much greater variance (SD = 0.5 sec.), as confirmed by an f-test ($p < 0.001$). We suspect that the small variance of pauses-in-clauses is due to their control by the grammar, whilst the large variance of pauses-after-clauses is due to extra-grammatical factors involved in speech planning.

Previous theories of intonational phrases either fail to account for pauses-in-clauses (Selkirk 2009; Hamlaoui/Szendroi 2017), including those associated with coordinate structures (Potts 2002, 2003); or they require multiple triggers (Selkirk 2005) or syntactic orphans (Nespor/Vogel 1986).

The present analysis has none of these defects. An added benefit of this analysis is that while earliers analyses rely on labeled syntax, ours does not. This makes our proposal compatible with Bare Phrase Stucture (Chomsky 1995) and Label-Free Syntax (Collins 2002, Collins/Seely 2020).

A metrical approach to ternarity in Northern European accentual contrasts

Pavel Iosad
University of Edinburgh pavel.iosad@ed.ac.uk

Many languages of Northern Europe possess typologically non-trivial systems of prosodic contrasts, analysed variously as 'tonal/pitch accent' (North and West Germanic, Gaelic, Baltic), laryngeal accent/stød (North Germanic, Baltic, Finnic, Gaelic), and ternary quantity distinctions (Finnic, Sámi, Gaelic). In this paper, I show that despite the diversity of phonetic correlates, the fundamental structure of these systems is almost perfectly isomorphic. Specifically, they are often three-way contrasts between stressed syllables that lack the segmental material to support the accentual contrast, and two kinds of stressed syllables that do have such segmental content: one bearing some marked accentual specification and one lacking it. I argue that this generalization is especially well captured by 'metrical' (more specifically foot-based) analyses of tonal accents (e. g. Morén-Duolljá 2013, Köhnlein 2016, Iosad 2016, Morrison 2019).

Usually, the contrasts are treated as two-way distinctions with a markedness asymmetry: for instance, Danish stød is considered the marked pole of the contrast (Basbøll 2005), while the relative markedness of North Germanic tonal accents is much debated (e. g. Kristoffersen 2006). Importantly, the two-way contrasts are often neutralized in certain segmental contexts, such as in final stressed syllables (Swedish/Norwegian) or in syllables with insufficiently sonorous rhymes (Danish stød, Franconian and Baltic accents).

Borrowing a term from the Danish tradition (e. g. Grønnum & Basbøll 2001, cf. also Liberman 1984), I will refer to syllables that cannot support the prosodic contrasts as lacking *accentual basis*. In the paper, I show that different accentual systems in Northern Europe exhibit this basic ternary structure, differing primarily in how they define accentual basis, and in the mechanisms of default vs. non-default prosodification that are responsible for the contrast in syllables with basis.

Importantly, basis is usually defined by *size*: accentual contrasts can require a bimoraic high-sonority coda (Danish stød, Baltic, Franconian), a bimoraic trochaic domain (Scottish Gaelic), a bimoraic voiced domain (Livonian), or a disyllabic domain (North Germanic tonal accents, Danish short-vowel stød). This framing allows us to treat the ternary systems of languages like Estonian and Aanaar Sámi, where the relevant dimension is quantity rather than 'accent', within the same framework: effectively, a light stressed syllable (Estonian Q1 ['linɑ] 'flax.GEN') is 'too small' to provide accentual basis, whilst heavy syllables (Q2/'long' ['lin:ɑ] 'town.GEN' and Q3/'overlong' ['lin:nɑ] 'town.PART') both have sufficient moraic material to support the contrast (cf. the analysis of Estonian Q3 as 'heavy accent' [e. g. Hint 1997, Kuznetsova 2018]).

The fundamental identity of 'ternary quantity' and 'accentual contrasts' is highlighted by cases that submit to either analysis. A notable example is Low German, variously treated as 'tonal'/'accentual' (Prehn 2007, Höder 2020), showing ternary quantity distinctions (Ternes 1981, Chapman 1993), or defining accentual basis by vowel quality (Kohler 2001). A variety of cues of similar structures is also attested in Scottish Gaelic (Ternes 2006), which Morrison (2019) analyses in terms of foot structure.

I argue that metrical approaches such as those of Köhnlein (2016) and Morrison (2019) provide exactly the right level of abstraction to capture the fundamental ternary structure underlying many Northern European accentual systems, whilst also allowing for a variety of phonetic realizations. It is also predicted that 'metrical' accentual contrasts can combine with other prosodic specifications like tone to produce more elaborate systems: this is the case in Latvian (Krämer forthcoming). I argue that metrical approaches are superior to frameworks that treat lexically distinctive tones as the analytical key to 'accentual' contrast (Hyman 2009, Gussenhoven & Peters 2019): in particular, I suggest that 'tonal' approaches are unable to explain the necessary link between size and the definition of accentual basis. Metrical analyses, by contrast, offer an insightful and unified framework for a range of apparently disparate phenomena.

Variable prosodic phrasing of multiple wh-questions in semi-spontaneous Urdu

Farhat Jabeen, Bielefeld University, Germany, farhat.jabeen@uni-bielefeld.de

While the prosody of wh-questions with a single wh-phrase is well-researched, the prosodic phrasing in questions with multiple wh-phrases has largely been ignored. In languages with variable word order, multiple wh-questions allow us to investigate the relationship between word order and prosodic phrasing. The current study offers this for Urdu, a South Asian language with flexible word order. Wh-phrases are analyzed as focused in terms of their information structure (Manetta, 2012; Truckenbrodt, 2012). The prosodic phrasing of single wh-questions in Urdu differs from that of narrow focus (Jabeen, 2019). Hence it is pertinent to analyze if multiple wh-questions in Urdu pattern with single wh-questions or narrow focus in terms of word order and prosodic phrasing. We investigate 1) word order variation in multiple wh-questions, 2) the F0 contour of in-situ wh-phrases compared with their scrambled counterparts, and 3) the prosodic phrasing of multiple wh-questions in Urdu.

Syntactic constituents in Urdu may be scrambled to mark information structure (Kidwai, 2000). The sentence initial position is used for topicalization and focused constituents are placed at the immediately preverbal position (Butt and King, 1996). The wh-phrases in Urdu are reported to have similar scrambling possibilities as the corresponding noun phrases (Manetta, 2012). Jabeen (2019) has shown that, in single wh-questions, the position of scrambled wh-phrases is reflected in their F0 contour as the upstepped F0 peak realized on a wh-phrase moves in a sentence along with the wh-phrase. Using the realization of upstepped F0 peaks on wh-phrases as evidence for a recursive Intonational Phrases (IP) boundary, (1-a) presents Jabeen's proposed prosodic phrasing for single wh-questions. This differs from the prosodic phrasing reported for narrow focus in Urdu (Jabeen, 2022), where a recursive IP boundary, marked with an upstepped F0 peak, is realized on the left edge of narrowly focused nouns. The focused noun itself carries a downstepped F0 peak.

(1)	a.	Noun	Noun	Wh-phrase$]_{IP}$	Verb	Single wh-question
	b.	Noun	Noun$]_{IP}$	Noun$_{Focus}$	Verb	Narrow focus

In the current study, we report results from semi-spontaneous speech produced by eleven Urdu speakers. They were shown two wh-phrases, *kis=ne* 'who' and *kis=ko* 'whom', and a complex predicate verb randomly placed on the screen, and asked to formulate a sentence using the given chunks of text. The target wh-phrases were presented in combination with five different verbs.

The analysis of word order showed that 70% of the wh-phrases were placed in-situ. For the remaining wh-questions, 'who' was scrambled and placed at the immediately preverbal position used to mark focus. This is in line with Jabeen (2019)'s data where 'who' was moved to the preverbal position in 28% of single wh-questions. The General Additive Mixed Models analysis of time-normalized F0 contour showed that the in-situ wh-phrase 'whom' was upstepped, whereas the scrambled wh-phrase 'who' was downstepped in comparison with the preceding F0 peak on wh-phrase1. No difference was found in the F0 contour of in-situ and fronted wh-phrases at the sentence initial position. This shows that the wh-phrases in-situ exhibit the F0 contour similar to that of the wh-phrases in single wh-questions i.e., an upstepped F0 peak. However, the F0 contour of wh-questions with scrambled wh-phrases is similar to that of narrow focus i.e., downstepped F0 peak on the scrambled wh-phrase.

Following Jabeen (2022), we analyze each in-situ wh-phrase as carrying a recursive IP boundary indicated by the upstepped F0 peak on wh-phrase2 (2-a). However, this applies only to in-situ wh-phrases and not to their scrambled variants. Based on Stjepanović (1998) and Bošković (2000)'s analysis of wh-movement, we claim that the scrambled wh-phrase 'who' takes on the prosodic properties of narrow focus as shown in (2-b), while the in-situ wh-phrases are 'true' interrogatives. Our data provides evidence for the interplay between word order and prosodic phrasing as indicated by the variable phrasing of in-situ and scrambled wh-phrases in multiple wh-questions in Urdu. It also contributes to the ongoing discussion regarding the analysis of wh-phrases as focused entities.

(2)	a.	Who$_{LH}]_{IP}$	Whom$_{L\text{^}H}]_{IP}$	in-situ
	b.	Whom$_{LH}]_{IP}$	Who$_{L!H}$	Scrambled

Utterance-final high vowel diphthongization in Chongqing Mandarin

Hailang Jiang, University College London
hailang.jiang.22@ucl.ac.uk

In Chongqing Mandarin (a dialect spoken in Southwestern China), high vowels undergo utterance-final diphthongization. This paper presents an analysis of diphthongization as fission of high vowels in monomoraic syllables motivated by an utterance-final floating mora. High vowels do not fission into identical parts due to an OCP constraint, and we derive the similarity between the parts with faithfulness constraints, which prevent them from surfacing elsewhere in the language.

High vowels including [i, y, u, ʊ] and the 'apical vowel' [ɻ̩] surface utterance-finally as their diphthongized versions, respectively [iɪ, yɪ, uo̯, ʊo̯, ɻ̩ɐ̯]. The examples in (1) illustrate the alternations of the five vowels (in red):

(1)

Utterance-medial high vowel		Utterance-final high vowel diphthongized	
[pi^{33}.xo^{31}]	'pen case'	[mau^{33}.piɪ^{31}]	'writing brush'
[ly^{34}.zən^{31}]	'female'	[mei^{34}.lyɪ^{42}]	'beauty'
[ts͡ɻ̩^{35}. t͡ɕin^{33}]	'funds'	[tʰə̯u^{33}.ts͡ɻ̩ɐ̯^{35}]	'to invest'
[fʊ^{22}.muo̯^{42}]	'parents'	[iɑŋ^{34}.fʊo̯^{21}]	'foster father'
[su^{35}.ts͡ə̯u^{33}]	'Suzhou'	[t͡ɕi͡ɑŋ^{35}.suo̯^{33}]	'Jiangsu'

Non-high monophthongs ([pe^{31}] 'white', [kʰo^{213}] 'class', [pa^{31}] 'eight'), a vowel in a closed syllable ([ɛin^{35}] 'heart') and the second part of an underlying diphthong ([pai^{213}] 'failure'), do not diphthongize utterance-finally.

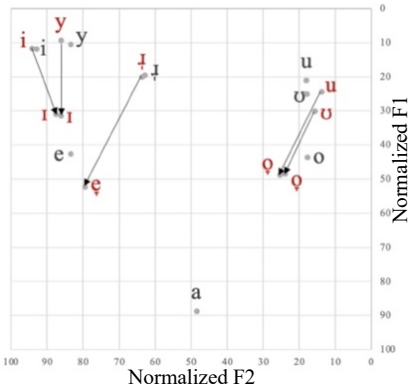
We analyze diphthongization as fission, rather than epenthesis. As a generalization of boundary tones, we set up a floating mora at the right edge of every utterance, which needs association. As the tableaux in (2) illustrate, these constraints motivate fission in high vowels, but not in low vowels which would otherwise violate INTEGRITY-IO(–high). Syllables that are already bimoraic like [ɛin] and [pai], cannot host the floating mora without becoming superheavy. Under an epenthesis account, it is not obvious how to restrict diphthongization to high vowels only (i.e. why underlying /pa$_1$#/ does not become *[pa$_1$V$_1$]).

(2) High vowels undergo diphthongization utterance-finally and non-high vowels do not

pi$_1$ μ#	INT(–hi)	*FLOAT	INT(+hi)
pi$_1$ μ		*!	
☞pi$_1$i$_1$			*

pa$_1$ μ#	INT(–hi)	*FLOAT	INT(+hi)
☞pa$_1$ μ		*	
pa$_1$V$_1$	*!		

Interestingly, the novel vowels derived through diphthongization cannot surface in any other contexts. Unlike other languages which exhibit lengthening, Chongqing Mandarin does not just lengthen a final vowel *[pi$_1$i$_1$], but rather the quality of the second part is slightly different. This reflects the phonotactic constraints which disallow two identical vowels and [+high] vowels utterance-finally. In the analysis we do not treat the novel vowels like [ɪ] as phonologically high and the phonetic evidence is that they are much lower than the phonologically high vowels in the formant space, as shown on the left.



Furthermore, the quality of the second part is not arbitrary (this is another advantage of the fission account) and in /pi#/ it has to be [ɪ] because it is the closest vowel to [i] that is not [i].

Intricate coda restrictions in loanwords of Tenyidie, an otherwise codaless language

Yuni Kim (U. Surrey – yuni.kim@surrey.ac.uk);
Savio Meyase (Newton Intl. Fellow, U. Edinburgh – savio.meyase@ed.ac.uk)

Background: A theoretically significant issue in phonology is the origin of patterns and restrictions in loanwords that do not correspond to the native phonology of the borrowing language (henceforth L1). Do such patterns reveal the emergence of innate, universal preferences in contexts of underdetermination (Itô & Mester 1999, Kenstowicz & Sohn 2001)? Or can most cases be explained by perception, orthography, and other factors that lead borrowers to posit a novel UR, whose output actually obeys the regular phonological production grammar of the L1 (Peperkamp et al. 2008, Boersma & Hamann 2009, Smith 2009)?

Case study and main claim: We present data from the previously undescribed English loanwords of Tenyidie, a Tibeto-Burman language of Northeast India. In Tenyidie, coda consonants in English loans display a complex set of largely manner-dependent adaptations. These do not arise in any obvious way from the L1 phonology, since codas are unattested in native vocabulary, nor are there potential derived codas that show any sort of repair, or any other epenthesis or deletion processes. We argue that the intricate coda patterns in loanwords result from the interaction of perceptual factors with the emergence of default markedness on the production side, namely [coronal] as the unmarked place of articulation for stops.

Data: The main generalizations are as follows. Note that all coda consonants are devoiced. In singleton word-final codas, plosives (1abc) and nasals (1def) neutralize in place-of-articulation to coronal, while fricatives (1ghi) and affricates (1jk) preserve the English PoA distinctions.

(1)	a) bed	[bet]	d) seen	[sin]	g) size	[sais]	j) catch	[kɐʧ]
	b) job	[ʤot]	e) SIM	[sin]	h) move	[muf]	k) judge	[ʤaʧ]
	c) book	[but]	f) sing	[sin]	i) fish	[fiʃ]		

Additionally, plosives are obligatorily deleted from complex codas to create simple codas (2abc) while other manners are retained (2def). In medial codas, plosives are generally deleted (2gh), while nasals assimilate in place to the following onset (2ij).

(2)	a) fast	[fas]	d) sense	[sens]	g) exact	[e.zet]	i) compare	[kom.per]
	b) bulb	[bol]	e) solve	[solf]	h) victim	[vi.tin]	j) conquer	[koŋ.kər]
	c) mark	[mar]	f) welsh	[welʃ]				

Analysis: We propose that all coda plosives, plus word-final nasals, are filtered by the perception grammar (Boersma & Hamann 2009) to be lexicalized as placeless. The [coronal] feature – whose default status emerges in this context, as the L1 phonology does not provide evidence for place markedness – is inserted by the production grammar. Perception alone cannot explain the PoA neutralization; the relative salience of place cues on dorsals and labials (Jun 1995, Kochetov & So 2007) makes it implausible that they are perceived as coronal. In contrast, fricatives and other continuants have more salient PoA cues throughout their duration, and are phonologized in Tenyidie with a place specification. In word-medial and complex codas, we propose that deletion of placeless plosives results from HAVEPLACE >> MAXC, while high-ranked MAX constraints protect nasal consonants and final coda nodes (the latter violated when the entire coda is deleted). We consider possible motivations for these emergent rankings. Notably, our analysis derives the system of coda restrictions without a complex family of CODACOND constraints; the role of CODACOND, if any, is limited to word-medial nasals.

Implications: Tenyidie presents evidence in favor of emergent, non-L1 preferences in loanword phonology, although these must be carefully untangled from the perceptual factors at play. More generally in phonology, the Tenyidie case may support work by Lahiri and colleagues on coronal underspecification, and it underscores the complex relationships that may hold between word-medial and word-final codas.

Towards a theory of metrical faithfulness

Björn Köhnlein (OSU, koehnlein.3@osu.edu) & Oscar Coppola (OSU, coppola.31@buckeyemail.osu.edu)

Goal. Aiming to contribute to a long-standing debate in phonological theory, this presentation provides the tenets of a theory of faithfulness to metrical structure with underlying metrical trees. We propose to restrict faithfulness to maximal heads (= DTEs) and assume that the lowest-level head in the emerging hierarchy must be a vowel. As we show, our approach derives attested unpredictable patterns of surface metrification while avoiding unattested ones.

Background. It is often assumed that metrical structure cannot be underlying and/or contrastive – at least not above the level of the mora (Krämer 2012 for overview). Most and foremost, this position derives from the observation that syllabification appears to be predictable across languages. However, the existence of prosodic systems with unpredictable lexical or morphological stress requires some way of representing prominence underlyingly. Traditional approaches commonly solve this problem with either underlying diacritics or features that, in some versions, are then translated into surface foot structure (such as Alderete 1999, Revithiadou 1999 for diacritics, de Lacy 2020 for a feature [stress]).

Our approach. As discussed in, e.g., de Lacy (2020), protecting metrical boundaries by faithfulness can lead to a range of undesirable predictions, and therefore, the only tenable solution might be to exclusively protect maximal heads. Building on HEAD-MATCH constraints introduced in McCarthy (1995, 2000) for output-output correspondence and adopted in, e.g., Köhnlein (2011, 2016) and Morrison (2019) for input-output correspondence, we indeed argue that only maximal heads of underlying metrical trees (but not boundaries or dependents) are protected by faithfulness:

(1) HEAD-MATCH (DTE, where the DTE hierarchy = PW–FT–σ–μ–V): Assign a violation mark for every underlying maximal head that is not a maximal head on the surface

By virtue of (1), HEAD-MATCH constraints only protect candidates that conform to the specified hierarchy 'PW–Ft–σ–μ–V'; e.g., an underlying foot node is only protected by faithfulness if it is the head foot of a PW on the surface. Furthermore, underlying trees can be underspecified, functioning as, e.g., a floating foot without a prespecified location. Since the lowest element evaluated by HEAD-MATCH must be a vowel, a stored consonantal DTE (as in /kik^{DTE}a/; 'DTE' is shorthand for a tree) would not be protected by faithfulness, which eliminates unattested surface syllabifications of the type [ki.k.a]. As we demonstrate, our approach correctly derives phenomena such as unpredictable lexical stress and foot-based accentual oppositions but rules out unpredictable secondary stresses (not a maximal head), moraic stress (second mora of a syllable cannot be a DTE), and *unpredictable* stress on syllabic consonants (consonants cannot be DTEs, though *predictable* stress can still be on syllabic consonants; see Bell 1978).

Alternatives. Diacritic or featural solutions to the underlying representation of prominence that use foot structure on the surface sometimes rely on assumptions that are not that different from our proposal. For instance, Alderete and Revithiadou restrict associated lexical accents to vowels, and de Lacy (2020: 2) notes that "[i]t is possible that [stress] depends on the presence of [+vocalic]," comparable to our 'DTE → V' claim. Conversely, unless stipulated otherwise, the possibility of underlying metrical structure follows from *Richness of the Base* (e.g., Prince & Smolensky 1993) and is furthermore compatible with the notion of *homogeneity of inputs and outputs* (Moreton 2004 for discussion). Along those lines, our approach could be argued to be more parsimonious than diacritic/featural storage solutions (at least within OT) – *unless* it could indeed be shown that we can abandon metrical constituency altogether and specify diacritics/features both underlyingly *and* on the surface (as proposed in, e.g., Scheer & Szigetvári 2005, van der Hulst 2012; cf. Fringe Meeting and special session of this mfm).

Vowel Lengthening, Hiatus Avoidance and Floating Consonants as a keyhole to Pseudo-Allomorphy in C20 Bantu from a Strict CV Perspective

Nancy C. Kula & Shanti Ulfsbjorninn
nckula@essex.ac.uk & s.ulfsbjorninn@mun.ca
University of Essex & Memorial University of Newfoundland

Background: Recent work in allomorphy has shown how apparent cases of allomorphy can be reanalysed as purely phonologically derived (pseudo-allomorphy), through exploiting the potential array of shapes of autosegmental underlying forms (Bendjaballah & Haiden 2008; Barillot et al. 2018; Faust et al. 2018). The key is to think of association lines as independent objects of representation (van Oostendorp 2006; Zimmermann 2017), which can be used contrastively in underlying forms (Ben Si Saïd 2010, 2014; Scheer 2010:155; Scheer & Ziková 2010:481-482). Exponents can be fixed, floating, empty or unfixed.

Case study: In the C20 Bantu languages spoken chiefly in Congo (Brazaville) a distinctive allomorphy distinguishes certain Noun Class markers where consonant and vowel segments mutually exclusively alternate with zero: C ~ V (e.g. Embosi (C25): /ba + ásí/ > [b-ásí] 'wives' vs. /ba + kúsu/ > [a-kúsu] 'tortoises' (Rialland & Aborobongui 2015)). In the former, the prefix vowel is deleted and in the latter the prefix consonant does not surface. In certain cases, some of the features of the 'deleted' vowel may show up on the surviving consonant as gliding: /mo + ásí/ > [m^{w}-ásí] 'wives'. These alternations interact with VV hiatus such that the 'deleted' consonants act as blockers to the otherwise regular VV hiatus deletion, producing a long vowel in place of vowel deletion (Rialland et al. 2015): /ba + kondzi + bá + sɛr + i/ > [a-kondza-á-sɛr-i] 'chiefs said'. This contrasts with the language's regular VV deletion: /mo + júlu + á + lámb + i/ > [o-júl-a-lámb-i] 'the woman cooked'.

Aim: We further develop the representational analyses of Beltzung et al. (2010) and Rialland et al. (2015) to enhance a pseudo-allomorphy approach to these phenomena within Strict CV. This case study provides a compelling case study of whole floating 'syllables', where the segmental deletion is mutually exclusive: C ~ V (cf. Morroccan Arabic (Scheer 2016), Ik (Ulfsbjorninn 2021)). It is the first case study in the literature where this applies to prefixes, rather than suffixes.

Analysis: Unlike more typical CV prefixes, these C ~ V prefixes underlyingly consist of an unfixed segment under C as shown in (1b). This shape explains why only the C or the V of an underlying <C>V prefix surfaces in these languages. The C variant will only surface when triggered by hiatus deletion, interacting with a Bantu condition banning empty V-slots (parametrically repaired by vowel lengthening). Moreover, if more than one prefix is present we see that the floating consonant of the class marker (which on its own appears to have been deleted), is still present in the representation and acts as a blocker of hiatus: mà + gì + sôtù > [má-í-sôtù] *[mí:sôtù] 'small mouth' (Yisangu). Unless the language deletes floating consonants in which case blocking is not obtained. This generates the full typology of class markers in Bantu with the locus of the alternation being the phonological shape of the prefix interacting with the stem.

(1) a. Fixed

b. Unfixed

Framework comparison: This case is particularly interesting when comparing across frameworks, because OT will be shown to struggle to generate the vowel-initial variant *a-kusu* (at least using coherent well established (non-ad-hoc) constraints). And the allomorphic analysis based on Priority (Bonet et al 2007) (a > b), will be shown to fail to predict the blocking aspect of the phenomenon. In our analysis, all the computation is done in a fully modular fashion, Right to Left, rules exclusively apply when their contexts are met. Rules do not apply extrinsically, counterfactually, nor teleologically.

Learning Long-distance Consonant Assimilation

Chunzi Li (1155111348@link.cuhk.edu.hk) & Regine Lai (ryklai@cuhk.edu.hk)
The Chinese University of Hong Kong

Introduction. The Subregular Hypothesis (Heinz, 2010) predicts that phonotactic patterns which are computationally less complex are easier to learn. According to this hypothesis, a long-distance harmony pattern, First-Last Assimilation (FL pattern), which requires the assimilation of features between the first and last consonants in a word, is computationally more complex than sibilant harmony, which is also a long-distance harmony pattern. Previous studies supported the Subregular Hypothesis that English-speaking adults were biased towards learning the computationally less complex pattern (sibilant harmony) (Lai, 2015; Avcu & Hestvik, 2020). However, a similar word-order construction where the first and last words show the long-distance dependency (AXB) was learnable for infants (Marcus et al., 1999; Gómez, 2002, 2005). Here we ask: if infants can learn nonadjacent word-order such as AXB, can they learn the FL pattern, which is abstractly the same as AXB? Since the two long-distance phonological harmony patterns differ computationally, whether the adult-like learning bias is also present in infants? If infants can learn the two long-distance patterns, when do they show the ability, and how do they develop it?

Experiment 1. 146 Cantonese-speaking infants aged 10, 12, and 14 months participated in our experiment. Infants in each age group were divided into two experimental groups. In the attested harmony group, infants were tested with the Full Harmony (FH) rule. This rule requires all consonants (stops) within a word to agree in aspiration (e.g. $t^hap^hik^he$). (Because there is aspiration contrast for stops in Cantonese). In First-Last Assimilation (FL) group, the pattern only requires the first and last consonant to agree in aspiration (e.g. t^hapik^he). We used the familiarization paradigm. After a 124-sec familiarization phase, each infant listened to 12 test trials (six consistent and six inconsistent). We calculated the looking time difference score by subtracting the looking time of the inconsistent trials from that of consistent trials for each infant and run one-sample t tests to examine whether the difference score was significantly higher than chance for each age group in each condition.

Results. 10- and 12-month-old infants did not show any learning effect in FH and FL conditions, but 14 -month-old infants could learn both patterns (see Figure1). These findings indicated that only 14-months infants could learn the two long-distance harmony patterns, which differed from the adult result. However, it was possible that 14-months infants did not learn the true FL pattern as stimuli were always trisyllabic. A true FL pattern requires the first and the last C to agree, regardless of the number of intervening Cs between them.

Experiment 2. A follow-up experiment was designed to test whether infants can really learn the long-distance dependency in FH and FL conditions. Another 43 14-month-old infants and 48 adults were recruited to participate in the experiment. Participants heard trisyllabic and pentasyllabic words in the exposure phase. Following the exposure phase infants listened to twelve quadrisyllabic words (6 consistent and 6 inconsistent) in the test, whereas adults were tested with novel trisyllabic, quadrisyllabic, and pentasyllabic words in a 2AFC task.

Results. A block effect was found in infant data that the difference score was significantly higher than chance only in Block 1 in FH condition (see Figure2), which indicated that 14-months-old infants could learn the real FH pattern but failed to find the long-distance dependency in FL pattern. Adult results showed that they could learn the FH pattern and generalize this pattern to quadrisyllabic words (see Figure 3) but were not able to do that in FL condition. The result reveals that not until 14 months infants could learn the simple long-distance harmony pattern and the adult-like learning bias also emerges at around 14 months.

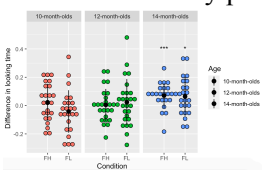


Figure 1. Results of Exp.1

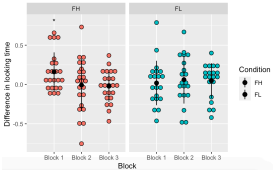


Figure 2. Infant results of Exp.2

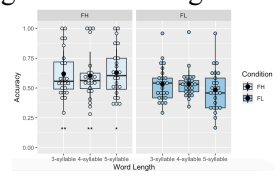


Figure 3. Adult results of Exp.2

Phonological exceptions are morphotactic exceptions given phonological underspecification

Katie McCann - University of Leipzig - katie.mc_cann@uni-leipzig.de

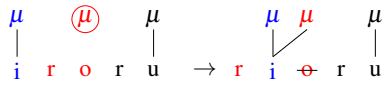
Main Claim: I show that a correlation between exceptional morphotactic position and exceptional phonological behaviour is explained by assuming underspecification in the phonology. This analysis adds to a body of work focusing on phonologically conditioned affix order (see Paster (2006) a.o.) without resorting to a P»M account. **Puzzle:** Mandan, a Siouan language of North America, has been described as a language with templatic affix ordering (Kasak 2019). Specifically, in Mandan the pronominal affixes are described to be templatically ordered with respect to the verb root and the so-called preverb (PV). The 1PL pronominal affix precedes the preverb, while the 1SG and 2nd person pronominal affixes follow the preverb. This results in the following affix order: 1PL-PV-1SG-2-*verb*, shown in (1). This ordering is completely independent of the arguments thematic roles.

(1) a. [émĩnĩpeʔʃ]
e-wa-ɾĩ-pE=oʔʃ
PV-1SG.A-2S-say.1A=IND.M
'I said it to you' (Kasak 2019:198)

b. [ɾáːnĩraːhinitoʔʃ]
ɾũ-aː-ɾĩ-ɾEːh=ɾĩt=oʔʃ
1PL.A-PV.TR-2S-go.there=2PL=IND.M
'we brought you here' (p.233)

Additionally, the 1PL marker undergoes a process of vowel deletion in (1-b). This process of vowel deletion only occurs when the 1PL prefix precedes a vowel-initial element. The general strategy for vowel hiatus resolution in Mandan is glottal stop epenthesis. Example (1) shows that there is a correlation of exceptional behaviour in the morphosyntax and phonology concerning the 1PL prefix. On the one hand, (1-b) indicates that the 1PL prefix has exceptional morphotactic properties: its position preceding the preverb. On the other hand, (1-b) indicates that the 1PL prefix has exceptional phonological properties: its behaviour in vowel hiatus constructions. **Solution:** I suggest that the exceptional morphosyntactic and phonological behaviour can be explained by underspecification in the phonology. I assume that the 1PL affixes are phonologically underspecified, their mora is floating in the input. Depending on the phonological environment of the 1PL, different outputs are predicted to become optimal: If 1PL is preceded by a CV syllable, the floating mora associates to the 1PL vowel. If it is preceded by a V syllable (which is always the case when a preverb attaches) metathesis occurs to satisfy an ONSET constraint and the mora associates to the preceding vowel, concequently the vowel of the 1PL deletes. This is shown in (2-b) from the example (2-a).

