Kevin M. Ryan
Revised preprint draft of June, 2023, to appear in *Phonology*

Degenerate feet in phrasal phonology: evidence from Latin and Ancient Greek*

Abstract

Degenerate feet, even when forbidden in isolated words, can arise within phrases due to resyllabification. In particular, when a stressed monosyllable of the shape C_0VC (where V is short) undergoes resyllabification in Latin and Ancient Greek, it yields a degenerate foot. While degenerate feet were tolerated in prose, they were avoided in hexameter verse. Even though a degenerate foot is a kind of light syllable, a light metrical position could not contain a foot. Verse evidence is used as a window onto the general prosodic structure of each language, revealing that speakers productively recognized degenerate feet and distinguished them from other prosodic categories.

Degenerate (that is, monomoraic) feet, while permitted in some languages, tend to be highly restricted in their distribution (Hayes 1995). In Ojibwe, for instance, a degenerate foot is possible only at the end of a prosodic word (PWd), as in (1) (Piggott 1980, Newell and Piggott 2014), suggesting that PARSE, which requires syllables to be footed, dominates FTBIN, which requires feet to be binary. (Throughout, feet are parenthesized.) Non-final degenerate feet, as in ungrammatical (c–d), are gratuitous because the feet could be combined, as in (b), satisfying PARSE without compromising FTBIN. In (d), [(ˌgin)] violates FTBIN because codas are non-moraic in Ojibwe.

(1)
a.	(ˌwiː)(ˈkwaː)(ˌboː)(ˌzo)	“he is carried along by the current”
b.	(ginˈwaː)(biˌki)(ˌzi)	“it is a long metal object”
c.	*(ginˈwaː)(ˌbi)(ˌki)(ˌzi)	
d.	*(ˌgin)(ˈwaː)(biˌki)(ˌzi)	

As I argue here, some languages that forbid degenerate feet in isolated PWds permit them in phrasal phonology, where multiple PWds interact. Classical Latin and Homeric Greek furnish two cases, along with the metrical diagnostics to confirm that the syllables in question are in fact degenerate feet, that is, both light (monomoraic) and independently footed. Specifically, degenerate feet arise in these languages due to resyllabification. An isolated PWd can be C_0VC (throughout, V is short), as with Latin *dat* “gives” in (2a). As the subscripts indicate, the PWd is bimoraic, satisfying FTBIN; indeed, isolated PWds are required to be at least bimoraic in Latin (Mester 1994) and Ancient Greek (Blumenfeld 2011). When prevocalic, however, as in (2b), *dat* loses its coda, which is now parsed as the onset of the following PWd. Latin, like Greek, tolerates the resulting degeneracy (subminimality). The metrical evidence reviewed below confirms that in configurations like (b), the consonant is resyllabified (without ambisyllabicity), the vowel remains short, and the first word retains its stress.

*I would like to thank three anonymous referees for their careful reading of the submission. Additionally, though they did not see any version of this article, parts of it benefited from earlier input by Dieter Gunkel, Bruce Hayes, Donca Steriade, Brent Vine, Kie Zuraw, and audience members at NELS 41 at the University of Pennsylvania in 2010.

(2) a. (ˈda$_{\mu}$t$_{\mu}$) "gives"
b. (ˈda$_{\mu}$)(ˈt au$_{\mu\mu}$)lu$_{\mu}$s$_{\mu}$ "Aulus gives"

Not all languages with bimoraic minima and resyllabification tolerate resyllabification-induced degeneracy like Latin and Greek do. Tamil, for instance, geminates the final consonant (if geminable) of a C_0VC word when it undergoes resyllabification, as in (3a–b) (cf. Italian; Chierchia 1982). Crucially, in Tamil, such gemination is absent when FTBIN is not at stake, as with [avaɭ] "her" in (c), which remains bimoraic after losing its coda (Ryan 2019: 128–32 and references therein). If the final consonant of a prevocalic C_0VC word is not geminable in Tamil, as with the rhotics, the vowel lengthens instead, as in (3e) (*ibid*., Rajam 1992: 85).

(3) a. (ˈn̪a$_{\mu}$l$_{\mu}$) "good"
b. (ˈn̪a$_{\mu}$l$_{\mu}$)(ˈl uː$_{\mu\mu}$ɾ) "good city"
c. (ˈa$_{\mu}$va$_{\mu}$)(ˈɭ uː$_{\mu\mu}$ɾ) "her city"
d. (ˈo$_{\mu}$ɾu$_{\mu}$) "one"
e. (ˈoː$_{\mu\mu}$)(ˈɾ uː$_{\mu\mu}$ɾ) "one city"

Another strategy to avoid resyllabification-induced degeneracy is to suppress resyllabification if it threatens binarity (e.g. by ranking FTBIN over ONSET). Ryan (2019) documents this situation in Māhārāṣṭrī Prakrit, which records word-final nasals differently depending on whether or not they undergo resyllabification. The final nasal of a C_0VC word, where degeneracy is threatened, is significantly less likely to resyllabify than the final nasal of a longer word, where degeneracy is not at stake. Of course, a language might also forbid cross-PWd resyllabification across the board, as with Dutch (Booij 1996).

A final logically possible strategy to avoid resyllabification-induced degeneracy is to suppress stress. In such a language, a C_0VC word, say, *tat*, would be stressed when preconsonantal but unstressed when prevocalic, as schematized in (4). I am not aware of any case exactly like this one, though Hayes (1995: 112–3) considers possible cases of subminimal words being unable to surface with stress in any context. While uncommon at best across words, within words, contrasts like (4a) vs. (4b) are commonplace.

(4) a. (ˈta$_{\mu}$t$_{\mu}$) (ˈba$_{\mu}$ga$_{\mu}$) (constructed)
b. ta$_{\mu}$(ˈt a$_{\mu}$ga$_{\mu}$) (constructed)

Latin and Greek, as mentioned, do not employ any of these strategies to circumvent a degenerate foot when one arises due to resyllabification. Rather, they let the degenerate foot stand. A benefit of examining such languages is that their extensive and exacting metrical traditions furnish independent diagnostics of prosodic properties such as weight and stress. Whether Ancient Greek had stress in addition to pitch accent is irrelevant here; either way, I assume, along with most analysts (e.g. Steriade 1988, Sauzet 1989, Golston 1990, Devine and Stephens 1994, Blumenfeld 2004, 2011, Sandell 2020), that it had feet, as discussed in §5.

For both languages, I focus on the dactylic hexameter, as schematized in (5). The following basic description of the meter will suffice for all present purposes. Each of six metra, as enumerated, is divided into two metrical positions. The first, ⏑, must be filled by a heavy syllable and the second, ⏑⏑, by either a heavy or pair of lights. If the latter is filled by a pair of lights, each light occupies a SUBPOSITION, in Prince's (1989) terminology. Note that "subposition" is equivalent

to saying "light-requiring position" for this meter, since light syllables are not otherwise licensed outside of line end. The cadence comprises the final two metra. In Latin, the cadence, unlike the rest of the line, is strictly regulated for stress, being nearly always (for most authors) stressed in strong (_) positions and unstressed in weak positions (⏑⏑ and ⏑).

(5)

				cadence	
1	2	3	4	5	6
_⏑⏑	_⏑⏑	_⏑⏑	_⏑⏑	_⏑⏑	_⏑

As I will show, stressed C_0VC retains its stress even while undergoing resyllabification, resulting in a degenerate foot. While such feet were freely tolerated in prose (and thus everyday speech), they were strongly avoided in most authors' hexameters. I attribute this avoidance to a maximum size constraint on the subposition, such that it cannot contain a prosodic constituent higher than the syllable. A degenerate foot, in effect, is too large for a subposition, but too small (being light) for a heavy-requiring position. It therefore finds no comfortable place to sit in the meter, even while being free to occur outside of verse.

To be clear, this analysis does not suppose that degenerate feet are somehow confined to poetic language or a property of the meter itself. Rather, degenerate feet are a property of the general language. Poets, in turn, can be sensitive to them, just as they are sensitive to moraic structure and other properties of the general language. In this way, verse sheds light on general prosody. Poets' special treatment of degenerate feet, as distinct from similar structures such as stressed light syllables more generally, supports the psychological reality of the construct. I conclude that degenerate feet are more widely distributed in the world's languages than previously assumed.

I begin with the empirical facts in Latin in §1 before turning to the formal analysis of degenerate feet as induced by resyllabification in §2. The next two sections §3–4 address the verse evidence for degeneracy in Latin, including (in §4) a cline of stressability among function words. I turn to Greek in §5, demonstrating that essentially the same behavior is found in the Homeric hexameter. Finally, §6 considers alternatives to the degenerate foot, with §7 concluding.

