Open Library of Humanities

Metrically-conditioned syncope in Strict CV metrics

Noam Faust, Universtité Paris 8/CNRS SFL, FR, noam.faust@univ-paris8.fr

The Strict CV metrics approach (Scheer & Szigetvári 2005; Ulfsbjorninn 2014) claims that once empty V-slots are factored in, moras are unnecessary. Instead, a grid-based analytic tool of Incorporation has been proposed and used in past analyses (Faust & Ulfsbjorninn 2019; Ulfsbjorninn 2014; 2021). In this paper, the theory is applied for the first time to the phenomenon of metrically-conditioned syncope, based on data from Mojeño Trinitario (Rose 2019). The analysis is compared to the moraic account proposed by Rose. The framework is then showed to be insightfully applicable to another language with similar patterns, namely Tonkawa (Gouskova 2003; 2007).

1 Introduction

Originating in the formalization of poetic meter, moras feature prominently in mainstream analyses of a myriad of phonological phenomena, such as stress-to-weight effects, minimality requirements, compensatory lengthening etc. (Hayes 1995 and references therein). However, within the less mainstream approach of Strict CV (Lowenstamm 1996; Scheer 2004), there is reason to think that moras are redundant. This theory of phonological representations argues that all skeletal tiers consist of iterated CV units. To illustrate, a word like Palestinian Arabic [færʒéːti] 'you(f.) showed' (own data) is represented with an empty V-slot (underlined) between the two phonetically adjacent consonants. The representation of long vowels also involves two V-slots, of which the second can be regarded as lexically empty and filled by spreading (hence the dashed arrow).

(1)   Palestinian Arabic [færʒéːti] 'you(f.) showed' in strict CV

Traditional analyses of syllabic weight regard (1) as being composed of two heavy syllables [fær] and [ʒeː], and a light syllable [ti]. In order to express the equal heaviness of [fær] and [ʒeː], every nucleus is said to project a mora; long vowels project two moras; and codas like [r] also project a mora. But in Strict CV the formulation becomes simpler. Heavy syllables of both types span two CV units, and light syllables span only one CV unit. Within this approach, the weight distinction expressed by moras is reduced to the number of V-slots employed in a syllable. Since V-slots are independently necessary (at least within Strict CV), moras are redundant.

And yet, possibly because moras are such a popular analytic tool, and thus any alternative to moraic analyses will have to face fierce opposition, little work has been conducted in Strict CV on metrical issues such as stress assignment in weight-sensitive languages. It is only recently, in Ulfsbjorninn (2014), that a tool was proposed in this framework to formalize the enhanced weight of CVC and CVV syllables *without* appealing to moras. According to Ulfsbjorninn, weight can be regarded as the result of an operation of "Incorporation", whereby the metrical significance of an empty V-slot is added to that of a preceding nucleus.

The representations in (2) illustrate. Incorporation operates within a grid-based approach to metrical structure (e.g. Halle & Vergnaud 1987). All metrically-significant V-slots project at least once, to L1. Then, as mentioned, the projections of empty, metrically-significant V-slots are incorporated into those of adjacent contentful V-slots. The latter therefore project higher than contentful slots that are not incorporators; in consequence, they attract stress. In (2), the first and third nuclei of [færʒéːti] 'you(f.) showed' are initially full, and project to L1 (2a). In Palestinian Arabic, non-final empty nuclei are also metrically-significant, so they also project to

L1. Incorporation then applies, adding the projections of the empty nuclei to the nuclei to their left.[1] Thus, both the first and the third nuclei project to L2. Stress in Palestinian is assigned to the rightmost nucleus that projects to L2 (for other configurations, see Faust & Ulfsbjorninn 2019).

(2)   Incorporation in Palestinian Arabic [færʒéːti] 'you(f.) showed' in strict CV Metrics
         a.   Before ncorporation   b.   After incorporation

The logic and limitations of incorporation are discussed further below. Note that for the syllable [fær], the view in (2) parallels the notion of moraic codas in classical moraic theory, whereby a consonant is syllabified with a preceding vowel and adds to the weight of the syllabic rhyme. But again, crucially, in Strict CV the source of projection is always a nucleus (empty or full), never a consonant.[2]

Since incorporation is a rather recent tool practiced within a minority approach, its empirical coverage is of course not yet full. Faust & UIfsbjorninn (2019) cover the weight effects from Palestinian Arabic using incorporation (and compare the analysis with a moraic account); and other effects traditionally associated with moras, such as word-minimality, metrically-conditioned gemination and metathesis, are dealt with in Ulfsbjorninn (2021). One phenomenon that has not yet been treated within Strict CV metrics is metrically-conditioned syncope: the omission of lexical vowels in non-prominent metrical positions.

This phenomenon in Mojeño Trinitario (Arawak) is the topic of Rose (2019), and will occupy the bulk of the present paper. In the more common syncope pattern in this language, shown in (3), every odd vowel except the last is syncopated (counting from the beginning of the word). Main stress ends up on the surface penultimate vowel, which can be the underlyingly penultimate or antepenultimate vowel (3a,b vs. 3c,d respectively).

(3)   Syncope of lexical vowels in odd positions in Mojeño Trinitario[2]
         a.   /nu-huma/   [nhúma]   '1PS-illness'
         b.   /huma-ɾe/   [hmáɾe]   'illness-NPSD'
         c.   /ti-ko-huma/   [tkóhma]   '3-vz-illness'
         d.   /pi-ko-jeʔe/   [pkójʔe]   '2-vz-possession'

---

[1] Subscripts on grid marks are *not* assigned by the grammar – they are only added to representations for the sake of explicitness. Also note that the projection of the second nucleus of the long vowel is incorporated, but the vowel is still long; this configuration will be returned to in the analysis of Tonkawa in section 6.

[2] I use the same abbreviations as Rose (2019). The following abbreviations do not feature in the Leipzig glossing rules: DIM diminutive; NPSD non-possessed; VZ verbalizer.

Rose (2019) applies a moraic approach to the data. In this paper, I illustrate how the Mojeño Trinitario data can be treated in Strict CV metrics, and discuss how this treatment fares in comparison to the moraic approach in Rose (2019). Subsequently, the approach is extended to Tonkawa (Gouskova 2007 and references therein), another language with metrically-conditioned syncope. Tonkawa, unlike Mojeño Trinitario but like Palestinian Arabic, involves underlying long vowels and non-prevocalic consonants; the extension therefore serves both to illustrate the treatment of such configurations in this framework and to enhance its empirical coverage.

The paper is structured as follows. The next section provides more discussion on the notion of incorporation, as well as a fuller presentation of the Mojeño Trinitario data. As will be seen, a minor pattern in the language sees every *even* syllable deleted. Moreover, some vowels resist deletion, and some cases of syncope trigger interesting segmental effects. Section 3 then briefly presents Rose's analysis of the data and points out what might be regarded as shortcomings. Section 4 turns to the account in Strict CV metrics and to how incorporation can account for metrically-conditioned syncope. The Strict CV account is also shown to be insightful for the segmental effects that accompany syncope. The section ends with a prediction: a language in which both heavy syllables and metrically-conditioned syncope are dealt with by incorporation should be possible. Section 5 presents the extension to one such language, Tonkawa, with its long vowels and non-prevocalic consonants: the proposal is shown to cover these data with few additional assumptions. Section 6 concludes.

2 More Background

Given the ample literature on Strict CV, published in all major journals and presented in all major conferences for the last 30 years, I assume that no additional presentation is required for it. For recent publications in major venues, see, for instance, Enguehard (2017), Enguehard & Faust (2018), Faust (2014a;b; 2015; 2017), Fathi (2017), Lahrouchi (2018), Lampitelli (2017), Newell (2021), Polgárdi (2015), D'Alessandro & Scheer (2015). A guide to Strict CV has been published in book form with a prestigious publisher (Scheer 2004, followed by Scheer 2012).

In contrast, Strict CV metrics and the notion of incorporation are relatively new. The next subsection presents them more thoroughly.

2.1 What is incorporation?

The projections on the grid in (2) above may at a first glance seem to be notational variants of moras; and thus, incorporation might seem to be another way of describing foot construction on top of moras. But the reason that a grid and incorporation are used follows from the basic premises of the theory.

In Strict CV, the only skeletal unit is the CV unit. Accordingly, all C-slots are followed by V-slots, full *or* empty. Given this premise, codas are not primitives of syllabic representation

– they are simply consonants whose C-slots are followed by empty V-slots. Furthermore, work traditionally performed by syllabic structure, such as closed syllable shortening, is attributed to lateral relations between nuclei (see Scheer 2004; for the lateral relation of government, see below). Thus, within this framework there is no sense in which non-prevocalic consonants are "syllabified" with a preceding vowel.

The rejection of the mora as a representational primitive is of course tied to these premises. In traditional moraic theory, non-prevocalic consonants become moraic *because* they join a preceding vowel to form a complex rhyme ("weight by position"). But if the approach rejects codas, then there can be no rhymes; and if there are no rhymes there can be no moraic codas. It follows that only V-slots, empty or full, may be metrically-significant.