(2) a. [ɾíːɾu ksahãmika]
i-ɾo-ɾu-ksah=awĩ=ka
PV.INS-1PL.S-INS.HAND-go.away=CONT=HAB
'[...], leaving us behind.' (p.233)

b. 

I propose a formal account in OT, where ONSET»MAX●»LINEARITY gives rise to metathesis over segment deletion. Association of the floating mora is ensured by high-ranked *FLOAT and MAX_{μ}. Deletion of the 1PL vowel by *HIATUS»MAX●. Crucially, 1SG and 2nd person pronominal affixes do not undergo metathesis even though doing so could prevent an ONSET violation. The crucial constraint interaction which prevents this is $\text{MAX}^{\mu}_{\bullet}$ » ONSET. Because the mora in 1SG and 2nd person affixes is associated underlyingly, undergoing metathesis and mora reassociation parallel to (2-b) incurs a fatal violation of $\text{MAX}^{\mu}_{\bullet}$. **Conclusion:** This analysis presents evidence that phonological underspecification can give rise to surface patterns which are phonologically and morphotactically exceptional. A purely templatic approach (see Nordlinger (2010) a.o.) or an approach using position classes (Inkelas 1993) is able to derive the exceptional surface ordering of affixes. However, it needs a further mechanism to explain the exceptional phonological behaviour. By allowing the phonology to manipulate segmental linearization the source for both exceptions is simply phonological underspecification.

Morpheme dominance instead of cyclicity

Ekaterina Medvedeva, University of Leipzig, ekaterina.medvedeva@uni-leipzig.de

Main claim: The generalization that the stress system in Nez Perce (Sahaptin, ISO 639-3) is cyclic, is empirically not correct. **Background:** Most lexical accent analyses are based on assumptions that morphemes are underlyingly either accented or unaccented and either left- or rightmost parameter determines the surface accent if more than one accented morpheme is present. For Nez Perce, where the stress surface both on the rightmost or the leftmost morpheme, additional assumptions are necessary: the stress is assigned cyclicly (Bogomolets, 2020) or surfaces on the (accented) morpheme closest to each word edge (which is in lines with cyclicity) (Bjorkman, 2010). However, the data from the original source (Crook, 1999) requires an alternative explanation. **Empirical data:** In the Nez Perce examples below if an unaccented root is combined with the accented suffix -síix/-cíix, the only underlying accent surfaces (1). However, if an accented root is combined with an accented suffix (2) or an accented prefix and accented suffix (3), the leftmost underlying accent surfaces.

(1) [[hìp] síix]
hip- síix
eat- INC.PL
'We eat'
Crook1999[101(233a)]

(2) [[cikáa]cìix]
cháaw- cíix
fear- INC.PL
'We fear'
Crook1999[101(233b)]

(3) [ʾimemé [[hìnewi]sìx]]
ʾimemée- hínewii- síix
2/3 PL.REFL- try INC.PL
'You/they are trying'
Crook1999[133(324c)]

Simultaneously, in examples of the type in (4), the inner accented lexical suffix -úu surfaces with stress and overwrites the leftmost pattern. Hence, the stress in Nez Perce is either right- or leftmost but is not cyclic, as not the outermost morpheme is bearing stress in (2) and (4).

(4) [pè[[wỳik] úu]]se
pée- wéeyik- úu- see
3ON3- cross- toward- INC
'he is crossing toward her'
Crook1999[174(410b)]

Theoretical proposal: The proposed analysis is based on two assumptions: (a) the leftmost accented morpheme determines the surface accent if more than one is present and (b) a binary distinction into accented and non-accented morphemes is insufficient for Nez Perce. Some suffixes are 'dominant' (Halle and Mohanan, 1985) and can overwrite the leftmost pattern. Based on the Gradient Symbolic Representations Theory (Smolensky and Goldrick, 2016) a morphemes lexical property of being either accented or dominant is encoded in different underlying activity of the accent: 1.0 for accented, and 2.0 for dominant. This triggers accent competition for stress surface realization which is driven by the minimization of gradient MAX violations: the accent with the greater input activity will surface, as in (7) for (4). If morphemes have the same activity the language-specific parameter (leftmost for Nez Perce) decides the stress realisation on surface, as in (6) for (3). I suggest that the proposed analysis can be extended to the pattern of other lexical stress systems with a similar patterns like Yakima Sahaptin (Jansen, 2010; Hargus and Beavert, 2006; Bogomolets, 2020) and Chamorro (Chung, 1983).

(6)

		MAX	LMOST	
	①.0 ①.0 ①.0 ʾimemée[hínewii]síix	3	1	
☞ a.	①.0 ʾimemée[hínewii]síix	2	0	6
b.	①.0 ʾimemée[hínewii]síix	2	1	7
c.	①.0 ʾimemée[hínewii]síix	2	2	8

(7)

		MAX	LMOST	
	①.0 ①.0 ②.0 pée [[wéeyik] úu]]	3	1	
a.	①.0 pée [[wéeyik] úu]]	3	0	9
b.	①.0 pée [[wéeyik] úu]]	3	1	10
☞ c.	②.0 pée [[wéeyik] úu]]	2	2	8

Expanding the Inventory of Mora Affixation: Diminutive Reduplication in Lillooet

Gloria Mellesmoen – University of British Columbia - gloria.mellesmoen@ubc.ca

Proposal: The diminutive morpheme in Lillooet (St'át'imcets, Interior Salish) is an affixed mora (μ or μ^{+}). Specifically, the VOWEL REDUCTION pattern corresponds to an affixed strong mora.

Background: Diminutive reduplication in Lillooet results in a stressed /ə/, which is marked cross-linguistically and within Salish languages. The /ə/ in Lillooet is a nuclear and non-moraic, and further resists stress when there is a full (moraic) vowel available to host stress (e.g., Roberts & Shaw 1994; van Eijk 1997; Revithiadou 1999). Diminutive reduplication creates one of three exceptional circumstances where /ə/ may bear stress, even when another non-/ə/ vowel is present (Caldecott 2009). The diminutive is marked by a copy of the consonant before the stressed vowel, which is position after the stressed vowel in the diminutive form (e.g., 1a-b). The location of stress remains the same in the diminutive form and the stressed vowel surfaces as /ə/. While the VOWEL REDUCTION pattern is the default way of forming a diminutive (Van Eijk 2011), there are also examples of diminutive reduplication without reduction to /ə/ (1c-d).

(1) PATTERN #1: VOWEL REDUCTION

a.	sjáqt͡saʔ	'woman'	sʔjəʔjqt͡saʔ	'girl'	
b.	naχʷít	'snake'	naχʷəχʷt	'worm'	

PATTERN #2: VOWEL FAITHFUL

c.	t͡súłakaʔ	'seven'	nt͡sút͡słakaʔ	'seven people'	
d.	twit	'good hunter'	twiʔwt	'boy'	(Van Eijk 2011)

Analysis: I posit two allomorphs of the diminutive in Lillooet; the VOWEL REDUCTION pattern in (1a-b) is derived by the affixation of a strong mora μ^{+} (cf. Zec 1995, Hagstrom 1997, Prillop 2013, Köhnlein 2019), while the VOWEL FAITHFUL pattern in (1c-d) follows the affixation of a mora without any additional specification. Segments in the nucleus (excluding /ə/) and the coda are moraic. An affixed strong mora replaces the strong mora in the input (2a), and crucially cannot replace the original mora by attaching to the stressed vowel without a change in the segmental content in the output (cf. NOVACUOUSDOCKING in Saba Kirchner 2013). The fission of a consonant provides segmental content for affixed empty prosodic unit (see Bye & Svenonius 2012; Bermúdez-Otero 2012; Saba Kirchner 2013; Zimmermann 2013, and others), and the strong mora is shared between the coda consonant and a /ə/ nucleus (2b).

(2) a. súpləxkan 'I scratched myself.' b. səspʔləxkan 'I scratched myself a little bit'

Discussion: Positing that the default diminutive pattern is arises following the affixation of a strong mora provides motivation for the marked loss of a stressed vowel resulting in a stressed /ə/ in the output form. The difference between the main (VOWEL REDUCTION) pattern and the more marginal (VOWEL FAITHFUL) pattern represents the difference between a strong mora (μ^{+}) and a mora unspecified for position or headedness (μ), respectively. This analysis is consistent with previous descriptions of Lillooet stress and the general phonological grammar of the language, while accounting for the markedness of the stressed /ə/ in diminutive reduplication (without incorrectly predicting the reduction of stressed vowels to /ə/ elsewhere) and providing a formal account of both allomorphs of the diminutive.

‘Nice’ palatals and ‘nasty’ dentals:

Affect marking and the structure of Mapudungun coronal consonants

Benjamin Molineaux, The University of Edinburgh

The South American language Mapudungun (ARN) has a fairly dense inventory of contrastive coronal consonants, including stops/affricates, fricatives, nasals and laterals, across dental, alveolar, retroflex and (alveolo)palatal places of articulation (/t̪, t, t͡ʃ, t͡ʂ, θ, s, ʃ, ʐ, n̪, n, ɲ, l̪, l, ʎ/ — cf. Sadowsky et al. 2013). It has long been observed (cf. Febrés 1765), however, that these segments alternate with each other in ways that are neither lexically nor phonologically predictable, and which can be attributed to affect. Indeed, we find that words with a neutral affect take on a positive or diminutive meaning when a coronal is palatalised (see 1a-c), while they take on a pejorative or augmentative meaning when the coronal is dentalised (see 1d-f) (Catrileo 1986, 2010, Salas 1992).

(1)	a.[θiweɲ]	‘companion’	vs.	[ʃiweɲ]	‘dear companion’
	b.[malen]	‘maiden’	vs.	[maʎeɲ]	‘lovely/little maiden’
	c.[t͡ʂewa]	‘dog’	vs.	[t͡ʃewa]	‘doggy’
	d.[kuʐe]	‘wife’	vs.	[kuθe]	‘hag’
	e.[nelan]	‘I didn’t take it’	vs.	[ɲel̪aɲ]	‘I didn’t take it, damn it!’
	f.[fejti]	‘this’	vs.	[fej̪ti]	‘this (damn/nasty)’

The link between palatal consonants and diminution or positive affect is cross-linguistically common (cf. Nichols 1971, Alderete and Kochetov 2017), falling within the category of what Hinton et al. (1994: 4) call ‘synaesthetic’ sound-symbolism, that is, “acoustic symbolization of non-acoustic phenomena”. More typologically unexpected is the dentalisation pattern, which has no obvious acoustic counterpart for size or affect, pointing to a more arbitrary (Saussurean) relation.

Be this as it may, structurally, the affective phenomena in Mapudungun consonants are interesting for two reasons: on the one hand, they target only coronal segments (dorsals and labials do not undergo palatalisation or dentalisation); on the other hand, the affective forms share a laminal articulation, either in the form of a (alvoelo)palatal or an interdental constriction. These facts suggest that featural activation has a clear hierarchical organisation in Mapudungun, where the features [CORONAL] as well as [APICAL] play a meaningful role.

In order to probe the robustness of the pattern, in this talk I will provide evidence from native speaker elicitation and historical corpus data spanning the 400-year textual record for Mapudungun (Molineaux and Karaiskos 2021). Focusing on diachrony, I will show that a trend towards lexicalisation in inherently positive and negative vocabulary (/pɨti/ > /pɨt͡ʃi/ ‘wee’; /weʐa/ > /weθa/ ‘bad’) coexists with the longstanding productive use of these phono-affective processes. Focusing on synchrony I propose a featural analysis of the language’s consonantal system, couched in the theory of Contrastive Hierarchy (Dresher 2009), where specific predictions about the target subset of segments for feature spreading can be formulated. Finally, I consider different potential formalisations to account for the phenomenon of affective phonological alternations, settling on the most parsimonious approach: affective meanings are elements in the morphological grammar whose sole exponents are floating phonological features. These take the shape of [–APICAL], as the general marker of affect, and a subordinate feature, [± ANTERIOR], indicating the polarity of said affect. Crucially these features only attach to the [CORONAL] node in an autosegmental tier, thus bypassing dorsals and labials.

Prothetic consonants and abstract phonological structure in Scottish Gaelic

Donald Alasdair Morrison
The University of Manchester
damoireasdan@outlook.com

Some closed-class proclitic items in Scottish Gaelic insert a *prothetic* consonant in the onset of a following vowel-initial word. These consonants belong lexically to the proclitic (*trigger*), but are prosodically integrated into the following word (*target*). They also alternate between palatalised and non-palatalised allomorphs, which are selected by the target in a manner that is not fully synchronically predictable from the target's overt phonological content. I offer an analysis of Scottish Gaelic prothetic consonants in which (i) the prothetic consonant is underlyingly floating and docks to a following onset in the phrase-level phonology; (ii) superficially vowel-initial forms underlyingly contain an underspecified initial onset consonant bearing V-place features; and (iii) a palatalisation contrast may occur underlyingly among consonants that are neutral on the surface with respect to palatalisation.

The prothetic consonants are [$N^{(j)}$ h $ɣ^{(j)}$ $k^{(j)}$] (capital letters = *fortis* coronal sonorants):

(1)	*athair*	[ahər^{j}]	'father'	*eathar*	[ɛhər]	'boat'
	an athair	[ə Nahər^{j}]	'their father'	*an eathar*	[ə N^{j}ɛhər]	'their boat'
	a h-athair	[ə hahər^{j}]	'her father'	*a h-eathar*	[ə hɛhər]	'her boat'
(2)	*obair*	[opər^{j}]	'work.VN'	*ithe*	[ix^{j}ə]	'eat.VN'
	a dh'obair	[ə ɣopər^{j}]	'to work'	*a dh'ithe*	[ə ɣ^{j}ix^{j}ə]	'to eat'
	ag obair	[ə kopər^{j}]	'working'	*ag ithe*	[ə k^{j}ix^{j}ə]	'eating'

These consonants do not occur when the target begins with a consonant, except that /$N^{(j)}$/ also docks to an initial onset beginning with a stop, e.g. *dath* [tah] 'colour', *an dath* [ə Ntah] 'their colour' (the resulting nasal + stop sequence undergoes various low-level coalescence processes in different dialects, which are ignored in the broad transcription employed here). I assume that the prothetic consonant is underlyingly floating and docks, when phonotactically possible, to a following onset in the phrase-level phonology, much like the classical autosegmental account of French liaison (Tranel 1995; Wetzels 2002; Bermúdez-Otero 2018). As with French liaison consonants, the underlyingly floating status of prothetic consonants is evidenced by the fact that they may become separated from the trigger by an intonational break, e.g. *an athair* [ə || Nahər^{j}], *a dh'obair* [ə || ɣopər^{j}].

Where applicable, the prothetic consonant usually agrees in [±front] with the following vowel. However, lexical exceptions occur, e.g. *aighean* [ɛən] 'heifers', *an aighean* [ə Nɛən] 'their heifers'. I assume that superficially vowel-initial forms underlyingly contain an underspecified initial onset consonant /$X^{(j)}$/ bearing [±front], e.g. *eathar* /X^{j}ɛhər/ vs. *aighean* /Xɛən/. The prothetic consonant is underlyingly unspecified for [±front], and coalesces with /$X^{(j)}$/ in the phrase-level phonology by taking on its [±front] value. A similar approach has often been adopted for prothetic consonants in closely-related Irish, where the same analytical problem exists on a larger scale (Gussmann 1986; Ní Chiosáin 1991; Anderson 2016).

Prothesis may also be fed by the deletion of initial /f/ under the initial mutation known as *lenition*. The overall effect is the replacement of /f/ by a prothetic consonant, e.g. *fairich* [far^{j}əx^{j}] 'feel', *chan fhairich* [xa Nar^{j}əx^{j}] 'will not feel'; *feith* [feh] 'wait', *chan fheith* [xa N^{j}eh] 'will not wait'. Again, the prothetic consonant usually agrees in [±front] with the following vowel. As before, however, lexical exceptions occur, e.g. *faic* [fɛ̃k^{jh}] 'see', *chan fhaic* [xa Nɛ̃k^{jh}] 'will not see'. I assume that an underlying contrast exists between palatalised /f^{j}/ and non-palatalised /f/, e.g. *feith* /f^{j}eh/ vs. *faic* /fɛ̃k^{jh}/, even though all labial consonants are neutral on the surface with respect to palatalisation.

The Spanish High-Mid Alternation is Strictly Phonological

Claudia Pérez Herrera
Université du Québec à Montréal

Context: Class 3 verbs like *pedir* 'to ask' in Spanish show an [e]~[i] alternation in their root which affects the pre-thematic vowel (PTV) –in red– depending on whether the theme vowel (TV) –in blue– emerges as **/i/** (1c) or not (1a-b):

(1) a) [píð-o] 'TO ASK.TV.PRES.IND.1SG' b) [pið-j-ó] 'TO ASK.TV.PRET.IND.3SG' c) [peð-í-ré] 'TO ASK.TV.FUT.IND.1SG' (2) [bi.βi.ré] 'TO LIVE.TV.FUT.IND.1SG'

This talk proposes a novel solution to the debate over whether the high–mid (h~m) alternation is (morpho)phonological (Embick 2012, 2014, 2016), or allomorphic (Bermúdez-Otero, 2013a; 2016). While Bermúdez-Otero's morphological approach defies *cyclic locality* (Bobaljik 2000, Embick 2010), Embick's morphophonological proposal challenges *modularity* (Fodor 1983) and fails to account for the difference between alternating and non-alternating PTVs.

Proposal: Relying on CVCV Phonology and Element Theory, I propose a purely phonological approach (following Harris (1985) analysis of the diphthong alternation) that solves the above-mentioned issues. I argue that the underlying [i] and [e] of the h~m alternating verb roots, in (1), are distinct from underlying regular Spanish [i] and [e] vowels.

In alternating verbs, the PTV comes with a floating |I| element (3-4) (in the line of Rennison, 2001; van Oostendorp, 2008; Trommer, 2010; Postma, 2018). Agreeing with Bermúdez-Otero's (2016: 13) that the elision of thematic /i/ is dissimilatory in nature and given the Obligatory Contour Principle (Leben, 1973; Goldsmith, 1976; McCarthy, 1986), – which penalizes two identical melodically contiguous elements – the floating element |I| in the PTV can only be expressed if there is no |I| element associated with the following vowel position (3-4).

(3)
CVCVCV → CV CVCV → CVCV
p|I|d|I| o → p|I|dØ o → p|I|d o
/p[ ]dio/ → /p[ ]do/ → [pí.ðo]

(4)
CVCVCVCV → CVCVCVCV → CVCVCVCV
p|I|d|I||AU| → p|I|d j |AU| → p|I|d j|AU|
/p[ ]dió/ → /p[ ]djó/ → [pi.ðjó]

If the TV is deleted, as in *pido* 'I ask' (3), or disassociates from its position to become a glide, as in *pidió* 'he/she asked' (4), the floating element |I| links. In regular verbs (2) there is no alternation as the root |I| is underlyingly linked.

Alternatively, if the TV surfaces as [i], the floating element in the root does not associate to the empty vocalic position. This position is then filled with the language's default epenthetic [e], like in *pedí* 'I asked' (5). In a regular class 2 verb (ex. *beberé* 'I will drink') (6), an underlying phonemic /e/ (in purple) will occur.

(5)
CVCVC VCV → CVCVCVCV → C V CVCVCV
p|I|d|I|r|AI| → pØd|I|r|AI| → p|AI|d|I|r|AI|
/p[ ]d-i-ɾé/ → /p[ ]d-i-ɾé / → [pe.ði.ré]

(6)
C V C V CVCV → C V C V CVCV
b|AI|b|AI|r|AI| → b|AI|b|AI|r|AI|
/beb-e-ɾé/ → [be.βe.ré]

Since the h~m alternation is strictly conditioned phonologically in this account, the locality problems that arise in the allomorphic or morpho-phonological analyses in the literature are avoided and the longstanding debate in the literature has a harmonious alternate solution.

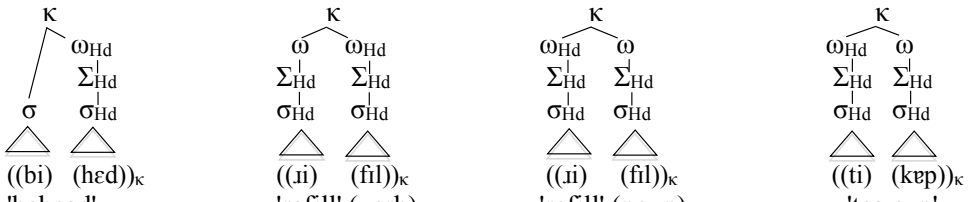
Precariousness as evidence for constraints on prosodic structure

Renate Raffelsiefen Leibniz-Institut für Deutsche Sprache, Mannheim

The Composite Group (κ) is one of the more controversial constituents of the prosodic hierarchy, defined by an interface with morphology or syntax and consisting of one or more phonological words (ω), along with any "stray elements", such as "level 2" affixes, clitics, and other function words (Nespor & Vogel 2007, Vogel 2019). Consider the morphological structures of the English words in (1) ("ST"= stem, "H-AF" = head affix (determining the morph. category of the derived word), "M-AF" = modifying affix (no such impact)). Assuming that the outer boundaries of these words align with κ-boundaries, and that ST and M-AF map to ω in English, while H-AF maps to the minimal prosodic constituent licensed by the given phonemes (/bi/), the prosodic structures in (2) arise. The trees also show the effects of head alignment, where every prosodic constituent aligns with one daughter functioning as the prosodic head marked by the subscript "Hd".

(1)a. $[[bi]_{H\text{-}AF}[hɛd]_{ST}]_V$ b. $[[ɹi]_{M\text{-}AF}[fɪl]_{ST}]_V$ c. $[[[ɹi]_{M\text{-}AF}[fɪl]_{ST}]_V]_N$ d. $[[ti]_{ST}[kɐp]_{ST}]_N$

(2)



The distinct prosodic trees in (2a) vs. (2b) capture correlating properties: the variability of the prefix vowel in (2a) ([bi:] ~ [bɪ] ~ [bə] in Wells 1990) versus stable stress and length of the prefix vowel in (2b) ([ˌri:] in Wells 1990); restriction to monosyllabic or trochaic stems with an initial onset in (2a), but no such restrictions in (2b) (e.g. *reorganize, reinvigorate*); possible conversion to nouns for (2b), (with relative prominence reversal, see (2c)), but not for those in (2a).

While the prosodic representations illustrated in (2) appear well-motivated, the depiction of the trees in (2) as being on a par, all conforming to *Minimal Distance* (parsing the initial syllable directly to the first available prosodic constituent (Vogel 2019)), belies the sharply different status of the structure in (2a) versus those in (2b-d). The prefix position in (2a) is characterized by drastic phonological restrictions on stability and productivity, where only salient obstruents are tolerated in the onset (3a) and only sonorants occur in final position (3b). The only other acceptable structure is no syllable margin (3c). Modifying prefixes show no such restrictions.

(3)a. /bi/ ([bi] ~ [bɪ] ~ [bə]) *bewitch, bedevil, befriend, besprinkle, ...*
b. {/ɪn/, /ɪm/} ([ɪn] ~ [ən], ([ɪm] ~ [əm]) *endear, endanger, embitter, embody, ...*
c. /ə/ *asleep, ahead, anew, afresh, ...*

Head prefixes not conforming to these restrictions fossilized (e.g. *withhold*) or disappeared in the history of English (Lutz 1997). Pilch (1955) links the loss of the once extremely common prefix *ge-* to the change of the initial plosive to a palatal fricative. This change proved fatal in the adjunct position as in (2a), not in other constituents (*yet, yellow*)).

The Swedish prefixes remaining in the position in (2a) are shown in (4) (Hedelin 1997). Other head prefixes have been promoted to ω, resulting in the structure illustrated in (2c) (e.g. the borrowed head prefix /ɛr/ in $((ɛr)ω_{Hd}(no)ω)κ$ 'ernå' 'to reach'), were replaced, or disappeared.

(4)a. /be/ ([be] ~ [bə]) *berätta* 'to tell', *begripa* 'to understand', *behöva* 'to need', ...
b. /fœr/ ([fœr] ~ ([fœ]) *förgiva* 'to forgive', *försöka* 'to try', *förklara* 'to explain',...

The precariousness indicated by the adjunct position in (2a) supports the relevance of a (violable) constraint prohibiting immediate dominance of lower prosodic constituents (cf. EXHAUSTIVITY, Selkirk 1996). Local conjunction (Smolensky 1996) of EXHAUSTIVITY with other constraints will be shown to allow for the conditions on the stability of relevant affixes to be modeled.

Proliferation of allomorphy induced by harmonic asymmetry: a case of overabundance

Péter Rebrus[H,E] <rebrus@nytud.hu>, Péter Szigetvári[E] <szigetvari@elte.hu>, Miklós Törkenczy[E,H] <tork@nytud.hu> (Hungarian Research Centre for Linguistics; Eötvös Loránd University)

We analyse two phenomena in Hungarian which generate complex asymmetric patterns that may be manifested in multiple allomorphs. The phenomena are the different harmonic subtypes of vacillating roots (*a*) and the harmonic behaviour of [ɛ] (*b*). We assume two parallel subsystems: (i) a morphologically based **paradigmatic** system determining the quality of the alternating vowel immediately following the root and (ii) a phonological system that is generally responsible for the **harmonic** behaviour of suffixes.

(*a*) There are three root types with respect to back/front (B/F) harmony: roots taking B suffixes, F suffixes, and roots that vacillate (B~F). Vacillating roots have three subtypes (see Forró 2013):

suffix ↓ root →	no strong preference	front preference	back preference
C-initial	**B~F** ʃoːdɛr-nɑk/-nɛk	**B~F** pɑrtnɛr-nɑk/-nɛk	**B~F** fɑtɛr-nɑk/-nɛk
V-initial	**B~F** ʃoːdɛr-**o**m/-**ɛ**m	**F** pɑrtnɛr-*om/-**ɛ**m	**B** fɑtɛr-**o**m/-*ɛm

(*b*) The harmonic counterparts of Hungarian vowels are *uniquely* identifiable with the exception of [ɛ] which alternates with open [ɑ], or with mid [o] and [ø]. Both cases occur in the possessive paradigm: [(j)**ɛ**]~[(j)**ɑ**] '3sg' vs. [**ɛ**m]~[**o**m]~[**ø**m] '1sg', [**ɛ**d]~[**o**d]~[**ø**d] '2sg'. In the third person suffixes, the productive allomorphs are the yodful [**j**ɛ]~[**j**ɑ], [**j**yk]~[**j**uk] (cf. Kiefer 1985). The yodless ones ([ɛ]~[ɑ], [yk]~[uk]) occur after roots ending in a single consonant (cf. Papp 1975), but only if they are **licensed**, that is, when the vowel immediately following the root occurs elsewhere in the paradigm.

This introduces multiple asymmetries: the yodless variant is available for B roots in 3pl ([modul-**u**k]), but not in 3sg (*[modul-**ɑ**]). No such asymmetry occurs for F roots: [diːzɛl-**y**k], [diːzɛl-**ɛ**]. This is because the [ɛ] in the 3sg suffix is also involved in a harmonic alternation unlike that in 1sg and 2sg. [ɛ] is licensed in 3sg ([diːzɛl-**ɛ**m/**ɛ**d] ⇒ [diːzɛl-**ɛ**]), but [ɑ] is not, since this vowel does not productively occur suffix-initially: [modul-**o**m/**o**d] ⇒ *[modul-**ɑ**]). By contrast, the [y]~[u] of 1pl always licenses yodless 3pl variants: [modul-**u**nk] ⇒ [modul-**u**k], [diːzɛl-**y**nk] ⇒ [diːzɛl-**y**k]. The same holds for roots without a harmonic preference, thus [fotɛl-jɛ], [fotɛl-jɑ], [fotɛl-ɛ], but not *[fotɛl-ɑ] 'armchair-3sg'. Thus we expect further asymmetries in the behaviour of yodless allomorphs:

root type→ suffix type ↓		back (yodful: B)	front (yodful: F)	vacillating (yodful: B~F)		
				no preference	F preference	B preference
3sg	V-initial	− *modul-ɑ	**F** diːzɛl-ɛ	**F** fotɛl-ɛ	**F** pɑrtnɛr-ɛ	− *hɑvɛr-ɑ/ɛ
3pl	(yodless)	**B** modul-uk	**F** diːzɛl-yk	**B~F** fotɛl-uk/-yk	**F** pɑrtnɛr-yk	**B** hɑvɛr-uk

Asymmetric behaviour thus occurs in four dimensions: (a) by root type (F or B-preference roots), (b) by harmonicity of yodless allomorphs, (c) by the number (3sg or 3pl), and (d) by the presence/absence of yod.

The stricter behaviour of suffix-initial vowels (vs. suffix internal ones) suggests that they constitute a morphologized subsystem. Initial ("thematic") vowels mark the *lexically* specified **inflectional class** a root belongs to: **-o-**, **-ɛ-**, **-ø-**, or **-ɑ-** (cf. Blevins 2016). The **harmonic class** of roots for *C-initial* suffixes is mainly determined by the phonological make-up of the root: F, B, or B~F. The mapping between inflectional and harmonic classes is not biunique. The source of the asymmetries in the many third person possessive suffix variants is that some of them are V-nitial, others C-initial, thus subject to different regularities in the two subsystems.

The prosodic structure of Germanic *mis-*: Diachrony and synchrony

Charles Redmon,[1,*] Aditi Lahiri,[1] and Frans Plank[1,2]
[1]University of Oxford, [2]University of Konstanz
*Corresponding author: charles.redmon@ling-phil.ox.ac.uk

Modern Dutch, English, and German all retain the prefix *mis(s)-*, which developed out of the Germanic particle *missa*, yet differ in their surface prosodic structures due to a number of factors, both synchronic and diachronic. These factors include foot structure and parsing constraints, word class, prefix separability, transitivity, and semantic transparency. Ultimately, in tracking both its synchronic state and historical evolution, we are able to use *mis-* as a window on the interactions between phonology, morphology, and syntax over time.

To illustrate the problem, consider the following items in each language (note these are not aligned to present cognates or translations):

	Dutch	**English**	**German**
Noun	'misdruk	mis'trust	'Missgriff
Verb	'misgrijpen	mis'handle	mis'trauen
Adjective	mis'moedig	mis'guided	'missgünstig

The moraic trochee is the preferred foot in all three languages, with parsing from right to left (due mainly to the impact of Romance loans as Germanic parsing was left-to-right). As a result, one consistent constraint is *σσσ́ (σ̀σσ́, σ́σσ̀, and σσ́σ are permitted). This constraint is relevant for the prosody of *mis*-prefixed words, particularly in German and Dutch where double-prefix constructions are common.

In addition to general parsing rules, word class is a primary determinant of the stress pattern in all three languages, with nouns largely receiving initial stress (predominantly compound stress, particularly in Dutch and German), and verbs stem stress. This noun-verb distinction derives historically from the above constraint in Germanic that avoided stress on initial light prefixes, resulting in a tendency for commonly prefixed verbs to receive stem stress (cf. English *be'gin*, Dutch/German *be'ginnen*). Adjective stress is more complex, but generally is initial (on the prefix) in German and on the stem in Dutch and English.