1 Resyllabification-induced degeneracy in Latin

Latin is a classical example of a moraic trochee language (Mester 1994). Feet are initially prominent and may be two syllables or one heavy (bimoraic) syllable. Degenerate feet are forbidden in isolated words, as supported by convergent evidence. For one, in words of three or more syllables, stress falls on the penult if the penult is heavy. If the penult is light, stress falls on the antepenult, as in (6a). With feet, this pattern is analyzed as involving a right-aligned trochee subject to final syllable extrametricality (i.e. foot-based NONFINALITY: "penalize a footed ultima"). Foot binarity (FTBIN) is then necessary to preclude the ungrammatical alternative in (6a) in which stress falls on the penult, a candidate that otherwise satisfies both NONFINALITY and TROCHEE. Second, in disyllables with an initial light, FTBIN is seen to dominate extrametricality, as in (6b). Evidence that the ultima is footed in such cases includes so-called iambic shortening (found especially in Archaic Latin), whereby a would-be light-heavy trochee becomes light-light due to FTBIN (Mester

1994).[1] On this analysis, if the stressed light syllable were footed by itself as a degenerate foot, the motivation for shortening the ultima would be lost. After all, unfooted ultimas are not shortened, as (6a) illustrates. Finally, FTBIN has been invoked to explain prosodic minimality, such as the lengthening in (6c) (Prince and Smolensky 1993/2004). An isolated prosodic word cannot be a degenerate foot. Monosyllables also reinforce the violability of NONFINALITY.[2]

(6) a. (ˈani)maː, *a(ˈni)maː "from the soul"
b. /amoː/ → (ˈamo), *(ˈa)moː, *(ˈamoː) "I love"
c. /da/ → (ˈdaː), *(ˈda) "give"

Despite being forbidden within words in Latin, degenerate feet, I argue, arise in cross-word contexts. In Latin, as in many of its descendants, a word-final consonant resyllabifies with a following vowel-initial word (Allen 1978, Harris 1983, Peperkamp 1997, Ryan 2019, Passino et al. 2022).[3] If a stressed monosyllable of the shape C_0VC is prevocalic, resyllabification yields a degenerate foot, as in (7a). As argued presently, such phrases are not normally parsed as (7b) (suppressing resyllabification), (7c) (lengthening the vowel), or (7d) (suppressing stress), among other possibilities (the possibility of ambisyllabicity, for one, is rejected in §2).

(7) *dat Aulus* "Aulus gives"
a. (ˈda)(ˈt au)lus
b. *(ˈdat) (ˈau)lus
c. *(ˈdaː)(ˈt au)lus
d. *da(ˈt au)lus

First, resyllabification applies as normal to C_0VC words. Among other evidence, this is clear from verse, where such words scan as light prevocalically. In the lines in (8), for example, *vir* "man," *fer* "carry," and *dat* "gives" must scan as light to fit the hexameter. Slashes indicate boundaries between metrical feet. Macrons mark long monophthongs. Metrically elided vowels are underlined. Each line is followed by its scansion (⏑ being heavy, ◡ light) and a rough gloss. If prevocalic C_0VC resisted resyllabification, as in (7b) above, one would expect it to be treated as heavy in verse.

(8) a. Vād̲e ag̲e, e/t ingen/tem fac/tīs **fer** a/d aethera / Trōiam (Virgil, *Aeneid* 3.462)
⏑◡◡ / ⏑⏑ / ⏑⏑ / ⏑◡◡ / ⏑◡◡ / ⏑⏑
"Go on, and by deeds **carry** great Troy to the heavens"

b. Hic **vir**, hi/c est, tibi / quem prō/mittī / saepiu/s audīs (Virgil, *Aeneid* 6.791)

[1]The shortening is traditionally called "iambic" because the input is *quantitatively* iambic, that is, a light-heavy sequence, not because stress is iambic.

[2]Cliticization complicates the basic Latin stress pattern, but not in a way that requires positing degenerate feet. In particular, enclitics (e.g. *que* "and") induce stress on a stem-final light in at least some contexts, as in *sceleráque* (probably also with stress on *sce*). If foot-based NONFINALITY were undominated, such forms would yield a degenerate foot. However, as (6) has already suggested, NONFINALITY is not undominated. Mester (1994) suggests one analysis of enclitics that obviates degeneracy, though the empirical situation is insecure (cf. Newcomer 1908, Allen 1978). At any rate, in agreement with Mester (1994), there is no strong case for degenerate feet in the context of enclitics. Even if there were, the issue is orthogonal to the treatment of phrases that follows.

[3]Pronunciation, not orthography, matters. For example, *h* does not block resyllabification in Latin or Greek.

_⏑⏑ / _⏑⏑ / __ / __ / _⏑⏑ / __
"This **man**, this is he, whom you hear often to be promised to you"

c. prīncipi/um **dat** e/t hinc mō/tūs per / membra ri/gantur (Lucretius, *De rerum natura* 2.262)
_⏑⏑ / _⏑⏑ / __ / __ / _⏑⏑ / __
"...**furnishes** the beginning, and from this, movements are conducted through the limbs"

As (9) illustrates, these same C_0VC words scan as heavy when pre-consonantal.

(9) a. audē̲ at/que̲ adver/sum fī/dēns **fer** / pectus i/n hostem (Virgil, *Aeneid* 11.370)
__ / __ / __ / __ / _⏑⏑ / __
"dare, and **bear** your brave chest against the enemy"

b. **vir** fui/t aut il/lā metu/entio/r ulla de/ōrum (Ovid, *Metamorphoses* 1.323)
_⏑⏑ / __ / _⏑⏑ / _⏑⏑ / _⏑⏑ / __
"...**man** was, or any woman more fearful of the gods"

c. multa vi/rum voli/tāns **dat** / fortia / corpora / lētō (Virgil, *Aeneid* 12.328)
_⏑⏑ / _⏑⏑ / __ / _⏑⏑ / _⏑⏑ / __
"going about, he **gives** many strong bodies of men to death"

Second, C_0VC does not undergo lengthening of the vowel or consonant when prevocalic, which would yield a heavy syllable. This again is clear from scansion, as in the verse lines just provided in (8), as well as from manuscripts in which vowel length is indicated.

Finally, lexical C_0VC does not lose its stress due to resyllabification. For starters, to my knowledge, no language with phrasal resyllabification works that way. In Italian, for instance, *snob horrendo* [ˈsnɔ.b or.ˈrɛn.do] "horrible snob" exhibits resyllabification, but the monosyllable retains its stress, as reinforced by [ɔ], which diagnoses stress (Peperkamp 1997).[4] Likewise, in Latin, resyllabification does not in general trigger destressing. This is clear, once again, from metrics. Ovid, for instance, virtually requires strong positions to be stressed in metrical cadences (Sturtevant 1923). A typical cadence such as *mīlitis ūsū* [ˈmiːliti.ˈs uː.suː] "from use of the soldier" would be impossible if the resyllabification induced destressing of either word (i.e. [miːliti.ˈs uː.suː] or [ˈmiːliti.s uː.suː]), as either parse would fill a metrically strong position in the cadence with an unstressed syllable.

More to the point, C_0VC monosyllables in particular do not lose their stress when undergoing resyllabification, as metrical evidence further supports. Consider once again Ovid's *Metamorphoses* (8 CE), in hexameter. Recall that stressed light syllables are rarely permitted in the cadence, though they are frequently found elsewhere in the line (Sturtevant 1923; see also §3). If, on the one hand, lexical C_0VC words retain their stress under resyllabification, one would expect them to be excluded from cadences, a context in which stress must coincide with heaviness. If, on the

[4]To be sure, the threat of subminimality can trigger prosodic fusion in some languages under some conditions. For example, in Kabardian (Gordon and Applebaum 2010), a CV word such as /ʃʼɐ/ "new" is subminimal. If possible, it will fuse with a host, as in [wəˈnɐʃʼɐ] "new house." But this fusion, which is highly restricted morphosyntactically, is not induced by resyllabification.

other hand, lexical C_0VC words lose their stress under resyllabification, they should be free, like unstressed function words, to occupy cadences when prevocalic, being unstressed light syllables.

In *Metamorphoses*, lexical $C_0VC\#V$ never occupies the cadence, whereas function $C_0VC\#V$ often does.[5] As representative function words, I take all C_0VC prepositions from the text, namely, *ad* "to," *in* "in," *ob* "against," *per* "through," and *sub* "under."[6] As representative lexical words, I take all C_0VC nouns and verbs from the text, namely, *dat* "gives," *det* "gives (subjunctive)," *fac* "make," *fer* "carry," *flet* "weeps," *it* "goes," *nat* "swims," *vir*[7] "man," *scit* "know," *stat* "stand," and *stet* "stand (subjunctive)."[8] Corpus counts are provided in (10). While $C_0VC\#V$ prepositions are roughly equally frequent inside and outside of the cadence, lexical $C_0VC\#V$ occurs only outside of the cadence. This significant difference between lexical and functional words (Fisher's exact test $p < .0001$) suggests that stressed C_0VC retains its stress even when prevocalic.

(10) Prevocalic C_0VC words in Ovid's *Metamorphoses* in the pre-cadence vs. cadence

	pre-cadence	cadence
preposition	360	527
lexical	36	0

A second and independent argument that lexical C_0VC retains its stress under resyllabification concerns Virgil's hexameter. Virgil avoids lexical C_0VC before a vowel altogether, regardless of position in the line. In Virgil's three hexameter works, the *Eclogues*, *Georgics*, and *Aeneid* (collectively c. 37–19 BCE), lexical C_0VC (using the same lists as above) occurs prevocalically six times. Preconsonantally, by contrast, it occurs 119 times. In other words, non-line-final lexical C_0VC precedes a vowel 5% of the time. This rate differs significantly from that of prepositions, which precede a vowel 41% of the time (Fisher's exact test odds ratio = 14, $p < .0001$). Corpus frequencies are provided in (11). This difference in Virgil's treatment of lexical and functional C_0VC arguably reflects stress: Virgil strongly disfavors stressed monosyllables in light-requiring positions, even when they are rendered light by resyllabification.[9] A formalization of this avoidance is presented in §3.

(11) C_0VC words in Virgils's *Eclogues*, *Georgics*, and *Aeneid* before a vowel vs. consonant

	prevocalic	preconsonantal
preposition	764	1,299
lexical	6	119

In conclusion, the final consonant of a C_0VC word resyllabifies when prevocalic, regardless of

[5] Throughout this article, V-initial words include those beginning with orthographic *h*.

[6] *Ab* "from" is set aside because it is usually *ā* before a consonant.