But how can one cover all of the weight effects reported in the literature without appealing to moraic codas? One question to ask is whether weight-sensitive languages may be regarded as weight-insensitive, if one assumes empty nuclei. This was indeed the claim in the first publication in Strict CV metrics, Scheer & Szigetvári (2005), henceforth S&S. In that paper, the authors targeted several systems which under a moraic account are analyzed as exhibiting stress-to-weight effects, and argued that they can instead be regarded as involving fixed stress. For instance, in their analysis, Latin stress in [fákere] 'make', [abéːre] 'have', [arísta] 'ear of corn' and [dóminus] 'Lord' is stably assigned to the antepenultimate V-slot (V_{-2}), not counting a final empty V-slot:

(4)   Seemingly weight-sensitive Latin has stable stress in Strict CV

    a. $C \quad V_{-2} \quad C \quad V_{-1} \quad C \quad V_0$

            f   á   k   e   r   e

    b. $C \quad V_{-3} \quad C \quad V_{-2} \quad C \quad V_{-1} \quad C \quad V_0$

            a   b   éː   r   e

    c. $C \quad V_{-3} \quad C \quad V_{-2} \quad C \quad V_{-1} \quad C \quad V_0$

            a   r   í   s   t   a

    d. $C \quad V_{-2} \quad C \quad V_{-1} \quad C \quad V_0 \quad C \quad V$

            d   ó   m   i   n   u   s

The most important aspect of this analysis (for the present purpose) is the treatment of the final empty nucleus in (4d), henceforth the FEN.[3] S&S pointed out that the designation of the FEN as metrically-insignificant derives the familiar phenomenon of final-consonant extrametricality

---

[3] Recall that the existence of final empty nuclei after word-final consonants follows from the basic premise of the approach, namely that the only skeletal unit is the CV unit.

(see also Harris & Gussmann 2002). Since, as is well known, in some languages, such as Spanish, final closed syllables do attract stress, one can parametrize the status of the FEN: in some languages it is metrically-significant, in others is isn't. Thus, a language like Spanish, where *regular* stress is penultimate in V-final words but final in C-final ones ([palóma] 'pigeon', [balón] 'baloon'), stress assignment is also weight-insensitive: it always lands on the penultimate metrically-significant V-slot, *counting* the FEN.

A similar parameter can be applied to non-final empty nuclei. In Latin, these are counted for the purposes of stress assignment (4b,c). In a weight-insensitive language with penultimate stress, only contentful nuclei are counted.

Importantly for what follows, S&S regarded their analysis as following the logic of a grid-based system (e.g. Halle & Vergnaud 1987): according to the above parameters, some but not all nuclei project and are therefore counted for the purpose of stress assignment.

To summarize the work in S&S, some systems, which have traditionally been regarded as weight-sensitive, can indeed be considered to exhibit stable stress in Strict CV. However, as discussed in Ulfsbjorninn (2014), this is not true for all such systems. For instance, consider Palestinian Arabic [færʒéːt] 'you(m.) showed', [tarʒámt] 'you(m.) translated' and [sákkatat] 'she silenced'. The stressed vowel in the former two stands in what would be the antepenultimate V-slot in a Strict CV representation; but in the latter, the stressed vowel is positioned in the 5th V-slot from the end. For this reason, Ulfsbjorninn set about to somehow integrate syllabic weight into a system that attempts to do away with syllables altogether.

The starting point for this task is the realization that there is something marked about the representation in (4c): an empty, unrealized position is allowed to be metrically-significant. In the terms of a metrical grid, an empty slot projects to line 1. Suppose then that this is not accepted in all systems: in some systems, the projections of empty slots cannot remain associated to those slots, precisely *because* these slots are unrealized.[4] Therefore, as already forescast, they are incorporated on to an adjacent nucleus. As a result, the incorporating nucleus projects to a higher line, and becomes metrically more prominent than a non-incorporating nucleus. The reader is invited to re-examine (2) above in light of this explanation (again, suspending the discussion of long vowels as involving empty nuclei to section 6).

This rationale for incorporation also explains why it, and not the simple foot-building of other metrical approaches based on grids, was proposed by Ulfsbjorninn. To express the same idea in Strict CV using a grid, but without incorporation, one would need to posit a rule that assigns an additional projection to nuclei preceding empty, metrically-significant V-slots. Such a rule would miss the generalization that it is precisely the marked status of metrically-significant

---

[4] Faust & Torres-Tamarit (2017), who combine a foot-based metrical approach with Strict CV skeletons, put this slightly differently: empty nuclei must be "identified" by the metrical structure.

empty nuclei that leads to the added projection. Indeed, it would be completely arbitrary: one could easily devise a rule that says the opposite. Using incorporation, cause and effect are tied together in a non-arbitrary fashion.

Finally, one may wonder what limits incorporation. With respect to the rationale proposed in this section, the answer is clear: in a system like Palestinian Arabic, only metrically-significant empty nuclei are incorporated. As a result, compared to a non-incorporating nucleus, an incorporator projects to as many lines more as the number of empty nuclei it has incorporated. More limitations on incorporation will be discussed below.

To summarize, Strict CV metrics rejects heavy syllables and codas as primitives, and therefore it must also reject moras. The only metrically-significant entity in this approach is the V-slot, full or empty. Some weight-sensitive system can be described as having stable stress in this approach, but others cannot. The process of incorporation has been introduced into Strict CV metrics in order to express weight effects without having to assume codas, moras or heavy syllables. It links cause and effect, in that it repairs a marked configuration in a non-arbitrary fashion.

Work on incorporation is only in its first stages. In this paper, it is applied for the first time to metrically-conditioned syncope, first in Mojeño Trinitario and then in Tonkawa. As will be clear below, the rationale proposed for incorporation in metrically-conditioned syncope is similar, and yet distinct, to the one proposed in this section. In these languages, too, it is called upon to repair a marked situation; but the marked situation is initially that of a metrical lapse or clash, not of an empty, metrically-significant nucleus.

But before that can be understood, more data from Mojeño Trinitario, the main language targeted here, must be presented.

2.2 More data from Mojeño Trinitario

Mojeño Trinitario exhibits two patterns of metrically-conditioned syncope. The more general pattern, odd-vowel syncope, is shown again in (5a–d), its iterative nature highlighted (the targets of syncope are underlined). Following Rose, I will refer to this pattern as the "iambic parse". Note that syncope also occurs before onsetless vowels in hiatus (5b). Also note, again, that **i.** main stress occurs on the surface penult, which may correspond to the underlying penult or antepenult; and **ii.** final vowels do not syncopate.

(5)   Mojeño Trinitario data – Iambic parse
        a.   /nu̱-huma/ => [nhúma]   '1SG-illness'
        b.   /su̱-a-no̱si/ => [sánsi]   '3F-IRR-stay'
        c.   /ʧunusi̱hi-ɾe/ => [ʧnushíɾe]   'cushion-NPSD'
        d.   /ti̱ko-hu̱ma-nu̱mo/ => [tkohmánmo]   '3-VZ-illness-SMOT'

Alongside the iambic parse, a smaller group of words exhibit another pattern, the "trochaic parse": in these, every *even* vowel is deleted (6). The two points about stress and final vowels hold for this parse too.

(6)   Mojeño Trinitario data – Trochaic parse
    a.   /mop<u>o</u>-hi/ => [móphi]   'bee-CLF'
    b.   /pak<u>u</u>-çiɾa/ => [pakçíɾa]   'dog-DIM'
    c.   /koj<u>u</u>re-çiɾa/ => [kojréçɾa] 'bird-DIM'

Not all vowels syncopate. Some vowels resist syncope, and these may combine with either parse. Thus, in (7a), the lack of initial syncope indicates a trochaic parse, but the second vowel does not syncopate (resistant vowels appear in bold). In contrast, the initial syncope in (7b) places the item within the more general iambic parse, but the third underlying vowel from the left does not syncopate. Crucially, stress in (7b) occurs on the *surface* antepenult; thus, Mojeño Trinitario stress cannot be assigned on the basis of the surface realization. Rather, it interacts non-trivially with syncope and the type of parse.

(7)   Mojeño Trinitario data – Resistant vowels
    a.   /pet**i**-çiɾa / => [petiçíɾa]   'house-DIM'
    b.   /t͡ʃinen**o**-ko/ => [t͡ʃnén**o**ko]   'daughter-in-law-NPSD'

The percentage of vowels that resist syncope is high: Rose places it at 45% (though see an important caveat in section 4). She also shows that there is some correlation between the quality of the vowel and the likelihood of it undergoing syncope. Both these facts might cast some doubt as to the productivity of rhythmic syncope of either pattern in the language. I find this to be of little importance in the present context: since both patterns are well-attested, they require a phonological explanation, as does the resistance of vowels to syncope and the interaction between that resistance and the two patterns. I will briefly return to this point in my analysis of resistant vowels.

    Finally, Rose mentions several segmental processes resulting from and interacting with syncope. I will be concerned with two of these here. First, if due to syncope /ɾ/ is expected to stand in a preconsonantal ("coda") position, it is deleted and the previous vowel is lengthened (8a).[5] Second, vowel-initial words in the iambic parse see the initial vowel replaced by a glottal stop (8b). Note that a glottal stop is not pronounced in words with surface-true initial vowels, e.g. *une-múʔi* 'water-CLF'. Rose argues that there is no phonemic glottal stop at the beginning of /etsepi/ 'thread', as evidenced by /n<u>u</u>-ets<u>e</u>pi-ɾa/ '1SG-thread-POSS' => *netspíɾa, *nʔetspíɾa*.

---

[5] /w/ and /j/ also delete in coda position, but only before /p,w/ and /ɾ,j/ respectively; this deletion also results in compensatory lengthening.

(8)   Mojeño Trinitario data – Post-syncope segmental effects

    a.   /po̱ri̱ɾopa/ => [pɾíːpa]   'needle'

        /su̱-po̱ri̱ɾopa/ => [spoːɾópa]   '3F-needle'

    b.   /e̱moto̱ne-ko/ => [ʔmotnéko]   'work-NPSD'

        /e̱tsepi/ => [ʔtsépi]   'thread'

There are several other interesting phonological effects in Mojeño Trinitario, and some interact with syncope; but for the purpose of this paper, the data in (5–8) suffice.