Incorporating these two facts into the modern prosody of *mis-* reveals that several surface inconsistencies such as those in the table above—namely, tress on *mis-* in Dutch verbs such as *misgrijpen*, stress on the stem in English nouns such as *mistrust*, and variable stress on *miss-* or the stem in suffixal nominalisations in German (e.g., *'Missdeutung ~ Miss'deutung, Miss'handlung, 'Missstimmung*)—derive not from any change in the prosodic systems of each language, but rather from changes in the morphosyntax and semantic interpretation of *mis-*.

Most notable in this regard is the treatment of *mis*-prefixed verbs. Separable prefixed verbs (or separable complex verbs; Booij 2002, van Kemenade & Los 2003) are present in both German and Dutch, but only Dutch includes *mis-* within this set (German did at an earlier stage but has since lost this interpretation). Such constructions receive compound stress and thus stress can be found on *mis-* in many Dutch verbs (e.g., *'miskijken*, *'misraden*, *'misstappen*). These constructions are also more transparent and semantically compositional (allowing, for instance, minimal-pair contrasts such as *'miszien ~ mis'zien* differing in their semantics and morphosyntax), resulting in greater productivity of *mis-* in Dutch than in German. By comparison, because English has lost SCV constructions in favour of phrasal verbs (see Thim 2012 for review), but crucially not incorporating *mis- (miss)* into this system, *mis-* is treated prosodically as any other verbal prefix in English.

Other distinctions such as the aforementioned nominal stress variability in German, and adjectival *mis(s)-* stress in German relative to lack of stress in English and Dutch, are also syntactically and semantically determined, reflecting differences in bracketing structure and derivational path. Finally, we note that in all three languages *mis(s)-* had a wider distribution in the Middle period than in the modern languages, with unstressed *mis*-prefixed verbs increasingly replaced by *ver-/ont-* variants in German and Dutch, and *dis-* in English (*fehl* is now commonly used in separable constructions in German where *miss-* was used earlier).

Dual morphosyntactic conditioning and the life cycle: Latin iambic shortening

Ranjan Sen, University of Sheffield, ranjan.sen@sheffield.ac.uk

The recalcitrant problem of 'iambic shortening' in early Latin (light-heavy = LH → light-light = LL) can be illuminated by considering syntactic structure alongside a stratal model of phonology, which is increasingly sensitive to morphosyntax at higher levels.

A solution emerges from the observations that (i) iambic shortening (e.g. *légo:* → *légo* 'I choose') may occur across certain word boundaries (e.g. *se.d ŏs.ten.de.re* 'but to show') and is sensitive to phrasal stress, and that (ii) cretic shortening (e.g. *dícito:* → *dícito* 'let him say') and word-initial iambic shortening (e.g. *voluptá:tem* → *volŭptá:tem* 'desire (acc.)') must be triggered after lexical stress has been assigned. They are phrase-level developments which (i) are sensitive to stress clashes at the word level (CLASH), (ii) remain faithful to some (but not all) word-level stresses at the phrase level (MAX-FTHD), and (iii) place greater emphasis on parsing syllables into feet (PARSE-σ) and avoiding non-head heavy syllables (WSP) at the phrase level, repairing by lightening (MAX-μ violation). Optimality-Theoretic analyses of the four sub-types are presented, where the interaction of the same constraints differs at word- and phrase-levels.

Furthermore, the shortenings are sensitive not only to stratal computational procedure, but also prosodic representational structure, showing *dual morphosyntactic conditioning* (Bermúdez-Otero & Luís 2009). Iambic shortening occurs in phasal 'troughs': *within phonological phrases* which are *not heads of their intonational phrases*, in feet which are *not heads of the head* PRWD of that phonological phrase, e.g. [*(quò.d ăc).(ce:).(pís).(ti: a:)* [*(Chármide:)*]$_{\varphi}$]$_{\varphi}$ 'that you received from Charmides' (Plautus *Trin.* 964). The influence of morphosyntax on phonological phrase formation – such as focus-marking, Match(XP, φ) (Selkirk 2011) – explains the philological literature's numerous observations on the sensitivity of iambic shortening to syntax/discourse-structure, e.g. focused elements do not undergo shortening as they bear phrasal stress, and neither L nor H can be followed by a pause.

Finally, the analysis also makes a theoretical contribution to diachronic phonology. In classical Latin, iambic shortening is mostly restricted to single disyllabic words, then becomes lexicalised in a handful of items (e.g. *bene:* > *bene* 'well'). Such domain narrowing rising through strata (phrase → word) and ultimate lexicalisation are predicted by the *life cycle of phonological processes*, where phonology becomes increasingly sensitive to morphosyntactic structure (Bermúdez-Otero 2015). The analysis presented therefore demonstrates the phenomenon's key contributions in three domains: synchronic phonological architecture, the syntax-phonology interface, and the diachronic life cycle of sound changes.

The status of full and reduced vowels in Southern Tutchone (Dene)

David Shanks, McGill University (david.shanks4@mail.mcgill.ca)

The orthography of Southern Tutchone (ST), a critically endangered Northern Dene language, includes both "full" and "reduced" vowels, with full <e> being described as alternating between a long and a short variant in open and closed syllables, respectively (Tlen 2016, 2022). Across Dene languages, there is commonly reference to a distinction between "full" and "reduced" vowels, a contrast between peripheral and centralized vowels, respectively (Krauss 1964). However, the phonological underpinning of the full-reduced distinction in ST has not been investigated. I provide evidence that the full-reduced distinction primarily encodes a length contrast.

ST has seven orthographic vowels: full <i, u, e, o, a> and reduced <ü, ä>, with reduced vowels marked with umlauts in common with other Alaskan and Yukon Dene languages (e.g., Manker 2012: 10; Ryan & Robinson 1990). While the reduced vowels are both central (typically [ɨ, ə], resp.), I argue that the distinction between the two groups is underlyingly in terms of length, evidenced in the realization of nasality and rhotacization. First, coda nasals and vowel nasalization are in complementary distribution. Full <i, u, a> can be nasalized (1a), but cannot have a nasal coda. In contrast, reduced <ä> cannot be nasalized but can have a nasal coda (1b). Examples in (1) are from the Kluane dialect.

(1) a. *tth'į* [tθ'ĩː] *[tθ'iːn] 'mosquito'
shą [ʃãː] *[ʃaːn] 'rain'

b. *män* [mən] *[mə̃] 'lake'
shän [ʃən] *[ʃə̃] 'I, me'

I propose that this difference is due to full vowels being underlyingly bimoraic and reduced vowels underlyingly monomoraic (2a). Nasalization thus occurs with long vowels only to avoid the possibility of a three-position (superheavy) rhyme (2b), which is crosslinguistically marked (Kaye et al. 1990). An underlying nasal that follows a reduced vowel then surfaces as a nasal coda.

(2) a. μ μ → V, a; μ → |, ə

b. μ μ → V, a N; *μ μ μ → V, |, a, n; μ μ → |, |, ə, n

Second, reduced vowels can be rhotacized, while full vowels cannot. Rhotacization, orthographically <Vr>, produces an R-coloured vowel that surfaces as long (3a). Rhotacized vowels then pattern with full vowels in terms of nasalization, as they can be nasalized but cannot have a following nasal coda (3b). Examples in (3) are from Kluane.

(3) a. *shür* [ʃɨ̃ːː] 'coney, butterfish'
shär [ʃɚː] 'bear'

b. *gür* [kɨ̃ːː] *[kɨːn] 'lark'
tl'är [tɬ'ɚ̃ː] *[tɬ'ɚːn] 'horsefly'

I propose that only reduced vowels can be rhotacized as they are the only monomoraic vowels. Taking the rhotic to be a part of the rhyme (and therefore moraic), a rhotacized full vowel would result in a three-position rhyme (4a). In addition, the fact that rhotacized vowels pattern with full vowels in terms of nasalization aligns with an analysis where both are bimoraic (4b), cf. (2b).

(4) a. μ μ → |, |, ɨ R

b. μ μ → |, |, ɨ R N; *μ μ μ → V, |, i, R

A notable exception to the clear orthographic distinction between full and reduced vowels (i.e., the use of the umlaut) is <e>, which patterns as a full vowel (long, tense [eː]) in open syllables and a reduced vowel (short, lax [ɛ]) in closed syllables. However, [ɛ] is a common realization of /ə/ across dialects (5a, cf. 1b), and <e> as [ɛ] is preceded by palatalization in many dialects with none permitting palatalization before <e> as [eː] (5b). Examples in (5) are from Lake Laberge.

(5) a. łät /łət/ [łɛtʰ] 'smoke'
män /mən/ [mɛn] 'lake'

b. łet /ɬjət/ [ɬjɛtʰ] *[łɛtʰ] 'scab'
ke /kʰeː/ [kʰeː] *[kʰjeː] 'tracks'

That is, cross-dialect variation reveals that <e> actually represents the light diphthong /jə/ in closed syllables and the expected full vowel /eː/ in open syllables. Future work will further examine <e>; however, its alternation in realization does not challenge the central claim that reduced vowels are underlyingly monomoraic while full vowels are underlyingly bimoraic.

On the influence of inherent vowel property in stress perception

Shu-hao Shih | National Taiwan University | shuhaoshih@ntu.edu.tw

Introduction: Studies on word-level stress suggest that non-native listeners may rely on acoustic cues that are significant in their native language, even when those cues are not used to realize stress in the target language (e.g. Dobrovolsky 1999 on Chuvash, Bowern *et al*. 2013 on Yidiny, Tabain *et al*. 2014 on Pitjantjatajra). This paper refines the claim by arguing that listeners are also influenced by inherent-vowel differences, using new evidence from a perception experiment. Specifically, I will show that Taiwan Mandarin listeners tend to use F0 to identify stress even when stress cues are absent. However, some listeners are attuned to inherent vowel duration and intensity to identify stress, resulting in 'sonority-driven stress' patterns. The findings have implications for possible stress patterns and linguistic fieldwork.

Methodology: Trisyllabic nonce words with the shape [CaCaCə], [CiCiCə], [CaCiCə], and [CiCaCə] were used in the experiment. The stimuli were modified natural recordings produced by a phonetically trained male speaker of New Zealand English. Relevant acoustic parameters for each vowel, including F0, duration, and intensity, were manipulated using Praat ([a]: 125 Hz, 165 ms, 80 dB; [i]: 135 Hz, 125 ms, 76 dB; [ə]: 115 Hz, 65 ms, 72 dB). Consonants were limited to [p, t, ʈ, c, k, q]. Each word employed only one consonant at a time (e.g. [kakakə]) in order to keep the focus on vowels. All the consonants were set to be 15 ms and the intervals between syllables were set to be 60 ms. Vowel quality (F1 and F2) was based on the male speaker's production. Consonant-vowel transitions were kept for each CV combination to make the stimuli sound more natural. So, the first two syllables in [CaCaCə] and [CiCiCə] were acoustically identical, whereas the first two syllables in [CaCiCə] and [CiCaCə] were different due to their vowel-inherent differences. In total, 21 female and 19 male native Taiwan Mandarin speakers participated in the experiment (age range: 20-26, mean = 21). Participants completed a forced-choice auditory identification task implemented through PsychoPy (Peirce *et al*. 2019), in which they were asked to identify the location of stress (first or second syllable stress) by clicking the corresponding buttons on a keyboard. Stimuli were heard five times each; five 24-item blocks were presented, with randomized items in each block. Listeners' binomial responses (0=initial stress, 1=penultimate stress) were analyzed using a generalized linear (logistic) mixed-effects model implemented in R (R Core Team 2022).

Results: Results show that word shape is a significant factor for stress identification ($p=0.03$) while sex and repetition order are not. As shown in Figure 1, listeners tend to identify initial stress for [CaCaCə], [CiCiCə], and [CiCaCə], but they perceive penultimate stress for [CaCiCə]. The individual result reveals that 10 listeners have this pattern. Moreover, 6 listeners also identify [i] as stressed for [CiCaCə] and [CaCiCə], but they perceive penultimate stress for [CaCaCə] and [CiCiCə]. However, there are listeners who identify [a] as stressed for [CiCaCə] and [CaCiCə]. Among those listeners, 4 perceive initial stress for [CaCaCə] and [CiCiCə], whereas 3 perceive penultimate stress. Finally, there are 3 listeners who perceive fixed stress for all the words (2 for initial stress and 1 for penultimate stress).

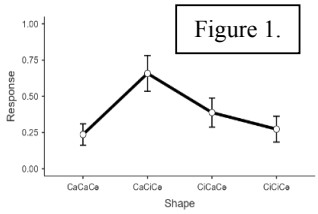


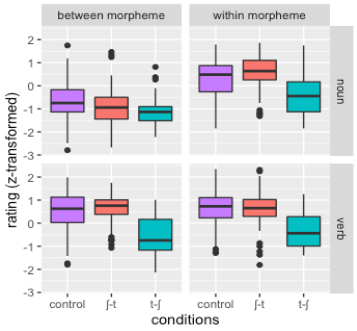
Figure 1.

Discussion: For listeners who perceive [i] as stressed, they potentially use F0 for stress identification. This is expected as the main acoustic correlate of tones in Mandarin is the direction of the F0 contour during the vowel (Shih 1988). However, the pattern is never reported in the stress literature. In fact, it shows an anti-sonority system: [i], which is less sonorous than [a], attracts stress away from the default position (e.g. [ˈCiCiCə] vs. [CaˈCiCə]). For listeners who perceive [a] as stressed, they are presumably attuned to inherent vowel duration and intensity as [a] is inherently longer and louder than [i]. The pattern fits the property of sonority-driven stress because [a] attracts stress away from the default position (e.g. [ˈCaCaCə] vs. [CiˈCaCə]). Together, the results indicate that in absence of (strong) acoustic cues, listeners may employ inherent vowel differences as significant, leading to various stress patterns.

Avoidance of *t*-sibilant sequences is general in Hebrew, but repair is morpheme-specific

Elizabeth Solá-Llonch & Lily Xu (UCLA)

Intro. Although morphologically-conditioned phonological alternations are often considered exceptions to general phonological behavior (e.g., Pater 2007), they may sometimes be supported by language-wide phonotactics (e.g., Korean palatalization; Chong 2019). However, even in these cases, it remains unclear if the restrictedness of the alternation affects the learning of the general phonotactics. For example, while sequences of *t*-sibilant [s,z,ʃ,ts] in Hebrew are attested within morphemes ([i-**tʃ**iʃ] 'to exhaust') and across morphemes ([**t-ʃ**uv-a] 'answer'), they are overall rare (Bolozky 1978), meaning that a general phonotactic restriction is likely learned against them. However, active repair via metathesis, though exceptionless, is only found in verbs of the *hit-CaCeC* template (/i**t-ʃ**aper/ -> [i**ʃt**aper] 'improved'). This paper uses a nonce-word judgment test to investigate the extent to which the restriction against such sequences is generalized to novel morphological contexts which only have supporting distributional evidence. **Methods.** *Design.* The experiment involved both a repetition and a rating task. During each trial, participants heard a recording of a target word and were immediately asked to repeat the word, then to rate it using a sliding scale from "Sounds like Hebrew" (100) to "Doesn't sound like Hebrew" (1). *Stimuli.* Sequences of [tʃ] or [ʃt] were compared to control sequences ([tk], [tr]) across two different morphological contexts, within morpheme (WM) and between morpheme (BM), and two different parts of speech, noun (N) and verb (V). 40 stimuli were created by combining nonce triconsonantal roots with 4 existing prosodic templates: *hit-CaCeC* (V-BM), *hat-CaCCa* (N-BM), *hi-CCiC* (V-WM), and *ma-CCeCa* (N-WM). All stimuli were recorded by a native Hebrew speaker. We present the preliminary rating data from 30 adult L1 Hebrew speakers. **Results.** Participants rated [ʃt] words as good as control words, but strongly dispreferred [tʃ] to control in all contexts, though the effect is weaker for BM in nouns (see figure). This was confirmed by mixed-effects modeling where interaction of sequence type and part of speech was found for BM (β = -0.55, p = 0.004), but not WM (β = -0.25, p = 0.15). **Discussion.** We find that [tʃ] sequences are generally judged ill-formed, confirming the hypothesis that there is a general language-wide restriction against such sequences. Additionally, even though participants have this restriction both within morpheme and in familiar between-morpheme contexts (*hit-CaCeC* verbs), they are reluctant to generalize to a novel between-morpheme context (*hat-CaCCa* nouns). Thus, the results from Hebrew show that a general phonotactic restriction is learned from distributional evidence even when repair of the pattern is highly constrained (see also Chong 2019, Jun et al. 2022 on Korean palatalization). However, speakers show awareness of the morphological-specificity of the between-mopheme repair process, since the dispreference for [tʃ] is weaker in the novel context than the familiar context. While the restrictedness of the metathesis alternation in Hebrew does not prevent speakers from learning a language-wide restriction against [tʃ], it does moderate the extent to which the restriction is generalized to new across-morpheme contexts.



Nasal consonant epenthesis in Noon

Juliet Stanton, NYU (stanton@nyu.edu)

Overview. Nasal consonant ([n]) epenthesis occurs in Noon (Cangin, Senegal) as one of several hiatus resolution strategies (all examples from Soukka 2000; see also Lopis 1980, Wane 2017). This pattern poses a problem for theories of consonant epenthesis (de Lacy 2006, Steriade 2009, Staroverov 2014). Noon's phonemic inventory includes glides [w j] and laryngeals [h ʔ] (with no relevant phonotactic restrictions), but [n] is the preferred epenthetic consonant – even though it is more marked, less featurally similar to a vowel, and more likely to induce coarticulatory changes on surrounding vowels. Evidence from Noon and its relatives excludes an alternative analysis of the pattern as [n] deletion. Implications for the typology and analysis of epenthesis are discussed.

Hiatus repair. Vowel-vowel sequences (V_1V_2), created through morpheme concatenation, are repaired in several ways. If V_1 is short and [+high], V_1 deletes (1a-b). If V_1 is [+low] and V_2 is [-high, -low], they coalesce (1c). These repairs co-vary with [n] insertion (Soukka also records [ɓetine], for example, as an SR of /ɓeti/ + /e/), which occurs in all other hiatus contexts (1d-f).

(1)

a.	/ɓeti/ + /e → [ɓete]		'a woman?'
	woman + POLARQUESTION (PQ)		
b.	/jaɓu/ + /iː/ → [jaɓiː]		'the old woman'
	old woman + DEF		
c.	/ɟaːl-aː-ma/ + /e/ → [ɟaːlaːmeː]		'that man?'
	man-DEF-REF + PQ		
d.	/oːmaː/ + /iː/ → [oːmaːniː]		'the child'
	child + DEF		
e.	/ɗuː/ + /e/ → [ɗuːne]		'we (incl.)?'
	we (inclusive) + PQ		
f.	/ati/ + /aː/ → [atinaː]		'or not' (tag question)
	if + IRREALIS.SUBORDINATOR		

The coexistence of (1a,c,e), all with the polar question marker, shows that the choice of hiatus repair strategy is phonologically (and not morphologically) determined. In addition, the suffixes in (1e-g) shows that [n] epenthesis is not limited to any one morphological context: it occurs in all hiatus contexts where deletion and coalescence do not. The proposed analysis employs a set of MAX-FEATURE, MAX, and DEP constraints (Casali 1996, McCarthy & Prince 1995), with [n] epenthesis occurring when other repairs would violate a high-ranked MAX(-FEATURE) constraint.

Epenthesis, not deletion. Possible alternative analyses of (1d-f) could appeal to [n] deletion, rather than [n] epenthesis, in certain environments. One alternative: perhaps the URs for forms like [oːmaː] 'child' end in [n], which is deleted word-finally. This is unlikely, as Noon words can end in [n] ([ɗuːn] 'ant', [kaːn] 'house', [kumun] 'nose'). Another: perhaps the URs for suffixes like [-iː] and [-e] are [n]-initial, but this [n] is deleted following a consonant in response to a prohibition on consonant-[n] clusters. This is also unlikely, as the distal [-neː] surfaces as such in all environments (/lom/ + /neː/ → [lomneː] 'go and buy', buy + DIST). A deletion-based alternative would also fail to explain why [n] epenthesis co-varies with the other hiatus resolution strategies in (1a-c).

Related patterns. The Cangin family includes Laalaa (Dieye 2010), Ndut (Morgan 1996), Noon, Palor (D'Alton 1984), and Saafi (Mbodj 1983). Palor allows hiatus but the others resolve it, though [n] epenthesis (Noon and likely Saafi) and/or deletion and coalescence (all but Palor). Analysis of these patterns strengthens the argument that [n] epenthesis is a possible hiatus resolution strategy.

On the phonological representation of English diphthong vowels

Patrycja Strycharczuk[1], Sam Kirkham[2], Emily Gorman[2] & Takayuki Nagamine[2]
[1] *University of Manchester*; [2] *Lancaster University*
patrycja.strycharczuk@manchester.ac.uk

Diphthongs can be defined in oposition to monophthongs, as consisting of two distinct component elements. These elements can be understood as perceptual, acoustic or articulatory targets, or as distinct phonological objects. However, none of these interpreations has yet been shown to accurately describe how diphthongs behave phonetically, particularly in regard to varying levels of diphthongisation.

In this paper, we present an analysis of vowels in Northern British English (NBE), with the aim of establishing whether there are any articulatory or acoustic properties that allow us to systematically distinguish between monophthongs and diphthongs. The data are electromagnetic articulography (EMA) and acoustic data from six native speakers, who produced a full set of phonologically long NBE vowels in a bV and bVd frame (e.g. *bee, buy, bead, bide*) in two prosodic contexts. We analysed the kinematic properties of vowels (time-varying displacement and velocity of the Tongue Dorsum and Upper Lip sensors) as well as the F1 and F2 trajectories, using a combination of two exploratory statistical methods: functional Principal Component Analysis (Gubian et al., 2015), and hierarchical clustering.

The analysis delivers two crucial findings. Firstly, some vowels like *buy* and *boy* clearly have two distinct articulatory targets, corresponding to two local velocity minima, while others, like *burr* or *bar*, only have one discernible target. However, it is impossible to draw a boundary between two-target diphthongs and one-target (long) monophthongs. All the measures of diphthongisation that we examined were unimodally distributed, and they commonly show intermediate values that fall between canonical diphthongs and canonical monophthongs. Such intermediate values are typical of vowels in *bee*, *boo*, *beer* and *beau*.

We propose that the dynamic patterns we see in our data can be captured in an Articulatory Phonology / Task Dynamics type representation (Browman & Goldstein, 1986, 1992; Saltzman & Munhall, 1989), in which both tense monophthongs and diphthongs consist of two articulatory targets coupled anti-phase. In case of diphthongs, the two articulatory targets are distinct, which produces inherent vowel change. In case of monophthongs, the two component targets are identical, and in consequence, only one target is apparent, i.e. the resulting articulatory trajectory is characterised by a single gestural maximum (single tangential velocity minimum). Intermediate diphthongisation arises when the two targets have similar, but not identical gestural location.

We support our proposal with computational modelling, implemented using the the Task Dynamics Application model (TADA, Nam et al., 2004). A simulation based on a two-target representation produces qualitatively accurate displacement and velocity trajectories for canonical monophothongs like *burr*, canonical diphthongs like *buy*, and intermediate cases like *bee*, when the only parameter being manipulated is the spatial properties of the component gestures. Furthermore, the represetation correctly predicts durational properties of long vowels, specifically no inherent duration difference between long monopthongs and diphthongs. This is in contrast to short monophthongs, which we propose to have a single articulatory target. We argue that a two-target representation for all long vowels is independently supported by phonological weight, as well as by the nature of historical dipthongisation and present-day dynamic vowel variation in English.

Kinande Tone as layered and gradient

Sören E. Tebay, Universität Leipzig, tebay@uni-leipzig.de

Main Claim: Harmonic Layer Theory allows for an analysis of tone in Kinande with a single phonological grammar that applies cyclically at three different morphological layers. Instead of domain-specific constraint rankings, lexically specified gradient activation of tones explains diverging behaviour. **Lexical and Phrasal Tone in Kinande**: Kinande (Atlantic-Congo, DR Congo) tone has been used by Jones (2014) as an argument for (a) interstratal opacity resulting from different constraint rankings between strata and (b) a large amount of evaluation cycles, including three phrasal ones. I will focus on three domain-specific processes that have served as arguments for domain-specific phonological grammars: floating tone docking (1), tone doubling (2), and phrasal tone competition (3). Nominal prefix tone depends on roots, cf. (1). Some nouns trigger a high tone on a preceding prefix (1-a,b), others do not, (1-c,d). Verbs show tone doubling, a different domain-specific process, whenever a grammatical high tone (e.g. in complex tone forms) is present (2-c,d). High tones show up on two consecutive syllables (underlined in (2)). Elsewhere, the underlying root tone contrast shows up on the syllable preceding the root (2-a,b).

(1) Root Tones in Nouns (Jones 2014:15)

	H	no H
Ⓗ	a. o-mu-góngo AUG-III-back	b. o-mú-lume AUG-I-man
no Ⓗ	c. o-ku-gulu AUG-XV-leg	d. a-ká-húka AUG-XII-insect

(2) Grammatical tone in verbs (Black 1995, Jones 2014)

	Ⓗ ('to send')				no Ⓗ ('to hit')				Phrasal
Simple (INF)	a. e-rí-		tum	-ir-a	b. e-ri-		hum	-ir-a	∅
Complex (PST)	c. tu-a-		tum	-í r-á-a	d. tu-á-		húm	-ir-a-a	H/L
	prefixes	OM	root	suffixes	prefixes	OM	root	suffixes	

In phrase-final position, tonal competition ensues, depending on the identity of the root and the phrasal context. Underspecified roots (3-a) alternate in all context, i.e. show different tones at the right edge of phonological ϕ-phrases (3-ϕ), and both declaratives (3-D) and questions (4-Q). Low-toned words (3-b), alternate only in Q-final position.

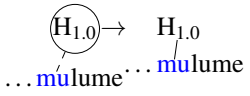
(3) Phrasal Tones in Nouns (Jones 2014, 21,22,138)

	medial	]$_\phi$	]$_D$	]$_Q$	
a. ∅	-gulu	-gulú	-gúlù	-gúlú	'leg'
b. L	...-heka			-heká	'truck'

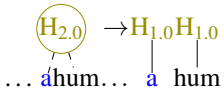
Harmonic Layer Analysis: I propose an analysis couched in the framework of Harmonic Layer Theory (Trommer 2019, Trommer & Zimmermann 2021), which combines central insights of Stratal OT (Bermudez-Otero 2018) and Gradient Symbolic Representations (Rosen 2016, Goldrick & Smolensky 2016). Grammatical and root tones, which are prespecified with phonological activity, enter the phonological derivation at three different layers where the same constraint grammar applies. More concretely, floating tones at the stem layer have default activity and are attached before any default tone insertion can take place. Therefore, they freely dock onto preceding morphemes (4a) to satisfy a ALTERNATION constraint against tautomorphemic docking (van Oostendorp 2007). This is vacuously satisfied for grammatical tones on verbs that do not come with segmental material. Nevertheless, they trigger a phonological process of tone doubling because they are underlyingly specified with 2.0 activity, too much for the language to tolerate at any layer. Grammatical tones are therefore split and occupy two syllables (4b). At the phrasal layer, many TBUs are already occupied by tones added at earlier levels. Boundary tones with default activity compete with other tones and the stronger ones survive. This also means that only stronger Q-final high tones can overwrite lexical high tones (4c). Such competition cannot arise at earlier layers and is still predicted by the same phonological grammar.

(4) Docking of selected tonal exponents

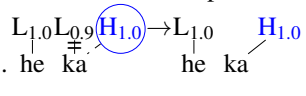
a. Nominal Tone Docking



b. Verb Tone Doubling



c. Phrasal Tonal Competition



Stress in Spanish: an analysis using layered feet

Francesc Torres-Tamarit, Universitat Autònoma de Barcelona, francescjosep.torres@uab.cat

Spanish stress has interested phonologists for decades as it shows both regular and exceptional patterns. Building on previous work by Bakovic (2016) and Martínez-Paricio (2021), this paper develops an analysis of Spanish stress by combining solutions that have not been explored together before: (i) underlying stress, (ii) indexed constraints, and (iii) layered feet.

Following Bakovic (2016), I assume that stress in Spanish is stem-final and quantity insensitive. Regular stress falls on the last vowel of the stem (penultimate in words ending in an inflectional affix (1a) and final in words ending in a consonant (1b) or a non-inflectional vowel (1c)). Irregular stress, however, falls on the second-to-last vowel of the stem (antepenultimate in words ending in an inflectional affix (2a) and penultimate in words ending in a consonant (2b)), or the third-to-last vowel of the stem (always antepenultimate (2c)).

1. Regular stress in Spanish
   a. ...ˈVC]$_{St}$V (*sabán*]$_{St}$*a* 'savannah')
   b. ...ˈVC]$_{St}$ (*animál*]$_{St}$ 'animal')
   c. ...ˈV]$_{St}$ (*Panamá*]$_{St}$ 'Panama')

2. Irregular stress in Spanish
   a. ...ˈVCVC]$_{St}$V (*sában*]$_{St}$*a* 'sheet')
   b. ...ˈVCVC]$_{St}$ (*caníbal*]$_{St}$ 'cannibal')
   c. ...ˈVCVCVC]$_{St}$ (*régimen*]$_{St}$ 'diet')

I assume the analysis of Bakovic (2016) for regular stress (1), which derives from ranking FINALSTRESS ('Stress is final in the stem') above NONFINALITY ('Stress is not final in the stem (= 1 violation) or word (= 2 violations)'). Irregular stress in (2a,b) derives from ranking a lexically indexed version of NONFINALITY$_{(1)}$ above FINALSTRESS. As opposed to Bakovic (2016), however, I assume metrical feet. In the present analysis, FINALSTRESS dictates whether feet are unmarked syllabic trochees, as in sa(bán]a)$_{Ft}$ or ca(níbal])$_{Ft}$, or monomoraic, as in ani(mál])$_{Ft}$ or Pana(má])$_{Ft}$ (which violate FOOT-BINARITY ('Feet must contain at least two moras or syllables')). I further assume that satisfaction of NONFINALITY$_{(1)}$ triggers building a layered foot, as in ((sába)$_{Ftmin}$n]a)$_{Ftmax}$ and the plural form ca((níba)$_{Ftmin}$l]es)$_{Ftmax}$ (singular ca(níbal])$_{Ft}$). These forms violate *LAYEREDFOOT ('Feet are maximally disyllabic'). The three-syllable window in Spanish can actually be derived from a constraint like ALIGN-Right(Ft$_{max}$, ω) ('Maximal feet right-align with a prosodic word'), undominated in Spanish.