[7] Counts for *vir* include counts for both possible spellings of the word, namely, *vir* and *uir*. Throughout this article, any Latin word spelled with *v* was also checked in its *u*-variant.

[8] This list excludes any C_0VC word with a long vowel or any variant with a long vowel. For example, *os* was excluded, being orthographically ambiguous between *os* "bone" and *ōs* "mouth." Forms of the copula *esse* were not counted as lexical verbs. Words ending with *m*, such as *cum* "with" and *rem* "thing," were excluded because final /Vm/ is subject to elision (especially in longer forms), suggesting that the rime might have at least optionally been realized as [Ṽː]. Any word possibly ending underlyingly with a cluster or geminate was excluded (e.g. *as* "coin," *cor* "heart," and *mel* "honey"). On word-final geminates in (Archaic) Latin, see Allen (1978: 75–7).

[9] I previously made this point in Ryan (2019) based on a smaller corpus, namely, the first six books of the *Aeneid*.

whether the word is lexical or functional. If the word would otherwise be stressed, it retains its stress under resyllabification. In a foot-based formalism, these conditions necessitate a degenerate foot.

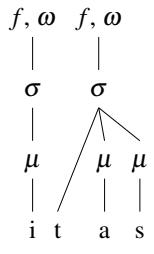
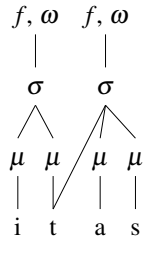
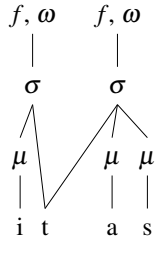
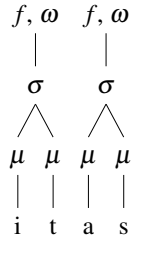
2 Resyllabification-induced degeneracy: analysis

As a simple representative example, consider *it as* "the coin (*as*) goes (*it*)." The winner [(ˈi)(ˈt as)] in (12) exhibits a degenerate foot induced by resyllabification. (To save space, when a PWd dominates nothing but a foot, they are notated on the same line as "f, ω.") Resyllabification is driven by ONSET, which penalizes a syllable with an empty onset. Because Latin permits isolated words to begin with vowels, ONSET must be dominated by faithfulness constraints precluding prothesis and aphaeresis (not shown).[10] ONSET must in turn dominate any constraint penalizing resyllabification (Ito and Mester 2009), including ALIGN-R below. The tableau also includes "weight by position" (WbyP: coda consonants are moraic), which dominates *μ/C (consonants must not be moraic), a ranking necessary to account for the weightiness of codas in Latin.

ALIGN-R in (12) is short for ALIGN(*lex*, R, ω, R) "the right edge of a lexical word coincides with the right edge of a PWd." A penalty is incurred by each misaligned segment. A separate constraint ensures that lexical words are parsed into PWds: MAX(*lex*, ω) "a lexical word corresponds with a PWd" (Ito and Mester 2019). This constraint checks the existence of a coindexed PWd, not its alignment. While a more traditional formulation of MATCH (Selkirk 2011) might wrap these two functions (alignment and existence) into a single MATCH constraint, I follow Ito and Mester (2019) in separating them, as they must be ranked differently: Alignment is violable; existence is not. The indexation to lexical words reflects that, as Selkirk (2011) puts it, "lexical category words are standardly parsed as prosodic words (ω), while functional category words like determiners, complementizers, prepositions, auxiliary verbs, etc. — in particular the monosyllabic versions of these — are not." Additional candidates without footing of the first word are considered later in this section.

[10] Relevant constraints include DEP, MAX_{σ_1}, and ANCHOR.

(12)

/it as/	ONSET	MAX(*lex*, ω)	WbyP	*μ/C	ALIGN-R	FTBIN
a. ☞ 	*			*	*	*
b. 	*			**!		
c. 	*		*!	*		*
d. 	**!			**		

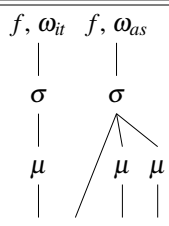
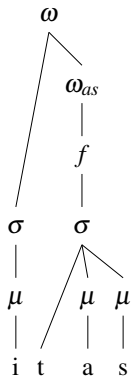
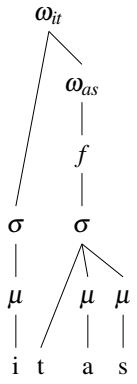
Given the two rankings ONSET $\gg$ ALIGN-R and WbyP $\gg$ *μ/C, ambisyllabicity is untenable. Candidates (12b–c) exhibit ambisyllabicity of the resyllabified consonant. That is, [t] is shared by two syllables. In (b), [t] is moraic; in (c), it is not. Of these two candidates, (b) is incorrect on empirical grounds. As discussed in §1, resyllabified consonants do not contribute to weight, ruling out (b). Candidate (c), however, has the appropriate weight profile. Nevertheless, (c) is ruled out analytically. Because WbyP must dominate *μ/C, (b) is more harmonic than (c), and, as just mentioned, (b) cannot win. If ALIGN-R (or FTBIN) were ranked above WbyP or *μ/C, (b) would win, which cannot be allowed. In short, because (b) must lose, both (b–c) must lose. Resyllabification cannot induce ambisyllabicity in Latin.

Candidates (12b–c) also violate CRISPEDGE (not shown), which in this case penalizes spreading a consonant across syllables (Ito and Mester 1999). The ranking of CRISPEDGE is irrelevant here, in that (a) wins regardless of how it is ranked.

Next, as tableau (13) illustrates, lexical *it* cannot cliticize to the following PWd. MAX(*lex*, ω) requires *it* to project its own PWd, ruling out (b). (For clarity, ω is indexed to the lexical word, if any, that stands in correspondence with it for the purposes of assessing MAX(*lex*, ω) and ALIGN-R; if no lexical word corresponds to ω, ω is left unindexed.) The alternative indexation (c) satisfies

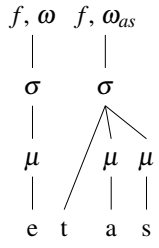
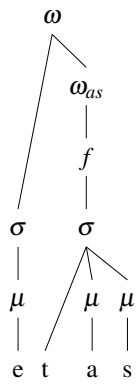
MAX(*lex*, ω) by indexing *it* to the maximal ω, but is then eliminated by ALIGN-R, given that the nearest right edge of a PWd is two segments away, across *as*. Additional possible indexations can be similarly eliminated.

(13)

/it as/	ONSET	MAX(*lex*, ω)	WbyP	*μ/C	ALIGN-R	FTBIN
a. ☞ 	*			*	*	*
b. 	*	*!		*		
c. 	*			*	**!	

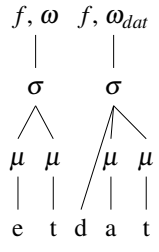
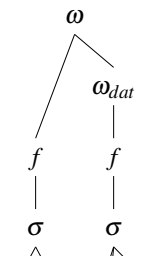
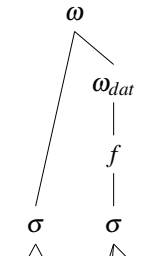
Function words are free to cliticize, as in tableau (14b), which replaces *it* "goes" with *et* "and." MAX(*lex*, ω) and ALIGN-R, as defined, ignore function words. (This is not to deny that function words might be stressed for other reasons, as discussed in §4.) In (14), FTBIN favors PWd adjunction, the correct outcome.

(14)

/et as/	ONSET	MAX(*lex*, ω)	WbyP	*μ/C	ALIGN-R	FTBIN
a. 	*			*		*!
b. ☞ 	*			*		

The analysis as it stands is incomplete, in that it predicts that a function word like *et* is free to be stressed or unstressed when preconsonantal. In (15), the three candidates, the first two with stress on *et* and the last without, are tied. At first glance, this might not seem a bad prediction, since function words like *et* can, in fact, be stressed or unstressed depending on how they are used. Nevertheless, a lack of stress is the default outcome (modulo overriding factors such as narrow focus; see §4). Thus, (c), with cliticization of the function word, should win in the base case. Various constraints could be added to militate against stressing a function word in order to break the tie in (15) in favor of (c). One is DEP(ω, *lex*), which penalizes a PWd that does not correspond to a lexical word (Ito and Mester 2019). Any constraint militating against feet or stress (even indirectly, as with alignment) would also work, appropriately lowly ranked. Output-output correspondence in stress is yet another possibility.

(15)

/et dat/	ONSET	MAX(*lex*, ω)	WbyP	*μ/C	ALIGN-R	FTBIN
a. ☞ 	*			**		
b. ☞ 	*			**		
c. ☞ 	*			**		

Finally, consider the fact that lengthening is a possible repair for degeneracy for isolated words but not for words affected by resyllabification. For example, /da/ "give" is lengthened to [(ˈdaː)], necessitating that FTBIN dominate DEP-μ. But given this ranking, what precludes /it as/ above from lengthening to *[(ˈiː)(ˈt as)]? Higher-ranking output-output correspondence, specifically, DEP$_{OO}$-μ, penalizes lengthening if the word surfaces elsewhere without length. Thus, free-standing [(ˈit)] precludes *[(ˈiː)(ˈt as)], but no output *[(ˈda)] is found to stand in the way of [(ˈdaː)]. See Breiss (2021) on prosodic output-output correspondence more broadly.[11]

[11] An anonymous referee brings up another difference between cases like /da/ (with lengthening) vs. /it/ (without lengthening): In only the former is the lengthening word-final. Another strategy would therefore be to allow a mora to be inserted only word-finally.