3 Rose (2019): a moraic analysis

Rose's (2019) analysis builds on previous analyses of rhythmic syncope – see for instance McCarthy (2008) and references therein. For the words in (3,5) above, Rose (2019) proposes a left-to-right iambic parse. Every underlying vowel projects a mora, and then iambic (i.e. right-headed) feet are built on these moras. A condition requires that the final foot not be aligned with the right edge of the word. For this reason, the final syllable of words with an odd number of syllables remains "unparsed" (9a,c), as do the final *two* syllables of words with an even number of syllables (9b,d). Main stress is assigned to the last foot, and therefore ends up on the underlying antepenult in (9b,d). Syncope applies to non-head positions within the foot as well as to unparsed vowels, with the exception of final vowels.

(9)   Iambic parse in Rose (2019)

    a.   /nu̱-hu)ma/ => [(nhú)ma]   '1SG-illness'

    b.   /(su̱-a)-no̱si/ => [(sá)nsi]   '3F-IRR-stay'

    c.   /(t͡ʃu̱nu)(si̱hi)-ɾe/ => [(t͡ʃnu)(shí)ɾe]   'cushion-NPSD'

    d.   /(ti̱ko)-(hu̱ma)-nu̱mo/ => [(tko)(hmá)nmo]   '3-VZ-illness-SMOT'

As anticipated, words of the minor pattern of even-vowel deletion are taken to be of a different parse, the trochaic parse. In these, after moras are projected, trochaic, left-headed feet are built. Again, in words with odd-numbered syllables, the final syllable remains unparsed (10a,c). But in words of the trochaic parse with even numbered syllables, all syllables are parsed – and main stress falls on the penult, in the final, right-aligned foot (10b).

(10)   Trochaic parse in Rose (2019)

    a.   /(mopo̱)-hi/ => [(móp)hi]   'bee-CLF'

    b.   /(paku̱)-(çiɾa)/ => [(pak)(çíɾa)]   'dog-DIM'

    c.   /(koju̱)(re-çi)ɾa/ => [(koj)(réç)ɾa]   'bird-DIM'

At this point, several shortcomings of the account can be pointed out. First, a minor problem is the mere existence of two parses within the same language. Ideally, in every language there
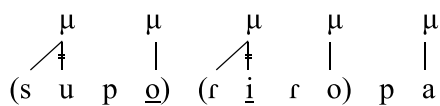
should be a single parse. Second, and more importantly, in this account there are *two* positions for syncope: the foot-internal non-head position and the unparsed position. A more unified account would be preferable. Third – and equally important – the exemption of final vowels from deletion in unfooted positions is assumed rather than motivated. Fourth, in order to capture the position of main stress, the trochaic parse requires right-aligned feet (10b), whereas the iambic parse must *not* involve such feet. To these problems I would add the idea of unparsedness itself: in the absence of any accompanying unique segmental effect, unparsedness is little more than a trick, and is best avoided.

In the context of this critique of Rose's account, and to anticipate criticism, let me emphasize the following. All of the shortcomings listed above are not unique to Rose's account. They have all probably been part of mora-based analyses in the past. But the fact that an analytic choice has a precedent does not make it unproblematic. Having two parses within a language is not impossible, but having one is undeniably better. Similarly, if one assumes two parses, having one parse allow right-aligned feet and the other reject them is not an impossible analysis; but having a single difference between the two parses is preferable.

As for resistant vowels, Rose (2019) does not present a formal analysis. She *does* propose one for the segmental effects (albeit briefly). This analysis relies crucially on moras and mora preservation. According to Rose, whenever a vowel is syncopated, its mora is associated with its underlying onset. This is shown for /s/ and /ɾ/ in (11a). However, as shown above, some consonants cannot retain the mora in coda position, and /ɾ/ is one such consonant. As a result, /ɾ/ is delinked from the mora, as in (11b); and the preceding vowel is then associated to it. A long vowel emerges.

(11)   /su-poɾiɾopa/ '3f-needle' => [spoːɾópa] – mora dissociation and reassociation
        a.   Mora reassociation   b.   Compensatory lengthening
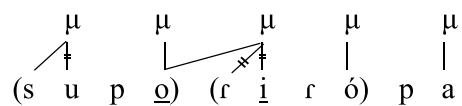
One drawback of this analysis, undiscussed in Rose (2019), is the following: as a result of compensatory lengthening, a long vowel is created across the foot boundary. The first mora of the long vowel belongs to one foot, and the second is external to that foot (it belongs to another foot). Such a configuration violates the principle of syllable integrity, according to which syllables may not straddle feet.[6] But the footing in (11) is crucial in Rose's analysis in order to capture the syncope facts.

---

[6] For syllable integrity, see for instance Everett (1999), in which the author argues that it is not an impossible structure, but a marked one.

Equally rare and controversial is the association of moras to onsets, illustrated by /s, ɾ/ in (11) above.[7] Yet onset moraicity is precisely the motivation provided by Rose for the other segmental effect under discussion here, namely [ʔ]-insertion. As shown in (12a), when a word-initial vowel is syncopated, its mora does not have an onset to associate to. A glottal stop is inserted for this purpose (12b).

(12)   /etsepi/ 'thread' => [ʔtsépi] – mora dissociation and glottal insertion
      a. Mora deletion   b. Glottal insertion
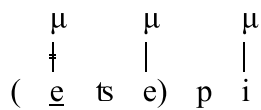
To summarize, Rose's account of the segmental effects requires two typologically-rare, formally-problematic configurations: **i.** a 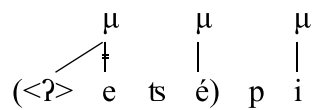violation of syllable integrity and **ii.** onset moraicity. Again, to anticipate criticism, I add: the fact that such configurations might have played a role in preceding analyses of unrelated phenomena does not make the configurations less marked or problematic. An analysis that does not require them should be preferable to one that does. If so, these drawbacks join the several shortcomings of the syncope account, which were listed above.

The incorporation-based account of Strict CV metrics in the next section arguably does not suffer from any of these drawbacks and shortcomings.

4 Analysis in Strict CV metrics

4.1 Syncope

In the original proposal in Ulfsbjorninn (2014), as explained above, incorporation was motivated by the need to express the metrical significance allotted to empty nuclei. This cannot be the case in Mojeño Trinitario, simply because in this language, as Rose asserts, underlying representations consist of sequences of CV syllables, with no real empty positions (though she sometimes leaves the identity of the underlying vowel unspecified). For instance, the underlying representation of [tkohma] '3-vz-illness' is given in (13).

(13)   UR of /ti-ko-huma/ '3-vz-illness' => [tkóhma]

        C V C V C V C V
        | | | | | | | |
        t   i   k   o   h   u   m   a

---
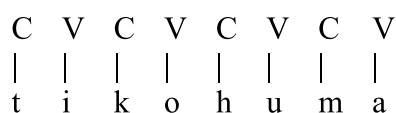
[7] Topintzi (2010) provides moraic analyses of several languages with apparent onset weight effects. Criticism is levelled against these analyses, for instance, in van de Weijer (2011), a review of Topintzi's book. Statistical evidence for onset weight has been found by Ryan (2014); but Ryan, like Gordon (2005) before him, does not use moras to describe these effects.

In Rose's analysis of such words, the iambic parse applies, and feet are built from left to right on underlying syllables. Why are feet built? The answer is well-known: feet are motivated by the need to create prominence relations between metrically-significant units. I submit that in systems with metrically-conditioned syncope, incorporation is motivated by the same need. As shown in (14a), assuming that all vowels are equally significant metrically, they all project to line 1; and there are no prominent nuclei. In order to repair this marked configuration, the single projection of every odd nucleus is added to the projection to its right. Incorporation has two effects in such cases, visible in (14b). First, it leaves the incorporated nuclei with no projection. Second, it leaves all even V-slots projecting to L2 (14b). I submit that by a language-specific exceptionless rule, V-slots that do not project cannot support their vowels, which are therefore dissociated from their nucleus (as in (14c)). Accordingly, they are syncopated.

As for main stress, the following generalization accounts for all of its occurrences: it is assigned to the last V-slot projecting to L2, not counting the final one, as in (14c). The exemption of the final nucleus from stress-assignment possibly follows from the cross-linguistic tendency to avoid final stress (e.g. Hyde 2011). I leave this issue at that, as a discussion of the more technical aspects of main stress assigment will constitute too much of a deviation, and the main goal of the present paper is to show how incorporation accounts for metrically-conditioned syncope.[8]

(14)   Incorporation in /ti-ko-huma/ '3-vz-illness' => [tkóhma]

    a. Before incorporation   b. After incorporation

    c. Main stress assignment
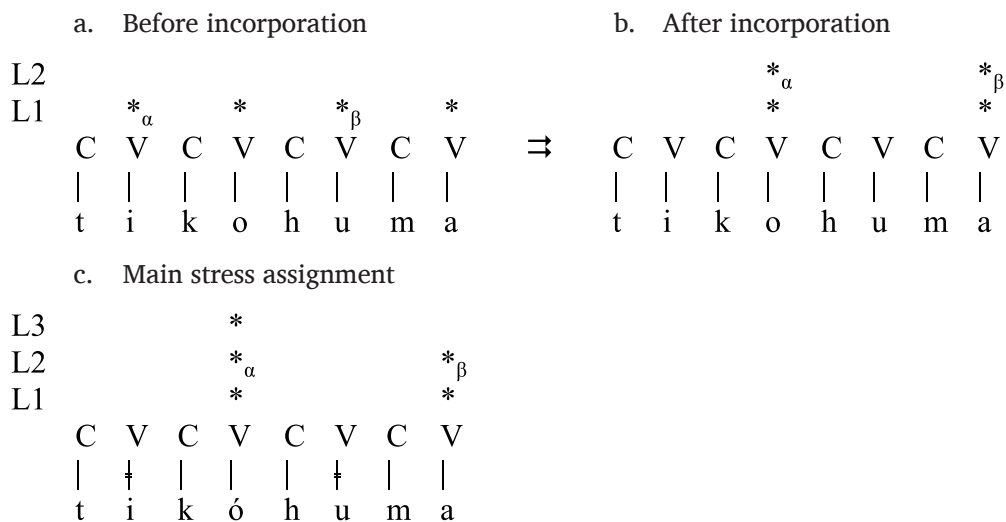
Before I discuss incorporation further, note that two of the shortcomings identified in Rose's moraic account are not shared by this one. First, there are no unparsed syllables in (14). Second,

---

[8] An alternative way to express the generalization about main stress, without reference to the exemption of the final V, is the following: main stress is assigned to the first L2 projection within a right-aligned window of three metrically-significant units.

in that account /i/ and /u/ were syncopated for different reasons – weak footed and unfooted positions respectively; in (14), they are both syncopated for the same reason, namely the absence of a projection in their V-slot.