Any comprehensive analysis of Spanish stress must further account for the irregular pattern in (2c), *régimen*], not covered in Bakovic (2016), as well as the set of stress patterns found in the plural of C-final forms displaying irregular stress. Two strategies are observed: (i) stress shifts one syllable to the right (e.g., both *régimen*], with antepenultimate stress, and *carácter*], with penultimate stress, give *regímen*]*es* and *caractér*]*es*, respectively); and (ii) stress shifts two syllables to the right (e.g., *ómicron*] gives *omicrón*]*es*) (Ohannesian 2004). These facts are accounted for straightforwardly if we assume a combination of underlying stress (through the presence of underlying metrical structure) and constraint indexation. (i) *régimen*] has underlying stress on the third-to-last syllable and is also indexed with NONFINALITY$_{(1)}$. *régimen*] surfaces with antepenultimate stress because IDENTSTRESS dominates *LAYEREDFOOT: ((régi)$_{Ftmin}$men])$_{Ftmax}$. In the plural, NONFINALITY$_{(1)}$ rules out *regi(mén]es)$_{Ft}$, and ALIGN-Right(Ft$_{max}$, ω) rules out *((régi)$_{Ftmin}$me)$_{Ftmax}$n]es. (ii) *ómicron*] also has underlying stress but is not indexed to NONFINALITY$_{(1)}$. The plural then surfaces with penultimate stress, omi(crónes])$_{Ft}$. (iii) *carácter*] has no underlying stress but is indexed to both NONFINALITY$_{(1)}$ and *LAYEREDFOOT$_{(2)}$. Layered feet are therefore avoided in the plural, meaning that *LAYEREDFOOT$_{(2)}$ dominates NONFINALITY$_{(1)}$: carac(tér]es)$_{Ft}$.

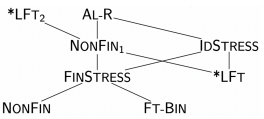


Figure 1: Hasse diagram

Dominance Meets Ghost Vowels: Moses-Columbia Salish Accent Revisited

Jochen Trommer Leipzig University jtrommer@uni-leipzig.de

Moses-Columbia Salish (Cm) stress has been used as a major argument against the Level Ordering Hypothesis of Stratal Phonology (Bermúdez-Otero 2018), which claims an inherent connection between affix order and the type of phonological rules and constraints applying in morphological domains (see Saarinen & Hay, 2014, Lieber 2019, Kiparsky 2020 for recent controversial discussion). Czaykowska-Higgins (1993) (CH) argues that 'dominant' grammatical affixes triggering stress-deleting cophonologies are interspersed with grammatical 'recessive' affixes which would require at least 10 otherwise unmotivated word-internal stratal levels.

In this talk, I argue for an alternative interpretation of the apparent dominant/recessive contrast in the language. 'Dominant' affixes have full vowels, recessive affixes 'ghost' vowels, i.e., vowels which lack a vocalic root node and are hence prone to deletion, a phenomenon well-documented crosslinguistically (see, e.g. Zoll 1993,1996, Rowicka 1999, Rubach 2013, Zimmermann 2019). I develop a Stratal-OT analysis of Cm where the Stem-Level stratum corresponds to lexical suffixation of bound roots, and the Word Level to the affixation of grammatical (valency-changing and narrowly inflectional) suffixes as has been argued for other languages of the pacific Northwest (see, e.g., Stonham 2007 on Nuu-chah-nuulth). The stratal analysis also derives general asymmetries between these domains not covered by the strictly cyclic framework of CH or alternatives in terms of cophonologies (Inkelas 19998,2017) or Gradient Symbolic Representations (Zimmermann 2018): Extrametricality effects do not extend to the Word Level, and at the Stem Level there are only two distinct types of affixes, both dominant.

The representational reinterpretation of dominance at the Word Level in Cm is possible since stress assignment and vowel deletion in the language are intimately related. Cm exhibits pervasive deletion of unstressed vowels. In particular, all vowels following the stressed vowel are deleted. The reanalysis proposed here builds on the new empirical generalization in (1):

(1) Vowels of dominant grammatical suffixes are never deleted.

Based on (1), dominant affix vowels can be understood as full vowels and recessive affix vowels as defective (ghost) vowels. The tableaux in (2) illustrate how this derives the different behavior of dominant and recessive affixes (full vowels are marked by '•'). RightMost(V *) (RM) captures that Cm words have stress on the rightmost full (surface) vowel, and L(eft)M(ost)(x *) the requirement that stress corresponds to the leftmost (underlying) accent. Max V and Max v are the faithfulness constraints targeting full and defective vowels respectively. In (2a), RM triggers deletion since the suffix vowel u is only protected by low-ranked Max v. In contrast, for the full vowel suffix in (2b), RM is satisfied by shifting stress since Max V – is undominated.

(2) a. **Accented Stem** + Recessive Suffix

Input: = a.	RM(V *)	Max V	LM(x *)	Max v
a. ʔí•tx-stu-n	*!			
☞ b. ʔí•tx-st-n				*
c. ʔi•tx-stú-n			*!	

b. Accented Stem + **Dominant Suffix**

Input: = a.	RM(V *)	Max V	LM(x *)	Max v
a. wá•k-tu•l-n	*!			
☞ b. wa•k-tú•l-n			*	
c. wá•k-tl-n		*!		

These constraints also capture other aspects of the system: RM that in combinations of two recessive unaccented affixes the rightmost wins, and LM that in combinations of two weak accented suffixes, the first wins. I conclude by discussing problematic typological predictions of alternative accounts. CH's cyclic account, Cophonologies, and Gradient Symbolic Representations all predict that languages may employ arbitrary numbers of distinct accentual affix types without connection to the order of affixes, and independently of vowel deletion. In contrast, the stratal approach predicts the actual crosslinguistic distribution: Stratum-internal dominance and the multiplicity of accentual affix types observed in Cm is only possible in a language where recessiveness is inherently correlated with deletion.

Is the foot a prosodic domain in European Portuguese?

Marina Vigário
University of Lisbon

It is well established that phonological systems across languages make use of a prosodic hierarchy (PH). However, whether PH is composed of a fixed set of domains in all languages is still under debate (e.g., Hyman 2011, Labrune 2012, Schiering, Bickel & Kristine Hildebrandt 2010). European Portuguese (EP) prosodic phonology has been extensively studied for the last decades (Frota 2000, 2014; Vigário 2003, 2010, 2021; Cruz 2013; Frota & Moraes 2016). Phonological facts clearly signal the following active domains in EP: syllable, prosodic word, prosodic word group, phonological phrase, intonational phrase. The foot, by contrast, seems *invisible*, and systematic investigation on its role in EP grammar has only started (Martínez-Paricio & Vigário 2021, Vigário & Martínez-Paricio 2021). Literature review suggests that typical phenomena cuing this domain in other languages do not signal the foot in EP, e.g., rhythmic-based secondary stress, strengthening phenomena, word clipping, restrictions on vowel reduction (VR) and deletion, word minimality constraints (Andrade & Viana 1989, Frota & Vigário 2000, Vigário 2003, Veloso 2017). The foot is mentioned in only a few (controversial) areas, as mid vowels lowering, argued in Wetzels (2007) to depend on particular foot types in Brazilian Portuguese (BP), but possibly not active in current EP, and primary stress (Pereira 1999, Wetzels 2007, Guimarães 2016), which has also been claimed to be assigned without reference to the foot, either by considering morphological position or lexical storage and probability (e.g., Mateus 1983, Wetzels 2007, Garcia 2017, Garcia & Guzzo 2022). With these observations in mind, in this work we take a closer look at the evidence for the foot in EP, with implications to the universal characterization of PH.

Defending some new approaches to a number of long-standing issues in EP phonology, which shed light to facts previously poorly understood, we were able to uncover new evidence for the foot (in the examples, stressed syllable is signalled in caps): (i) we propose that word stress assignment in verbs and non-verbs follows the same mechanism, being based on *metrical foot construction* (trochee) in the most frequent subclasses of verbs (present tense) and non-verbs (thematic) – e.g., $(FA.lo)_{\Sigma}\ )_{PW}$, $fa.(LE.mos)_{\Sigma}\ )_{PW}$ '(I/we) $speak_{SubjPres}$'; $sa.(PA.tos)_{\Sigma}\ )_{PW}$ 'shoes' – and on *morphological position* (stem=theme final) in the complementary subclasses (verbs, past tense; non-verbs, athematic – *falava* '(I) $speak_{PastImp}$': $faLA]_{Theme}va$; *falávamos* '(we) $speak_{PastImp}$': $faLA]_{Theme}vamos$ '(we) $speak_{PastImp}$'; $aVÔ]_{Theme}$ 'grandpa'; exceptions are lexically marked; trochee formation is quantity insensitive (FA.la, fa.LA.mos, FA.lam '(he/we/they) $speak_{IndPres}$'; ja.NE.la, ja.NE.las 'window(s)'); the regularities found are not amenable to alternatives not relying on the foot; (ii) we maintain that allomorph selection in evaluative suffixation (-*zinh*-/-*inh*-) distinguishes between footed $((aNEL)_{\Sigma,PW}ZInho$ '$ring_{Dim}$') vs unfooted morphological bases $((janeLInhas)_{PW}$ '$windows_{Dim}$'); VR shows that the base -*inh*- attaches to lacks stress (unlike in BP); (iii) observing that in EP all existing and newly introduced words respect a right-aligned three syllable stress window, we argue that this restriction on the location of stress is related to the maximal size of the foot domain (along the lines of Kager 2012); (iv) acknowledging that, even if in EP there are many unpredictable exceptions to VR, e.g., *ad**o**TAr* [ɔ]/*[u] 'adopt' (Mateus & d'Andrade 2000), there are no true exceptions to VR in posttonic position (Marquilhas 2000, Vigário 2003), we propose that the (PW head) foot is the domain for *regular* VR. We conclude that the foot is a domain in EP.

Several implications are drawn from this work: (i) in some languages, the foot is not primarily a rhythmic domain; (ii) given the type of cues to the foot in EP, this domain is possibly not accessible at very early stages of language acquisition, and hence this domain may be acquired in EP later than in other languages; (iii) EP does not invalidate the hypothesis that the foot is a universal category.

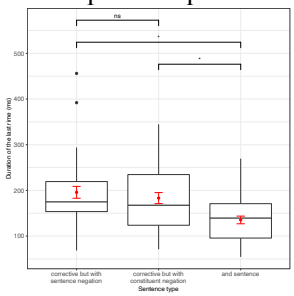
Prosodic evidence for the recursive prosodic structure of corrective *but* sentences

Danfeng Wu (University of Oxford)

This paper provides prosodic evidence for a syntactic analysis of corrective *but* sentences, and argues that prosodic structure is not completely flat, but can replicate the dominance relations in the syntax. Corrective *but* sentences are *but*-coordination that requires negation in the first conjunct:

(1)a. Max misses **not** spinach but chard. b. Max does**n't** miss spinach but chard.

Toosarvandani (2013) analyzed (1a) as DP-coordination ((2), *the strictly-DP-coordination approach*). This contrasts with Wu (2022), who argued that (1a) has more than one possible parse (*the ambiguity approach*): one with DP-coordination (3a), and the others with vP-coordination (3b) and TP-coordination (3c) plus ellipsis.



(2)Analysis of (1a) according to the strictly-DP-coordination approach
Max misses [DP **not** spinach] but [DP chard].

(3)Multiple analyses of (1a) according to the ambiguity approach
a. Max misses [DP **not** spinach] but [DP chard].
b. Max [vP misses **not** spinach] but [vP chard$_i$ ~~misses t$_i$~~].
c. [TP Max misses **not** spinach] but [TP chard$_i$ ~~he misses t$_i$~~].

Following experimental results by Wagner (2005, 2010) a.o. that the size of coordination affects the prosodic boundaries of the conjuncts, these two approaches make different prosodic predictions: the strictly-DP-coordination approach predicts that (1a) should have the prosody of DP-coordination (4). Assuming that when producing a structurally ambiguous sentence, the speaker chooses any parse, the ambiguity approach predicts that on average, the prosodic boundary following *spinach* in (1a) should be larger than that of (4).

(4)Max doesn't mix spinach**)** and chard.

Both analyses agree that (1b) involves vP-coordination plus ellipsis (Max does [vP **not** miss spinach] but [vP chard$_i$ ~~miss t$_i$~~]), which, when compared with (4), can be a testing ground for the question of recursivity of the prosodic structure. Different theories on syntax-prosody mapping make different predictions about how a vP that contains a DP is mapped onto prosody. Theories that follow the Strict Layer Hypothesis (e.g. Nespor & Vogel (1986); Selkirk (1986); Pierrehumbert & Beckman (1988)) predict no prosodic difference between a vP that contains a DP (*not miss spinach* in (1b)) and a syntactic phrase that doesn't dominate any other phrase (the DP *spinach* in (4)). In contrast, theories that allow the prosodic structure to replicate the syntactic dominance relations (e.g. Selkirk 2009, 2011; Elfner 2012, 2015) predict a larger boundary following *spinach* in (1b) than (4).

Methods and results. 6 speakers read 6 sets of items like (1a-b) and (4) plus 90 fillers. The items had a leading context to elicit the intended information structure. 2 research assistants labeled the last rime of the word immediately before the critical prosodic boundary (e.g., for (1a-b) and (4), *ach* of *spinach*), whose duration was shown to be correlated to the strength of the boundary (Wightman et al. 1992). We fitted a linear mixed effects model, with the duration of the last rime as the dependent variable, item as fixed effects, by-speaker and by-item-set random intercept and by-speaker random slope. The rime in items like (1a) is 48.1 ms longer than in items like (4) ($p = 0.04$); the rime in items like (1b) is 60.7 ms longer than in items like (4) ($p = 0.05$).

Discussion. The fact that the prosodic boundary in (1a) is greater than that in (4) suggests that (1a) is structurally ambiguous. The fact that a vP containing a DP (e.g., the vP in (1b)) corresponds to a stronger prosodic phrase than just a DP (e.g., the DP in (4)) suggests that the prosodic structure is not completely flat. One way to implement this is to allow for recursive φs (i.e., a φ can dominate another φ), and boundary strength depends on the number of φ-levels that a φ dominates.

Morphological asymmetries as a result of cyclic optimization: Hidatsa as an argument for Harmonic Layer Theory

Eva Zimmermann, Leipzig University, Eva.Zimmermann@uni-leipzig.de

The lexical accent system of Hidatsa (Park, 2012) shows two asymmetries that seemingly require direct access to morphological information in the phonology: If an underlyingly accented root (=RA) combines with accented affixes (=AA), the ① leftmost accent surfaces unless it is on the final mora of a root (=RA_F). Crucially, this finality-effect can only be observed for roots (1-b) and affixes can surface with accent on both non-final and final moras (1-b+c). The root-finality effect can also be observed in compounds (i.e. [**Rt_{NF}** Rt_{NF}] but [Rt_F **Rt_{NF}**]). Interestingly, the ② rightmost final root accent surfaces in case two roots with final accent are compounded ([Rt_F **Rt_F**]); in contrast to the general preference for leftmost accent. This root-affix asymmetry is different from both positional faithfulness (e.g. Beckman, 1998) and positional licensing (e.g. Zoll, 1998) effects since a marked structure is only avoided in a root – a positional prominence account hence requires the novel indexation of a negative markedness constraint to the root (e.g. $\text{NONFINALITY}_{root}$). And the directionality reversal in compounding seemingly requires direct access of morphological information in the phonology (e.g. Inkelas, 1998; Pater, 2010).

(1)

a.	**RA_{NF}**-AA_F	/buʔée-ø-ií/	buʔáaʔii	smoky-CNT-INT
b.	RA_F-**AA_F**	/xiibí-ø-ií/	xiibaʔií	wrinkled-CNT-INT
c.	**AA_F**-RA_{NF}	/ná-cáagic/	nácaagic	2SG-mourn

(Park, 2012, 73,229-30)

Theoretical proposal In contrast, I argue that both asymmetries fall out as epiphenomena within Ⓐ a cyclic model of phonology where Ⓑ phonological elements have a certain activity that can gradiently differ (=GSR; Rosen, 2016; Smolensky and Goldrick, 2016), namely Harmonic Layer Theory (Trommer, 2019). Under assumption Ⓑ, accent competition can not only be decided by a directionality parameter (=LMOST in Hidatsa) but also by MAX favouring the realization of an element with higher activity. And under Ⓐ, morphological information only indirectly influences the phonology via a cyclic evaluation in three layers (L1:root, L2:word, L3:phrase). In contrast to stratal accounts, the same phonological grammar optimizes at each layer. The root-affix asymmetry in Hidatsa then falls out from assuming that there is a general NONFINALITY effect that disprefers H-tones associated to the final mora. Since markedness constraints are violated relative to the marked element's activity, NONFINALITY results in weakening of a final H as in (2b-L1/L2); implemented as a 0.2-activity loss (activities of H's are subscripted). Since all roots are optimized at L1 prior to affixation, every root-final H will have less input activity than an affix H at L2. And whereas the LMOST preference decides in case all competing H-tones have the same input activity (2a-L2), this directionality preference is overwritten by the preference to realize the stronger H in case a weakened H enters the competition (2b-L2). The directionality reversal in compounds is taken to be an epiphenomenon from a compound marker that consists of a suffixed floating H: The model correctly predicts that it can only win the competition and overcome the LMOST preference in case all compounded roots have a final and thus weakened H as in (2c).

(2)

a.	L1: Rt_{NF} H_1 → H_1 μ μ μ μ ↣ Faithful realization of H	L2: Rt_{NF}+AA_F H_1 H_1 → H_1 μ μ - μ μ μ μ μ μ ↣ LMOST favors initial H
b.	L1: Rt_F H_1 → $H_{0.8}$ μ μ μ μ ↣ NONFIN: H-Weakening	L2: Rt_F+AA_F $H_{0.8}$ H_1 → $H_{0.8}$ μ μ - μ μ μ μ μ μ ↣ MAXH favors stronger H
c.		L2: Rt_F+Rt_F $H_{0.8}$ $H_{0.8}$ H_1 → $H_{0.8}$ μ μ μ μ μ μ μ μ ↣ MAXH favors strongest H

Extension A GSR model also allows lexical activity differences. Crow (Graczyk, 2007) shows the same systematic root-finality effect as Hidatsa but also shows lexical exceptions cross-cutting this pattern: An arbitrary class of Rt_{NF} loose their accent to any AA and one aspectual AA always surfaces with its accent, even if it follows a Rt_{NF} – these morphemes are taken to be underlyingly specified for an exceptionally weak and exceptionally strong H-tone respectively.

The |A|ffrication of the Early-French Velar. If |I| would allow it, |U| wouldn't.

Fabian Zuk

In the pre-history of French, Latin <c> before Latin <Ă Ā> resulted in a palatal affricate /ʧ/. This did not occur in say Tuscan Italian or Spanish where the stop is maintained (cf. Figure 1). Though simple to describe, the details and implementation of this sound-change are substantially more complicated and have significant consequences for the dating of other phenomena and for constructing a theory of possible or likely paths of sound-change. Because stressed romance /a/ ends up as a front vowel spelled <e> **in open syllables** by the mid 9th century, understood as the insertion of the |I| element (or a [+ANT] trait) to the original open-vowel /a/ specified |A| and which gives /e/ or /ɛ/ in modern French, vowel palatalisation is generally considered to have fed the palatalisation and affrication of <c> → [ʧ], the two-rules standing in a feeding order: Ⓐ stressed /a/ → /æ/ → /e/ feeds Ⓑ <c> → /ʧ/ /_V|I|. But this simple scenario is confronted by serious issues. For one, most manuals only recognize the fronting of /a/ → [æ] in stressed open syllables (ex. Pope 1952, § 231; Bourciez 1955, § 35), whereas the palatalization of <c> also occurs before an unstressed /a/ as in VÁCCA → ofr. *vache* [vaʧə] or CABÁLLUM → ofr. *cheval* [ʧəval]. Several solutions will be explored, and their theoretical implications discussed.

Figure 1: Latin etymon and Romance reflexes

Latin	Italian	Spanish	French	Gloss
CANTÁRE	*cantare*	*cantar*	*chanter*	'to sing'
CABÁLLUM	*cavallo*	*caballo*	*cheval*	'horse'
MERCÁTUM	*mercato*	*mercado*	*marché*	'market'
CÁNEM	*cane*	*can*	*chien*	'dog'

Ségéral and Scheer (2020) for example propose that ALL instances of /a/ (stressed and unstressed) are fronted to /æ/, thus providing the palatal environment for the affrication of <c> → /ʧ/ before unstressed /a/ (ex VÁCCA → *vache*), but also explaining palatalization at the onset of closed syllables, ex. CÁRRUM → [ʧærro] → afr. *char*. This hypothesis has a parallel in the across-the-board fronting of /u/ → /y/. Less conveniently, this solution introduces a Duke of York situation, where the fronted /æ/ reverts to a central pronunciation in closed syllables (PARTEM → *pærte → ofr. *part* [par]) and in initial unstressed syllables (AMĬCUM → ofr. *ami* [ami]), LAVĂRE → *laver* [lave]). This is a lot of reversion and begs the unanswered question of whether the palatality was ever part of the phonemic representation: /æ/ = |A.I| or whether the frontness of /a/ pronounced [æ] was just some low-level phonetic detail. In the latter case, the absence of |I| from the representation should exclude this palatality from any phonological computational process, thus making the affrication a simple coarticulatory effect. Among other solutions to be discussed, Hall (1946) proposed that the affrication of <c> → /ʧ/ elsewhere than in the stressed open syllable would be due to simple analogy, but here the sheer quantity of analogy required also makes it an unattractive solution. Fortunately, a far simpler solution exists: <c> → /ʧ/ everywhere except before the back vowels /u/, /o/, /ɔ/, CŪRA → ofr. *cure,* CŎRPUS → ofr. *cors* 'body', CŌNSUĔRE→ ofr. *cosdre* 'to sew'. The velar quality of these vowels, represented by |U| had an inhibitory effect on the spontaneous palatalization of <c> → /ʧ/. Under this interpretation, the **feeding** relation between rules Ⓐ and Ⓑ can be replaced by a different observation**: assimilation to a following back velar vowel bled a preceding <c> of its potential to palatalise and affricate.** By removing the triggering role of [æ] from the affrication of <c>, both processes are unbound from a strict chronological sequence. Furthermore, this case study, which allows the back velar vowel /u/, /o/, /ɔ/ to be distinguished from all others by the element |U|, demonstrates an advantage which elemental representations have over binary features.

Figure 2: Evolution of /a/

Stressed Open	Stressed Closed	Unstressed
MAREM → *mer*	CARRUM → *char*	VACCA → *vache*
PATREM → *père*	CANTARE → *chanter*	CABALLUM → *cheval*

Poster papers

Definiteness in Qassimi Arabic: a change in progress

Mohammed Al-Ariqy & Ayman Alrajhi
University of Utah / University of Warwick

Our understanding of the definite determiner in Arabic comes mainly from Modern Standard Arabic (MSA), other varieties are understudied, and those other varieties reveal a richer, more complex set of behaviors than previously understood. This paper analyzes the definite determiner (DET) of one of these varieties: Qassimi Arabic (QA), spoken in Qassim in Saudi Arabia. The DET in this dialect has **three morphological realizations: [a], [al], and [aG];** the 'G' in the latter is an underspecified consonant that copies the features of the following word-initial coronal consonant, creating a geminate. We argue that the OCP account of the DET assimilation given in previous literature about MSA partially holds in this dialect.

The first realization of this DET is [al] (1). It surfaces faithfully before [-coronal]. The constraint IDENT-LATERAL preserves the lateral feature of the DET in these forms. It is worth mentioning that VC syllables are attested in word-initial positions of the definite forms in this dialect (Alrashed, 2018); thus [al] is a licit syllable.

(1)	Indefinite	Definite	Gloss
	a. gałam	**al**-gałam	The pen
	b. ʕaʃa	**al**-ʕaʃa	The dinner

The second form of the DET is one where the /l/ in the DET assimilates to the following coronal consonant (2). This assimilation is triggered by the constraint OCP-CORONAL that bans adjacent coronals (Leben, 1973). In these examples, the DET is the first half of a geminate created by the assimilation of the consonant of the DET to the following [+coronal]. In (3), the faithful candidate is ruled out by OCP-COR. Candidate (3c) satisfies this constraint but

(2)	Indefinite	Definite	Gloss
	a. θuub	**aθ**-θuub	The dress
	b. rijaal	**ar**-rijaal	The Riyal
	c. simak	**as**-simak	The fish

Is ruled out by MAX-C. The winning output satisfies both by assimilation which violates the low-ranking IDENT-LAT; this constraint preserves the lateral feature in the determiner. **The third form of the DET is [a].** This form occurs before words starting with a complex onset (4). These examples show that the DET behaves similarly before coronals and non-coronals when the word starts with a complex onset. This, we argue, is governed by some constraints in the dialect which are ranked higher than OCP-COR that triggers assimilation of the DET before coronals in (2). In (3), we argue that the underlying form of the determiner in this dialect is not only /l/ but rather /al/, which makes it different from the MSA case and explains the existence of the third allomorph of the DET in (4). Only the vowel of the DET surfaces in these forms. We argue that the definite DET does not fully surface before these words because they start with onset clusters.

(3)	/al-θuub /	OCP-COR	MAX-C	ID-LAT
	a. al.θuub	*!		
	☞**b. aθ-θuub**			*
	c. a.θuub		*!	

(4)	Indefinite	Definite	Gloss
	a. **bg**ira	**a**-bgira	The cow
	b. **tr**aab	**a**-traab	The soil

So, forms like *[altraab] and [albgira] would create a sequence of three consonants, banned in this dialect. So, the constraint *CCC that bans this sequence is high-ranking in (QA) (Alnuqaydan, 2022). The faithful candidate (5a) fatally violates the high-ranking OCP-COR twice compared to the winning candidate (5c) that violates it only once. (5a) contains a sequence of three consonants, so it also violates *CCC. By assimilating to the following coronal, candidate (5b) satisfies OCP-COR once, so only incurs one OCP violation. However, this assimilation creates a non-intervocalic geminate which is banned by a markedness constraint in this dialect: *GGC that bans non-intervocalic geminates; this is one of the contextual constraints on geminates discussed in (Pajak, 2009). The winning output minimally violates the high-ranking OCP-COR at the expense of MAX-C by deleting the determiner's consonant. The [tr] sequence in this output violates OCP-COR, but root faithfulness outranks it, so [tr] must be retained. Candidate (5d) also minimally violates OCP-COR by epenthesis on the left edge of the stem word, but this comes at the expense of violating the high-ranking CONTIGUITY that bans epenthesis near the DET. **In brief**, this paper provides an analysis for the definite determiner of an Arabic variety and argues that the determiners in this dialect are [a], [al], and [aG] as opposed to [al] and [aG] in MSA.

(5)	/al-traab /	*GGC	CONTIGUITY	OCP-COR	*CCC	MAX-C	ID-LAT
	a. al.traab			**!	*		
	b. at.traab	*(!)		*	*		*
	☞**c. at.raab**			*		*	*
	d. a.lit.raab		*(!)	*!			

Left Edge Word Stress in Faifi Arabic

Abdullah Alfaifi (ahalfifi@ub.edu.sa); Stuart Davis (davis@indiana.edu)
University of Bisha; Indiana University

As noted by Watson (2011), primary stress in Arabic dialects references the right edge of the word, where, typically, stress falls on a final superheavy syllable or, lacking that, a heavy penult if there is one. Dialects differ in stress when the final two syllables are light; for example, if the antepenult is heavy, some dialects like Cairene stress the penult (e.g. [mak.'ta.ba] *'library'*) while others like Hijazi stress the antepenult (['mak.ta.ba] *'library'*). Further, dialects differ as to whether primary stress must fall on one of the last 3 syllables as in Hijazi (Bokhari 2020) or whether stress can be pre-antepenult as in San'ani ['ra.ga.ba.tih] *'his neck'* (Watson 2011). Dialects that reference the left edge of the word for primary stress do not seem to have been reported in the published literature. An exception noted by Watson is stress fluctuation in postpausal position in San'ani where an initial syllable can receive primary stress irrespective of its weight or that of the following syllables as in ['ta.maam] *'okay'* and ['ka.tabt] *'I/you$_{M.S.}$ wrote'*. In non-post-pausal position, these words have stress on the final superheavy syllable. The focus of this paper is stress assignment in Faifi Arabic (FA), a group of dialects spoken in southwestern Saudi Arabia, which have been shown to preserve a set of ancient features like the use of prefixal /m-/ as the definite article (e.g. [mgalam] '*the pen'*) and an obligatory indefinite marker /-in/ as in [galam-in] '*a pen'*. Primary stress in FA seems to be initial by default, whether the following syllables are light: ['ṭa.la.ʕa.ba.ha] *'he took her out'*; closed (even if closed by a geminate) ['na.baʃ.ʃa] *'you searched'*; or containing a long vowel ['śi.lii.hu] *'eat$_{Imp.F.S.}$ it$_{M.S.}$'*. This suggests that main stress in FA is determined from the left edge of the word making it unique among Arabic dialects. While initial stress is the most prominent pattern, there are specific cases where stress is attracted to other syllables. Cases include words starting with [ʔa] followed by a heavy syllable: stress falls on the 2nd syllable as in [ʔa.'taj.tim] *'you$_{PL}$ came'*, [ʔa.'ṭaʕ.nɑɑ.him] *'we obeyed them$_{M.}$'* (cf ['ba.naj.tim] 'you$_{PL}$ built'; and ['la.giṭ.nɑɑ.him] *'we picked them up'*). Similarly, initial [ʔVC] syllables are never stressed. Rather, stress falls on the 2nd syllable even when light, as in [ʔim-'ṭi.fil] *'the baby'* and [ʔaʕ.'fii.him] *'I pardon them'* (cf. ['gim.bi.la] *'a bomb'*, ['niʕ.fii.him] *'we pardon them'*). In trisyllabic words with an initial [Ca] syllable, stress falls on the 2nd syllable only when it is superheavy ([ma.'ṭɑɑʕ.min] *'restaurants'*, cf. ['da.ras.tim] *'you$_{PL}$ studied'*). In words longer than 3 syllables with an initial [Ca] syllable, stress falls on the 2nd syllable only if it is heavy or superheavy (e.g. [ma.'ʃɑɑ.jix.him] *'their$_{M.}$ sheiks'* and [na.'ʃart.bi.hin.na] *'I took them$_{F.}$ out'* (cf. ['na.ʃa.ra.him] *'he sawed them'*, ['sa.ma.kat.hin.ne] *'their$_{F.}$ fish'*). Stress fluctuation is observed in words with five or more syllables, where stress may fall on one of the first 3 syllables, but not beyond the 3rd syllable (['naḍ.ḍɑɑ.rɑɑt.hin.na]-[naḍ.'ḍɑɑ.rɑɑt.hin.na]-[naḍ.ḍɑɑ.'rɑɑt.hin.na] *'their$_{F.}$ glasses'*. Thus, in FA, the three-syllable window is at the left edge of the word. We offer a foot structure analysis where moraic trochaic feet are built from the right edge of the word but where the leftmost foot is assigned main stress thus favoring initial stress. We suggest the tendency for initial syllables with glottal stops to repel stress relates to the epenthetic nature of the initial glottal stop to avoid stressing a lexical syllable beginning with a vowel. Stress is on the 2nd syllable in a word like [ma.'ṭɑɑʕ.min] because the initial syllable is unfooted when before a superheavy. Stress is initial on ['da.ras.tim] since the first two syllables form a moraic trochee given contextual coda weight (the 2nd syllable in ['da.ras.tim] is monomoraic) and final extrametricality. We connect the FA preference for initial stress with San'ani post-pausal initial stress noted by Watson and to the view that default stress in Classical Arabic was initial (in words lacking heavy syllables; Watson 2011). In this way, the FA stress pattern can be considered archaic reflecting an ancient preference for word-initial stress.