3 Degeneracy avoidance in the Latin hexameter

As discussed in §1, in Virgil's hexameter, C_0VC words freely occur prevocalically if they are function words (41%), but rarely if they are lexical words (5%). This difference can be explained by stress. If C_0VC is unstressed, as with the function word *ab* "from" in (16a), resyllabification does not create a degenerate foot. If lexical monosyllables lost their stress prevocalically, as with *dat* "gives" in (16b), Virgil would have no reason to avoid them prevocalically. However, lexical monosyllables retain their stress under resyllabification, as in (16c), permitting one to explain the rarity of that configuration in Virgil's epics as reflecting a constraint against degenerate feet.

(16) a. a(ˈb oː)riːs "from shores"
b. *da(ˈt oː)raːs "gives shores"
c. (ˈda)(ˈt oː)raːs "gives shores"

This avoidance does not extend to stressed light syllables in general. Ryan (2017: 590, see also Mercado 2021) finds that stressed light syllables occur in Virgil's *Aeneid* at nearly the same rate as in prose (indeed, in the pre-cadence, they are overrepresented relative to prose). Thus, Virgil's avoidance of forms like (16c) is not due to the coincidence of lightness and stress; it is specific to degenerate feet. Moreover, lexical monosyllables with long vowels ($C_0VːC$) are not avoided before vowels. They occur prevocalically 57% of the time.[12] Thus, Virgil's avoidance of forms like (16c) is not due to the coincidence of monosyllabicity and stress.

Despite the avoidance of degenerate feet in Virgil's (and certain others') hexameter corpora, such avoidance is not characteristic of Latin in general, judging by prose, nor is it found in the verse of all poets. Figure 1 shows the rate at which C_0VC is found prevocalically for lexical vs. functional words for several authors. As a sample of hexameter authors, I take (roughly chronologically) Ennius, Horace, Virgil, Ovid, Lucan, Valerius Flaccus, Statius, Juvenal, and Silius Italicus. As a prose sample, I take Caesar, Cicero, Nepos, Livy, Seneca, and Quintilian. Approximate end dates are provided in the figure.[13] The lists of prepositions and lexical words are the same as in §1. Prose corpora were split into lines by sentence punctuation.

As Figure 1 reveals, most of the hexameter corpora — with the exceptions of Ennius, Horace, and possibly Juvenal — exhibit strong avoidance of lexical C_0VC before a vowel, whereas none of the prose corpora does. In particular, hexametrists Virgil, Lucan, Valerius Flaccus, Statius, and Silius Italicus nearly (though never categorically) forbid lexical C_0VC in prevocalic position. Ovid likewise shows a significant difference between lexical and functional C_0VC, though in his case, lexical C_0VC remains frequent before vowels. The two earliest hexameter corpora examined here, by Ennius and Horace, exhibit no discernible avoidance of lexical C_0VC before a vowel,

[12] This rate is based on the lexical $C_0VːC$ monosyllables *bōs* "cow," *dās* "give," *dēs* "give (subjunctive)," *dīc* "say," *dīs* "rich," *dōs* "dowry," *dūc* "lead," *crās* "tomorrow," *crūs* "leg," *fās* "breathe," *iūs*/*jūs* "law," *mōs* "manner," *Pān* (a deity), *pēs* "foot," *scīs* "know," *sōl* "sun," *spēs* "hope," *rēs* "thing," *rōs* "dew," *rūs* "countryside," *vēr* "spring," and *vīs* "force."

[13] Specific works are as follows: Ennius' *Annales* fragments, Horace's *Sermones* (Satires 1 and 2), Virgil's *Eclogues*, *Georgics*, and *Aeneid*, Ovid's *Metamorphoses*, Lucan's *Phrasalia*, Valerius Flaccus' *Argonautica*, Statius' *Thebaid*, Juvenal's *Satires*, Silius Italicus' *Punica*, Cicero's oratories, Caesar's war commentaries, Nepos' *De viris illustribus*, Livy's *Ad urbe condita*, Seneca's *Epistulae morales ad Lucilium*, *Quaestiones naturales*, and *Dialogi*, and Quintilian's *Institutiones* and *Declamationes maiores*. All were accessed at the Latin Library (`www.thelatinlibrary.com`) on May 10, 2022.

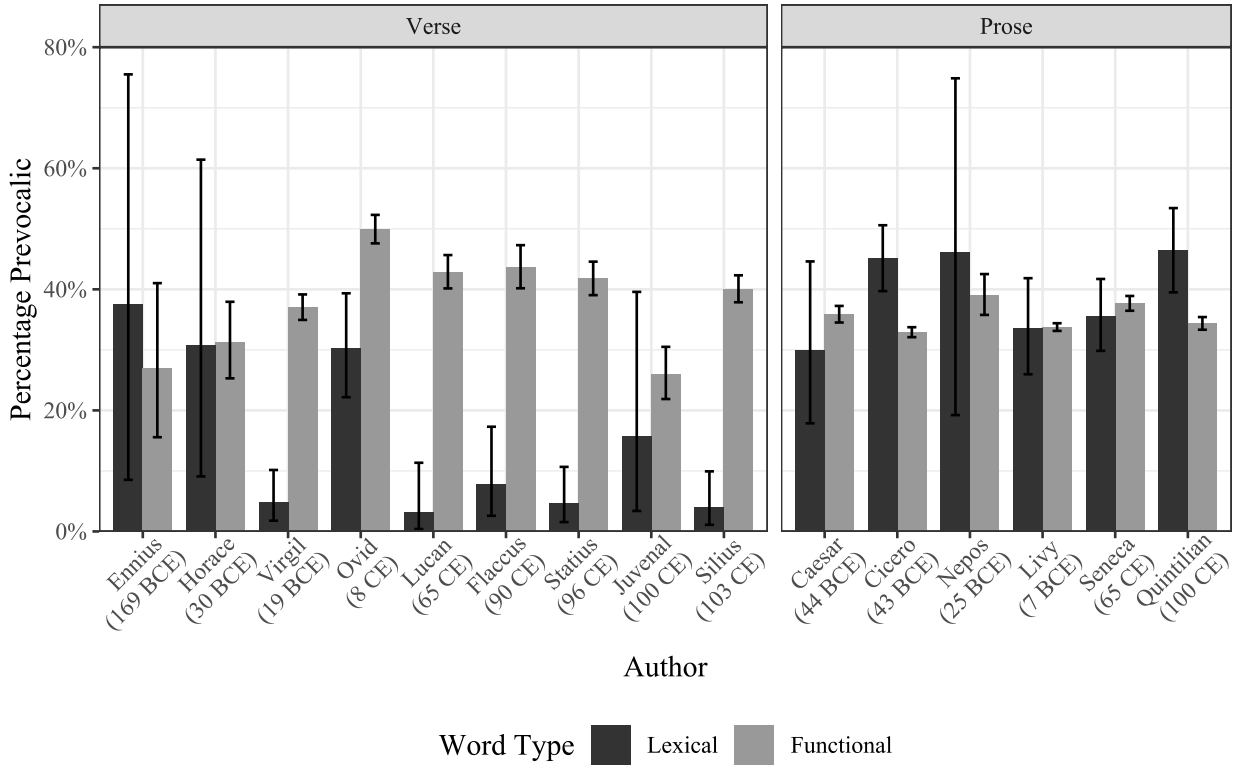


Figure 1: Percentage of C_0VC words that are prevocalic as opposed to preconsonantal, arranged by genre (labels at top), author (at bottom), and word type (grayscale fill). Within each genre, authors are arranged by rough *termini ad quem*, usually the end of the author's life (to save space, "circa" is omitted). Throughout, error bars are 95% confidence intervals based on the binomial.

though the error bars are large due to the small sizes of the corpora (just 515 lines in the case of Ennius). Ennius (c. 169 BCE or earlier) is substantially earlier than the other authors, being the sole representative here of Old Latin.

It therefore appears that avoidance of lexical C_0VC before a vowel is specific to verse, reflecting the poetic grammars of certain hexametrists.[14] These poetic grammars, I claim, possess a constraint forbidding a metrical subposition from containing a foot: *SUBPOS⊃FOOT. (Because degenerate feet always project to degenerate prosodic words in Latin, *SUBPOS⊃PWD would work equally well here.) This constraint belongs to a family of position size maxima (Hanson and Kiparsky 1996). By excluding degenerate feet from subpositions, the constraint effectively excludes degenerate feet from anywhere in the line, as such feet already could not occur elsewhere, being light. To account for the varying strength of *SUBPOS⊃FOOT for different poets, the constraint could be weighted, as in Harmonic Grammar (Pater 2009). A constraint against stress in subpositions would not be a viable substitute for *SUBPOS⊃FOOT. As discussed earlier in this section, stressed lights are not generally avoided in subpositions.[15]

This analysis based on *SUBPOS⊃FOOT makes no predictions about degeneracy avoidance outside of verse. After all, subpositions are not found in prose (or, insofar as they might be found in clausulae, they need not be subject to the same constraints as in verse). Moreover, because different poets possess different metrical grammars even for the same meter, *SUBPOS⊃FOOT need not be active, or active to the same degree, for every poet and every type of verse. Individual poets, even when part of the same metrical tradition, vary in their permisiveness of licenses and their sensitivity to linguistic factors in ways that do not necessarily reflect differences of dialect (see e.g. Hayes et al. 2012 on the iambic pentameters of Shakespeare vs. Milton). In the present case, *SUBPOS⊃FOOT would have different weights for, say, Ovid and Virgil. But the lack of evidence for *SUBPOS⊃FOOT in Horace's verse does not imply that Horace's language lacks degenerate feet. It suggests only that his poetic grammar is insensitive to the category. Meters are not sensitive to every kind of linguistic structure available to the poet (consider the marginal role of pitch accent in most quantitative meters; e.g. Arnold 1905: 6, West 1987: 2).