Now let us turn to the use of incorporation in this context. First, incorporation in Mojeño Trinitario is to the right, not to the left. I assume that, like the construction of trochais vs. iambic feet in a language, this is a parametric issue: other languages with metrically-conditioned syncope can operate with incorporation to the left (see the case of Tonkawa in section 5). Second, I claimed that the motivation for incorporation in Mojeño Trinitario is the creation of prominence relations, or the avoidance of lapse; but in Palestinian Arabic, incorporation was motivated by the need to eliminate metrically-significant empty nuclei. I have little to say about this difference, beyond the fact that the same operation can serve two purposes, just like foot-building in one language is relevant mainly for minimality effects, but in another for stress assignment. In the present approach, metrically-conditioned syncope and "complex rhyme" creation are achieved by the same mechanism. Another, related difference between Mojeño Trinitario and Palestinian Arabic is that in the former, contentful nuclei are incorporated, but in the latter they are not.

Proponents of more traditional grid-based foot-building may ask: why appeal to incorporation in order to create prominence, as opposed to simply adding a projection to each even vowel. The answer is clear: such a view, like any foot-building device, does *not* in fact predict the deletion of vowels with single projection (or vowels in the weak branches of feet). Within the grid approach, syncope is achieved by an additional stipulation, according to which L1 is deleted after the projection of one of the nuclei to L2. With incorporation, the same operation achieves the projection to L2 of the incorporator and the deletion of the only projection of the incorporated nucleus, leading to its syncope. I will return to this difference below in the discussion of resistant vowels.

Back to the analysis of Mojeño Trinitario, (15) repeats the principles of the analysis:

(15)   Basic principles of the analysis
        i. All vowels initially project once, to L1.
        ii. Incorporation (of a single projection) proceeds from left to right (unlike in Arabic).
        iii. A vowel whose only projection has been incorporated is dissociated and therefore remains unpronounced.
        iv. Main stress is assigned to the last V-slot projecting to L2, not counting the final one.

Consider now, in (16), a word of the iambic parse with an odd number of syllables. The last syllable of such a word cannot be incorporated, as there is no syllable to its right. As a result, its projection is left in its V-slot, and the vowel is realized (henceforth, incorporation, main stress assignment and vowel delinking will all appear under "after incorporation"):

(16) Incorporation in /nu-huma/ '1SG-illness' => [nhúma]
a. Before incorporation   b. After incorporation

```
L3                                              *
L2                                              *ₐ
L1        * ₐ       *        *          *            *
        C  V   C  V  C  V    ⇉    C  V  C  V  C  V
        |  |   |  |  |  |          |  ǂ  |  |  |  |
        n  u   h  u  m  a          n  u  h  ú  m  a
```

One of the criticisms I raised against Rose's analysis was its axiomatic treatment of the resistance of final vowels to deletion. The present analysis, in contrast, motivates the exceptionless retention of final vowels. Taken together, (14) and (16) show that final V-slots are always either incorporators or unincorporated. Thus, they are *never* without a projection, and never syncopate.

The three-syllable word in (16) also illustrates another fact that will become crucial below. If incorporation is aimed at creating prominence, why not skip it and go directly to main stress assignment? It appears that prominence relations must be established before main stress assignment; and then main stress is placed on a prominent position.

The next issue was the two parses. An interpretation of Rose's account is the following: the iambic parse is the general rule in the language, but some words are marked as trochaic. This distinction can be put in the terms of the present analysis: incorporation is generally to the right, but a subgroup of words is marked for leftward incorporation. However, such a view would give the wrong result in four-syllable words, because in these the final vowel would be incorporated and thus expected to syncopate /paku-çiɾa/ => *[pakçiɾ]. Exempting final vowels from syncope as a general rule, as Rose does, is not a tempting option in the present account, as this would undo the advantage celebrated in the previous paragraph.

Instead, I propose here to view the "trochaic parse" such that it is not an exception to rightward incorporation. The marking of such words, I propose, takes the form of an initial freestanding projection, $*_\alpha$ in (17). Incorporation then proceeds rightwards, as elsewhere in the language.

(17) Incorporation with freestanding projection in /paku-çiɾa/ 'dog-DIM' => [pakçíɾa]
a. Before incorporation   b. After incorporation

```
L3                                                      *
L2                                      *ₐ                   *ᵦ
L1   *ₐ      *       *ᵦ      *       *        *            *         *
        C  V  C  V  C  V  C  V    ⇉    C  V  C  V  C  V  C  V
        |  |  |  |  |  |  |  |          |  |  |  ǂ  |  |  |  |
        p  a  k  u  ç  i  ɾ  a          p  a  k  u  ç  í  ɾ  a
```

Rather than allowing for two parses in the same language, the analytic strategy in (17) encodes the exceptionality of the trochaic parse in the phonological representation of such words. A reviewer notes that this solution is "as ad-hoc" as the two parses, but I do not agree with this assessement. The solution proposed here is more unificatory, as it does not require the existence of two grammars in a single language (to which words are presumably associated using a diacritic). Rather, it adopts a more constrained (and more conservative) view of the relation between the lexicon and phonology: lexical exceptions are encoded in the lexicon using the same phonological objects that appear in other phonological representations, and the computational system is uniform for all inputs. In addition, this strategy of marking such words carries another advantage, in that the minor status of the trochaic parse correlates with the relative markedness of representations with freestanding projections.[9]

The present account of words such as (17) avoids yet another problem which was identified in Rose's account, namely that in order to capture the penultimate stress, right-aligned feet had to be exceptionally permitted in the trochaic parse. Here, not only is there no need for two different parses, but also the exemption of the trochaic parse from non-finality (of feet) in unecessary.

As already mentioned for (14), even the distinction of "parsed" vs. "unparsed" syllables is eliminated from the analysis. In the present account, no syllable is exempted from the general process of prominence creation. For completeness, (18) illustrates the analysis of a word with an odd number of syllables and an initial freestanding projection:

(18)   Incorporation with freestanding projection in /mopo-hi/ 'bee-CLF' => [móphi]

a. Before incorporation   b. After incorporation

$$
\begin{array}{llll}
\text{L3} & & & * \\
\text{L2} & & & *_\alpha \qquad\qquad *_\beta \\
\text{L1} & *_\alpha \quad * \quad *_\beta \quad * & \Rightarrow & * \qquad\qquad\qquad * \\
\end{array}
$$

L3   *
L2   *$_\alpha$ *$_\beta$
L1   *$_\alpha$ *   *$_\beta$ *   *   *
            C V C V C V $\Rightarrow$ C V C V C V
            | | | | | | | | | ǂ | |
            m o p o h i   m ó p o h i

As for the trochaic/iambic parses, lexical projections – projections that are not assigned by rule – can be used to encode the resistance of vowels to syncope in the phonological representation of an item (an issue that was not formalized by Rose). Suppose that, unlike regular vowels,

---

[9] An approach adhering to the Prosodic Hierarchy, with feet and moras, can also do away with the two parses, by assuming a lexical degenerate foot at the left edge of such words. The marked nature of degenerate feet parallels that of freestanding projections. That said, one may then ask why degenerate feet are only found at the left edge of the word. Also note that the freestanding projection is somewhat equivalent to freestanding moras, a recurrent tool in moraic analyses (e.g. Zimmermann 2017).

resistant ones are lexicalized with an additional projection, the underlined $*$ in (19).[10] Like all other vowels, this nucleus will also project once to L1, such that even before incorporation, it already projects to L2 (19a). Upon incorporation (19b), one of its projections is absorbed into the following nucleus, but the vowel retains its lexical projection $*$, and so it is still realized.

(19)   Resistant vowel, no freestanding projection: /tʃineno-ko/ 'daughter-in-law-NPSD' =>
         [tʃnénoko]
         a.   Before incorporation   b.   After incorporation

```
L3                                                              *
L2                       *                              *ₐ              *_β
L1      *ₐ      *       *_β      *              *       *       *       *
        C  V   C  V   C  V   C  V       ⇒      C  V   C  V   C  V   C  V
        |  |   |  |   |  |   |  |               |  |   |  |   |  |   |  |
        tʃ i   n  e   n  o   k  o               tʃ i   n  é   n  o   k  o
```

One may ask why the projection $*$ of the resistant vowel is incorporated at all. The answer is again the creation of prominence: if it were not incorporated, the adjacent second and third nucleus would both project to L2 (before main stress assignment) and clash. Thus, under this view of the marking of resistance to syncope, one can see that not only vowels with single projections undergo incorporation; rather, any vowel that stands in the way of prominence relations does. Similarly, it seems that the establishment of prominence limits the number of projections that may be incorporated: this number seems to be limited to one, if one suffices in order to create prominence and avoid clashes.

In (15) above, I stated that main stress is assigned "to the last V-slot projecting to L2, not counting the final one". The application of this principle, which hitherto derived surface penultimate stress, correctly results in surface *ante*penultimate stress when, as in (19) above, the penult is a resistant vowel.