Morpheme Structure Constraints: non-existent, an exceptional residu, or ubiquitous?

Paul Boersma, Universiteit van Amsterdam

For the biggest part of the 20th century, phonological theorizing accepted that underlying forms (UF) could be restricted by "morpheme-structure constraints" (MSCs). In 1993, Optimality Theory (OT) banned MSCs, arguing that in phonological production, i.e. the mapping from UF to the phonological surface form (SF), only *structural constraints*, i.e. restrictions on SF, could have a place. In fact, OT came with "richness of the base", the standpoint that one should be able to allow any weird phonological form as the input to the phonology (i.e. at UF), e.g. underlying |gvmbtrpkplq| in English, and have structural constraints convert this to an SF that will sound well-formed, e.g. surface /.brɛ.pl̩./ in English.

This situation should be different in Bidirectional Phonology and Phonetics (BiPhon), which accepts more levels of representation than just UF and SF, such as multiple phonetic and morphemic levels. In BiPhon, restrictions are expected at every level, including UF. Consider the case of the pronunciation [[ɕaʂa]], a Polish-compatible auditory form that English listener–speakers may produce as the articulatory form [ʃaʃa]. The "problem" might lie in perception, i.e. in the mapping from auditory form to SF, due to a structural constraint at SF; if so, the perceived surface form will be /.ʃa.ʃa./, which is then stored in the lexicon as the UF |ʃa+ʃa|, which is then mapped in phonological production to /.ʃa.ʃa./ and subsequently in phonetic implementation to auditory [[ʃaʃa]] and finally articulatory [ʃaʃa]. Alternatively, the perceived SF might be /.ɕa.ʂa./ (due to high cue constraints) but faithful lexical storage might be hampered by an MSC that forces the UF to be |ʃa+ʃa|, which is then produced as /.ʃa.ʃa./ → [[ʃaʃa]] → [ʃaʃa]. Or again, there might be an articulatory problem, with correct perception, storage and phonology ([[ɕaʂa]] → /.ɕa.ʂa./ → |ɕa+ʂa| → /.ɕa.ʂa./ → [[ɕaʂa]]) but subsequent articulation [ʃaʃa]. In total, there are *five* potential loci in this sequence where something usually notated as "ɕ" or "ʂ" could "turn" into something usually notated as "ʃ"; there is no intrinsic reason in multi-level theories such as BiPhon why one specific level (here, UF) should be excluded from being constrainable.

Apart from this argument from Occam's razor, this talk considers some cases that are *awkward* or even *almost impossible* to handle without MSCs.

A famous **awkward case** is that of Semitic verb roots, which are constrained to follow the template $C_1C_2(C_3)$ underlyingly, while there is not at all such a restriction at the surface.

An **almost impossible case** is that of the Sanskrit paradigm /buḏ-am boːḏ-ati ḅut ḅut-su ḅoːtsjati buboːḍa budḍa/. According to Zwicky (195) and Kiparsky (1965) this is a case of UF |ḅuḏ|, where always one of the two instances of breathiness is dropped. There exists an OT analysis with structural constraints at SF that accounts for this. However, Richness of the Base requires that an underlying *|biḏ| should be mapped to something Sanskrit-compatible, and it will do so in /biḏ-am/, but it will also lead to /bit-su/, while the paradigm /biḏ-am bit-su/ is ill-formed (breathiness should always hop, as Pāṇini –500 and Sag 1973 generalized). I will show that Lexicon Optimization can solve the problem if at SF we have an MFC */C̤$_1$VC̤$_2$/, and at UF we have a structural constraint *|C_1VC̤$_2$|. That an MFC account is needed here, is basically caused by the interesting convoluted fact that single breathiness is allowed at SF but not at UF, whereas double breathiness is allowed at UF but not at SF.

Once MSCs are allowed, accounts that hitherto had to invoke awkward structural constraints at SF can favourably be reanalysed in terms of MSCs, which can thereby be reinstated into the phonologist's everyday toolset.

Revisiting computational complexity in phonology

Julian Bradfield, `jcb@inf.ed.ac.uk`*, University of Edinburgh*

'Complexity' is a term with many meanings in phonology, ranging from size of inventories to the difficulty of learning purported rules (Pellegrino et al. 2009). One of the more precise meanings is the computational complexity of phonological processing, and of models of phonology. This has been variously dismissed as irrevelant (Prince and Smolensky 2004), used to cast doubt on the reality of formalisms (Eisner 1997), and used to justify formalisms (Bermúdez-Otero 2003). What do, or can, complexity arguments really tell us?

Most such arguments have an apparently fundamental flaw. Basic complexity analyses assume a particular model of computation, generally 'random access machines' (RAMs), which abstract a single CPU and some fast memory. Unlike, say, vision and hearing, little is known about how phonology is processed in the brain. However, it is certain that there is nothing resembling a random access machine in the brain: the brain is a massively parallel collection of highly connected 'gates' (neurons), where memory and processing are intimately intertwined.

Another apparently major flaw is that most complexity results are *asymptotic*, as the size of the problem tends to infinity. In phonology, does 'infinity' even reach double digits? (Kornai (2009) argues that this vitiates almost all previous work, and suggests using *Kolmogorov complexity*, a measure of non-randomness, instead.)

In this presentation we revisit and extend the complexity analyses of theories, considering both practical and asymptotic analyses. Initially we ignore the first flaw above, and consider classical computation. We find:

- Under reasonable assumptions, *SPE* is plausibly tractable both in the worst case and practical cases, and is asymptotically quadratic in the length of the input.
- OT has been problematic to analyse without simplifications also adopted in previous work (Gen a reasonable function of input, etc.). Eisner (1997) showed an NP-hard lower bound for his Primitive OT; we show that for reasonable variants of OT, the currently attainable upper bound is ExpTime, which is (under generally believed complexity-theoretic assumptions) significantly worse than NP-hardness.
- Although some early work (Ellison 1994) claimed a variant of OT with tractable complexity, a detailed analysis shows that this fails in both asymptotic and practical cases.

We then turn to addressing the first flaw. Our understanding of the brain is still very limited. The brain has a similar number of neurons (10^{11}) as a high-end system-on-chip has transistors, but the connectivity is far higher (up to 10^4 rather than 2–4). In some cases, individual neurons perform identifiable functions; in others large ensembles of neurons act together (Buzsáki 2004). Recent work (Grimaldi et al 2018–20) claims that phonemic processing is identifiable in mm-sized regions, meaning ensembles around 10^4.

Complexity analysis of such computational models is still leading-edge. Deep neural nets (where 'deep' is actually very shallow) are a 'horrible class [of models]', where theoretical and practical complexities diverge far (Shalev-Shwatz 2014). Other models such as 'Massively Parallel Computation' (Ghafari 2019) still assume shared memory distinct from processing. However, Fox (2013) presents a physical computational model of massively parallel neural processing, which is shown experimentally to simulate at least modest ensembles reasonably well, and which has high connectivity and communication time as first-class components of the model. Fox does not, though, develop a formal complexity theory of the model.

We present an outline implementation of *SPE* and (reasonable variants of) OT in Fox's model, together with initial analyses of complexity, leading us to suggest that in reality neither model can be argued against on complexity grounds.

The influence of syllable weight on primary and secondary stress in German

Andrea Brugnoli, University of Verona, andrea.brugnoli_01@univr.it

State of the art: German has variable primary stress bound to the last three syllable of a word and it has been claimed to be at least to some degree sensitive to syllable weight (henceforth SW), although opinions differ about exactly which types of syllables should count as heavy and in which positions (Giegerich 1985, Vennemann 1990, Fery 2000). Experimental evidence using trisyllabic nonce words with different syllabic structures (L = light syllable, H = heavy syllable) found that the default position for stress in German is the penultimate syllable (in LLL words). A final heavy syllable (closed by a consonant, e.g. LLH, *Fe.ko.mot*) triggers stress either on the final or on the antepenult and a final superheavy syllable (closed by two consonants) attracts stress more than a heavy final (Janßen 2003). With respect to secondary stress, it is usually believed to build trochaic feet from left to right (Alber 2009), while regarding its sensitivity to SW almost no experimental evidence is present. The results of a judgment task suggest that secondary stress in German is partially influenced by syllable weight (Alber 1997).

Aim: The first aim of this study is, on one hand, to replicate previous results regarding the influence of SW on primary stress in German, and, on the other hand, to expand the research on new types of possible heavy syllables which have not been investigated before. The second aim is to gather some experimental evidence of the influence of SW on secondary stress, and test the hypothesis whether both levels of stress are sensitive to SW and, if so, to which degree.

Methodology: 30 native German speakers have been asked to read aloud nonce words inserted in a carrier sentence. The nonce words constructed to investigate primary stress had different number of syllables and different types of heavy syllables in different positions. The analyzed heavy syllables are: (syllables with) coda consonant, double coda consonant, double onset, triple onset, diphthong, vowel length and vowel sonority (e.g. LHL, coda consonant, *Wa.tan.ka*). The nonce words constructed to investigate secondary stress had all the structure XXXYX, where X = any syllable and Y = syllable bearing primary stress. Primary stress was induced using primary stressed suffixes (e.g. *-iéren*), while secondary stress was assumed to be placed on the first syllable when only light syllable precede primary stress, i.e. ȌLLYX (because of left-to-right directionality), and on a second heavy syllable in case of sensitivity to syllable weight (LȈLYX). Stress position was judged by ear. Stress patterns found on nonce words with heavy syllables were compared with the baseline with only light syllables (e.g. LLH vs LLL).

Results: For primary stress, the results suggest a default position on the penultimate syllable in the baseline condition (LLL). With respect to SW, a final syllable with a coda or a long vowel (LLH) counts as heavy and attracts stress more than the baseline. Furthermore, a final syllable with a complex coda or a diphthong attracts stress even more. A diphthong in a penultimate syllable also attracts stress. No influence of onset and vowel sonority has been found. No influence of a heavy antepenult of any kind has been found. For secondary stress, the results suggest a directionality from left to right (i.e. secondary stress on the first syllable), while a second syllable with a coda attracts secondary stress and one with a diphthong attracts even more. No influence of onset has been found.

The perception of acoustically distorted speech produced with face masks in multilingual multi-talker environments

Faith Chiu[1], Laura Bartoševičiūtė[2], Albert Lee[3] and Yujia Yao[2]

[1]*University of Glasgow,* [2]*University of Essex,* [3]*Education University of Hong Kong*
faith.chiu@glasgow.ac.uk, laurabartoseviciute@gmail.com, albertlee@eduhk.hk, vera.yujia.yao@gmail.com

This paper examines the perception of speech produced with face masks in multilingual multi-talker environments. Three groups of varying in language background (n=27) listened to and reported English target sentences produced with or without a face mask in the presence of a competing English or Lithuanian talker. Listeners were monolingual native speakers of English, second language (L2) English speakers with Lithuanian as first language (L1), and L2 English speakers with L1 Mandarin Chinese. In addition, Lithuanian speakers also completed the same experiment but with Lithuanian target sentences.

English target sentences were based on the International Matrix sentence test for speech audiometry in noise (Hewitt, 2007; HörTech, 2019). The stimuli consist of a 50-word base matrix (10 names, 10 verbs, 10 numerals, 10 adjectives, and 10 nouns) from which grammatically correct but contextually unpredictable five-word sentences are built using a random combination of one word of each word category. All matrix sentences have fixed syntactic structure ('Alan bought two big beds'; name + verb + number + adjective + noun). Lithuanian target sentences follow the same format and are constructed as original stimuli for this experiment since there is no existing Lithuanian version of the International Matrix sentence test. Audio stimuli from these sentences were generated by recording a native female speaker of each language. Individual words were produced in sentence frames and then edited to generate the presented sentence stimuli. Continuous speech from a male competing talker in English and in Lithuanian was presented at a challenging -10dB Signal-to-Noise ratio.

All participants were instructed that they would hear recordings of sentences produced by a female talker in the presence of a male competing talker. The target sentences were cued by sex of the speaker. Participants were instructed to listen only to the female voice and ignore the male voice in the background. Participants were asked to type what they after each sentence and were requested to report individual words if they were not able to hear the whole sentence. Responses were scored based on the proportion of words correctly recognised in each sentence. There were 5 keywords per sentence; a full mark per sentence was scored as 100%. Each error took away 20% Keywords were considered accurate regardless of the position they appeared.

Results indicate that participants were more accurate with perceiving target sentences in their L1. Targets produced with a face mask were less accurately perceived across all groups regardless of listening in L1 or L2. In general, a competing talker in a language which matches the target (English distractor on English target) had a more detrimental effect on perception accuracy than a mismatched one (Lithuanian distractor on English target). Exceptionally, only when Lithuanian participants – with both English and Lithuanian knowledge – listened in their L1 was there no added challenge from matching distractor and target language. We conclude that acoustic distortions from face masks present an across-the-board difficulty while linguistic knowledge can reduce distraction from competing talkers. Findings are in line with the target-masker linguistic similarity hypothesis (Brouwer et al., 2012) which states that the more linguistically similar the target and competing talker are, the harder it is to segregate the incoming information that derives from the two competing speech signals.

Morpheme Boundaries and Locality in Dagur Rounding Harmony

Chenming Gao University of Cambridge cg710@cam.ac.uk

Relativized locality is typically defined in terms of metrical templates or featural tiers (Hualde 1989; Odden 1994; Nevins 2010). Dagur (Mongolic) rounding harmony shows a typologically rare blocking effect, in which adjacency must refer to morpheme boundaries.

Dagur has six phonemic vowels: [−RTR] /i, u, ə/ and [+RTR] /ɔ, a, ɛ/. Except for [ɛ], each of these has a long, phonemic counterpart. In Dagur, all plain **C**s (but not marginal /p, f, ŋ/) have labialized (**C**^{w}) and (**C**^{j}) palatalized counterparts.

Underspecified suffix vowels are subject to (i) RH, (ii) RTR harmony (RTRH), (iii) palatal assimilation (PA), and (iv) labial assimilation (LA). RH is sensitive to morphemic boundaries: only onsetless suffix vowels undergo RH, while tautomorphemic onsets (suffix-internal or inserted **C**) consistently block RH: [ɔs-ɔr-ɔ] 'water-INSTR-RFL' (RH), [ʧɔlɔ-jar-a] 'stone-INSTR-RFL' (**C**-insertion blocks RH), [saw-ɔʤar] 'sit-CONV CONCOM' (LA, but suffix-internal **C** blocks RH to σ_2), [bɔs- ɔʤar] 'get up-CONV CONCOM' (RH, but suffix-internal **C** blocks RH to σ_2), [bɔs-lɣa] 'get up-CAUS' (suffix-initial **C** blocks RH).

The pattern cannot be explained by pre-specifying [−round] on non-alternating vowels. In Qiqihaer dialect, INDEF LOC /-**E**tn/ became /-**E**t**E**/. Importantly, RH only affects the onsetless /**E**/, but not the /**E**/ in /t**E**/, which suggests the blocking effect is productive.

The blocking effects cannot be identified through featural tiers. Compare [mɔːd-ɔr] 'wood-INSTR' with [mɔːd-da] 'wood-LOC': the stem-final [d] is transparent, while the suffix-initial [d] is opaque. Transparency and opacity cannot be predicted through segment-internal characteristics.

It then might be tempting to pose a metrical analysis: onsets and nuclei are eligible triggers of RH, while codas remain invisible. This requires [s] in [.ɔs.-.ɔr.] to remain as a coda when RH applies, so that [+round] spreads through it. The morpheme boundary effect will then be a by-product of cyclicity. However, in [mɔːd-d-ɔ] 'wood-DAT-RFL' and [ɔs-d-ɔ] 'water-DAT-RFL', constraints on coda clusters (Engkebatu 1988, pp. 141–148) forbid the syllabification of DAT /-d/ as a coda. Syllable structure algorithm will then assign stray /-d/ as onset to RFL /-**E**/, which predicts *[.mɔːd.-.d-a.] and *[.ɔs.-.d-a.].

Therefore, morpheme boundaries must be referred in defining the domain of RH. In fact, considering that a tautomorphemic intervening **C** is always prevocalic, there is no need to specify its onset status. In /mɔːd-d-**E**/ [mɔːd-d-ɔ] 'wood-DAT-RFL', [d] is heteromorphemic to RFL and is invisible in **V**-to-**V** RH. In /mɔːd-d**E**/ [mɔːd-da] 'wood-LOC', **V**-to-**V** spreading is blocked by the tautomorphemic [d]. To explain heteromorphemic **V**-to-**V** RH, this requires that stem vowels and suffix vowels belong to the same plane. To explain the blocking effects, tautomorphemic **C** and **V** must belong to the same plane. Crucially, the computation of the latter precedes the former. I argue that two types of adjacency parameters apply disjunctively: RH is either (i) constrained by a domain defined by tautomorphemic **C**, or (ii) subject to **V**-to-**V** spreading. It is assumed that the more 'local' parameter is prioritized. In the case of Dagur, tautomorphemic relation is more local than heteromorphemic **V**-to-**V** spreading. In /bɔs-E ʤEr/ [bɔs-ɔʤar] 'get up-CONV CONCOM', tautomorphemic [ʤ] first identifies a new domain, (ʤEr). The absence of [+round] in this domain results in the default filling of [−round] (hence [ʤar]). Then the remained (bɔs-**E**) is subject to **V**-to-**V** spreading, which results in [bɔs-ɔ].

Toward a Description of Ingressive Speech in Contemporary French

Jane Gilbert (Indiana University, janegilb@iu.edu)

Introduction. Pulmonic ingressive speech, or using an inhalation airstream during speech production, has been observed in many languages and regions, often functioning to subconsciously signal paralinguistic feedback (Eklund 2008). Its use is characteristic of Swedish and related languages, as well as the speech of women (Clarke & Melchers 2005, Eklund 2007), and is highly interactive and therefore difficult to elicit artificially (Eklund 2002). Its existence in French is widely acknowledged, and impressionistically associated with female speech, the affirmative particle *oui*, and the expression of "reticence" (Léon 1992), but its use in this language has yet to be described systematically. In this study, we identify social, pragmatic, and discourse factors that favor the use of ingressive *oui* by native speakers of European French.

Methods. An initial survey of 44 hours of naturalistic data consisting of various types of media (podcasts, YouTube videos, and scripted, unscripted, and competition-based television series) led us to target unscripted television series with an emphasis on the subjects' professions for maximal token frequency. We extracted all occurrences of ingressive *oui* from one season (338 minutes) of the reality series *L'Agence*, which yielded 14 tokens, and from one season (185 minutes) of the documentary series *Chef's Table France*, which yielded 2 tokens. We coded for social, pragmatic, and discourse factors.

Results. Contrary to expectations, most tokens (13/16) were produced by male speakers. However, 9 of these were produced by the same individual. Six tokens constituted an entire conversation turn; 9 were turn-initial. No speaker pronounced *oui* ingressively when speaking to camera or conversing by telephone. Most tokens (14/16) occurred in one-on-one conversation. All were produced in professional contexts, but never in formal conversations. In all of these contexts, the interlocutors knew each other well. For the interlocutor pair that accounts for the largest subset of the data (8/16), turn-taking proved to be a primary function of the ingressive particle. It only appears in response to a total question in 2/16 occurrences. Within *L'Agence,* all tokens appeared in the latter half of the second season, 11/14 of which occurred in the final episode.

Discussion. Within our data, a prototypical context for ingressive *oui* emerges, defined by 5 qualities: 1) two interlocutors are conversing directly; 2) the speakers have a personal relationship outside of the professional domain; 3) the conversation occurs within the professional domain, with the interlocutors interacting in their capacity either as colleagues or as professional and client; 4) the topic of conversation is related to their professional relationship; 5) the speakers are not of the same sex. The increasing frequency over time within *L'Agence* suggests that as attention to the fact of being recorded decreases, ingressive use increases, again broadly aligning with Eklund's findings for Swedish (2002). Our results suggest however that the gender factor in French differs somewhat from broad crosslinguistic trends, perhaps even following divergent pragmatic tendencies. The individual factor may however surpass that of gender. Finally, our data suggest that the ingressive airstream is a register-specific phonological tool pragmatically available for managing specific communication challenges, notably polite negotiation for the floor and the intersection of interpersonal alignment with professional disagreement or disappointment.

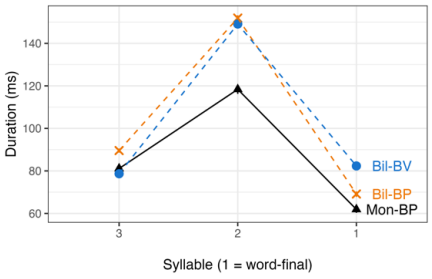
Cue interaction and the representation of stress in language contact

Natália B. Guzzo (Saint Mary's University) and Guilherme D. Garcia (Université Laval)

We examine the acoustic manifestation of stress in Portuguese-Veneto contact in Brazil. We propose that the representation of stress involves not only metrical features, but also the specification of acoustic cues, and that these acoustic specifications may be transferred in a contact situation. In both Brazilian Portuguese (BP) and Brazilian Veneto (BV; Romance), stress is mostly penultimate, but it is typically realized in the final syllable if this syllable is heavy (i.e., ends in a coda or diphthong; Garcia, 2017; Guzzo, 2022; Mateus & d'Andrade, 2000). However, previous investigations indicate that the acoustic manifestation of stress and stress-related properties in the two languages is somewhat different. While stress is cued with duration in both languages, they differ regarding vowel reduction. Unstressed final vowels in BP exhibit substantial vowel reduction and often undergo devoicing and deletion (Massini-Cagliari, 1992; Walker & Mendes, 2019), whereas reduction of unstressed vowels in BV is marginal (Guzzo, 2022).

Assuming (a) that the representation of stress includes the acoustic cues employed in its manifestation, and (b) that stress is cued differently in BP and BV to some extent, two possibilities for BP-BV bilinguals' productions arise: (i) they produce stress differently in the two languages, mirroring BP monolinguals in their BP productions, or (ii) they exhibit an overlap of stress cues in the two languages. We hypothesize that possibility (ii) applies to the BP-BV contact situation: their representations for BP and BV stress interact, similar to what has been observed for other phonological phenomena in contact (Newlin-Lukowicz, 2014; Sundara et al., 2006).

To test this, we conducted a production experiment where participants named figures using carrier sentences. Participants were BP-BV bilinguals (n = 21) and BP monolinguals (n = 9); no BV monolinguals were included since virtually all speakers of BV in Brazil also speak BP. Bilingual participants completed two versions of the experiment, one in each language. In both languages, the target vowel was /a/, which was found in final, penultimate or antepenultimate position in three-syllable nouns with penultimate stress.



Duration, F1, F2 and f0 (from three points) of all the target vowels (n = 2,602) were extracted using Praat scripts (Boersma & Weenink, 2022). The data were analysed with three mixed-effects linear models (one per correlate: duration, f0 and F1; models included by-speaker and by-item random intercepts). We found systematic differences in duration, f0 and F1 (all coefficients below have $P < 0.01$ given their t values). Bilinguals produced stressed vowels with similar duration in BP and BV, but significantly longer than those produced by monolinguals (see figure; $\hat{\beta}$(Bil-BV)=37.84, t=6.15; relative to Mon-BP in syllable 2). Word-finally, vowels were significantly longer in BV productions. For f0, BV vowels had substantially higher values word-finally relative to both bilingual and monolingual ($\hat{\beta}$=61.55, t=4.98) BP productions. Finally, F1 in word-final vowels was significantly lower in monolingual than bilingual productions (BV: $\hat{\beta}$=56.05, t=3.95; BP: $\hat{\beta}$=63.07, t=3.95), which patterned together, indicating more reduction in monolingual BP. These results suggest an overlap in some of the cues (i.e., duration, F1) used to signal stress in bilingual BP and BV, as per our hypothesis. At the same time, f0 is used differently in bilingual BP and BV, indicating that acoustic specifications are not identical. In summary, contact promotes cue interaction in the manifestation of stress, suggesting that such cues must be representationally encoded.

Epenthesis, Deletion and Markedness

Mark Hale & Madelyn Kissock
Concordia University

A standard argument for the role of 'markedness' (e.g., de Lacy 2006) concerns the fact that epenthetic segments are generally unmarked: widely and uncontroversially attested epenthetic consonants include the relatively unmarked [ʔ] and [h], for example. The data is not altogether clear, however, with relatively unmarked [t] being only controversially attested as epenthetic, and some relatively marked segments like [r] ('linking *r*') being attested fairly broadly. The arguments for markedness of particular segments are many and complex, but one regularly invoked argument concerns inventories: languages are much more likely to have a 'place gap' in the velar or labial domain than in the coronal one, for example. One of the ways to insure that unmarked segments are favored in inventories is for *diachronic* processes to preferentially eliminate marked segments.

We can contrast a 'markedness'-based explanation for the nature of the epenthetic segment with a diachronic explanation which does not reference markedness. This explanation holds, building on a (synchronic) distinction drawn in Hall (2006), that epenthesis arises in two ways: (1) via the reinterpretation of transitional coartication effects as segmental targets ([ua] → [uwa], etc.) and (2) via the reinterpretation of conditioned segmental loss in environment X as conditioned segmental insertion in the complementary environment $\bar{X}$ (e.g., 'linking *r*').

In this paper we report on a relatively simple argument which seems to us to lend strong support to the diachronic explanation over that of a markedness-based one. If we examine as a test case the very simple and confidently-reconstructed history of the Polynesian languages (e.g., Biggs 1978) we can ask about the diachronic stability of the consonants of Proto-Polynesian (*p, *t, *k, *ʔ, *f, *w, *s, *h, *m *n, *ŋ, *l, and *r). In the 48 living daughter languages surveyed in Biggs' article, only three of the Proto-Polynesian consonants ever show up as Ø, and these three do so fairly broadly: *ʔ, *h, and *r. It seems fairly clear that the explanation for these segmental losses cannot be 'markedness reduction' — i.e., the inventory 'gaps' (relative to Proto-Polynesian) that loss of *ʔ and *h (e.g.) give rise to are the loss of *unmarked* segments (hence their argued presence in epenthesis), not the loss of *marked* segments.

Under a theory of sound change that posits reanalysis in acquisition as the source for segmental changes, it seems that this data is trying to tell us that there is a challenge to the accurate perception of segments such as *ʔ, *h, and *r. Diachronic phonology is, as Ohala has so often said, nature doing psycholinguistic experiments for us. If this is correct, then the explanation for the frequent use of 'unmarked' [ʔ] and [h] in epenthesis, as well as the frequent use of relatively 'marked' [r], finds a unified explanation in the higher probability of the diachronic *loss* of these segments (presumably easier to miss in some contexts than others, thus 'conditioned' loss) and in the general connection between loss and (complementary) epenthesis.

References

Biggs, Bruce. 1978. The history of Polynesian phonology, in *Proceedings of the Second International Austronesian Linguistics Conference*, S. Wurm & L. Carrington (eds). Pacific Linguistics C-61: 691-716.

de Lacy, Paul. 2006. *Markedness: Reduction and Preservation in Phonology*. Cambridge: CUP.

Gick, Bryan. 2002. The American intrusive *l*. *American Speech* 77.2: 167-183.

Hall, Nancy. 2006. Cross-linguistic patterns of vowel intrusion. *Phonology* 23: 387-429.

Ohala, John. 1993. Sound change as nature's speech perception experiment. *Speech Communication* 13:155-161.

F2 and VOT in the Emphasis Contrast in Four Arabic Dialects

Reem Hazi & Vladimir Kulikov, Qatar University

One of the phonological contrasts that distinguish Arabic among other languages is a contrast in *emphasis*, or pharyngealization in coronal stops and fricatives. *Plain* consonants /s, d, t, ð/ < س د ت ذ are contrasted with *emphatic* consonants /ṣ, ḍ, ṭ, ð̣/ < ظ ط ض ص, which have an additional gesture of tongue retraction in the posterior area of the vocal tract. The most salient acoustic correlate of this contrast is lowering of F2 on the adjacent vowel (Ghazeli, 1977). In addition, some dialects have developed a difference in VOT between plain and emphatics voiceless stops. While in some dialects (e.g., Jordanian Arabic, Khattab et al., 2006) this difference is small and lies within the same VOT category, some other dialects developed a more salient contrast, in which long-lag VOT in plain [t] is opposed to short-lag VOT in emphatic [ṭ] (Qatari Arabic, Kulikov, 2022). It is not clear, however, how the two acoustic correlates interact.

In this paper, we investigate a trade-off relation between the two acoustic correlates of emphasis, – F2 and VOT, – in four Arabic dialects: Lebanese, Syrian, Saudi, and Qatari. The data were obtained from 40 speakers (n = 10 for each dialect, both female and male), who were recorded reading 20 words with plain and emphatic voiceless initial stops [t] / [ṭ] followed by low vowel [a]. A total of 820 items were submitted to an acoustic analysis.

The results showed that the dialects systematically differed in the realization of the emphasis. Plain and emphatic stops had contrastive differences both in F2 and VOT, but their magnitude varied among the dialects (Figure 1). In the Lebanese dialect, the contrast was predominantly realized as a difference in F2. The vowel [a] was fronted and raised in the plain context (M_{plain} = 1808 Hz), but it was retracted in the emphatic context (M_{emph} = 1097 Hz). The difference in VOT was minimal (M_{plain} = 38 ms; M_{emph} = 32 ms). In the Qatari dialect, the main acoustic correlate was VOT, with plain voiceless stops (M_{plain}= 72 ms) produced with aspiration and emphatic stops being unaspirated (M_{plain}= 17 ms). The difference in F2 was, in contrast minimal: the vowel [a] was realized as back in both contexts, with more retraction in the emphatic context (M_{plain} = 1230 Hz; M_{emph} = 1108 Hz). The Syrian and Saudi dialects showed intermediate patterns.

The patterns revealed geographical distribution: Syrian Arabic was more similar to Lebanese Arabic as both dialects had a smaller difference in VOT, but Saudi Arabic patterned with Qatari Arabic revealing much longer VOT in plain stops and very short VOT in emphatic stops. The findings suggest that different groups of Arabic dialects may be developing differences in acoustic realization of emphasis.