4 Varying stress propensities of function words

The previous section identified five hexametrists who strongly (but not categorically) avoid lexical C_0VC before a vowel, namely, Virgil, Lucan, Valerius Flaccus, Statius, and Silius Italicus. So far, I have employed prepositions as representative function words and nouns and verbs as representative lexical words. In this section, I consider additional word types of shape C_0VC, namely, adverbs, pronouns, and conjunctions. Here, adverbs include *bis* "twice," *sat* "enough, well," and *ter* "thrice"; pronouns include *id* "it," *quid* "what," *quis* "who," and *quod* "which"; and conjunctions include *an* "whether," *at* "yet," *et* "and," *sed* "but," *tot* "so many," *ut* "that," and *vel* "or." As Figure 2 shows, these additional types are intermediate in behavior between lexical words and

[14] Verse vs. prose cannot be compared for any individual author here, as each author's works fall entirely or nearly entirely on one side or the other. That said, given the range of authors and dates and the near consistency of the split between verse vs. prose, it is unlikely that the split can be attributed instead to dialect or chance.

[15] Indeed, as an anonymous referee observes, such a constraint, if it were active throughout the line, would entail that a large portion of Latin lexicon could not be employed in hexameter verse, violating the principle of FIT, by which languages favor meters that allow for expansive use of their vocabularies (Hanson and Kiparsky 1996).

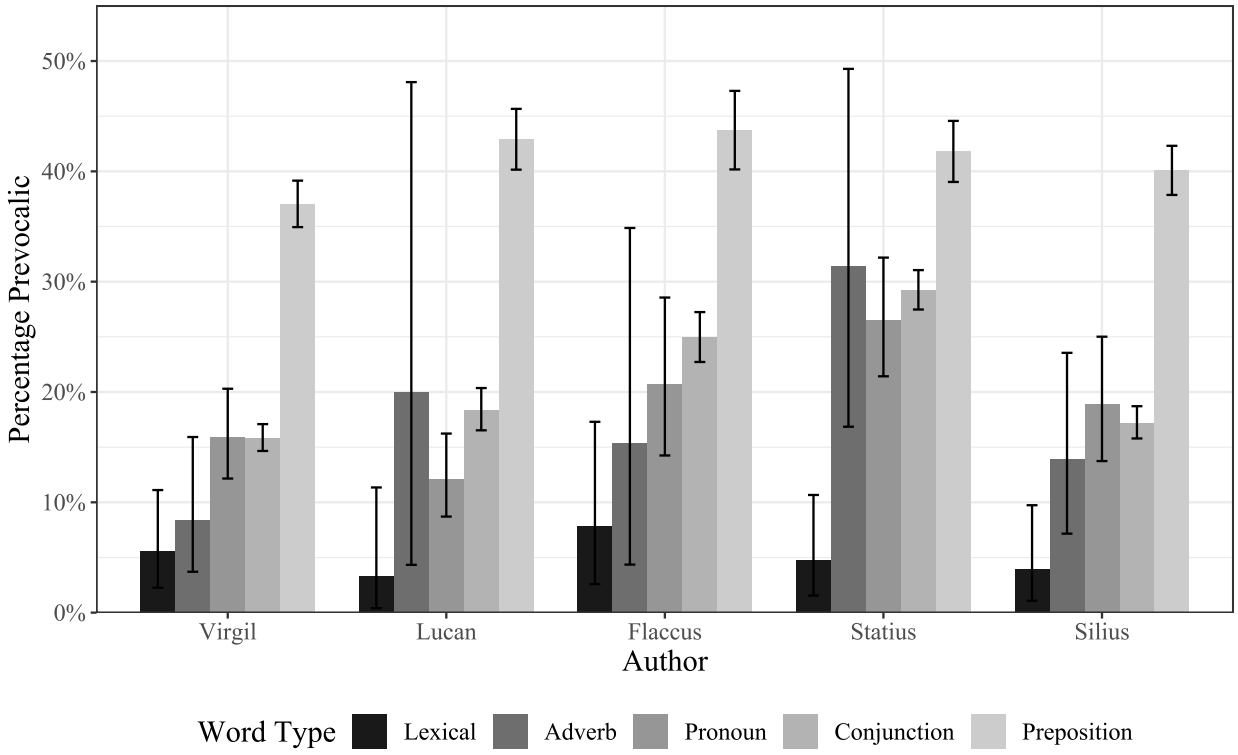


Figure 2: Prevocalic rates of five word types for five hexameter authors. "Lexical" here comprises nouns and verbs; adverbs are separate.

prepositions. Across authors, they are more vowel-avoiding than prepositions, but less vowel-avoiding than nouns or verbs. For most authors, the two contrasts just mentioned are significant, as the non-overlapping error bars in Figure 2 suggest.

Figure 3 shows the rate for each individual word, combining the works of the five authors into a single corpus. The rarer the word (judging by its count in each author's corpus), the larger its error bar. Note that some words that appear to be outliers for their category, such as *stet* "stand (subjunctive)" for lexical words, are sparsely attested ($n = 9$ in this case) and thus less reliable. Furthermore, categorization is not always straightforward. Lexical words here include nouns and verbs; adverbs are kept separate. Among adverbs, *bis* "twice" and *ter* "thrice" pattern more like lexical words, while *sat* "enough, well" patterns more like a preposition.

On the present analysis, words' varying rates of prevocalism reflect their varying propensities to be stressed. These stress propensities are general to the language — indeed, they are highly general across languages — and need not be stipulated by this analysis by, for instance, indexing *SUBPOS⊃FOOT to individual words. The different treatment of lexical vs. functional words vis-à-vis stress and cliticization has been treated extensively (Selkirk 1996, 2011, Truckenbrodt 2007, Ito and Mester 2019). Meanwhile, pronouns and conjunctions vary in stress, as determined in part by pragmatic factors such as focus, givenness, topic, demonstrativity, and so forth (Lee et al. 2008). In sum, the range of prevocalic rates in Figure 3 reflects a "cline of clisis," to use the term from Gunkel and Ryan (2017). The more likely a C_0VC word is to be stressed, the more it will be avoided prevocalically, as it is only stressed C_0VC words that incur violations of *SUBPOS⊃FOOT

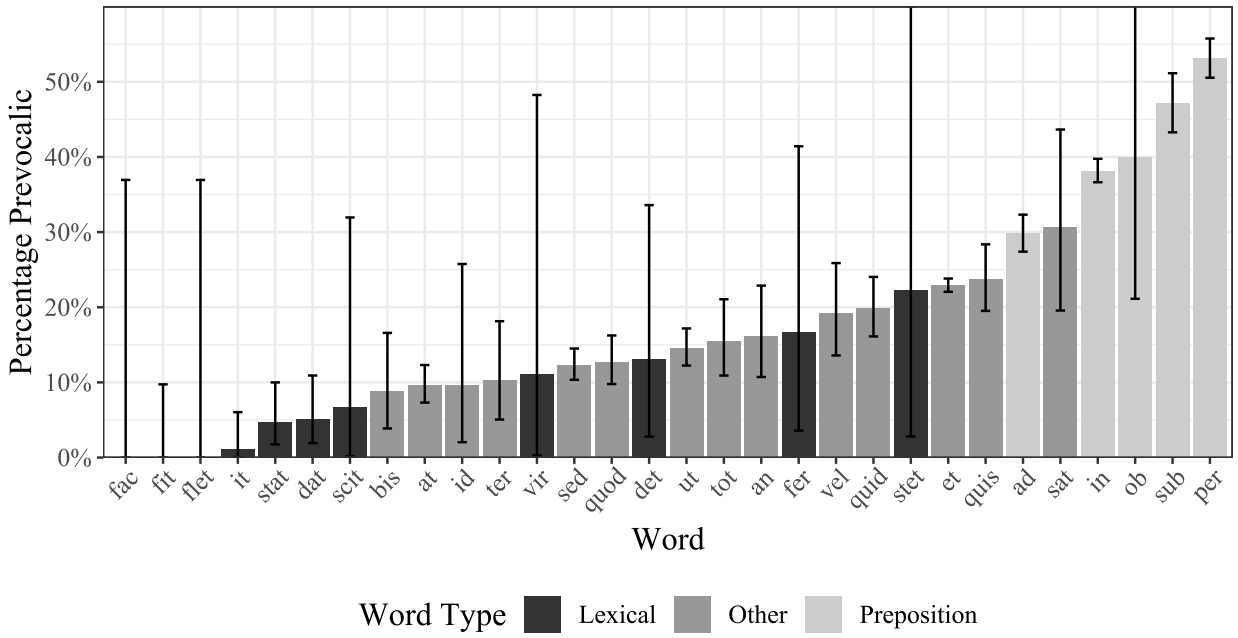


Figure 3: Prevocalic rates by word, pooling the corpora in Figure 2. Prepositions (lightest shading) tend to exhibit the highest rates, lexical words (i.e. nouns or verbs, darkest shading) the lowest. Other word types (adverbs, pronouns, and conjunctions) tend to be intermediate.

under resyllabification.

5 Degeneracy avoidance in the Ancient Greek hexameter

Like Latin, the Ancient Greek hexameter, as represented here by the *Iliad* and *Odyssey*, distinguishes degenerate feet from other light syllables. The basic template for the meter is the same as in (5), though Greek, unlike Latin, is a pitch accent language. I assume, following most modern analyses, that Ancient Greek word prosody — not just its poetic metrics — is organized around feet, which are invoked to motivate pitch accent placement, prosodic minimality, syllable timing, and other phenomena (Steriade 1988, Sauzet 1989, Golston 1990, Devine and Stephens 1994, Blumenfeld 2004, 2011, Sandell 2020; but cf. Steriade 2014). Here, all that is relevant is that monosyllables can be footed, normally so as lexical words, and sometimes as function words, just as in Latin and other languages.