(19) above is an underlyingly quadrisyllabic word in the iambic parse – in the present terms with no freestanding initial projection. As shown by Rose, resistant vowels feature also in the trochaic parse – in the present terms, in items *with* a freestanding initial projection. An example is *peti-çíra* 'house-DIM', with a peninitial resistant vowel (recall: that this word belongs to the trochaic parse is evident from the lack of syncope of the first vowel).

The word is represented in (20). After incorporation, all four vowels still project, and therefore all four vowels surface. Stress, in contrast to (18), is assigned to the penult, again because it is the rightmost L2 projector not counting the final V-slot.

---

[10] Like the subscripts for incorporated projections, the underline is used only for ease of reference. The additional projection is not of a different nature from the regular projections.

(20) Resistant vowel, freestanding projection: *peti-círa* 'house-DIM'

  a. Before incorporation   b. After incorporation

```
L3                                                          *
L2                      *                        *          *
                        ‾                        α          β
L1   *      *           *        *       *       *    *     *     *
     α                  β                        
                        
     C  V  C  V  C  V  C  V    ⇒    C  V  C  V  C  V  C  V
     |  |  |  |  |  |  |  |          |  |  |  |  |  |  |  |
     p  e  t  i  ç  i  ɾ  a          p  e  t  i  ç  í  ɾ  a
```

Thus, resistance to syncope, like the trochaic vs. iambic parse, is encodable with the help of projections. The general principles that apply elsewhere lead to the correct placement of stress. As in the case of the different parses, the relative markedness (within the language) of the resistance to syncope is expressed through the need to memorize, in these specific cases, the additional piece of structure that is the lexical projection *.[11]

It should now be restated that in fact, resistance to syncope is not so marginal in the language. Rose reports that 45% of syncopatable vowels do not syncopate, or in other words, are misbehaved with respect to syncope. Note, nevertheless, that within Rose's account, final vowels are not syncopatable by axiom, so they are not counted among well-behaved vowels. In the present account they are syncopatable, but never syncopate. Thus, there are many more well-behaved vowels than Rose considers there to be, and there is reason to think that resistant vowels are more of a minority than Rose reports, in line with their arbitrary L2 projection.

Let me summarize. Using the tool of rightward incorporation, the Strict CV metrics approach rids the analysis of all of the problems identified in the previous section. The principles in (15) above derive all of the surface forms with no need for unparsedness, non-finality (of feet), the two parses, the sensitivity of non-finality to the type of parse, or the axiomatic exemption of final vowels from syncope. In addition, the exceptionality of the trochaic parse and of syncope-resistant vowels is expressible in the phonological representation using phonological objects, rather than being simply assumed; this special, marked encoding correlates with the marked status of the parse or vowel. As I show in the next subsection, the strict CV approach also provides an elegant account of the two segmental effects mentioned in the data section.
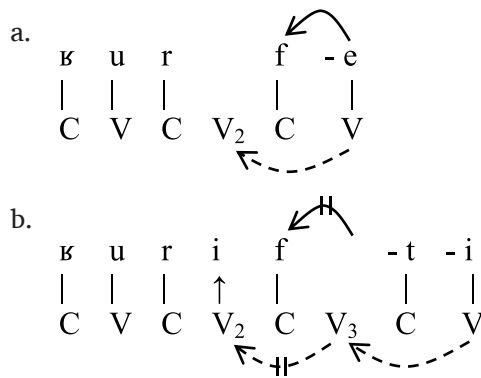
4.2 Segmental effects

A central concern of Strict CV is the lateral relations between skeletal constituents. There are two lateral relations: government and licensing. Both emanate from contentful V-slots. Government is the relation between a contentful V-slot and a preceding empty one, which allows for the latter

---

[11] Note that the solution proposed for resistant vowels cannot be used to replace free-standing projections, as a reviewer suggested. If the initial syllable of (18) projected to L2, the predicted realization would be *[mopóhi].

to remain unrealized. For instance, in the Palestinian Arabic word *ʁurf-e* 'room-F' in (21a), V_2 remains unrealized because it is governed by the following contentful V-slot (dashed arrow). When the 1SG.POSS *-i* suffix is added, the suffix *-e* of the base exhibits an allomorph *t* (21b). The vowel *-i* then governs V_3, which remains unrealized. But V_2 is then ungoverned, and so epenthesis occurs *ʁurifti*.
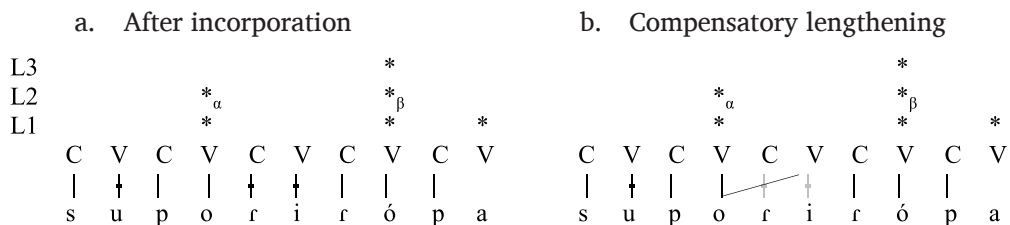
Onsets are said to be licensed by a following contentful nucleus (solid arrow in 21a). Licensing is used primarily in analyses of lenition and fortition (Ségéral & Scheer 2008; Scheer & Ziková 2010). The post-consonantal, licensed position of *f* in (21a) is cross-linguistically a strong position; while its preconsonantal, *un*licensed position in (21b) is a recurrent locus of lenition (though these effects are not manifest for *f* in Palestinian Arabic).

(21)   Palestinian Arabic *ʁurfe* 'room' and *ʁurif-t-i* 'my room'

a.

| ʁ | u | r | | f | - e |
| C | V | C | V_2 | C | V |

b.

| ʁ | u | r | i | f | | - t | - i |
| C | V | C | V_2 | C | V_3 | C | V |

Licensing can be used to explain the compensatory lengthening which occurs due to an erased pre-consonantal /ɾ/. Assume that this consonant must be licensed (this is a cross-linguistically recurrent requirement of rhotics, e.g. Gussmann 2002:41 for English). As shown in (22a), after incorporation the first /ɾ/ is unlicensed and therefore cannot associate to its position. This leaves an entire CV unit unassociated, a dispreferred configuration (Faust & Torres-Tamarit 2017). It is repaired through compensatory lengthening as in (22b).[12]

(22)   /su-poɾiɾopa/ '3f-needle' => [spoːɾópa] in Strict CV

		a.	After incorporation					b.	Compensatory lengthening		

L3
L2
L1

C V C V C V C V C V   C V C V C V C V C V
s u p o ɾ i ɾ ó p a   s u p o ɾ i ɾ ó p a

---

12 After lengthening, /ɾ/ cannot be reassociated as that would constitute a violation of the No Line Crossing constraint (Goldmith 1976).

(Note that the long vowel is allowed to be expressed as such even though its second nucleus does not project. This fact is discussed further in section 5.)

One problem of the moraic account proposed by Rose was the fact that the lengthened vowel in (20b) straddled two feet, violating syllable integrity. Since there are no feet in the present account, it does not suffer from this problem.

Government, in turn, can rid the account of another problem, namely that of moraic onsets. Recall that Rose assumes a general rule of reassociation of dissociated moras to underlying onsets, such that even the first onset of an initial cluster – e.g. [spoːɾópa] in (22b) above – is moraic. Such onset moraicity, she argues, motivates the insertion of glottal stops in /etsepi/ => ʔtsépi 'thread'. In Strict CV, the government potential of a contentful nucleus must be dispensed (if possible). Empty C-slots can also be targets of government. Thus, in a vowel-initial word with a realized initial vowel (23), the first V-slot governs not a preceding empty V-slot, but the empty C (this kind of government is known at least since Charette 2003).[13] But if the underlying initial vowel is unassociated, the initial C cannot be governed. Its realization cannot be inhibited, and therefore [ʔ] is inserted (incidentally, this also solves the problem of an entirely unrealized CV unit).

(23)   Initial glottal insertion due to lack of V-to-C government

a.   /unemuʔi/ 'water-CLF' => [unemúʔi]   b.   /etsepi/ 'thread' => [ʔtsépi]
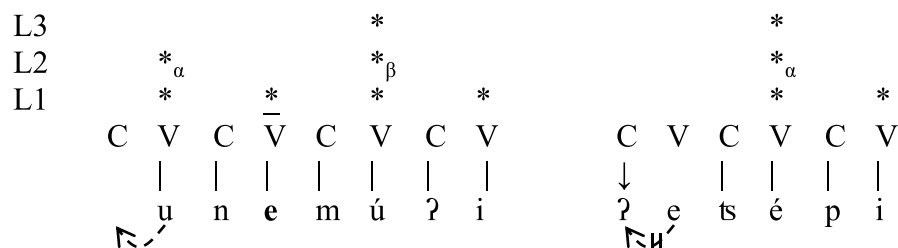
Unlike in Rose's account, the controversial tool of moraic onsets is simply not called for in the Strict CV account (see ft. 7). Instead, glottal insertion follows from the basic premise of the theory – that all onsetless syllables involve an empty onset position – coupled with the notion of government.

4.3 Summary of the account of Mojeño Trinitario

In this section, I have presented a novel account of Mojeño Trinitario rhythmic syncope using the tool of incorporation. The main insight is the following: in order to create prominence relations and avoid lapses, a projection from one nucleus is amassed to that of a following nucleus, from left to right. The incorporators thus become prominent, and the incorporatees cannot support

---

[13] The representations in (23) depict the situation after incorporation. (23a) originally has a freestanding initial projection and a second resistant vowel.

the vowels associated to them, leading to syncope. In the analysis, incorporation is limited by its goal of prominence creation: it applies minimally (only a single projection of a single nucleus at a time) and iteratively. I have compared my account to the only account available of the facts, which uses moras and feet. Incorporation, I claimed, is at least a worthy competitor for the moraic approach, as it avoids a series of drawbacks identified in the latter. The account in Strict CV also led to an understanding of two segmental effects without appealing to cross-linguistically dispreferred configurations, as in Rose's account.