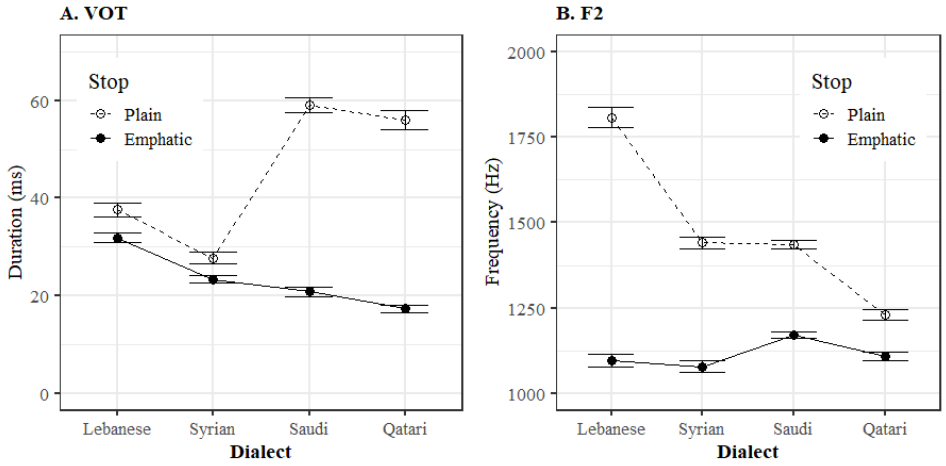


Figure 1. Differences in VOT and F2 between plain and emphatic stops [t] / [ṭ] in the four Arabic dialects: Lebanese, Syrian, Saudi, and Qatari

The acoustic correlates of stress and pharyngealisation in Palestinian Arabic

Niamh Kelly
niamh.kelly@ncl.ac.uk
Newcastle University, UK

Research on prosody in Arabic includes work on lexical stress and focus in Jordanian Arabic (de Jong & Zawaydeh 1999, 2002) and on intonation in Egyptian Arabic (Hellmuth 2006a,b) and Lebanese Arabic (Chahal 2001, Chahal & Hellmuth 2014, Kelly 2021). No phonetic research appears to have yet been conducted on the acoustic correlates of stress in Palestinian Arabic. Cross-linguistically, lexical stress is often represented by longer duration, higher intensity and spectral tilt, and more peripheral quality (Gay 1978, Beckman 1986, Sluijter & van Heuven 1996, Gordon & Roettger 2017). In Arabic, long vowels without primary stress have sometimes been described as having secondary stress (Nasr 1959). In addition, Arabic has so-called "emphatic" consonants, which are produced with a secondary pharyngeal constriction, and these have been found to cause a higher F1 and lower F2 in the adjacent vowels (Jongman, Herd & Al-Masri 2007).

The current study examines the acoustics of lexical stress and pharyngealisation in long and short /a/ in Palestinian Arabic. (The data were kindly provided by Hall (2017).) Target words were disyllabic or trisyllabic with penultimate stress, with both the stressed and unstressed vowels either long or short /a/. The goal was to determine the correlates of lexical stress, as well as to determine whether length and pharyngealisation interact with stress. Example words are [ˈʒa:bha, ˈʒabha, saˈbaqna, sa:ˈbaqna, ˈfasˤəl, ˈħa:sˤel]. In total, I examined 5 stressed and 3 unstressed long vowels, and 6 stressed and 6 unstressed short vowels.

Recordings of 14 speakers (7F, 7M) producing 14 target words were analysed. Each word was produced twice in sentence-medial position. The total number of tokens was 1075. Praat scripts measured mean f0 (semitones), f0 range (st), duration (msec), mean intensity (dB), F1 & F2 (Hz) at the vowel midpoint and spectral tilt (H1-H2). These were subjected to a linear mixed effects regression analysis (using the *lmer* function in R (R Core Team, 2019)). The best model for each measure was chosen by model comparison using the *anova* function. Speaker and token were incldued as random factors.

The best models for each measure showed that the acoustic correlates of lexical stress are higher mean f0 and intensity, longer duration, lower spectral tilt (more modal voice quality), lower F1 and lower F2 (a higher and backer /a/ vowel). Long vowels had longer duration, wider f0 range, higher mean intensity, higher F2 (fronter vowel) and lower spectral tilt. Being next to a pharyngealised consonant resulted in the vowel having lower intensity and higher spectral tilt (breathier voice quality) as well as a higher F1 (but only for stressed vowels) and lower F2 (but only for stressed long vowels). As such, these results show an interaction among stress, length and pharyngealisation for some acoustic measures. For example, pharyngealisation has the opposite effect on spectral tilt compared to that of stress and length. These findings will be discussed in more detail. This work adds to phonetic research on lexical stress and pharngealisation in Arabic, in particular an understudied variety.

Word Minimality, weight and sensitivity to onsets in French hypocoristics

Mohamed Lahrouchi
CNRS & University Paris 8

One of the main aspects of the hypocoristic formations that has attracted the attention of phonologists relates to the truncation processes they undergo. Proponents of the prosodic hypothesis (McCarthy & Prince 1986 et seq., Nespor & Vogel 1986, Selkirk 1981) argue that these processes obeys a minimality condition, which is defined in terms of the authentic units of prosody (μ, σ, Ft, ω): A well-formed prosodic word must contain at least one binary foot at the moraic or syllabic level, depending on the language (see among others Mester 1990 on Japanese, Plenat 1982, 1999 and Nelson 1998 on French, Colina 1996, Piñeros 2000, Plénat 2003 and Torres-Tamarit 2021 on Spanish). The examples in (1a-b) comply with the binarity condition, while those in (1c) deviate from it.

(1) French hypocoristic formations (Plénat & Huerta 2006)

a.	ʃaʁlɔt	ʃaʃa	'Charlotte'	2σ, 2μ
	mikaɛl	mika	'Michael'	
	gabrijɛl	gabi	'Gabriel'	
b.	viktwaʁ	vik	'Victoire'	1σ, 2μ
	kχistjã	kχis	'Christian'	
	frederik	fχɛd	'Frédérique'	
c.	florãs	flo	'Florence'	1σ, 1μ
	Joanna	ʤo	'Joanna'	
	klod	klo	'Claude'	

Despite their relatively limited number, the forms of the type in (1c) challenge the Word Minimality hypothesis, since they contain only one light syllable (equivalent to one mora) whose onset though complex does not contribute to weight (see Hayman 1985, Hayes 1989, 1995, Morén 1999, *contra* Topinzi 2005, 2008). This presentation combines the strict CV approach to syllable structure (Lowenstamm 1996) with the Word Minimality hypothesis. It argues that the shape of the truncated forms in (1) can be analyzed *without appeal to any prosodic hierarchy: no moras, no syllables, no feet*. The forms use two CV units, which correspond to the minimal domain where Proper Government holds, hence the *Minimal Word*. In this view, *prosodic weight* is defined as function of the number of vocalic positions a hypocoristic form contains (see Szigetvári & Scheer 2005, Faust & Ulfsbjorninn 2018 on stress assignment): each form must display (at least) two V slots. There are forms (1a) which require that both vocalic slots are identified with their own segments, while others (1b,c) allow one slot to remain empty (See Sheer 2004 on lateral relations in strict CV). This is shown in (2).

(2)

a.	b.	c.	d.
C V C V	C V C V	C V C V	C V C V
| | | |	| | |	| | |	| | |
m i k a	v i k	f l o	f ɛ d

The final V in (2b) and (2d) is parametrically licensed to remain empty (Kaye 1990), while the medial V in (2c) is properly governed by the following vowel. Moreover, building on previous work (Hirst 1985, Lowenstamm 2003, Rennison 1998, Rennison & Neubarth 2003, Ségéral & Scheer 2007, among others), I will argue that French hypocoristics display two types of so-called *mutæ cum liquidā* sequences: One of the form obstruent + rhotic (2d), and one whose obstruent is followed by a lateral consonant (2c). The first behaves as a complex segment, associated to one position; the latter is bipositional. The occlusion element |ʔ| present in /l/ but not in /r/ requires the consonant to be associated to its own C-slot (see Element Theory: Harris 1990, Backley 2011, among others). This occlusion element also plays a structuring role in Spanish hypocoristics, which tend to turn any fricative in the onset position into a stop, according to Piñeros (2000: 75) and Plénat (2003: 83): e.g. **f**ran**s**isko ~ **p**an**ʧ**o 'Fransisco', al**f**on**s**o ~ **p**on**ʧ**o 'Alfonso', ali**s**ja ~ li**ʧ**a 'Alicia', del**f**ina ~ **p**ina 'Delfina'.

Prosodic and phonotactic conditioning of high-vowel deletion in Quebec French

Jeffrey Lamontagne (Indiana University Bloomington)

Introduction. Cross-linguistically, vowel deletion is generally sensitive to prosodic factors, most notably to stress (Crosswhite 2004). However, the role of **prosody** in the deletion of high vowels in Quebec French is contested: there are conflicting proposals for whether prominence conditions deletion in production (cf. Verluyten 1982; Cedergren 1986), with perceptual acceptability judgments suggesting that prosodically weak syllables are associated with increased deletion (Garcia, Goad & Guzzo 2017). This varied description in the literature may result from the limited amount of production data, but is likely compounded by debates surrounding the nature of prominence in French, including the presence and type of foot (e.g. Verluyten 1982, Mertens 1987, and Andreassen and Eychenne 2013 for no foot; Selkirk 1978, Montreuil 1993, and Bosworth 2019 for trochees; Paradis & Deshaies 1991, Scullen 1997, Garcia, Goad and Guzzo 2017 for iambs; Goad and Buckley 2006 for a combination) and iterativity (e.g. see Verluyten 1984; Tranel 1994; Jun & Fougeron 2002). The contribution of **phonotactics** to high-vowel deletion is similarly complex, with deletion being possible – but not necessarily favoured – in syllables with codas (e.g. Cedergren & Simoneau 1985; but cf. Gendron 1966) and complex onsets (Verluyten 1982). The current study therefore probes prosodic and phonotactic conditioning using data from production. We thereby demonstrate the critical role of prosody in (Quebec) French phonology and further mount evidence for an updated analysis of the prominence system in Quebec French in terms of prosodic structure.

Methods. We perform mixed-effects regression on 29 924 instances of underlying high vowels in non-final syllables from 131 native speakers in the Phonologie du français contemporain (Durand, Laks and Lyche, 2002; https://www.projet-pfc.net/) and Québec National Assembly (Milne 2014) corpora. Logistic regression was computed to predict binary deletion as classified by the SPLalign forced aligner (Milne 2014; see methodology in Lamontagne 2020 for automated classification). We further compare linear regression results of log-transformed durations from non-deleted tokens to contrast vowel deletion and shortening, thereby addressing the proposal that deletion is synchronically the extreme result of shortening (e.g. Cedergren & Simoneau 1985).

Results. **Syllable parity** significantly affects high-vowel deletion: odd-numbered syllables from the right edge favour deletion ($p<0.0001$), seemingly contra Goad, Guzzo & Garcia (2016). However, following work on weight sensitivity in the dialect (Lamontagne & Goad 2020), we further consider whether the final syllable is closed, which reveals that words ending in an open syllable favour deletion in odd-numbered syllables from the right edge and words ending in an open syllable favour deletion in even-numbered syllables from the right edge ($p<0.0001$). Parity from the left edge has no significant effect for deletion, but contributions to duration lend credence to analyses of left-to-right rhythmic structure (with or without footing, e.g. see Goad & Buckley 2006). We further observe that, unlike for duration, high-vowel deletion is sensitive to the cluster's **sonority** profile, with rising-sonority clusters favouring deletion ($p<0.0001$), an effect that is magnified for higher-frequency clusters but reversed in lower-frequency clusters ($p<0.0001$).

Discussion. Contra Cedergren & Simoneau (1985), comparisons between duration and deletion demonstrate that (phonologised) deletion should synchronically be distinct from shortening due to differences in phonological and phonetic conditioning of the two processes. Our results confirm the prosodic conditioning of high-vowel deletion in Quebec French, and these patterns lend support to recent analyses of (Quebec) French as exhibiting right-to-left iambic footing with iterativity (e.g. Garcia, Goad and Guzzo 2017) with weight sensitivity (Lamontagne & Goad 2020; Lamontagne 2022). The current study further demonstrates the crucial role played by prominence in phonological phenomena in French, suggesting directions for future research.

A phonetic comparison of lexical /ɨ/ and epenthetic /ɨ/ in Korean naturalistic speech

Hyunjin Lee (hyunjin.lee25@uga.edu), University of Georgia

Previous studies (Miner 1979, Gouskova & Hall 2009) argue that an epenthetic vowel may be shorter than its corresponding lexical vowel and can have different F1 and F2 from its corresponding lexical vowel (Davidson 2006, Gouskova & Hall 2009). In the case of Korean, previous studies (Kim 2009, Kim & Kochetov 2011) on the phonetic characteristics of vowel epenthesis have been conducted based on the comparison of epenthetic /ɨ/ and its corresponding lexical /ɨ/, and no durational and formant differences have been found between them. That is, epenthetic /ɨ/ and lexical /ɨ/ are phonetically identical to one another. However, these studies are based on controlled syllable structures such as C/ɨ/C in laboratory speech. Laboratory speech is quite different from naturalistic speech in that laboratory speech is slow, overly clear, and unnatural compared to naturalistic speech. Thus, a phonetic comparison of epenthetic /ɨ/ and lexical /ɨ/ in Korean naturalistic speech may help to get a more fine-grained phonetic model of loanword adaptation in Korean.

The present study analyzed Korean naturalistic speech (M=6, F=6). The results show that there are no statistical differences between epenthetic /ɨ/ and its corresponding lexical /ɨ/ in terms of F1, and duration. These results are consistent with the previous studies' argument that phonetically epenthetic /ɨ/ is not different from lexical /ɨ/. However, the statistical results show the wider range of F2 of epenthetic /ɨ/ compared to the range of F2 of lexical /ɨ/ while the ranges of F1 of epenthetic /ɨ/ and lexical /ɨ/ are not different. Interestingly, the wide range of F2 of epenthetic /ɨ/ has been found in laboratory speech as well (Shin & Iverson 2014). Thus, it can be assumed that F2 of epenthetic /ɨ/ varies more than F2 of lexical /ɨ/ in both laboratory speech and naturalistic speech. One possible reason for the wider range of F2 of epenthetic /ɨ/ is that epenthetic /ɨ/ does not have a specific articulatory target for vowel backness which is related to F2. Cross-linguistically, some epenthetic vowels have a neutral position and are subject to their surroundings. For example, specific articulatory properties of schwa may be determined by the surrounding environments (Harris 2005, Flemming 2009, Kondo 1994). To see whether surrounding environments have significant effects on F2 of both epenthetic /ɨ/ and lexical /ɨ/ in the data, contextual variations were analyzed. The place of articulation is a statistically significant factor for both lexical /ɨ/ and epenthetic /ɨ/. (e.g., lower F2 after a labial consonant, higher F2 after an alveolar consonant). This finding is consistent with Kim and Kochetov (2011)'s result based on lab speech. However, interestingly while the ranges of F1 of epenthetic /ɨ/ and lexical /ɨ/ are identical statistically, F2 of epenthetic /ɨ/ shows the wider range than F2 of lexical /ɨ/ statistically. Specifically, the data shows the lower F2 of epenthetic /ɨ/ after a labial consonant and the higher F2 of epenthetic /ɨ/ after alveolar or palatal compared to lexical /ɨ/. That is, epenthetic /ɨ/ is produced more like /u/ after labial consonants and /i/ after alveolar consonants than lexical /ɨ/. Based on these results, F2 of epenthetic /ɨ/ may be more subjected to its preceding consonant than lexical /ɨ/ because epenthetic /ɨ/ does not have an articulatory target for vowel backness. This explanation is consistent with Oh (1992) arguing that epenthetic /ɨ/ is more underspecified than other epenthetic and lexical vowels in Korean, and epenthetic /ɨ/ may be more subjected to the contexts surrounding itself. According to Oh (1992), the epenthetic /ɨ/ is only specified for [+high], and this argument is consistent with the result that F2 of epenthetic /ɨ/ varies more than F2 of lexical /ɨ/ in this study.

Unlike previous studies focusing on a comparison of lexical /ɨ/ and epenthetic /ɨ/ based on the mean values of formants, this study dealt with the ranges of formants of lexical /ɨ/ and epenthetic /ɨ/ and found that the range of F2 of epenthetic /ɨ/ varies more than the range of F2 of lexical /ɨ/ and also F2 of epenthetic /ɨ/ is more subject to its surrounding environments than F2 of lexical /ɨ/ in Korean. One possible explanation for these is that epenthetic /ɨ/ has no specific articulatory target in terms of vowel backness in Korean.

Onset is on set: syllable adaptation in Moroccan Arabic

Nabila Louriz
University Hassan II, Casablanca

It is widely accepted in Arabic phonology literature that the onset is an obligatory constituent of the syllable. Indeed, this is the case in Moroccan Arabic (MA) native as well as nativized words. The present paper examines how ill-formed syllables are adapted in MA loanwords. Precisely, it studies the source of asymmetries encountered in the adaptation of Amazigh, French and Spanish onsetless syllables in MA and attempts a unified account.

There is a lack of consensus concerning the role phonetics and phonology have in the adaptation of foreign phonological structures. While some researchers claim that adaptations take place in phonology (Paradis & Lacharité 1997, 2009), others argue that they are perceptually motivated (Peperkamp et.al., 2008). A third camp of researchers defend the interaction between phonetics and phonology in borrowings (Boersma & Hamann 2009; Kenstowicz 2013). On the other hand, there is a general agreement that ungrammatical phonological structures are adapted by insertion rather than deletion. However, while some loanwords in MA are repaired by what seems to be insertion, others are adapted by means of deletion of the ill-formed syllables altogether. This presents a challenge to current approaches to adaptation.

Unlike MA, the three donor languages involved in this study allow syllables without onset. The latter must be either equipped with an onset or deleted altogether in order to be integrated in MA lexicon. The first case is found in borrowings from French and Spanish (but not Amazigh). For instance, Fr. /alymet/-> MA [zalamit] *'matches'*, Fr. /ardwaz/ -> [lardwaz] *'slate'*, Sp. /enʧufe/ -> MA [lanʧufi] *'plug'* show not only satisfaction of the onset requirement, but also asymmetry in the consonants occupying the onset position. The alternative adaptation where the initial onsetless syllable disappears in MA is found in the three donor languages. Examples include Fr. /elastik/-> [lastik] *'rubber'*, Am. /ataras/-> [taras] *'trouble'*, Sp. /armarjo/ -> [marijju] *'closet'*. Three questions are discussed: what triggers adaptation asymmetry within and across the donor languages? Why is adaptation by insertion a possibility in French and Spanish but not in Amazigh loanwords? What controls the borrower's preference to one onset or another?

I will show that neither insertion nor deletion play a role in 'fixing' foreign onsetless syllables. Instead, adaptation of the latter is the result of morphological parsing guided by the borrowers' L1 phonology, which is, in turn, driven by the nature of the input as well as frequency of collocation. The resulting seemingly asymmetrical outputs are generated by the ranking of faithfulness and structural constraints.

Nasal-Consonant Sequences in Setswana

Keneilwe Matlhaku

This paper provides a unified analysis of nasal-consonant (NC) sequences in Setswana within a Government Phonology (GP) (Kaye, Lowenstamm & Vergnaud 1985; 1990) with a main focus on (1) strengthening of the consonant (C) in NCs, (2) behavior of the C in NCs. Strengthening is a phonological process that entails an increase in the magnitude or duration of an articulatory gesture or movement (Bybee and Easterday 2019). According to Bybee & Easterday (2019: 278), "fricatives become aspirated, approximants become stops, fricatives become affricates and approximants become fricatives". Therefore, a sound, considered to be less strong or weak changes into a stronger one.

Strengthening contexts: In Setswana, underlying representation of fricatives and sonorants become strengthened in the following contexts: (1) postnasal context and after a reflexive prefix vowel /i/ whose roles are to express the idea of *-self* or *-selves* (e.g. /f, s, ʃ, χ, h/→ [p^h, ts^h, q^h, k^h/; /r, l~d/ → [t^h, t]). (2) It appears after syncope (Cole 1955). Strengthening also affects stem-initial consonant nasal /n/ and high front vowel /i/ across a syllable/ morpheme boundary (Batibo 2000).

Strengthening of C in NC clusters in Setswana

i.	**1st sg:**	/**f**a/ 'give'	→[m̩**p^h**a] 'give me'; /n-Øut͡l^{w}a/→ [ŋ-**k**ut͡l^{w}a] 'hear me'
ii.	**Syncope**:	/bɔ-n-**s**-a/	→[bɔ-n-**ts^h**-a] 'cause to see'
iii.	**Class 9/10 prefix:**	/n**r**ɔ /	→[n̩**t^h**ɔ] 'wound'

Data: The data come from an acoustic study of seLete, a dialect of Setswana involving a voice onset time (VOT) measurement of obstruents in word initial, mid and postnasal environments comprising voice recordings of adult native speakers of the dialect.

Findings: Unaspirated stops and underlying onset-less syllable are realized with short-lag VOT while aspirated stops and underlying fricatives/liquids have a long-lag VOT.

Analysis: Setswana has a strict CV syllable structure, therefore I assume the Strict CV version of GP (Lowenstamm 1996; Dienes and Szigetvári 1999; Scheer 2004): phonological representations are strictly composed of a string of CV units, regardless of the types of strings observed on the surface. Within the GP framework, three basic constituents are recognized namely, the Onset (O), Nucleus (N) and Rhyme (R). Parsing is achieved through associating segments with these constituents, which are maximally binary branching units (KLV 1990; Hulst and Ritter 1999; Hulst 2006). Relations between constituents, and segment ordering, are defined by the government and licensing relations between Onset (O), Nucleus (N), and Rhyme (R).

Conclusion: Setswana strengthening is attained by the sharing of feature(s) between the N and C (consonant to-consonant licensing) in an onset "sandwich", in which O_2 must license O_1, because R_1 is empty within this structure (NØCV). O_2 is strengthened in the onset sandwich so as to be a proper governor of O_1 in the following instances: (1) when O_1 is the /N-/ prefix, (2) when O_1 precedes an onsetless syllable (epenthetic /k/ contexts), and (3) when O_1 is an onset filler in an onsetless syllable (e.g., when O_1 has to precede the reflexive prefix /i-/). Crucially, the reason is about being a proper governor in the normal sense where the governor has to have more features overall. Therefore, the only reason strengthening occurs in the second and third instances is that the continuants ([cont.] need [-cont.] feature to gain more complexity so as to become proper governors. Therefore 'strengthening' involves changing segments into [-cont.] if necessary, plus adding [Dorsal] if the C has no place features, and adding spread glottis [+SG] to approximant /r/ → [t^h] to distinguish it from /l/→ [t] (implies that prior to being proper governors /l/ and /r/ need to also lose their voicing and move down the sonority scale by becoming [-cont.] segments.) Lastly, NC sequences in Setswana are not consonant clusters but a sequence of two onsets that enter into a government relation.

Laryngeal Realist Representations in Bengali

Jahnavi Narkar, UCLA

For laryngeal contrast specification, two types of relationships between phonological specification and phonetic realization have been proposed. In theories of 'laryngeal realism' (Honeybone, 2005; Beckman et al., 2013, a.o.), languages that contrast positive and negative VOT employ the feature [voice], while ones that contrast short positive and long positive VOT employ [spread]. Under the opposing view, the difference between such languages is at the level of phonetic realization, not phonological specification (Chomsky and Halle, 1968; Keating, 1984, a.o.), and laryngeal contrasts in both types of languages are represented by [voice].

Evidence from languages like Bengali, that have a four-way laryngeal contrast, could disambiguate these positions by testing their predictions (shown in the table below). The crucial difference is in the representation of Dh – [voice] and [spread] in realist models and [breathy] in traditional models (Ladefoged, 1973; Islam, 2019).

category	stops	realist	traditional
T	[p, t, ʈ, k]	[]	[]
Th	[p^h, t^h, $ʈ^h$, k^h]	[spread]	[spread]
D	[b, d, ɖ, g]	[voice]	[voice]
Dh	[$b^ɦ$, $d^ɦ$, $ɖ^ɦ$, $g^ɦ$]	[voice], [spread]	[breathy]

I compared the phonetic realization of the Bengali four-way contrast in infant-directed speech (IDS) and adult-directed speech (ADS). IDS has been demonstrated to be slower (Kuhl et al., 1997) and breathier than ADS (Miyazawa et al., 2017). Insofar as phonetic realization reflects featural specification, specified features are predicted to be enhanced in IDS, thus providing a clue to the specification of the four laryngeal categories. If the Dh category is specified by [voice] and [spread], both negative and positive VOT should be longer in IDS compared to ADS. If, on the other hand, this category is represented by [breathy], H1*-H2* should be greater in IDS compared to ADS.

I measured three phonetic cues corresponding to the three features under discussion - negative, lead VOT corresponding to [voice], positive, lag VOT to [spread] and H1*-H2* corresponding to [breathy]. For all prevocalic stops, VOT and H1*-H2* immediately following the stops was measured in IDS and ADS speech samples of 10 native speakers of Bengali reading a story, originally recorded by Yu et al. (2014).

A linear mixed effects models showed that both positive and negative VOTs of the Dh category were significantly longer in IDS than in ADS, supporting the laryngeal realist representation for this category. The representation of D with [voice] and T as unspecified was also supported. However, for the Th category, there was no difference in the positive VOT in the two registers. There was also no significant difference in H1*-H2* by register. However, the expected effect of category on H1*-H2* was found – Dh > Th > D, T.

The results, thus, supported the representation of Dh with both [voice] and [spread]. However, the specification of Th with [spread] predicted by both approaches was not supported. Moreover, the representation of the Dh category by [breathy], in a framework that assumes a direct relationship between featural specification and phonetic implementation, was not supported. These conflicting results suggest that evidence for laryngeal realist representations must be *phonological* (e.g., Honeybone, 2005; Islam, 2019), not just phonetic. More generally, the relationship between phonetic realization and phonological specification can be abstract and mediated by language specific phonetic grammars.

Vowel Metathesis without Precedence Relations

Kuniya NASUKAWA (Tohoku Gakuin University) and Shin-ichi TANAKA (University of Tokyo)

To make all types of structure-building systematically coherent in the context of The Minimalist Program of Generative Grammar (Chomsky 2010, at passim), Precedence-free Phonology (PfP) claims that the computational system (CS) takes not only morpho-syntactic objects but also phonological features called *elements* as the arguments of Merge. Then, through the merging of elements CS builds a hierarchical phonological representation for each morpheme before being stored in the lexicon. In this model, as in syntax, precedence is the natural result of computing and interpreting the head-dependent relations which hold between units in a structure. This paper challenges the common assumption that the analysis of phonological processes relies on precedence. It illustrates this by focusing on the following type of vowel metathesis in Nagoya Japanese, which is typically analysed as a swapping process operating between two adjacent vocalic segments *ai*, *ae*, *oi* and *ui*: the palatality of the second vowel becomes an on-glide to the first vowel, while the quality of the first vowel is preserved in the newly formed CV sequence.

	Tokyo Standard J.		*Nagoya J.*
a.	*um**ai*** 'delicious'	→	*um**ja:***
	*om**ae*** 'you, dear'	→	*om**ja:***
b.	*sug**oi*** 'amazing, great'	→	*sug**jo:***
	*zur**ui*** 'go home'	→	*zur**ju:***

Since PfP makes no reference to precedence relations, it rejects any analysis based on metathesis. Instead, it regards the process in question as coalescence, in which two sounds merge into one by combining their properties ('resonance' elements (|I| (dip), |U| (rump), |A| (mass), see Backley 2011), as illustrated below.

	V_1		V_2		$V_{1,2}$	Traditionally described as	phonetically realised as
a.	|A|	+	|I|	→	|A<u>I</u>|	*ja:*	[æ:]
	|A|	+	|AI|	→	|A<u>I</u>|	*ja:*	[æ:]
b.	|AU|	+	|I|	→	|AU<u>I</u>|	*jo:*	[ø:]
	|U|	+	|I|	→	|U<u>I</u>|	*ju:*	[y:]

Fusion takes place between V_1 and V_2, which in PfP are structured hierarchically (V_1 is dominated by V_2) rather than ordered sequentially (Backley 2021). In addition, a language-specific rule makes |I| (palatality) structurally dependent, meaning that it makes a bigger contribution to the acoustic signal of the fused structure and is therefore perceived as having greater prominence than other elements (THE PRINCIPLE OF PHONETIC REALISATION OF HEAD-DEPENDENCY STRUCTURE). As a result, the structures |AI|, |AUI|, |UI| are realised as palatalized [æ:] [ø:] [y:] (rather than [ja:] [jo:] [ju:]) (Harris, 1994; Backley, 2011). As a salient property, palatality may yield glide-vowel sequences such as [ja:] as phonetic variants in Nagoya Japanese. This analysis serves as a starting point for exploring other processes that have been accounted for in terms of precedence. The aim is to strengthen the claim that precedence is not a formal property of linguistic structure.

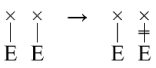
Laryngeal dissimilation supports the markedness of voicelessness

Péter Őri, Eötvös Loránd University (Budapest), oripeter17@gmail.com

Elsewhere, I have argued that only |H|, the fortis-marking element of Element Theory, should be available to encode laryngeal opposition in the phonology of VOT-based binary-contrast systems. This means that in this analysis, it is uniformly the fortes that constitute the laryngeally marked obstruent set in both voicing and aspirating languages. Laryngeal systems with two obstruent series will only differ according to the phonological processes targeting |H|. Furthermore, they may vary in the way the presence or the absence of |H| in a phonological expression is physically interpreted; this, however, is considered to fall outside the purview of phonology—see the Laryngeal Relativism view (Cyran 2014); cf. the more phonetically based "narrow interpretation of the feature [voice]" approach (Hall 2001) or Laryngeal Realism (Honeybone 2005).

Several cases may be taken to support the claim that basing the laryngeal specifications of obstruents in the phonology on their phonetic forms is misguided. First, there exist languages in which lenis obstruents are actively voiced; nevertheless, voicing is phonologically inactive as they do not trigger laryngeal assimilation. Examples include Italian, some accents of Southern American English, Swedish and Meccan Arabic.

I aim to show how another set of phenomena, laryngeal dissimilatory patterns, may lend support to the unmarkedness of voicing. Dissimilation can be thought of in unary models as the deletion/delinking of an element/feature (Bye 2011); see (1). Laryngeal dissimilation can be exemplified by deaspiration, i.e., the loss of the element |H| in languages like Meithei; see (2).

(1) 

(2) *thin* 'pierce' + *khət* 'upward' → *thingət* 'pierce upward'
hi 'trim' + *thok* 'outward' → *hidok* 'trim outward'

It is the marked value of a laryngeal feature that dissimilates, with the exception of voicing; see (3) (Bennett 2013). In the case of dissimilations involving [voice], or |L|, the result of the process will generally be a laryngeally marked obstruent, which requires the addition of a feature/element in unary models. Examples of this pattern include Eastern Bantu languages like Kikuria or Embu as well as Moro and Minor Mlabri. Dissimilation in Moro is illustrated in (4).