As before, the present concern is monosyllables of the shape C_0VC. Short-voweled monosyllables exhibit three accentual patterns, namely, acute (high or rising), grave (lowered or canceled high; cf. Devine and Stephens 1994, Probert 2003, 2006), and none (certain clitics). An accented monosyllable is acute when at the end of an intonation group or hosting an enclitic; otherwise, it is grave. Regardless of accent and word type, resyllabification normally applies in $C_0VC\#(h)V$ throughout the line, as confirmed by scansion.

Figure 4 shows prevocalic rates of monosyllables in the combined Homeric corpus, aggregated by word type (lexical, pronoun, preposition, or conjunction). The corpus and word lists were

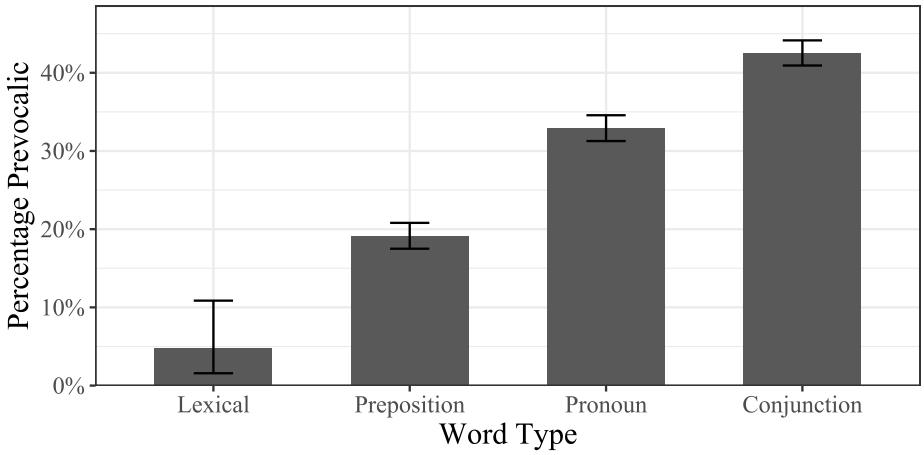


Figure 4: Prevocalic rates for Greek monosyllables, aggregated by word type.

prepared as follows. The two Greek texts were downloaded from the Perseus Digital Library.[16] Repeated lines were removed after the first instance. All words of shape C_0VC were taken as data, excluding those with long vowels (even when length is not orthographically apparent, as with some alphas, iotas, and upsilons), apocopic forms such as *pot'* (for *pote* "at some time"), and allomorphs confined to preconsonantal or prevocalic position (e.g. *kád* for *katá* "against" before *d*). The emphatic enclitic *per* was excluded because it does not fit well with any of the categories in the figure.[17] Finally, any token of prevocalic C_0VC scanning as heavy was excluded.[18]

After these exclusions, the following C_0VC words remain. Lexical words include *bán* "go, mount," *dós* "give," *p^{h}án* "speak," *p^{h}t^{h}án* "come," *stán* "stand," and *t^{h}és* "put."[19] Because there is only one adverb, *trís* "thrice," and it patterns with the lexical words, the adverb is counted as lexical in this section. Pronouns include *hén* "one," *min* "him/her/it," *són* "your," *sós* "your," *sp^{h}in* "for them," *tís* "who," *tis* "someone," and *tón* "him." Prepositions include *en* "in," *es* "into," *ksún* "with," *prós* "towards," and *sún* "with." Finally, conjunctions include *án* (modal particle), *gár* "for, since," *ken* (modal particle), *mén* "whereas," and *tár* "and so."

As Figure 4 reveals, lexical C_0VC words, unlike the other word types, are almost categorically avoided before vowels. Their prevocalic incidence is 4.8% (5 of 104 tokens), almost exactly matching Virgil's rate of 5.0% (6 of 119 tokens) in (11) and that of several other Latin hexametrists in Figure 1. The analysis is likewise the same. Due to MAX(*lex*, ω), a lexical word, regardless

[16] `www.perseus.tufts.edu`, accessed May 14, 2022. Further post-processing was facilitated by James Tauber's `greek-accentuation` module for Python.

[17] Even though it is not shown, *per* agrees with the generalizations in this section, being prevocalic 65% of the time when unaccented and 5% of the time when acute.

[18] This includes any prevocalic C_0VC in the (normally heavy) line-initial position, the site of some irregularity (West 1982). It also includes a number of tokens preceding a (historical) digamma (**w*), which is not indicated in orthography but which usually blocks resyllabification. For example, *hoi* "they" scans as if it were *hwoi*. Using a list of common digamma-initial words from Monro (1891), any bigram with a digamma-initial second member was excluded. Additionally, all remaining tokens of prevocalic monosyllables except (as accented) *àn*, *en*, *gàr*, *ken*, *mèn*, *min*, and *tis* were checked by hand. Among the 444 tokens scanned, 1.6% involved digammas not already captured. The error rate for the remaining words is likely similar.

[19] The *n*-final forms are neuter singular aorist active participles. The *s*-final forms are second-person singular aorist active imperatives.

of accent, must correspond with a PWd. If the lexical word is C_0VC and prevocalic, the PWd is rendered light by resyllabification, as in (17). The resulting syllable, being light, cannot occupy any position in the meter that requires a heavy syllable. But it also cannot occupy a light-requiring subposition, given *SUBPOS⊃FOOT (weighted as necessary to permit exceptions). It follows that degenerate feet are disfavored throughout the hexameter.

(17) (dὸ)$_\omega$(s apop^{h}t^{h}ímenon)$_\omega$ "grant that he meet his demise"

The presence of pitch accent in Greek raises a possible confound for this analysis that I now address. Hypothetically, one could imagine that lexical monosyllables might be more likely to be acute than other monosyllables, and that it might be their acuteness rather than their lexicality driving their underrepresentation before vowels. Figure 5 breaks down word type by accent type, showing that accent type does matter, but not in a way that undermines the generalization just posited. To wit, two generalizations are now evident: First, lexical C_0VC is avoided prevocalically regardless of accent (acute or grave), as already stated. Second, acute C_0VC is avoided prevocalically regardless of word type. Even C_0VC function words are nearly unattested before vowels when they are acute.

Analyzing this second generalization is beyond the scope of this article, but possibly represents another way in which degenerate words are avoided in subpositions. Recall that monosyllables are acute in two contexts, namely, when final in an intonation group and when hosting an enclitic.[20] Both contexts have been analyzed in other languages as being associated with prominence. First, Selkirk (1996) and Ito and Mester (2019) treat the non-reducibility of function words when final in the phonological phrase in English. Second, clitics are pre-stressing (requiring their host to be footed) in some languages (Mester 1994). That said, I leave these matters in Ancient Greek to future research. What is important here is that the lexicality gradient persists even when accent is controlled, as with grave accent in Figure 5.

Finally, as in Latin, beyond lexical categories, individual Greek C_0VC words vary in their prevocalic propensities, presumably reflecting varying propensities to be stressed. Figure 6 shows the rates for individual monosyllables in Greek. Note that each word has a separate entry for each accent pattern that it takes. For example, *tís* "who," which is rarely prevocalic, is separate from *tis* "someone," which is often prevocalic.

6 Discussion

A degenerate foot, despite being a kind of light syllable, is penalized in light-requiring positions in meter, being nearly banned by some poets. The present analysis does not maintain that the poets avoid degenerate feet simply because such feet are marked. (If that were the case, there would be no explanation for why the poets avoid one type of marked structure but not numerous others, nor would there be an explanation for the confinement of the avoidance to verse.) Rather, the poets avoid degenerate feet because they exceed the tolerance of a light-requiring metrical position. That

[20]These contexts need not be expressed disjunctively. Assuming that an enclitic projects to a recursive prosodic word, a non-disjunctive generalization is that an acute ultima of a maximal prosodic word becomes grave when non-final in the intonation group. Ultimas before enclitics are not affected because they are not final in their maximal prosodic words.

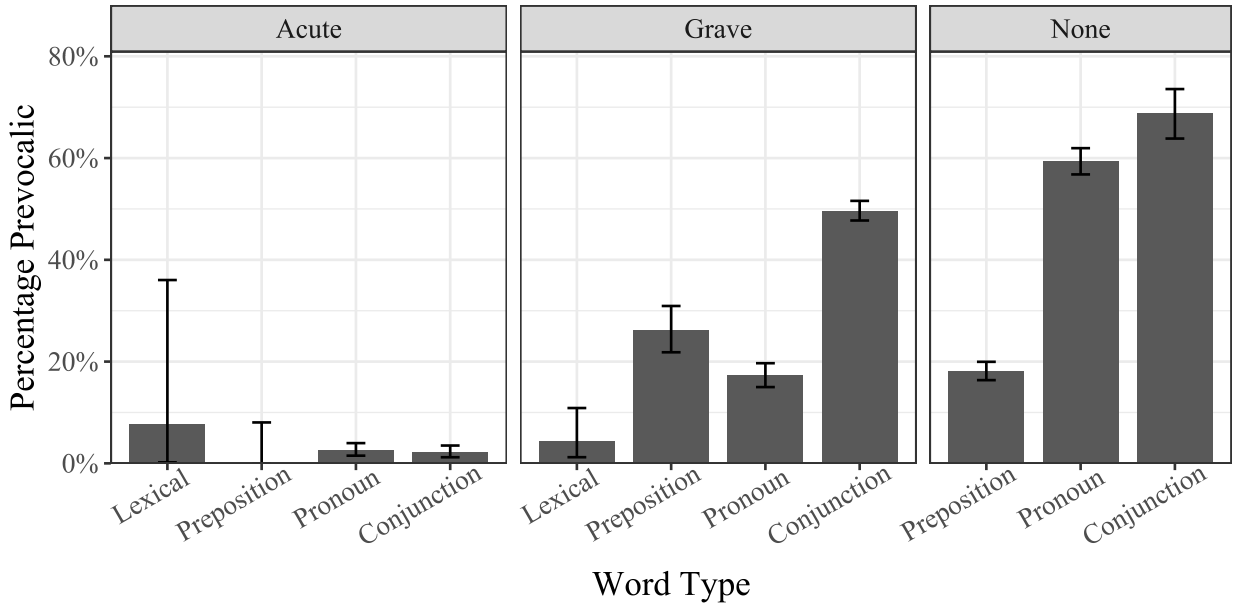


Figure 5: Prevocalic rates for Greek monosyllables, grouped by accent type (top) and word type (bottom).

is, a light-requiring position (subposition in this case) cannot dominate a prosodic category higher than the syllable.