The rationale of prominence-creation adopted here for incorporation is also somewhat novel: in previous analyses, incorporation was applied mainly to unassociated/empty nuclei, and motivated by the markedness of metrically-significant, empty slots. The question is raised whether both rationales – prominence-creation and the elimination of empty, metrically-significant nuclei – can coexist in a single system. As things stand, there is no reason they should not. But since Mojeño Trinitario does not exhibit underlyingly empty nuclei, it only illustrates the prominence rationale.

The next section extends the analysis to Tonkawa, which is exactly the type of system predicted: incorporation is shown to eliminate both lapses and metrically-significant empty nuclei.

5 Tonkawa

5.1 Basic facts and tools

Tonkawa (Hoijer 1933; 1946), like Mojeño Trinitario, exhibits metrically-conditioned syncope. It has featured in past analyses of this phenomenon – see Gouskova (2003; 2007) and references therein. Gouskova (2007) is also the source of data in this section. Examining Tonkawa here acheives at least three goals. First, it extends the empirical coverage of the framework. Second, Tonkawa, unlike Mojeño, has underlying long vowels and non-prevocalic consonants alongside rhythmic syncope, and therefore it illustrates the two rationales of incorporation in a single system. Third, and relatedly, a hiatus resolution process also interacts with metrics in an interesting way, which crucially distinguishes such hiatuses from long vowels. In a framework like Strict CV, this distinction is important, since both long vowels and hiatuses are sequences of two CV units.[14]

Metrically-conditioned syncope in Tonkawa affects both long and short vowels. For short ones, sequences of two light syllables (underlined in (24)) are not allowed. Long vowels, in turn, may surface anywhere in the word, except after initial light syllables. In this configuration, the initial light syllable is stressed and the long vowel is shortened (compare (24d,f) to (24a–c, e)).

---

[14] Mojeño Trinitario also exhibits hiatuses and their resolution, but these have been ignored above for reasons of brevity and elegance of exposition. I assert that the analysis of hiatus resolution provided for Tonkawa is compatible with the Mojeño Trinitario facts, too.

Finally, hiatuses (in bold) and sequences of heteromorphemic identical vowels (24f) are reduced through the deletion of the first vowel.[15]
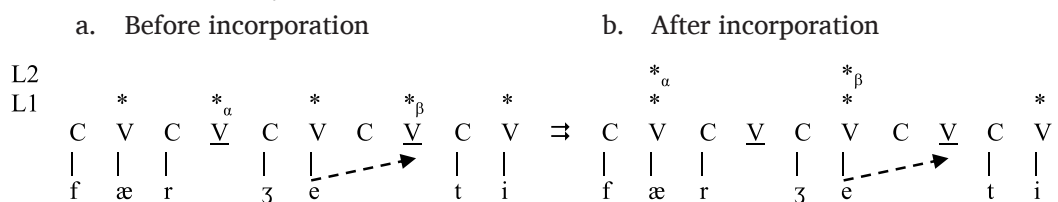
(24)   Tonkawa facts (Gouskova 2007)[16]
      a.   /kaa-na-oʔ/ => [káanóʔ] 'he throws it away'
      b.   /nes-kaa-na-oʔ/ => [néskáanóʔ] 'he causes him to…'
      c   /kaa-na-n-oʔ/ => [káananóʔ] 'he is throwing it…'
      d.   /xa-kaa-na-oʔ/ => [xákanóʔ] 'he throws it far away'
      e.   /we-tasa-sooyan-oʔ-s/ => [wétsasóoyanóʔs] 'I swim off with them'
      f.   /ke-taa-notoso-oʔ/ => [kétanótsóʔ] 'he stands with me'

Gouskova (2003; 2007) provides a foot-based analysis of the facts, which I will not summarize here. A central assumption in her analysis is the obligation for the initial foot to be heavy – this is crucially how she derives the shortening of the non-initial long vowel. A similar assumption will be made below in my own analysis.

    Before we turn to the incorporation-based analysis of the facts, recall the application of incorporation to "heavy syllables" of the CVC and CVV types. This application was already illustrated in the introduction to this paper for the Palestinian Arabic word [færʒéːti] 'you(f.) showed'; it is repeated in (25) below.

(25)   Incorporation of empty nuclei (repeated from (2))
      a.   Before incorporation   b.   After incorporation

L2
L1   * $*_\alpha$ * $*_\beta$ *
    C V C $\underline{V}$ C V C $\underline{V}$ C V $\Rightarrow$ C V C $\underline{V}$ C V C $\underline{V}$ C V
    | | | | |.-> | | | | | | |.-> | |
    f æ r ʒ e   t i   f æ r ʒ e   t i

An additional word is due in the present context regarding the treatment of long vowels. In strict CV, long vowels are represented as branching onto two V-slots (and thus engulfing an empty C). To express headedness (initial or final) in long vowels, it is standard in this approach to assume that the head V is lexically associated, and the dependent V initially empty, and filled through spreading. For Arabic, as well as for Tonkawa, long vowels are left-headed, and therefore the projection of the second V-slot is incorporated into that of the first. That said, this view of long vowels raises the following question: if the projection of the second nucleus of the vowel is incorporated, why is it pronounced at all? That is, why is the vowel long?

---

[15] In the examples provided by Gouskova, these resolved hiatuses are always stressed. But as we will see, that fact follows from the original syllabic structure.

[16] Gouskova reports that no information is provided by Hoijer regarding the position of main stress.

At present, I do not have an insightful answer to this question. I assume the following principle:

(26)   Principle of vowel length
         Vowels projecting to L2 (or higher) spread to occupy the nucleus of a following CV.

Using a strength metaphor for the understanding of projections, such vowels possesses enough strength to be realized in an incorporated V-slot, too, even though the latter does not project.[17] Note that this view does not carry any consequences for incorporators in closed syllables, which cannot spread to the dependent position without violating the principle of no line crossing (Goldsmith 1976).

Having discussed long vowels, we may now return to the Tonkawa data.

5.2 Incorporation-based analysis of Tonkawa data

I submit that Tonkawa words are parsed along the lines of the following principles:

(27)   Principles of Tonkawa parsing
         i.   Incorporate the projections of all empty nuclei to the *preceding* V-slot (as in Palestinian Arabic), *including* the final empty nucleus.
         ii. Delete problematic VC sequences (i.e. those that causes hiatuses).
         iii. Check if initial V is an incorporator. If not, make it one (through the only strategy possible, namely incorporation of a single projection to its right).
         iv. Eliminate lapses (= two consecutive unincorporated L1 projections) through incorporation (as in Mojeño Trinitario).
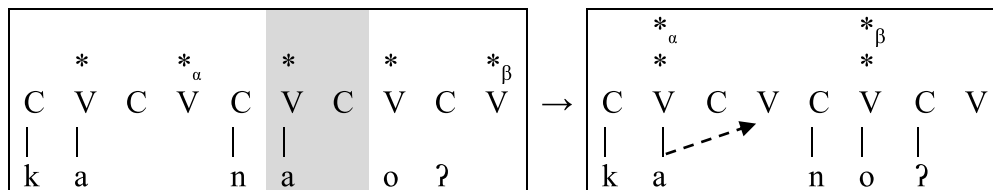
Note that principle (ii) is not an innovation of the present account. It was originally proposed in Government Phonology, a predecessor of Strict CV, in Gussmann & Kaye (1993), where it was called "Reduction", and has since featured in many Strict CV analyses (e.g. Faust 2017). As for principle (iii), it parallels Gouskova's assumption that the initial syllable must be heavy.

I will now show that the above principles lead to the correct surface representations of the set of items in (24). The first example illustrates two aspects of the data and their analysis: long vowels and hiatus resolution through deletion. The initial configuration is given on the left, with the offending, hiatus-creating sequence in grey (and assuming that final empty nuclei are metrically-significant in Tonkawa). On the right, we see the result of the application of the above principles: incorporation applies to the empty nuclei, the long vowel is achieved through

---

[17] Interestingly, the spreading can occur between two incorporation domains: an incorporator nucleus can spread to a position that was incorporated by another nucleus (cf. 22).
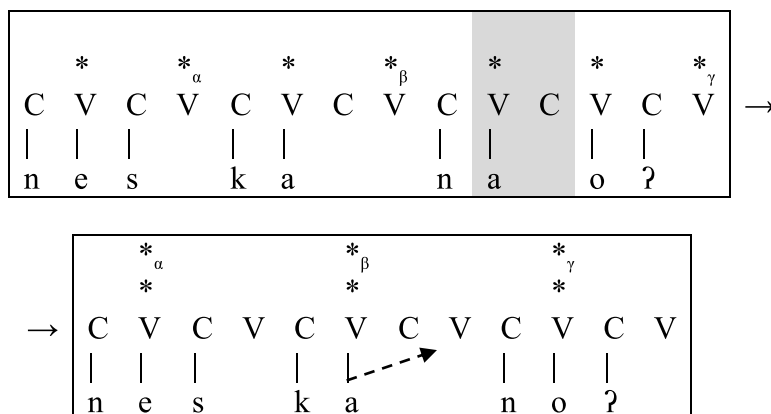
spreading, and the offending sequence is pruned in the interest of hiatus avoidance. Stress is correctly predicted to appear on both surviving vowels.