(3)

Laryngeal feature	Feature value undergoing dissimilation	Attestation
[voice]	+	moderately
	–	robustly
[spread glottis]	+	robustly
	–	unattested
[constricted glottis]	+	robustly
	–	unattested

(4)

/ék-/	+	/ómóná/	→	/ék-ómón/	'LOC-tiger'
/ék-/	+	/etám/	→	/ég-ətám/	'LOC-neck'
/lalogó/	+	/-at̪/	→	/lalog-at̪-ó/	'they said (at)'
/lapó/	+	/-at̪/	→	/lab-at̪-ó/	'they carry into/at'

The peculiar cross-linguistic behavior of |L| in dissimilatory patterns suggests that voicing is, in fact, normally treated by linguistic systems as the unmarked property, supporting the idea that it is reasonable to posit |H| as a laryngeal element in such languages too.

There seem to be four languages in which voiced obstruents turn voiceless as the result of laryngeal dissimilation. I argue that the first exception, Bakairi (Souza 1991), can also be analyzed as an H-language. Although it is more problematic to assume |H| as the laryngeal element in the remaining three languages, Azerbaijani (Salimi 1976), Japanese (Itô & Mester 1986) and Western Bade (Schuh 2002), they do indeed show characteristics of an H-system.

All in all, my goal is to provide further evidence that the presence of active voicing in a language does not require us to analyze it as an L-system. The fact that lenis obstruents are fully voiced in a language does not imply that voicing will trigger assimilation, or that it must be the marked property in a system displaying laryngeal dissimilation.

A bisegmental representation for ambisyllabic consonants in Dutch and German

Andreas Pankau • Freie Universität Berlin • Andreas.Pankau@fu-berlin.de

Introduction Dutch and German possess so-called ambisyllabic consonants, i.e. consonants that behave as if they occupied simultaneously the coda and the onset position of two syllables (Booij 1995, Wiese 2000). The necessity to recognize such consonants stems from the asymmetric distribution of tense and lax vowels. As the German examples in (1) show, tense vowels are licit in open syllables and hiatus position, but lax vowels are banned from these positions.

(1) *sie* [zi:] 'they', *[zɪ]; *quasi* ['kva:zi] 'nearly', *['kva:zɪ]; *Liane* [li'a:nə] 'liana', *[lɪ'a:nə] (Ger)

Despite this, lax vowels are licit in open syllables followed by a syllable with a filled onset.

(2) *Mittag* [mɪtak] 'noon, lunch' (Ger)

To reconcile (2) with (1), the *t* is analyzed as ambisyllabic, occupying both the onset position of the first syllable and the coda position of the second syllable. I argue in this talk that ambisyllabic consonants are better analyzed as two segments, each occupying a distinct position.

A difference between Dutch and German There is a curious, hitherto unnoticed difference between Dutch and German regarding the set of admissible ambisyllabic consonants: whereas Dutch disallows voiced ambisyllabic fricatives (Hulst 1985), German allows them, cf. (3).

(3) *Navi* [navi] 'GPS' *Fusel* [fʊzəl] 'bobble' *Level* [lɛvəl] 'level' (Ger)

This difference is irreducible to a general ban on voiced ambisyllabic consonants: both sononrants and voiced plosives are licit as ambisyllabic consonants in Dutch and German, cf. (4).

(4) *hebben* [hɛbən] 'to have' *bidden* [bɪdən] 'to pray' *willen* [vɪlən] 'to want' (Dut)
blubbern [blʊbɐn] 'to bubble' *Widder* [vɪdɐ] 'ram' *flügge* [flʏgə] 'fledged' *Sonne* [zɔnə] 'sun' (Ger)

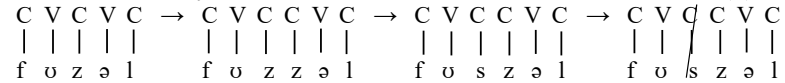
Analysis Analyzing ambisyllabic consonants bisegmentally allows one to reduce this difference to an independent difference between Dutch and German with respect to voicing assimilation in heterosyllabic obstruent clusters, i.e. clusters of the form $C_1.C_2$. Although both Dutch and German devoice syllable final obstruents (FOD), Dutch also has the requirement that sequences of obstruents must agree in voicing (Trommelen & Zonneveld 1979, Hulst 1980, Booij 1995). Whenever C_2 is a voiced obstruent, these two requirements clash. This conflict is resolved in one of two ways. If C_2 is a voiced plosive, then C_2 regressively voice assimilates C_1 (RVA) so that C_1 (re)voices. If C_2 is a voiced fricative, then C_1 progressively voice assimilates C_2 (PVA) so that C_2 devoices. The effects of RVA and PVA are illustrated in (5).

(5) RVA (C_2 = voiced plosive): *zakdoek* /k.d/ → [g.d] 'handkerchief' *stofdoek* /f.d/ → [v.d] 'duster'
PVA (C_2 = voiced fricative): *koekvorm* /k.v/ → [k.f] 'baking tin' *asvat* /s.v/ → [s.f] 'ashbin'

The bisegmental representation of ambisyllabic consonants allows subsuming the ban on ambisyllabic voiced fricatives in Dutch under the interaction between FOD and PVA, cf. (6). Assume that Dutch had the underlying representation /fʊzəl/. Since the first syllable *fʊ* is too light, an additional C-slot is inserted (rhymes in Dutch and German must minimally contain two slots, cf. Booij 1995, Wiese 2000). This C-slot is then not linked to the following *z*, but copies the melodic content of the adjacent C-slot, resulting in a structure with two adjacent *z*'s. The sequence *z.z* then undergoes FOD, resulting in *s.z*. Since *s.z* violates voice identity, PVA applies, resulting in *s.s*. Ambisyllabic consonants in neither Dutch nor German are longer than single consonants, so I assume that the additional C-slot is deleted via a rule of degemination.

(6)


As for German, it only has FOD, and hence allows the structure in (7) for the UR /fʊzəl/.

(7)


The problematic step in (7) – degemination – ceases to be a problem if degemination in German applies globally (Wolf 2011): it applies to *s.z* because the *s* was a *z* in a previous stratum.

Consequences In the remainder of the talk, I discuss the consequences of this analysis for ambisyllabic voiced plosives in Dutch and German, geminate inalterability, *Duke of York* derivations, and show how it can be made compatible with ambisyllabic [ɣ] in Dutch.

Strength resolves the degrees of tonal overwriting in Asante Twi

Prithivi Pattanayak, *University of Leipzig*

MAIN CLAIM: The present study provides a uniform account of the degrees of tonal overwriting pattern in Asante Twi, a dialect of Akan (Ghana), by assuming different gradient activities of the floating tones along with formalizing a relevant universal constraint, as an alternative to the Circumfix-Contiguity account (Trommer, 2011).

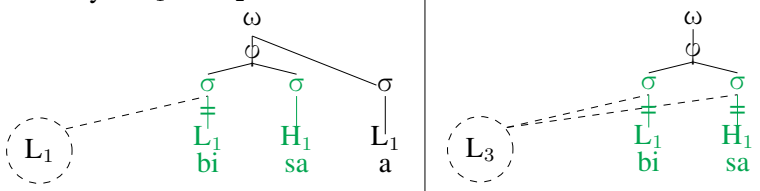
DATA:

(1) Category	Verb forms	Example	Gloss (Paster, 2010)
a. **Negative Habitual** (L prefix+ floating L tone)	CV H	ésí ń-ꜜtó	'Esi doesn't buy...'
	CVR(V) HL	ésí ń-ꜜnôm	'Esi doesn't drink...'
b. **Past** (Floating L prefix+ L suffix)	CV H	ésí tò-ò	'Esi bought...'
	CVOV LH	ésí bìsá-à	'Esi asked...'
c. **Imperative** (Floating L prefix)	CV H	tò	'Buy!...'
	CVOV LH	bìsà	'Ask!...'

Asante Twi shows a three way L tone contrast. In (1a) the floating L tone associated with Negative Habitual prefix is so weak ($L_{0.5}$) that it is only realized as a downstep on all initial verb-σ; whereas, the floating L prefix of the Past shows minimal overwriting (1b), strong enough (L_1) to overwrite a single other tone, showing consistent L on all initial verb-σ; and the floating L of Imperative (1c) has the highest strength (L_3) to overwrite more than one tone, hence showing maximal overwriting by replacing all lexical tones of the verb stem. Similar minimal vs maximal overwriting competition pattern is also exhibited by floating H tones.

BACKGROUND: The Low-High tonal alternation in Asante Twi has been discussed previously (Paster, 2010; Trommer, 2015; Korsah, S. and Murphy, A., 2020). The challenging account of tonal overwriting has been previously analysed with a floating tonal circumfix and a Contiguity constraint (CONT$_T$: Tautomorphemic tones form a contiguous melody) (Trommer, 2011).

ANALYSIS: The assumption of Gradient Symbolic Representations (= GSR, Rosen, 2016; Smolensky and Goldrick, 2016) in which all phonological elements (tones/ TBU's) have a certain activity directly accounts for the different degrees of overwriting pattern, which is implemented in Colour Containment based analysis (van Oostendorp, 2006; Trommer and Zimmermann, 2014). The crucial high weighted constraint employed to justify the minimal vs maximal overwriting pattern are *FLOAT (which demand association of floating tones to syllable), *DAL (no epenthetic association lines) and the tie-breaker constraint that I propose: ***CONTOUR**$_w$ **(=*CNT**$_w$**)**: Assign X violation for every PrWd associated to two different tones τ_1, τ_2 where X is the shared activity of τ_1 and τ_2 in that PrWd.



This crucial constraint does not allow any contour tone melodies over a PrWd which predicts the correct results in: Ⓐ the floating tone (L_1) only associates to a single TBU; whereas in Ⓑ the Imperative marker's floating (L_3) is so strong that it demands to dock to all TBUs of the verb stem as association to just a single TBU results in higher violation of *Cnt$_w$ compared to the floating L of Past prefix. Thus preference for association of floating tones than realization of underlying tones and the assumption of strength justifies the degrees of overwriting pattern correctly. For the Negative Habitual ($L_{0.5}$), it's low strength justifies the lower violation of crucial constraints: L $\rightarrow$ σ and *FLOAT resulting in realization of the floating L only as a downstep.

Yoruba vowels, openness, and [–ATR]

Markus A. Pöchtrager, University of Vienna, markus.poechtrager@univie.ac.at

Claim. The harmonic behaviour of Standard Yoruba vowels follows from their internal structure if we assume that aperture and [−ATR] share a common property: structure.

Background. Government Phonology (GP) 2.0 (Pöchtrager 2006) reinterprets the element **A** (aperture/coronality) as structural, to explain the behaviour of coronals and non-high vowels. Fudge (1969), Selkirk (1982), or Vaux & Wolfe (2009) assume special syllabic positions for coronals to explain superheavy syllables (VVCC) with both Cs coronal: *fiend* (**fiemp*/**fienk*), *count* (**coump*/**counk*) etc. This leaves unexplained *why* coronals are special. Vowels show similar excesses: S.Brit.Engl. *draft*, *task* have [ɑː] but only one coronal following; the vowel (**A**) compensates (**dreeft*). GP 2.0 reinterprets **A** as structural, with part of the structure unused/available to adjacent segments. (In *fiend* the vowel borrows room from the coronals.) Coronality and aperture (both old **A**) *are* structure; objects thought to contain **A** are bigger (contain more *empty* structure) than those without. The resulting scalar representation of openness captures vowel reduction and stress-related phenomena (Pöchtrager 2018, 2021).

Standard Yoruba (SY) has 7 oral vowels (Bamgboṣe 1967); the higher four [+ATR], the lower three [−ATR] (1). Mid-vowels are [−ATR] when followed by another [−ATR] vowel (mid or low). Thus *a* is a trigger (though not a target); the high vowels are neither, but block harmony (2).

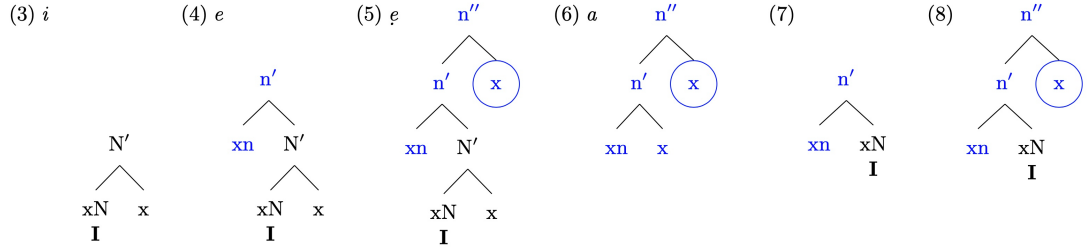
(1)

i	*u*	
e	*o*	[+ATR]
ẹ /ɛ/	*ọ* /ɔ/	[−ATR]
a		

(2)

ẹsẹ̀ 'foot'	**esẹ̀*
ọbẹ̀ 'soup'	**obẹ̀*
ẹ̀pà 'groundnut'	**epà*
Yorùbá 'Yoruba'	**Yọrùbá*

Proposal. [−ATR] means more structure (vis-à-vis [+ATR]), *as does aperture,* but the two differ in internal arrangement. (Schane 1990 for a similar claim leaving the interaction of **A** with structure unexplained, though.) Nuclei have a bipartite structure (Pöchtrager 2018, 2020, 2021) of up to two heads (xn, xN). Each head projects maximally twice (xn/n'/n", xN/N'/N"). A given language has a subset of possible structures; (3–6) show SY *i e ẹ a*. (Aperture is expressed by empty structure; *ẹ* is bigger, but does not contain more empty structure, than *a*.)



The specifier of xn (Specxn, circled) expresses [−ATR]. If a vowel projects up to Specxn (the triggers *ẹ ọ a*), then the vowel to its left will do so, too, *if* it contains xn to begin with: Mid vowels will be [−ATR] *ẹ ọ*, low *a* already contains Specxn (requirement vacuously met), but high vowels lack xn and stay unaffected. Harmonic behaviour follows from internal structure.

Further issues. 1. Archangeli & Pulleyblank (1989) take /i, a, u/ as underspecified for ATR. [−ATR] is filled in in time to make /a/ a trigger, rendering underspecification untestable (Dresher 2009: 125f). No underspecification is required here. **2.** ATR contrasts are diachronically unstable in high vowels; [−ATR] *high* vowels typically merge with [+ATR] *mid* vowels (Stewart 1971). With aperture a function of size and [−ATR] expressed by Specxn, ATR in high (front) vowels requires marked structures (7–8) where two heads are sisters. If those get reinterpreted (by learners) as less marked, such that the lowest level of projection is a projection of xN, while keeping the amount of structure constant, high [+ATR] (7) changes to high (3), identical to SY *i*, and *high* [−ATR] (8) to *mid* [+ATR] (4). That is, [−ATR] is lost, openness gained. **3.** [−ATR] and aperture are similar acoustically (Lindau 1978: 552; Schane 1990). Both lead to a lower F_1 (vis-à-vis [+ATR]/higher counterparts).

Spanish /x/-fronting: gradient or categorical?

Michael Ramsammy & Georges Sakr
University of Edinburgh

In this poster, we report the results of a pilot experiment using Ultrasound Tongue Imaging (UTI) that was designed to test the outcome of vowel-to-consonant coarticulation in Spanish dorsal obstruent realisations. Navarro-Tomás (1972, §134) describes Spanish /x/ as having a velar realisation in the context of following /i/ or /e/, and a uvular realisation before /u/, /o/ or /a/. More extreme fronting of /x/ to [ç] in front-vowel contexts has been documented for varieties like Chilean Spanish (Hualde and Colina 2014; Bolyanatz Brown 2021).

2 speakers of Chilean Spanish, 2 speakers of Colombian Spanish and 4 speakers of Peninsular Spanish took part in the study. Non-word VCV-sequences were used to test the realisation of intervocalic /k/ and /x/. The experiment was implemented in *Articulate Assistant Advanced* (Wrench 2022). UTI with simultaneous audio recording was used to track tongue movements in the midsagittal plane. We focus here on data from /ixi, uxu, exe, oxo, axa/-sequences in which stress was systematically varied (i.e. /V́xV/ vs /VxV́/).

Fitted tongue splines were calculated using GAMs for each speaker to provide a visualisation of the tongue configuration across test contexts. We observe that stress produces small effects on tongue position. As shown in Figure 1, where differences are observable, the tongue generally reaches a higher maximum in post-tonic /V́xV/-contexts than in pre-tonic /VxV́/.

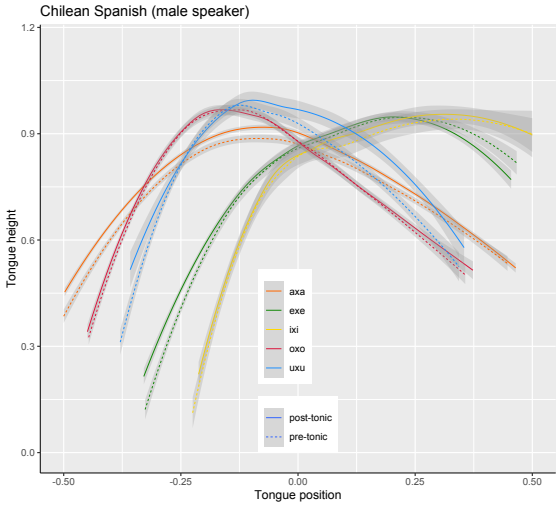


Figure 1: Fitted tongue splines: Chilean Spanish.

Furthermore, there is evidence that Chilean speakers articulate a velar [x] in the context of /u, o, a/, which is characterised by a high dorsum and lowered front body. In the /i/ and /e/-contexts, there is significant root advancement and tongue-tip raising that is consistent with articulation of [ç]. By contrast, the Peninsular and Colombian speakers articulate /x/ with variable degrees of root/dorsum retraction in /u, o, a/-contexts. Unlike the Chilean realisations shown in Figure 1, tongue-tip raising is not observed in front-vowel contexts in the Peninsular and Colombian data.

In sum, our results confirm that the articulatory realisation of /x/ in Spanish varies according to dialect as well as vowel and stress context. We discuss the question of whether the observed patterns support the assumption of a categorical allophonic alternation between [x]∼[ç] in Chilean Spanish (resembling e.g. German *ich*- and *ach*-Laut). In Peninsular and Colombian Spanish, by contrast, the results are more consistent with the assumption that gradient V-to-C coarticulation determines the quality of /x/-realisations.

Michela Russo (UJML 3 & SFL CNRS/U. Paris 8 - mrusso@univ-paris8.fr)

The French liaison and the way it 'moves'. The view from floating '-fix' and beyond

For decades, the phonology of French has devoted much attention to the phenomena of *liaison* (starting from Delattre 1940 and Fouché 1959): when two vowels are in contact at the word boundary, for example a determiner (W_1) and a noun (W_2), a consonant appears between the two words, resyllabified in the onset position of the second W[2] (Selkirk & Vergnaud 1973; Morin & Kaye 1982; Encrevé 1988; Steriade 1999; Sauzet 1999; Tranel 2000; Post 2000; Laks 2011; Pak & Friesner 2006; Encrevé & Scheer 2010; among others):

(1) Chained liaison (mandatory) with definite and indefinite articles (D°)

a.	[ɛ̃]	'un/a' W_1	+	[aʁbʁ]		'arbre/tree'	W_2
	Indef D°	[ɛ̃‿naʁbʁ]		'un arbre/a tree'			W_1W_2
b.	[le]	'les/the' W_1		+	[aʁbʁ]	'arbres/trees'	W_2
	Def D° PL	[le‿zaʁbʁ]		'the trees'			W_1W_2

The mandatory *liaison* in (1) concerns prepositions, determiners and prenominal adjectives to the left of a N category, clitic elements which precede N or V, integrated into the syllabification domain of these categories. According to our Phonology-Syntax approach to the *liaison*[1], in (1d) ([le‿zaʁbʁ] 'les arbres/the trees' [z] is a plural merging morpheme specific to the determiner (D° Art), having a functional plural head structural higher than the pluralizable morphemes within a nominal group (DP), see (2):

[le-**D**… [aʁbʁ -**N**
/ /
z-***PL*** z-***PL***

However, in liaison environments, especially if we consider the alternations in morphological derivations, we find a large number of liaison consonants {t s z d t ʁ l p k g …}; morpho-phonological derivations show in French that in addition to a constant floating consonant as in (1), there are variable floating segments, as in (2) or a constant latency in morphological derivation as in (3), (4) and (5):

(2) Variable Floating Segment/Morpheme

a.	[gʁɑ̃] (MSG) 'grand/big'	[gʁɑ̃d] (FSG)	[t/d]
b.	[gʁɑ̃t‿ami] (MSG) 'grand ami/big friend'	[gʁɑ̃d‿amie] (FSG)	[t/d]
c.	[gʁɑ̃dœʁ] (N F)	'grandeur/greatness'	[d]
d.	[vɛʁ] (MSG) 'vert/green'	[vɛʁt] (FSG) 'verte'	[t]
e.	[vɛʁdyʁ] (N F) 'verdure'		[d]

(3) Liaison and the morphological derivation: constant latency [N], [Adj] or [V]→ [N]

a.	[savɑ̃] (MSG) 'savant/scholar'	[savɑ̃t] (FSG)	[t]
b.	[ʃɑ̃] 'chant/song'	[ʃɑ̃tœʁ] 'chanteur/singer'	[t]
c.	[luʁ] 'lourd/heavy' [luʁd] (FSG)	[luʁdœʁ] 'lourdeur/heaviness'	[d]

(4) [[$_V$dɔʁ] -eur]$_N$ 'dormeur/sleeper'

a.	[dɔʁ] (3^e Pres SG) '(il) dort/ he sleeps'	(V)
b.	[dɔʁmœʁ] 'dormeur/sleeper'	(N)

(5) Suppletion and final variability in adjectives:

[bo] (MSG) 'beau/nice' [bɛl‿ete] 'bel été/nice summer'

These morphemes [s/z], [t/d], [m l…] are inert and merging, licensed by *liaison*. The question is to define the type of accessibility to discontinuous segments through syllabification, and the order of morphemes established by phonology and morphology in those *liaison* environments. Traditional analyses characterize floating consonants either as lexical segments, morphemes or as segments that express a segmental deficiency. In our approach affixes (prefixes, suffixes, infixes, etc.) are concepts derived from phonological processing, the access to phonic content is made through categorial properties (see Paster 2006; Pater 2009). Phonology has an interpretative character; it deals with the internal linearity of segments through a process of structuring. What are the phonological principles of *liaison* involved in those derivational processes? What is the link between the varied set of liaison consonants and the derivations in French? In our approach we consider that floating consonants which occur in the environment of liaison and derivation are morphemes whose phonic content is discontinuous, and that their realization or phonic information depends on the fusion of two or more morphemes. In (a) [vɛʁ], (b) [vɛʁ t] and (c) [vɛʁ d], three morphemes are candidates to realize the *liaison* morpheme. The candidate (a.) [vɛʁ] is chosen because of its fidelity to lexical specifications ([vɛʁ]), but in case of suffixation the dissociated consonant is chosen b. [t] or c.[d]. The discontinuous phono-morphological fragment [t] is an adjectival marker of feminine [vɛʁ t]. Phonological linearization, which organizes morphemes hierarchically, reflects the mirror principle (Baker 1985; Zukoff 2021, 2022), which predicts a parallelism between morphology and syntax, as well as the principle of the right morphological head. Parallel *liaison* derivations will be provided with modern Occitan and medieval French.

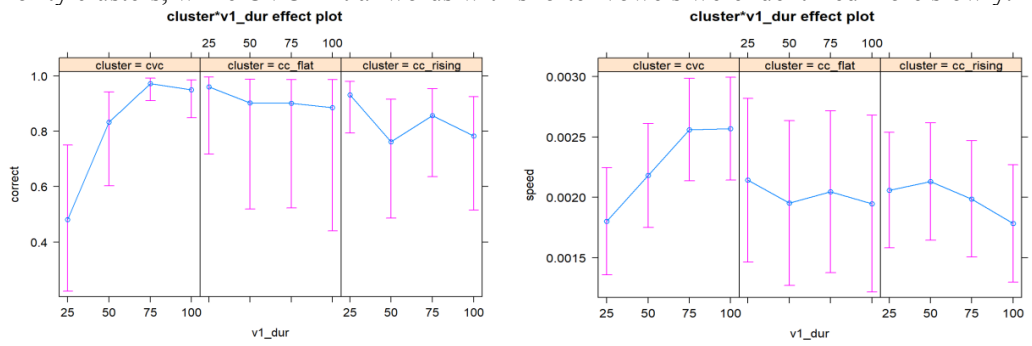
[1] This approach to the *liaison* combine GP = *Government Phonology* and 'Word-Syntax' (Selkirk 1973; Williams 1981; Fabb 1984 ; Baker 1985; Pesetsky 1985; Inkelas 1990; Sauzet 1999; Borer 2001; Zukoff 2022; Kalin 2022). For verbal inflexion see El Fenne (2020).

Perceptual vowel deletion in Polish phonotactic perception

Geoff Schwartz, Kamil Kaźmierski, Zuzanna Cal, Ewelina Wojtkowiak – UAM Poznań

Perceptual vowel epenthesis (e.g. Dupoux et al. 1999, Durvasula & Kahng 2015) typically arises in situations when phonological systems interact, such as L2 acquisition or loanword adaptation. The epenthesis is said to 'repair' ill-formed phonotactic configurations, and is claimed to shed light on what is 'marked' from the perspective of syllable structure. For this reason, research on perceptual epenthesis has focused on speakers of languages with restrictive phonotactics. By contrast, very little research has adopted an opposite strategy, investigating the phonotactic perception of speakers of languages with rich phonotactic possibilities. Considering the fact that Polish is such a language, it is natural to assume that speakers of Polish should have little trouble perceiving consonant clusters. At the same time, however, Polish is known (since Dłuska 1986) to frequently interrupt its clusters with 'intrusive' vocoids (IVs) that are typically not perceived (see Hall 2006).

In this paper, we describe a perception experiment aimed at characterizing the perceptual robustness of IVs to Polish listeners. Participants performed a two alternative forced choice identification task, implemented in E-Prime, in which they declared whether the stimulus item they heard was CCV-initial (e.g. *braki* 'absences') or CVC-initial (e.g. *buraki* 'beets'). The stimuli included a four-step duration continuum (25-50-75-100 ms) of either the base vowel of CVC words or an IV in CCV words. A mixed-effects logistic regression model tested how the interaction of V/IV-duration with base word (CVC-CCV rising sonority-CCV flat sonority) affected listener accuracy. Control variables included age, sex, L1-L2 language experience, formant frequencies of the vowels/IVs, and speaker voice. A similarly structured linear model was fitted for processing speed (1/Response Time). Listeners were highly accurate (Left Figure) in identifying the base items. Both flat and rising sonority clusters were robustly identified even when IVs were as long as 100 ms. IV duration had modest effects on accuracy for rising sonority but not flat sonority clusters. CVC-initial words were identified least accurately in the 25 and 50 ms conditions. For processing speed (Right Figure), effects of IV duration were modest, and observed only for rising sonority clusters, while CVC-initial words with shorter vowels were identified more slowly.



Overall, our results may be characterized as a tendency for 'perceptual vowel deletion' in Polish phonotactic perception, essentially a bias that listeners are more likely to hear CVC sequences as clusters than to perceive IVs as true vowels. Phonologically, such a bias suggests a structural link between CVC-initial and cluster-initial sequences in Polish, regardless of the sonority profile of the cluster. This link is most easily expressed in approaches that assume a prevocalic or 'onset' status of first consonant in the cluster (e.g. Scheer 2004; Schwartz 2016).

Learnability of prosodic end-weight effect in Malay echo reduplication

Jian-Leat Siah, UCLA (jlsiah@g.ucla.edu)

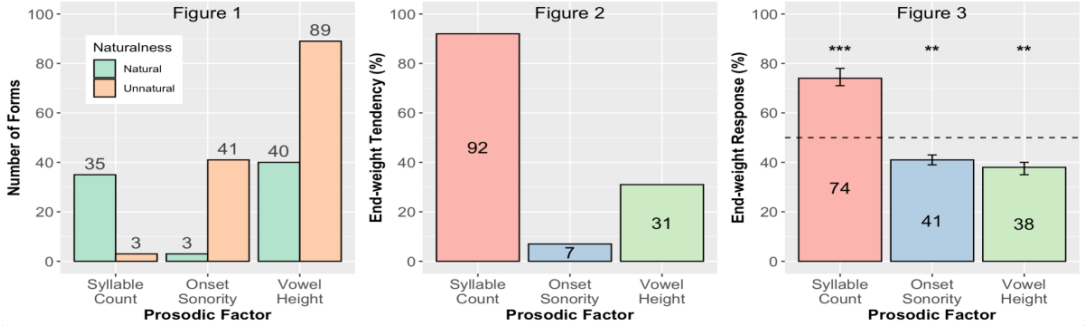
Background: Echo reduplication involves copying of a word with some minor alternation, such as a change in onset consonant (e.g., *helter-skelter*) or a change in vowel (e.g., *pitter-patter*). It often respects prosodic end-weight, whereby the prosodically heavier constituent tends to come second. Several prosodic factors have been shown to contribute to prosodic end-weight, as summarized in Ryan (2019:193). The present study will focus mainly on the effects of syllable count (SC), onset sonority (OS) and vowel height (VH). Typologically speaking, more syllables, less sonorous onsets and lower vowels induce prosodic end-weight more than fewer syllables, more sonorous onsets and higher vowels do.

Motivation: Echo reduplication in Malay is theoretically interesting because both natural and unnatural statistical patterns coexist in the lexicon. As shown in Figure 1 below, the SC factor is predominantly natural in that 35 out of 38 forms have the member with more syllables placed second (e.g., *terang-benderang* 'ablaze'). Figure 2 gives the same observations expressed as percentages. In contrast, the OS and VH factors go against the typology, meaning that there are more forms whose second member contains a more sonorous onset (e.g., *sayur-mayur* 'vegetables') or a higher vowel (e.g., *warna-warni* 'colourful') than the first member. The current study aims to investigate whether these lexical trends differ in terms of their learnability. That is, are the typology-matching patterns more readily internalized and extended to novel contexts by native speakers of Malay than the typology-defying patterns?

Method: To this end, 54 native speakers of Malay residing in Malaysia were recruited and completed an online wug test in which they had to choose between two orders (e.g., *madik-madak* vs. *madak-madik*) for 45 echo-reduplicated wug items each. All the wug items obeyed Malay phonotactics and were created by manipulating the prosodic factors discussed above. Only a subset of the wug items (3 for SC, 12 for OS, 8 for VH) is relevant for the present study.