Such avoidance is phonetically natural in the sense that a degenerate foot is presumably the longest type of light syllable in the language. At least three factors potentially conspire to make degenerate feet longer than other light syllables in Latin and Greek. First, on the present analysis, a degenerate foot arises only in a monosyllable, and monosyllables tend to be longer cross-linguistically than syllables that are part of longer words and therefore subject to polysyllabic shortening (Lehiste 1970, Mori 2002, 2014). Second, degenerate feet are stressed, and stressed syllables tend to be longer than their unstressed counterparts, as evidenced in Latin by reductive sound changes (Weiss 2020: 119–32). Finally, degenerate feet, being always word-final on this analysis, have the potential to undergo phrase-final lengthening (cf. Delattre 1966, Lindblom 1968, Wightman et al. 1992), while non-word-final light syllables lack this potential.

With this phonetic rationale in mind, this section briefly addresses the viability of alternative possible analyses of the avoidance of stressed C_0VC#V in verse that do not depend on the foot. First, as mentioned in §3, *SUBPOS⊃PWD would work just as well as *SUBPOS⊃FOOT here, since degenerate feet are always coextensive with degenerate prosodic words on this analysis. Thus, if one rejects the foot but not the prosodic word, an alternative is available that trivially modifies the present analysis.

Consider next a purely grid-based approach, without any bracketing for feet or prosodic words. As (18) illustrates, the avoidance of stressed C_0VC#V does not reflect the avoidance of a particular rhythmic configuration, at least not one expressed by the standard grid. For example, avoided type (18a) *dat amīca* has the same rhythmic profile as unavoided type (18b) *data porta*. To address the excessive crudeness of the traditional grid, one might pursue one of two strategies, invoking either monosyllabicity or phonetic duration.

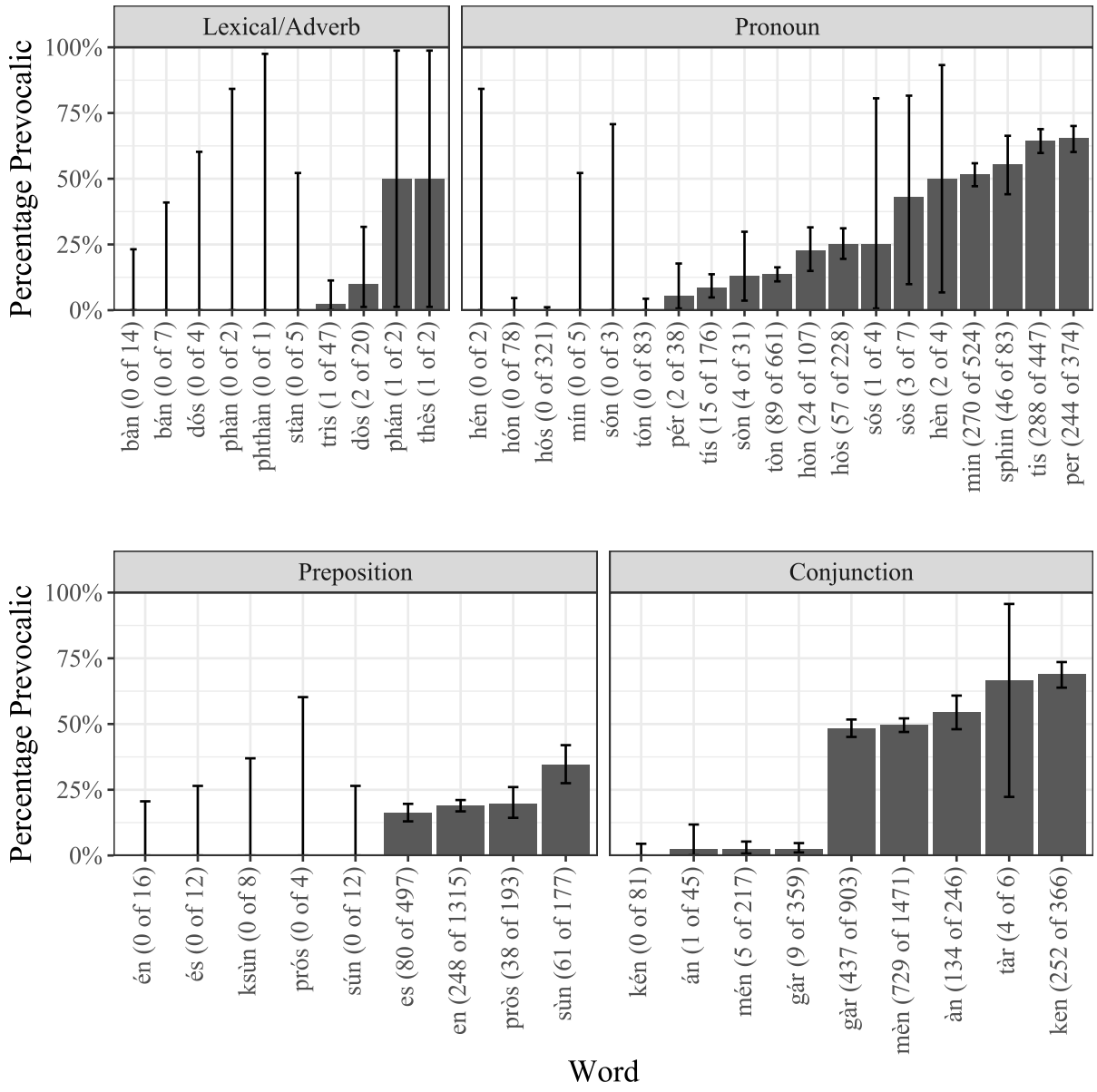


Figure 6: Prevocalic rates for Greek monosyllables, showing individual words. The labels at bottom also indicate the prevocalic and total frequencies of each word. The bimodality within conjunctions (and to some extent within the other categories) can be motivated by acute vs. non-acute accent, as addressed by the previous figure: If a C_0VC conjunction (or other word type) is acute, it is unlikely to immediately precede a vowel.

(18) a. *dat amīca*
"friend gives"

b. *data porta*
"door given"

First, consider a constraint like *SUBPOS⊃STRESSEDMONO "a subposition cannot contain a stressed monosyllable." The first issue with this constraint is that it defeats the intent of the purely grid-based strawman by invoking what can only be construed as a type of prosodic word, namely, the monosyllable. As just discussed, if one allows reference to the prosodic word, then a constraint like *SUBPOS⊃PWD suffices, which has the effect of excluding degenerate prosodic words from the hexameter without invoking monosyllabicity. Another objection to an analysis in terms of *SUBPOS⊃STRESSEDMONO is that it stipulates the description, giving up a fair amount of restrictiveness in so doing. For instance, the constraint *SUBPOS⊃STRESSEDMONO implies the simpler constraint *SUBPOS⊃MONO, banning all monosyllables from subpositions. I am not aware of such a meter.[21] The *SUBPOS⊃FOOT analysis, in which a position type exhibits a prosodically defined maximum (Hanson and Kiparsky 1996), avoids such overgeneration. "Monosyllable," not being a prosodic category, is not available as a predicate.

A final possible line of analysis that eschews the foot is to refer directly to (normalized) phonetic duration, defining duration ranges for metrical positions (cf. Flemming 2001, Ryan 2014). On such an approach, stressed monosyllables would exceed the durational tolerance of a light-requiring position. Restrictiveness, once again, is a concern. For example, if the cutoff for light positions can be drawn at whichever point is necessary to preclude stressed monosyllables, what prevents other cutoffs, such as excluding stressed monosyllabic C_0V, but only if the vowel is low? Another concern is the abstract computation of duration, that is, normalization. For example, one would presumably not want positional tolerances to vary as a function of speech rate, as raw duration would predict. Moreover, categories tend to overlap. For instance, the shortest heavies are often shorter than the longest lights, even when considering mean durations (Hayes 1999, Gordon 2002). Thus, a structure-free approach appears to be a nonstarter. That said, poetic practice can be sensitive to fine-grained phonetic detail (Ryan 2011), leaving open the question of how best to integrate phonetic and phonological phenomena in metrics.

7 Conclusion

In Latin and Ancient Greek, lexical monosyllables of the shape C_0VC remain prosodic words when they undergo resyllabification, thereby becoming degenerate feet. Verse evidence confirms that such monosyllables retain their stress even while becoming light. Prosodic word minimality (here in the form of foot binarity) is thus conditional in these languages, being suspended under certain conditions in a phrasal context. As discussed in the introduction, however, not all languages with prosodic word minima and resyllabification permit phrase-internal violations of minimality like Latin and Greek do.

[21] The avoidance of monosyllables in line-final position is not a function of position type.