(28)　/kaa-na-oʔ/ => [káanóʔ] 'he throws it away'

```
        *       *α     *      *      *β
  C  V  C  V  C  V  C  V  C  V          →
  |  |        |  |
  k  a        n  a        o  ?
```

```
   *α              *β
   *               *
  C  V  C  V  C  V  C  V
  |     ⌐--→     |  |  |
  k  a        n  o  ?
```
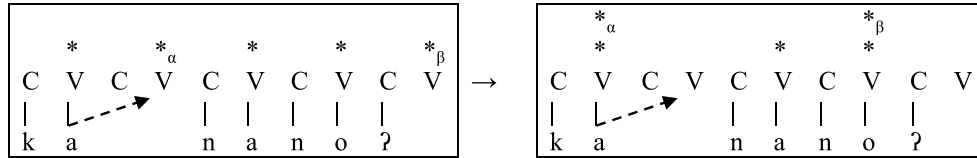
In (29), it is shown why long vowels remain unaltered after initial heavy syllables. Both the heavy syllable and the long vowel following it are incorporation domains, so the long vowel can be realized as such (I assume deletion no longer requires comment). Stress is again correctly predicted to occur on all surviving vowels.

(29)　/nes-kaa-na-oʔ/ => [néskáanóʔ] 'he causes him to…'

```
        *       *α     *      *β     *      *      *γ
  C  V  C  V  C  V  C  V  C  V  C  V  C  V          →
  |  |  |     |  |           |  |        |  |
  n  e  s     k  a           n  a        o  ?
```

```
      *α              *β              *γ
      *               *               *
→    C  V  C  V  C  V  C  V  C  V  C  V
     |  |  |     |  |     ⌐--→     |  |  |
     n  e  s     k  a           n  o  ?
```

The representations in (30) illustrate an interesting difference between Tonkawa and Mojeño Trinitario, as well as between the present proposal and the one in Gouskova (2003; 2007). In Mojeño Trinitario, because all syllables are open underlyingly, there is no incorporation operation other than the one creating prominence. As a result, the only case of a non-incorporator being realized is that of final vowels in odd-syllable words of the "iambic" parse (e.g. (16) above). But in Tonkawa, due to the existence of empty nuclei, vowels are projected to L2 "before" other metrical issues are considered. The medial syllable [na] in (30) below may therefore be realized because there is no lapse of two L1 projections; the preceding vowel is incorporated, and the following vowel projects to L2 because it is an incorporator. Assuming, as above, that stressed vowels are those that project to L2, stress is again correctly predicted to appear on the first and last vowels, but not on [na].
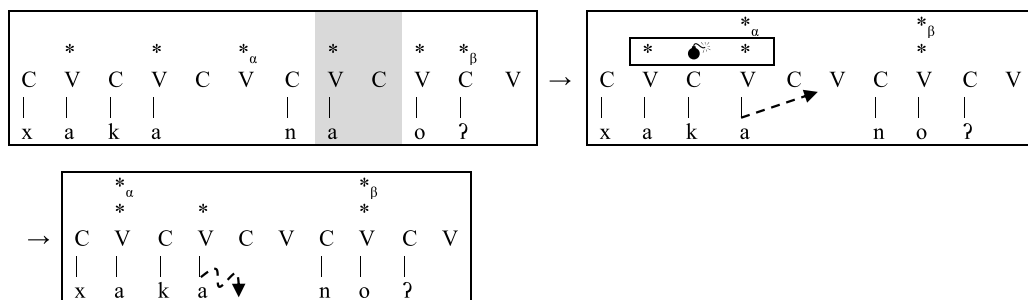

(30) /kaa-na-n-oʔ/ => [káananóʔ] 'he is throwing it…'

```
        *     *ₐ     *      *     *ᵦ
  C  V  C  V  C  V  C  V  C  V   →
  |  ⌐--→    |  |  |  |  |
  k  a       n  a  n  o  ʔ

   *ₐ              *ᵦ
   *               *
  C  V  C  V  C  V  C  V  C  V
  |  ⌐--→    |  |  |  |  |
  k  a       n  a  n  o  ʔ
```

The retention of the vowel in [na] is analyzed by Gouskova (2007) with an uneven trochee [(**káana**)(nóʔ)], a structure which has been argued to be dispreferred in Hayes (1995). It actually follows from the footless rationale in the present account, without any further assumptions.

So far, only empty nuclei have been subject to incorporation, as in Palestinian Arabic. The next word shows the effect of initial light syllables on a following long vowel. After the incorporation of all empty nuclei, the initial syllable is not an incorporator, and the word does not begin with an incorporation domain (hence the bomb in the second frame). Therefore, as in the third frame, incorporation applies to the V-slot immediately to the right of the initial V: the first V-slot of the long vowel. The contentful V-slot of the long vowel no longer projects to L2, and therefore, in accordance with the principle in (26), the vowel may not spread. This derives long vowel shortening after initial light syllables. If so, in Tonkawa, incorporation may apply not only to empty nuclei, but also to full ones. Note, again, that the lack of stress on the reduced short vowel is also predicted, since it ends up only projecting to L1.[18]

(31) /xa-kaa-na-oʔ/ => [xákanó] 'he throws it far away'

```
     *     *     *ₐ    *     *  *ᵦ
  C  V  C  V  C  V  C  V  C  V  C  V   →
  |  |  |  |  |     |     |  |
  x  a  k  a        n  a     o  ʔ

        *ₐ              *ᵦ
   *     *              *
  C  V  C  V  C  V  C  V  C  V
  |  |  |  ⌐--→    |  |  |
  x  a  k  a        n  o  ʔ

        *ₐ              *ᵦ
        *     *         *
  C  V  C  V  C  V  C  V  C  V
  |  |  |  ↓        |  |  |
  x  a  k  a        n  o  ʔ
```

Short vowels may also be targeted by incorporation, in which case they are completely lost, as in Mojeño Trinitario. A case in point is the next example (32). Again, the initial V-slot is not an incorporator initially, but must become one. As a result of the incorporation of its single projection, the second vowel cannot be realized. Note that the incorporation in this case can also be regarded as the repair for lapse (see below); but the obligatory incorporator status of the first

---

[18] In the previous section, I mentioned a pressure not to leave unidentified CVs in the structure. But such an unidentified CV is exactly what is left behind after the shortening of the vowel in (31). It seems that this is a violable pressure, as indeed suggested by Faust & Torres-Tamarit (2017).

V-slot is independently necessary in order to account for (31) above. Stress placement is correctly predicted without assuming uneven trochees.

(32)   /we-tasa-sooyan-oʔ-s/ => [wétsasóoyanóʔs] 'I swim off with them'

```
      *   ●☼  *α      *        *      *β      *        *      *γ
      C   V   C   V   C   V   C   V   C   V   C   V   C   V   C   V
      |   |   |   |   |   |   |           |   |   |   |
      w   e   t   a   s   a   o           y   a   n   o   s
```

```
          *α                      *β                      *γ
          *               *       *               *       *
  →   C   V   C   V   C   V   C   V   C   V   C   V   C   V   C   V
      |   |   |       |   |   |   ╘----→   |   |   |   |
      w   e   t   a   s   a   s   o       y   a   n   o   s
```

So far, we have seen: **i.** incorporation that repairs empty, metrically-significant V-slots, as in Palestinian Arabic; and **ii.** incorporation of one projection from a contentful nucleus in order to comply with a Tonkawa-specific requirement for the beginning of the word. Lapse avoidance, i.e. the motivation for incorporation that was evident in Mojeño Trinitario, is also true in Tonkawa, as (33) illustrates. In this example, the first frame presents the state-of-affairs after the incorporation of empty nuclei and the elimination of the hiatus /o-o/ have applied.[19] This representation poses two problems. First, the initial V-slot is not an incorporator; and second, there is an L1 lapse in the sequence [noto]. Both problems are resolved through incorporation: the former as in (31) above, shortening the long vowel; and the latter as in (32) above, by right-to-left incorporation, resulting in the syncope of the second syllable. Neatly, the direction of incorporation in the latter case need not be posited, since it follows from clash avoidance: if it were left-to-right, a clash would be created with the following syllable.

(33)   /ke-taa-notoso-oʔ/ => [kétanótsóʔ] 'he stands with me'

```
              *α                          *γ
      *   ●☼  *                   *   ●☼  *β      *
      C   V   C   V   C   V   C   V   C   V   C   V   C   V
      |   |   |   ╘----→   |   |   |   |   |   |   |
      k   e   t   a       n   o   t   o   s   o   ʔ
```

```
          *α                      *β                      *γ
          *               *       *                       *
  →   C   V   C   V   C   V   C   V   C   V   C   V   C   V
      |   |   |   ╲↓      |   |   |   |   |   |
      k   e   t   a↓      n   o   t   o   s   o   ʔ
```

─────────────────────────

[19] The two consecutive, heteromorphemic, identical vowels are treated on a par with hiatus.

This last representation closes the account of the Tonkawa facts. As for Mojeño Trinitario, there are other facts reported in the literature on this language; but the account above suffices to illustrate the incorporation-based, Strict CV metrics take on the data. As I hope has been shown succinctly, such an incorporation-based account is easily applicable to languages like Tonkawa, which combine both rationales of incorporation: elimination of metrically-significant empty nuclei and lapse avoidance.

6 Conclusion

One goal of the Strict CV metrics approach is to show how, once empty V-slots are factored in, moras are unnecessary. The grid-based analytic tool of incorporation put forth in Ulfsbjorninn (2014) has been used to this end in past analyses. But the theory has yet to be applied to metrically-conditioned syncope.