Results: The results for the wug test are given in Figure 3. Overall, the subjects' responses matched the lexical trends but with some divergences. The SC factor is relatively well-learned, as 74% of the time the subjects chose the order that was typologically natural. However, the unnatural OS factor is under-learned compared with the natural SC factor. To illustrate, the discrepancy between the experiment and the lexicon for the natural SC factor (|74%−92%| = 18%) is smaller than the one for the unnatural OS factor (|41%−7%| = 34%), suggesting that the former is learned better than the latter. Interestingly, the equally unnatural (but highly attested) VH factor is properly learned, as the subjects' responses closely matched the statistical distribution in the lexicon. The results mentioned above were confirmed with a mixed-effects logistic regression model using the *glmer* function from the *lme4* package (Bates *et al*. 2015).

Implications: The present study lends support to the Law of Frequency Matching that is well-attested in previous literature (Ernestus & Baayen 2003, Hayes *et al*. 2009, Zuraw 2010). Moreover, the current findings also suggest that unnatural patterns are in fact learnable if the learner is provided with enough evidence (White 2017), calling for a more nuanced interpretation of the 'surfeit of the stimulus' effect reported in Becker *et al*. (2011, 2012).

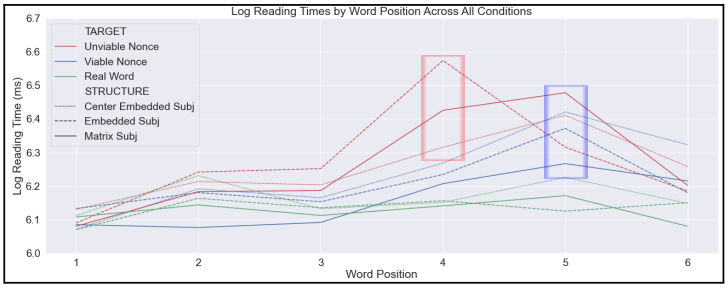


The Relationship between Phonological Viability and Syntactic Complexity

John R. Starr, Marten van Schijndel, Helena Aparicio (Cornell University)
jrs673@cornell.edu

In this study, we examine the phonology-syntax interface, focusing on how phonotactic viability interacts with online processing of different syntactic structures. **Experiment.** We ran a self-paced reading experiment (N=40) where participants read 27 sentences with different phonotactic TARGETS in certain STRUCTURES (Table). Each TARGET (rows in Table) varies phonotactic viability in the onset position: REAL targets are words in the lexicon ("brick"), VIABLE targets are phonotactically-valid gaps in the lexicon ("blick"), and UNVIABLE targets are phonotactically-invalid words ("bnick"). Each STRUCTURE (columns in Table) increases syntactic difficulty: MATRIX clauses are the least difficult to process, EMBEDDED clauses more difficult, and CENTER-EMBEDDED clauses most difficult (Rayner et al. 1992). All TARGETS appear in a fixed position (position 4); the words in positions 5 and 6 were identical across all conditions. We collect reading times (RTs) at all positions, with higher RTs indicating increased processing. **Results** are visualized in the Figure; all findings have been statistically confirmed with linear mixed-effects models. We focus on comparisons between UNVIABLE and VIABLE targets to unveil the influence of phonotactic viability when processing each STRUCTURE. We find that UNVIABLE targets lead to longer RTs than VIABLE and REAL targets in all STRUCTURES at position 4 (red box in Figure). These results suggest phonotactic unviability strongly influences the initial processing of the TARGET, regardless of STRUCTURE. However, prior work notes that syntactic processing occurs after the initial display of the stimulus (Van Gompel & Pickering 2006). As such, we examine position 5. We report a significant increase in UNVIABLE RTs compared to all other TARGETS for the MATRIX condition, but no significant increase in RTs compared to VIABLE targets for both the EMBEDDED and CENTER-EMBEDDED conditions (blue box in Figure) in position 5. **Discussion**. These findings suggest that the phonological influence on syntactic processing after the initial stimulus is most present when syntactic difficulty is low, while more complex syntactic structures reduce the impact of phonological viability. In total, these results are inconsistent with a strictly modular view of the grammar previously proposed (Chomsky 1965; inter alia): phonology is independent at first (position 4), but then interacts with syntax later on (position 5). Instead, we support previous offline research that shows a bidirectional relationship at the syntax-phonology interface, such as studies on flexible-ordering phenomena like binomials (Benor & Levy 2005; Ryan 2017), genitive/dative constructions (Shih 2017), and noun-adjective pairs (Blake 2022).

	Matrix Subject	Embedded Subject	Center-embedded Subject
Real Word	Last night the brick smashed through …	I hoped the brick smashed through …	The window the brick smashed through …
Viable Nonce	Last night the blick smashed through …	I hoped the blick smashed through …	The window the blick smashed through …
Unviable Nonce	Last night the bnick smashed through …	I hoped the bnick smashed through …	The window the bnick smashed through …



YO CREO QUE FUE UN SÁ...

SPANISH STRESS AND WORD RECOGNITION

D.P. VAN SOEREN | D.P.VAN.SOEREN@RUG.NL | UNIVERSITY OF GRONINGEN + COLUMBIA SCHOOL LINGUISTIC SOCIETY

If listeners hear the Spanish utterance *Yo creo que fue un sa…* 'I think it was a sa…', the monosyllabic fragment /sa/ is likely to prime lexical items in the mind that begin with /sa/, such as *sábado* 'Saturday' or *salón* 'sitting room', and inhibit word candidates that do not start with /sa/ such as *vuelo* 'flight'. This is because the speech comprehension process is incremental (Weber & Scharenborg 2012; Nooteboom 1981); listeners do not wait until the end of an utterance before they process it.

Importantly, there is substantial evidence that in Spanish, words with a mismatching stress pattern are also inhibited (Soto-Faraco et al. 2001). In other words, listeners take account of prosodic differences between stressed and unstressed syllables, and it helps to reduce the number of word candidates.

This phenomenon has been tested in several word priming studies. In a study by Soto-Faraco et al. (2001), speakers heard neutral Spanish sentences ending with a word fragment that matched one potential word and differed from a second option in the position of the stress, in such a way that in a phrase like *Él vio un libro sobre el prin**ci**…* 'He saw a book about the prin**ci**…', the fragment *prin**ci***– (bold indicates stress), matched the first two syllables of the word *prin**ci**pio* 'beginning' and differed only in stress from the first two syllables of ***prín**cipe* 'prince'. Subsequently, the participants needed to decide as fast as possible whether a visually presented word was an existing word or a nonword. Their response time to target words (e.g. 'PRINCIPIO', 'PRÍNCIPE') indicated if the prime activated the matching target word (faster response time) and inhibited its mismatching competitor (slower response time). The stress-matching words were always recognised faster than the stress-mismatching words, clearly indicating the activation of the stress-matching word. Similar results were found in equivalent experiments for English and Dutch (Cooper, Cutler & Wales 2002; Van Donselaar, Koster & Cutler 2005).

Based on this evidence, we can conclude that stress information from the first two syllables of a word facilitates word recognition. This begs the question whether a similar experiment with monosyllabic primes would yield the same results. Therefore, we carried out an adjusted replication of the aforementioned priming experiment, in which the disyllabic primes are replaced with monosyllabic ones. We hypothesised that a prime like stressed **sá**– would prime ***sá**bado*, but inhibit *sa**lón***.

Condition	Prime (e.g.)	Target (e.g.)	Response time
Match	sá–	SÁBADO	588 ms
Mismatch	sa–	SÁBADO	619 ms
Control	vue–	SÁBADO	636 ms

Table 1. Average response times for each condition.

Table 1 shows that, as expected, the fastest response times are recorded in the Match condition (588 ms). The recognition of a target is inhibited if it starts with the same syllable, but mismatching stress. The slowest response time, however, is observed in the Control condition, where the prime shows no segmental overlap with the target.

Two logical operations underlie all major types of segmental alternations

Veno Volenec (Concordia University | veno.volenec@concordia.ca)
Johanna Benz (University of Pennsylvania | jbenz@sas.upenn.edu)

Purpose. In Logical Phonology (LP; Volenec & Reiss 2020; Reiss 2021), where rules are conceptualized as set-theoretic operations, a single feature-changing alternation such as voicing assimilation needs to be modeled by two rules: first, *set subtraction* removes a feature, and then *set unification* adds a feature with a different value. Superficially, this looks like an unwarranted complication of the simpler *SPE*-style framework (Chomsky & Halle 1968; Kenstowicz 1994), where such alternations can be captured with a single rule; for voicing assimilation, this rule is '–SON → αVOI / __ –SON, αVOI'. Here we show, however, that the reconceptualization of '→' as set subtraction and unification is empirically motivated by the attested types of segmental alternations: some alternations only utilize subtraction, some only unification, and some their combination. *SPE* rules, in contrast, offer no formal means for distinguishing between the removal, addition and replacement of features; the arrow '→' actually has a different meaning depending on the type of alternation. We also show that the existence of representational underspecification follows directly from the logic of set subtraction in LP, while *SPE* rules fail to relate it explicitly to phonological computation.

Definitions. A segment is a set of valued features enclosed in curly brackets: {...}. A natural class is a set of segments enclosed in square brackets: [...]. It is stated by listing all of the features that are shared by all of the segments in the class. Set subtraction: If A and B are sets of features, then A – B results in the set that contains all and only the features of A that are not features of B. Set unification: If A and B are sets of features, then A ⊔ B results in the smallest set that contains all the members of A and all the members of B. A ⊔ B cannot yield a set/segment that contains features of opposite values; it fails in that case, giving an unchanged output.

Analysis. Subtraction alone accounts for debuccalization, i.e., the removal of place features from a segment. For example, Arbore debuccalizes glottalized obstruents in codas: beːkʼ.taw and dʒédˀ.lo surface as beːʔ.taw and dʒéʔ.lo (Hayward 1984). In LP, this is stated as '[–SON, +GLOT] – PLACE / in CODA'. In full segment deletion, subtraction removes *all* of the features from a targeted segment. In Karok, /i/ is deleted when followed by another vowel: ni-axjar surfaces as naxjar (Harris 2011). This is analyzed as '[–CONS, +HIGH, +FRONT] – {–CONS, +HIGH, +FRONT, ...} / __ [–CONS]'. Unification alone accounts for feature-filling alternations, i.e., the adding of features into underspecified segments. Turkish /D/, which is underspecified for voicing, is filled in with +VOI in onsets (Bale et al. 2014). This is modeled as '[+COR, –CONT] ⊔ +VOI / in ONSET'. The targeted class contains /t/, /d/ and /D/; unification with /t/ fails because a segment cannot have both +VOI and –VOI; it does not alter /d/ because /d/ already has +VOI; and /D/ receives +VOI and surfaces as d. Epenthesis unifies an entire segment (*qua* set of features) with ø (the empty set). In Lebanese Arabic, /i/ is inserted into coda CC clusters: kibʃ surfaces as kibiʃ (Hall 2011). This is modeled as 'ø ⊔ {–CONS, +HIGH, +FRONT, ...} / C__C'. Finally, in feature-changing alternations such as assimilations and dissimilations, subtraction first removes features, yielding underspecified segments, and unification then adds differently valued features. Croatian voicing assimilation (Volenec 2020) is modeled thus: '[–SON] – +VOI, –VOI / __ [–SON]' followed by '[–SON] ⊔ αVOI / __ [–SON, αVOI]'.

Conclusion. LP posits two logical operations—set subtraction and unification—to account for all major types of segmental alternations, while explicitly differentiating feature deletion, addition and replacement on formal grounds. Unlike *SPE*-style phonology, LP formally shows that a feature-changing alternation is merely feature deletion followed by addition, both of which are attested independently. The existence of underspecification simply follows from the logic of subtraction in LP, while it remains unrelated to the computational aspect of phonology if rules need to use the less precise arrow '→'.

Sources of paradigm uniformity in Káínai Blackfoot nouns

Natalie Weber (Yale University)

Overview Phonological variation across speakers may be due to (a) different lexical representations, or (b) different grammars. This paper focuses on a pattern of consonant deletion at the right edge of some noun stems in Blackfoot (Algonquian), which varies both across and within speakers. The phonological conditions for deletion create different empirical predictions for the two hypotheses of phonological variation, which I test with experimental data.

Patterns Some Blackfoot noun stems end in a 'non-permanent' *m*, *n*, or *s* which is present before certain suffixes (Frantz 2017: 12). In (1a) the non-permanent *n* is present before the singular suffix *-i* but absent before the plural suffix *-istsi*. Other stems end in *n* in both contexts, (1b), or a vowel in both contexts, (1c). Examples are from the dictionary (FR; Frantz & Russell 2017).

(1)	*Singular*	*Gloss*	*Plural*	*Gloss*	
a.	maotoyóópa**n**-i	'rye grass'	maotoyóópa-istsi	'rye grasses'	[FR 146]
b.	ponopaa**n**-i	'quiver'	o-nnopáá**n**-istsi	'his quivers'	[FR 146]
c.	niítahtaa-yi	'river'	niítahta-istsi	'rivers'	[FR 159]

Corpus study A corpus study of the dictionary (Frantz & Russell 2017) shows that permanency is strongly conditioned by phonological factors. Out of the 657 entries for noun stems ending in *m*, *n*, or *s* which contain a plural example, 51.75% stems included a non-permanent consonant (i.e. a consonant which does not appear in the plural example). These are not distributed evenly across the lexicon. Non-permanent consonants occur frequently in stems which end in a short vowel (V) and short consonant (C) (328/363 entries= 90.358%). Non-permanent consonants are rare in stems with a final long vowel (VV) plus C (10/212 = 4.717%) or a final long consonant (CC) (2/82 = 2.439%). No stems end in a long vowel (VV) plus long consonant (CC).

Analysis Non-permanent consonants occur only in bare nouns (Bliss 2018; Weber & Matthewson 2014) and before the singular suffix, suggesting that non-permanent consonants are parsed to a coda position before the singular suffix, (2a). Deletion then arises due to paradigm uniformity: stem-final consonants should be parsed to the same syllable position across a paradigm. Deletion is the preferred strategy to avoid mismatches, (2b).

(2)				
a.	[mɔː.to.jó.pɐ**n**.ʔi̥]	maotoyóópa**n**-i	'rye grass'	([n] = coda)
b.	*[mɔː.to.jóː.pa.**n**i.ˢtsi̥]	*maotoyóópa**n**-istsi	'rye grasses'	([n] = onset; avoided)
	[mɔː.to.jóː.pɛː.ˢtsi̥]	maotoyóópa-istsi	'rye grasses'	([n] = deleted; preferred)

Assuming there is a constraint (``OO-Coda'') requiring correspondence of syllable position across outputs (Benua 1997; Burzio 1994), this constraint ranking captures consonant deletion: {Dep-μ, Max-μ, Dep, OO-Coda} ≫ Max. High-ranked Max-μ prevents deletion in VVC and VCC stems.

Experiment I recorded a wordlist in 2017 with seven speakers of the Káínai Blackfoot dialect (ages: 50–70). The wordlist contained 52 noun stems ending in *m*, *n*, or *s* divided among the three stem shapes above. Speakers recorded the wordlist in singular and plural contexts. Preliminary examination of the data reveals paradigm uniformity effects: VC stems frequently have final consonants in all contexts, though the stems which do this differ across speakers. I will test the predictions of two sources of phonological variation. If speakers have reanalyzed the stem, the final vowel or consonant should be relatively longer than other short segments; speakers have induced a different grammar with demoted OO-Coda, all consonants should be permanent.

Stress, tone, and prosodic word in Wenzhounese

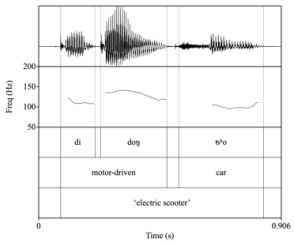
Chen Xie (chen.xie@ling-phil.ox.ac.uk), University of Oxford

In Wenzhounese, a Wu dialect in China, there are four tonal categories (I, II, III, and IV) that each divide into two registers (a = high; b = low) depending on the phonation of the syllabic onset (Rose, 2000). In total, there are eight lexically contrastive tones (Ia, Ib, …, IVb) which surface when a syllable (which usually corresponds to a morpheme) is uttered in isolation. However, in polysyllabic words, tonal contrast is radically neutralised, a processed often referred to as tone sandhi. In Wenzhounese, tone sandhi in disyllabic words is "right-dominant", i.e. it is usually the case that the second syllable retains its citation tone, while the first syllable undergoes tone sandhi. This right-dominance has been argued to result from iambic stress (M. Y. Chen, 2000: 500; Duanmu, 2007: 304ff).

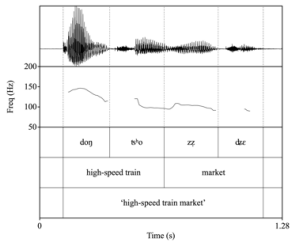
There are three problems with the putative iambic stress account. First, its perception to native speakers is elusive. Second, its acoustic correlates, if any, are yet to be identified. The Iambic-Trochaic Law predicts that duration would be a cue to stress in iambic languages, but this is not borne out: for example, I compared the duration of IIIa tones in the first (n = 39) and second syllable (n = 16), and found no significant difference (t = -0.61, df = 18.96, p = 0.54). Third, Rose (2011) demonstrates that for some disyllabic pairs, the first syllable is much longer than the second, hence featuring a trochaic pattern. As such, there is no strong evidence for iambic stress in Wenzhounese, so the right-dominant pattern requires a different analysis.

Although how tone sandhi interacts with stress remains elusive, there is a clearer relation between tone sandhi and the prosodic word. Disyllabic tone sandhi applies within disyllabic prosodic words (Scholz, 2012). I will argue that the prosodic word is also the domain for lexical tone sandhi processes in longer compounds, the evidence being the distribution of the depressor effect. Rose (2002) observes that low register tones with high falling pitch have a lowered pitch onset, called "depression". His investigation of disyllabic words shows that the depressor effect only occurs on the initial syllable. However, I have found that in longer compounds, the depressor effect can occur word-internally in Wenzhounese.

(1)



(2)



In (1), the morphosyntactic structure is [[di doŋ] tsʰo], but the prosodic structure is (di (doŋ tsʰo)) because the final two syllables are the domain for disyllabic tone sandhi, after which the initial syllable /di/ undergoes trisyllabic tone sandhi. We can see that the pitch onset of /doŋ/ is depressed. By contrast, the quadrisyllabic compound in (2) has two disyllabic tone sandhi domains, (doŋ tsʰo) and (zʐ dʑɛ), each marked by the depressor effect on the initial syllable.

A plausible explanation is that the depressor effect is a cue to the left edge of the prosodic word, which is organised recursively in (1) and (2), i.e. (ω σ (ω σσ)) and (ω (ω σσ) (ω σσ)), respectively. That (2) is dominated by a higher prosodic word is supported by quadrisyllabic tone sandhi in some varieties of Wenzhounese (Zhengzhang, 1964). These findings suggest that the prosodic word can be defined in phonology proper without reference to syntax (see also Lahiri & Plank 2010, 2022), and that there is internal structure within the prosodic word.

Testing OCP and Tonal Markedness Scale in L2 tonal perception

Chao Zhou & João Veríssimo, University of Lisbon,
zhouchao@edu.ulisboa.pt & jlverissimo@edu.ulisboa.pt

Background: Acquiring Mandarin lexical tones poses a great challenge to learners without tonal language experience. Beyond learners' previous linguistic knowledge, some phonological universals also seem to be at play in L2 tonal acquisition, namely the Obligatory Contour Principle (OCP; Leben 1973) and the Tonal Markedness Scale (TMS; Rising > Falling > level; Ohala 1978, Hyman & Vanbik 2004). Zhang (2016) assessed the production of Mandarin tone sequences by native speakers of three non-tonal languages (English, Japanese and Korean) and reported that learners avoid using identical lexical tones on adjacent syllables (OCP effect), especially the contour tone sequences (TMS effect: contour tones T4 and T2 are more marked than level tones T1). On the basis of mainstream L2 speech theories (Flege 1995; Best & Tyler 2007), where a tight link between L2 speech perception and production is assumed, one would expect that these two phonological universals likewise shape L2 tonal perception.

Current Study: This study examines whether OCP and TMS play a role in the L2 perception of Mandarin tone sequences by native speakers of a non-tonal language. L1-Portuguese learners of Mandarin (n=59) participated in a forced-choice identification task with disyllabic pseudo-words in Mandarin (n=96) displaying identical (T1T1, T2T2, T4T4; n=16×3) or non-identical tone sequences (T1T2, T2T1, T1T4, T4T1, T2T4, T4T2; n=12×6). The same 96 syllables were used in the two conditions, and were matched for identical tone sequences in their frequency, homophone density and phonological neighborhood density (DoWLS-MAN; Neergaard et al. 2022).

Results & Discussion: Data was analysed with mixed-effects logistic regression. A main model fitted on all responses did not reveal an effect of condition on identification accuracy ($M_{identical}$=46%; $M_{non\text{-}identical}$=46%). Therefore, we found no evidence of the OCP on L2 Mandarin tone perception. If OCP operated, it would convert identical responses into different ones, thus lowering the identification accuracy in the identical condition. A second model focused on responses to identical tone sequences (M_{T1T1} = 56%, M_{T2T2} = 33%, M_{T4T4} = 53%) to examine the effect of TMC. The results showed that learners' accuracy was lower on T2T2 than T4T4 (b = -1.15, 95%CI = [-1.69, -0.61], $p < 0.0001$), indicating that rising tone is indeed the most difficult one. But there was little evidence for a difference between T4T4 and T1T1. In a third model, identical tone sequences were further split into separate tones (first tone: T1, T2, T4; second tone: T1, T2, T4) to test whether the TMC interacts with word-level position. In word-initial position, counter tones were more difficult than the level tone (b = 0.68, 95%CI = [0.22, 1.14], p = 0.0034), but the rising tone was not less accurate than the falling one, largely in line with what TMC predicts. In word-final position, L1-Portuguese learners were actually more accurate on T4 than T1 (b = 1.16, 95% CI = [0.59, 1.74], $p < 0.0001$), which may have reduced the difference between T4T4 and T1T1 in general.

Taken together, these results do not support an effect of OCP in the L2 perception of Mandarin tones by L1-Portuguese Learners. There might be an effect of TMC in identifying identical tone sequences, but it is largely overshadowed by the positional effect on T4 acquisition (the falling tone may be favoured in utterance-final position in an intonational language like Portuguese; Broselow et al., 1987). The weak evidence of phonological universals in L2 tonal perception can be ascribed to the fact that L2 speech perception and production are inherently different (Ramus et al. 2010; Boersma 2011), or the OCP is actually a language-specific structural constraint, rather than a universal bias (Boll-Avetisyan & Kager, 2014).

Special Session

The prosodic hierarchy: structure and performance

Jelena Krivokapić (University of Michigan)

One of the fundamental questions in prosodic theory is how many prosodic categories exist in the prosodic hierarchy above the level of the word. Most theories assume a small set of prosodic categories. An alternative view suggests that there is one prosodic category that can vary in strength. I examine these two opposing views, focusing on how research on recursion, phonetic gradience, and individual variability inform us about the prosodic hierarchy. I further discuss how we can relate these findings to the function of prosodic phrases.

On headedness and layers in the Prosodic Hierarchy, with special attention to the foot

Violeta Martínez-Paricio (Universitat de València)

The strong hypothesis of the Prosodic Hierarchy (PH) postulates that there is a small set of universal prosodic categories (syllables, feet, prosodic words, phonological phrases, intonational phrases and utterances) organized in a hierarchical way. However, prosodic studies on different languages have argued in favor of introducing additional language-particular categories in the PH, hence, weakening the strong version of the hypothesis.

A possible solution to this challenge has been explored in the work of Itô & Mester (2007, 2009, 2012, 2013, 2021 *inter alia*). These authors have argued that the fixed number of universal prosodic primitives can still be maintained if the structural possibilities of the hierarchy are enlarged through recursion. Just as syntax displays recursion, it is proposed that prosodic *interface* categories (i.e., supra-foot categories) may display recursion, giving rise to additional layers in the PH. Crucially, these layers do not constitute new prosodic categories, but are instances (i.e. minimal/maximal projections) of existent categories. This line of research makes different predictions to one in which new independent categories are posited (Bennett 2018).

In this talk I will argue that, whereas *true recursion* in the sense of Pinker & Jackendoff (2005: 203) — the combination of two or more categories into one of equal nature, e.g. $(k\ k)_k$ (i.e., *balanced recursion* in terms of van der Hulst 2010: 320)— is unlikely to take place below the prosodic word, unbalanced (and limited) recursion via adjunction (e.g. $(k\ i)_k$ is possible at the foot level. I will summarize the empirical evidence and major predictions of a model that allows for Internally Layered Ternary (ILT) feet (i.e. feet with an adjoined syllable, (Ft σ)$_{\text{Ft}}$) and argue that, in some languages, such structures arise as a last resort device to ensure exhaustivity. Importantly, this ILT foot is not a distinct category to the foot: both are instances of the same category, with slightly different structural relations. Furthermore, I will argue that the stipulation that feet only permit unbalanced and limited recursion —as opposed to higher categories— is probably a natural consequence of the notion (and definition) of headedness below the prosodic word, as well as the different nature of lower and higher prosodic categories in the PH. Finally, I will discuss some of the potential shortcomings of a prosodic model that incorporates ILT feet in prosodic representations and discuss future lines of research to test the ternarity and layeredness hypotheses at the level of the foot.

References

Bennett, R. (2018). Recursive prosodic words in Kaqchikel (Mayan). *Glossa* 3: 1–33.

Hulst, H. van der (2010). A note on recursion in phonology. In Hulst, H. van der (ed.) *Recursion and Human Language*, 301–42. Berlin: Mouton de Gruyter.

Itô, J. and Mester, A. (2007). Prosodic adjunction in Japanese compounds. In Miyamoto, Y. and Ochi, M. (eds.) *Formal Approaches to Japanese Linguistics: Proceedings of FAJL 4*. MIT Working Papers in Linguistics 55, 97–111. Cambridge: MIT Department of Linguistics and Philosophy.

Itô, J. and Mester, A. (2009). The onset of the prosodic word. In Parker, S. (ed.), *Phonological argumentation: Essays on evidence and motivation*, 227–60. London: Equinox.

Itô, J. and Mester, A. (2012). Recursive prosodic phrasing in Japanese. In Borowsky, T., Kawahara, S., Sugahara, M. and Shinya, T. P*rosody Matters. Essays in Honor of Elisabeth Selkirk*, 280–303. Sheffield and Bristol: Equinox.

Itô, J. and Mester, A. (2013). Prosodic subcategories in Japanese. *Lingua 124*, 20–40.

Itô, J. and Mester, A. (2021). Recursive prosody and the prosodic form of compounds. *Languages*, *6*(2), 65.

Pinker, S., & Jackendoff, R. (2005). The faculty of language: what's special about it? *Cognition*, *95*(2), 201-236.

The too many tools problem in phonology:
Multiple Phonologies + Prosodic Hierarchy = unfalsifiable theories

Heather Newell (Université du Québec à Montréal)

This Special Session asks, "Is there a prosodic hierarchy, and if so, what does it consist of?" and notes that asking this question "has led to positions where there is no prosodic hierarchy (i.e. no constituents at and above the word level)". This talk proposes to examine some of the reasons why one might promote such a position in the face of the abundance of work in Generative Phonology that holds the Phonological Word and higher levels of the Prosodic Hierarchy (PH) to be necessary.

Let us consider the two (related) arguments in the literature in favour of the PH. The first is known as non-isomorphism, and claims that there are phonological domains that cannot have sources other than the PH (ex. phases, strata, direct reference). The second claims that phonological computations or representations refer crucially to the PH (ex. affixation to a PWd, stress-assignment applying within a PWd).

(1) Arguments for the Prosodic Hierarchy:

A. Non-isomorphism:
   The domains of phonological operations are determined by the Prosodic Hierarchy, rather than being determined directly by syntactic domains.
B. Reference to prosodic structure:
   Phonological rules, constraint-rankings, or lexical entries refer to prosodic categories.

In addition to the above, most frameworks that make use of the PH hold the following:

(2) The Many-Phonologies Hypothesis:

There are different phonologies (rules or rule-ordering/constraint rankings or weights) in each different phonological cycle. These phonologies make crucial reference to the Prosodic Hierarchy, which is built at the interface between syntax and phonology.

Not all phonological frameworks hold both (1) and (2) to be true, but there is a strong correlation in the literature whereby a framework that postulates (1) will postulate (2). It is argued here that this combination leads to an abundance of unfalsifiable analyses in the phonological literature.

Before discussing the falsifiability of proposals within certain frameworks, we can note that almost all phonologists hold the following assumptions, regardless of their position on the PH or on the existence of multiple phonologies.

(3) Common non-PH postulates:

A. There are non-interface phonological structures. These structures include some subset of feet/metrical grids, syllables/CVs/morae, segments (which may be underspecified), and features/elements.
B. There is a procedural algorithm that is used to determine where/when/which domains will undergo phonological computation (ex. Match, phases, strata).

Keeping the postulates in (3) constant, and considering the variables of whether the PH (1) or Multiple Phonologies (2) exist, we get the following results with regard to falsifiability:

I Many Phonologies + PH	II One Phonology + PH
III Many Phonologies, No PH	IV One Phonology, No PH

The scenario in I has the potential to capture any possible phonological pattern. If one allows different phonologies at each phase/cycle or morphologically-conditioned phonologies, as well as iterative hierarchical prosodic structures, it is hard to see how such a theory could be falsifiable.

The scenarios in II and III allow either different phonologies at each phase/cycle/ morphologically-conditioned phonologies (III), or iterative hierarchical structures (II). As these permit no meta-theoretical limit on the number of cycles/phonologies/structures allowed, it is difficult to determine how such theories can be falsified.

Clearly the above statements cannot cover all of the individual details of every framework of type I-III, but each of the frameworks that fall within these categories may easily find themselves unfalsifiable.

Scenario IV is the only option above that makes clearly falsifiable claims at face-value. It does not allow morpheme-specific phonologies, co-phonologies, or stratal phonologies. It does not allow prosodic structure at the PWd and above. Scenario IV might be wrong, but we can easily test it, and we need to re-prioritize testing our basic assumptions. One might retort that IV *has been* falsified. But, as pointed out in Scheer (2011:§365), this is not true, as it has never been tested. Phonological theory rejected SPE's # and + diacritics, and directly replaced them with the PH.

I propose that pushing scenario IV can solve many problems associated with the PH. First, the original theoretical underpinning of Prosodic Phonology is largely faulty (Newell 2017). Non-isomorphic patterns have become much rarer as syntactic theories have become more advanced. Second, cross-linguistic discord between syntactic and prosodic domains (ex. whether XPs or X^0s correspond to PWds) increasingly reduces the explanatory power of the PH. Third, if we take the postulates in (3) seriously, then we can do away with the need for the PH and with multiple phonologies (and their correlates, like Bermúdez-Otero's (2011:2023) Russian Doll Theorem).

If the postulates in (3) suffice (IV is not falsified), then the PH must be superfluous. In addition to the theoretical discussion above, we will discuss how analyses in the literature proposed to require reference to the PH may be reanalysed without it.