Hexametrists in both the Latin and Greek traditions avoided degenerate feet in their verse due, I maintain, to a constraint against a subposition dominating a foot. Meanwhile, prevocalic lexical C_0VC was permitted freely outside of verse, revealing that the languages in general tolerated degeneracy. Beyond lexical words, as this article recognizes, function words vary in their propensities to be stressed. The more likely a C_0VC function word is to be stressed, the more it is avoided before a vowel in the hexameter, reflecting the same degeneracy effect observed more rigidly for lexical words. With this new evidence for degenerate feet being induced by resyllabification in languages that otherwise do not permit degeneracy, the degenerate foot receives additional support, being more widely distributed in the typology than previously acknowledged.

References

Allen, W. Sidney. 1978. *Vox Latina: A guide to the pronunciation of Classical Latin*. London, U.K.: Cambridge University Press.

Arnold, E. Vernon. 1905. *Vedic metre in its historical development*. Cambridge: Cambridge University Press.

Blumenfeld, Lev. 2004. Tone-to-stress and stress-to-tone: Ancient Greek revisited. *Annual Meeting of the Berkeley Linguistics Society* 30.1–12.

Blumenfeld, Lev. 2011. Coercion and minimality. *The Linguistic Review* 28.207–240.

Booij, Geert. 1996. Cliticization as prosodic integration: The case of Dutch. *The Linguistic Review* 13.219–242.

Braver, Aaron, and Shigeto Kawahara. 2014. Incomplete vowel lengthening in Japanese: A first study. *Proceedings of the 31st West Coast Conference on Formal Linguistics*, ed. by Robert E. Santana-LaBarge, 86–95. Somerville, MA: Cascadilla Proceedings Project.

Breiss, Canaan. 2021. *Lexical Conservatism in phonology: Theory, experiments, and computational modeling*. Doctoral Dissertation, UCLA.

Chierchia, Gennaro. 1982. An autosegmental theory of raddoppiamento. *North East Linguistic Society* 12.

Delattre, P. 1966. A comparison of syllable length conditioning among languages. *International Review of Applied Linguistics* 4.183–198.

Devine, Andrew M., and Laurence Stephens. 1994. *The prosody of Greek speech*. Oxford: Oxford University Press.

Flemming, Edward. 2001. Scalar and categorical phenomena in a unified model of phonetics and phonology. *Phonology* 18.7–44.

Golston, Chris. 1990. Floating L* (and H) tones in Ancient Greek. *Arizona phonology conference*, ed. by James Myers and Patricia E. Pérez, volume 3, 66–82. Tucson: University of Arizona.

Gordon, Matthew. 2002. A phonetically-driven account of syllable weight. *Language* 78.51–80.

Gordon, Matthew, and Ayla Applebaum. 2010. Prosodic fusion and minimality in Kabardian. *Phonology* 27.45–76.

Gunkel, Dieter, and Kevin M. Ryan. 2017. Corpus-linguistic approaches to clisis in metrical corpora. Paper presented at "What is a Word?", University of Zurich, 14 December.

Hanson, Kristin, and Paul Kiparsky. 1996. A parametric theory of poetic meter. *Language* 72.287–

335.

Harris, James. 1983. *Syllable structure and stress in Spanish: A nonlinear analysis*. Cambridge, MA: MIT Press.

Hayes, Bruce. 1995. *Metrical stress theory: Principles and case studies*. Chicago, IL: University of Chicago Press.

Hayes, Bruce. 1999. Phonetically-driven phonology: the role of Optimality Theory and inductive grounding. *Functionalism and formalism in linguistics*, ed. by Michael Darnell, Edith Moravscik, Michael Noonan, Frederick Newmeyer, and Kathleen Wheatly, volume 1, 243–285. John Benjamins.

Hayes, Bruce, Colin Wilson, and Anne Shisko. 2012. Maxent grammars for the metrics of Shakespeare and Milton. *Language* 88.691–731.

Ito, Junko, and Armin Mester. 1999. Realignment. *The prosody-morphology interface*, ed. by René Kager, Harry van der Hulst, and Wim Zonneveld, 188–217. Cambridge: Cambridge University Press.

Ito, Junko, and Armin Mester. 2009. The onset of the prosodic word. *Phonological argumentation: Essays on evidence and motivation*, ed. by Steve Parker, 227–260. London: Equinox.

Ito, Junko, and Armin Mester. 2019. Match as syntax-prosody Max/Dep: Prosodic enclisis in English. *English Linguistics* 36.1–28.

Lee, Chungmin, Matthew Gordon, and Daniel Büring, ed. by. 2008. *Topic and focus: Cross-linguistic perspectives on meaning and intonation*. Dordrecht: Springer.

Lehiste, Ilse. 1970. *Suprasegmentals*. Cambridge, MA: MIT Press.

Lindblom, Björn. 1968. Temporal organization of syllable production. *Speech transmission laboratory quarterly progress*, volume 2–3, 1–6. Stockholm, Sweden: Royal Institute of Technology.

Mercado, Angelo O. 2021. Word stress in the Early Latin hexameter. *Die italischen Sprachen*, 85–102. Hamburg: Baar-Verlag.

Mester, Armin. 1994. The quantitative trochee in Latin. *Natural Language and Linguistic Theory* 12.1–61.

Monro, David Binning. 1891. *A grammar of the Homeric dialect*. Oxford: Clarendon Press.

Mori, Yoko. 2002. Lengthening of Japanese monomoraic nouns. *Journal of Phonetics* 30.689–708.

Newcomer, Charles B. 1908. The effect of enclitics on the accent of words in Latin. *The Classical Journal* 3.150–153.

Newell, Heather, and Glyne Piggott. 2014. Interactions at the syntax-phonology interface: Evidence from Ojibwe. *Lingua* 150.332–362.

Passino, Diana, Joaquim Brand ao de Carvalho, and Tobias Scheer. 2022. Syllable structure and (re)syllabification. *Manual of Romance phonetics and phonology*, ed. by Christoph Gabriel, Randall Gess, and Trudel Meisenburg, 89–126. Boston: De Gruyter.

Pater, Joe. 2009. Weighted constraints in generative linguistics. *Cognitive Science* 33.999–1035.

Peperkamp, Sharon. 1997. *Prosodic words*. Doctoral Dissertation, University of Amsterdam. Published as HIL Dissertations 34, The Hague, Academic Graphics.

Piggott, Glyne. 1980. *Aspects of Odawa morphophonemics*. New York: Garland Publishing.

Prince, Alan. 1989. Metrical forms. *Rhythm and meter*, ed. by Paul Kiparsky and Gilbert Youmans, volume 1 of *Phonetics and Phonology*, 45–81. San Diego, CA: Academic Press.

Prince, Alan, and Paul Smolensky. 1993/2004. *Optimality Theory: Constraint interaction in Generative Grammar*. Malden, MA: Blackwell. Technical Report, Rutgers University and University of Colorado at Boulder, 1993. Revised version Blackwell, 2004.

Probert, Philomen. 2003. *A new short guide to the accentuation of Ancient Greek*. London: Bristol Classical Press.

Probert, Philomen. 2006. *Ancient Greek accentuation: Synchronic patterns, frequency effects, and prehistory*. Oxford: Oxford University Press.

Rajam, V. S. 1992. *A reference grammar of classical Tamil poetry*. Philadelphia, Pennsylvania: American Philosophical Society.

Ryan, Kevin M. 2011. Gradient syllable weight and weight universals in quantitative metrics. *Phonology* 28.413–454.

Ryan, Kevin M. 2014. Onsets contribute to syllable weight: Statistical evidence from stress and meter. *Language* 90.309–341.

Ryan, Kevin M. 2017. The stress-weight interface in metre. *Phonology* 34.581–613.

Ryan, Kevin M. 2019. *Prosodic weight: Categories and continua*. Oxford: Oxford University Press.

Sandell, Ryan. 2020. Stress-to-tone and tone-to-stress: On stress, tone, and intonation in Ancient Attic-Ionic Greek. Paper presented at the Wiener Sprachgesellschaft, December 15.

Sauzet, Patrick. 1989. L'accent du grec ancien et les relations entre structure métrique et représentation autosegmentale. *Langages* 95.81–113.

Selkirk, Elisabeth O. 1996. The prosodic structure of function words. *Signal to syntax: Bootstrapping from speech to grammar in early acquisition*, ed. by James L. Morgan and Katherine Demuth, 187–213. Mahwah, NJ: Lawrence Erlbaum Associates.

Selkirk, Elisabeth O. 2011. The syntax-phonology interface. *The Handbook of Phonological Theory* 435–484.

Steriade, Donca. 1988. Greek accent: A case for preserving structure. *Linguistic Inquiry* 19.217–314.

Steriade, Donca. 2014. A synchronic analysis of Ancient Greek accent. Paper presented at the Harvard GSAS Colloquium, September 22.

Sturtevant, Edgar H. 1923. Harmony and clash of accent and ictus in the Latin hexameter. *Transactions of the American Philological Association* 54.51–73.

Truckenbrodt, Hubert. 2007. The syntax-phonology interface. *The Cambridge handbook of phonology*, ed. by Paul de Lacy, 435–56. Cambridge: Cambridge University Press.

Weiss, Michael. 2020. *Outline of the historical and comparative grammar of Latin*. Ann Arbor: Beech Stave Press, 2nd edition.

West, M. L. 1982. *Greek metre*. Oxford: Clarendon Press.

West, M. L. 1987. *Introduction to Greek metre*. Oxford University Press.

Wightman, C. W., Stefanie Shattuck-Hufnagel, M. Ostendorf, and P. J. Price. 1992. Segmental durations in the vicinity of prosodic phrase boundaries. *Journal of the Acoustical Society of America* 92.1707–1717.