This paper filled this gap by applying the mora-less, incorporation-based account to this phenomenon, first in Mojeño Trinitario (Rose 2019), and then in Tonkawa (Gouskova 2003; 2007). For Mojeño Trinitario, the account was compared to Rose's moraic account, and it has been my contention that it is preferable to that competitor on several fronts. As detailed in the paper, it eliminates several axiomatic assumptions, offers a more uniform take on the data, adequately expresses minor patterns with marked phonological representations and covers segmental effects in a less problematic manner. As for Tonkawa, while a comparison with a moraic account was not undertaken, I showed that the incorporation-based approach can easily be extended to the phenomena from this language.

Two motivations for incorporation have been identified: **i.** eliminating the marked configuration of empty nuclei with projections, and **ii.** avoidance of lapse/clash. In Palestinian, only the first problem is repaired through incorporation; in Mojeño Trinitario, since there are no underlying empty nuclei, only the second rationale holds. The prediction that a system may involve both motivations for incorporation was confirmed in Tonkawa. I argued that the limitations placed on incorporation – the number of incorporated projections, whether incorporators can be incorporated, etc. – follow from the different motivations. For instance, in Tonkawa, incorporators can be incorporated in order to allow for initial prominence; only one projection, the minimal amount required for the creation of prominence, is incorporated at a time. Having said all of the above, and as already mentioned, work on incorporation as a tool is only beginning. It is certainly possible that more configurations may be found in future work.

While the accounts in this paper are alternatives to moraic ones, this paper should not be read as an attack on moraic theory in general. Such a goal cannot be achieved without a much wider, typologically-informed examination of analyses conducted in that theory. Rather, I hope to have shown that within a theory that rejects syllable weight, moras and feet, rhythmic syncope *can* be accounted for, and in a way that *can* compete with a moraic account.

Acknowledgements

Competing interests

The author has no competing interests to declare.

References

Charette, Monik. 2003. Empty and pseudo-empty categories. In Ploch, Stephen (ed.), *Living on the Edge: 28 Papers in Honour of Jonathan Kaye*, 465–480. Berlin and New York: Mouton de Gruyter. DOI: https://doi.org/10.1515/9783110890563.465

D'Alessandro, Roberta & Scheer, Tobias. 2015. Modular PIC. *Linguistic Inquiry* 46(4). 593–624. DOI: https://doi.org/10.1162/LING_a_00195

Enguehard, Guillaume. 2017. Reduplication in Russian verbs and adjectives: motivating form with morphosyntactic constraints. *Glossa: a journal of general linguistics* 2(1). 59. DOI: https://doi.org/10.5334/gjgl.242

Enguehard, Guillaume & Faust, Noam. 2018. Guttural ghosts in Modern Hebrew. *Linguistic Inquiry* 49:4. 685–721. DOI: https://doi.org/10.1162/ling_a_00287

Everett, Dan. 1999. Syllable Integrity. *Proceedings of WCCFL (West Coast Conference on Formal Linguistics)* XVI, 177–190. Cambridge University Press and University of Chicago Press.

Fathi, Radwa. 2017. Gender exponence and apparent polarity in a class of Omani Mehri plurals. *Glossa: a journal of general linguistics* 2(1). 103. DOI: https://doi.org/10.5334/gjgl.249

Faust, Noam. 2014a. Templatic metathesis in Tigre imperatives. *Phonology* 31. 209–227. DOI: https://doi.org/10.1017/S0952675714000116

Faust, Noam. 2014b. Where it's [at]: A phonological correlate to the Phase Impenetrability Condition in the Construct state of Modern Hebrew. *Lingua* 150. 315–331. DOI: https://doi.org/10.1016/j.lingua.2014.08.001

Faust, Noam. 2015. Eroded prefixes, gemination and guttural effects in Tigre: an account in CVCV phonology. *Natural Language and Linguistic Theory* 33(4). 1209–1234. DOI: https://doi.org/10.1007/s11049-014-9277-1

Faust, Noam. 2017. Apophony in the inflections of weak and strong verbs in Palestinian Arabic. *The Linguistic Review* 34(1). 83–124. DOI: https://doi.org/10.1515/tlr-2016-0006

Faust, Noam & Torres-Tamarit, Francesc 2017. Stress and final /n/ deletion in Catalan: combining Strict CV and OT. *Glossa: a journal of general linguistics* 2(1). 63. DOI: https://doi.org/10.5334/gjgl.64

Faust, Noam & Ulfsbjorninn, Shanti. 2019. Arabic stress in Strict CV, with no moras, no syllables, no feet and no extrametricality. *The Linguistic Review* 35(4). 561–600. DOI: https://doi.org/10.1515/tlr-2018-2001

Goldsmith, John. 1976. An overview of autosegmental phonology. *Linguistic Analysis* 2(1). 23–68.

Gordon, Matthew. 2005. A Perceptually-Driven Account of Onset-Sensitive Stress. *Natural Language & Linguistic Theory* 23. 595–653. DOI: https://doi.org/10.1007/s11049-004-8874-9

Gouskova, Maria. 2003. *Deriving economy: Syncope in Optimality Theory*. Amherst, MA: University of Massachusetts dissertation.

Gouskova, Maria. 2007. The reduplicative template in Tonkawa. Phonology 24:3. 367–396. DOI: https://doi.org/10.1017/S0952675707001261

Gussmann, Edmund. 2002. *Phonology: Analysis and Theory*. Cambridge: Cambridge University Press. DOI: https://doi.org/10.1017/CBO9781139164108

Gussmann, Edmund & Kaye, Jonathan. 1993. Polish notes from a Dubrovnik Café. *SOAS Working Papers in Linguistics & Phonetics* 3. 427–462.

Halle, Morris & Vergnaud, Jean-Roger 1987. *An essay on Stress.* Camridge, MA: MIT Press

Harris, John & Gussmann, Edmund 2002. Word-Final Onsets. *UCL Working Papers in Linguistics* 14. 1–14.

Hayes, Bruce. 1995. *Metrical Stress Theory.* Chicago: University of Chicago Press.

Hyde, Brett. 2011. Extrametricality and nonfinality. In van Oostendorp, Marc & Ewen, Colin & Hume, Beth & Rice, Keren (eds.), *A Companion to Phonology*, 1027–1051. Blackwell.

Lahrouchi, Mohamed. 2018. The left edge of the word in the Berber derivational Morphology. *Glossa: a journal of general linguistic*s 3(1). 30. DOI: https://doi.org/10.5334/gjgl.250

Lampitelli, Nicola. 2017. A morphophonological analysis of the velar insert in Italian verbs. *Glossa: a journal of general linguistics* 2(1). 47. DOI: https://doi.org/10.5334/gjgl.234

Lowenstamm, Jean. 1996. CV as the Only Syllable Type. In Durand, Jacques & Laks, Bernard (eds.), *Current Trends in Phonology Models and Methods*, 419–442. European Studies Research Institute, University of Salford.

McCarthy, John J. 2008. The serial interaction of stress and syncope. *Natural Language and Linguistic Theory* 26. 499–546. DOI: https://doi.org/10.1007/s11049-008-9051-3

Newell, Heather. 2021. Bracketing Paradoxes Resolved. *The Linguistic Review* 38(3). 443–482. DOI: https://doi.org/10.1515/tlr-2021-2072

Polgárdi, Krisztina. 2015. Syncope, syllabic consonant formation, and the distribution of stressed vowels in English. *Journal of Linguistics* 51. 383–423. DOI: https://doi.org/10.1017/S0022226714000486

Rose, Françoise. 2019. Rhythmic syncope and opacity in Mojeño Trinitario. *Phonological Data and Analysis* 1(2). 1–25. DOI: https://doi.org/10.3765/pda.v1art2.2

Ryan, Kevin M. 2014. Onsets contribute to syllable weight: statistical evidence from stress and meter. *Language* 90,2. 309–341. DOI: https://doi.org/10.1353/lan.2014.0029

Scheer, Tobias. 2004. *A lateral theory of phonology. Vol 1: what is CVCV, and why should it be?* Berlin: Mouton de Gruyter. DOI: https://doi.org/10.1515/9783110908336

Scheer, Tobias. 2012. Direct interface and one-channel translation. *A non-diacritic theory of morphosyntax-phonology interface. Vol. 2 of A lateral theory of phonology*. Berlin: Mouton de Gruyter.

Scheer, Tobias & Szigetvári, Peter. 2005. Unified representations for stress and the syllable. *Phonology* 22(1). 37–75. DOI: https://doi.org/10.1017/S0952675705000436

Scheer, Tobias & Ziková, Markéta. 2010. The Coda Mirror v2. *Acta Linguistica Hungarica* 57(4). 411–431. DOI: https://doi.org/10.1556/ALing.57.2010.4.4

Ségéral, Philippe & Scheer, Tobias. 2008. The Coda Mirror, stress and positional parameters. In Brandão de Carvalho, Joaquim & Scheer, Tobias & Ségéral, Philippe (eds.), *Lenition and fortition*, 483–518. Berlin: Mouton de Gruyter. DOI: https://doi.org/10.1515/9783110211443.3.483

Topintzi, Nina. 2010. *Onsets: Suprasegmental and prosodic behaviour*. Cambridge: Cambridge University Press. DOI: https://doi.org/10.1017/CBO9780511750700

Ulfsbjorninn, Shanti. 2014. *A Field theory of stress: the role of empty nuclei in stress systems*. SOAS – University of London, PhD Dissertation.

Ulfsbjorninn, Shanti. 2021. Lenition and Metathesis in Hawu: a quantity-sensitive language. *SOAS Working Papers in Linguistics* 20. 1–25.

van de Weijer, Jeroen. 2011. Review of Onsets: Suprasegmental and prosodic behaviour, by Nina Topinzi. *Lingua* 121. 323–327. DOI: https://doi.org/10.1016/j.lingua.2010.09.005

Zimmermann, Eva. 2017. *Morphological length and prosodically defective morphemes*. Oxford University Press. DOI: https://doi.org/10.1093/oso/9780198747321.001.0001