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A PARAMETRIC THEORY OF POETIC METER

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This paper presents a parametric theory of poetic meter which defines a set of formally possible meters based on the prosodic constituents and categories given by universal grammar, and a functional principle that selects an optimal meter for a particular language on the basis of its lexical phonological structure. We support this theory by a detailed analysis of a favored meter in Finnish, a stress-based meter in which syllable count varies in accord with constraints on syllable weight, and show why partially similar meters are likewise favored in English.*

Genius ipsius linguae Fennicae, copiosa vocum
ponderosissimarum et elegantissimarum varietate
superbientis, egregie vatum favet industriae.
(H. G. Porthan, *Dissertatio de Poesi Fennica*,
1778.)

From the mid-nineteenth century up to the 1940s Finnish poetry was dominated by stress-based meters adopted under the influence of Germanic languages. Although many stress-based meters have a fixed syllable count, the most successful one to evolve in Finnish was an IAMBIC-ANAPESTIC (or, less commonly, TROCHAIC-DACTYLIC) meter in which the number of syllables varies in accord with constraints on syllable weight. This meter is defined by the following characteristics:

- (1) a. A strong metrical position may not contain an unstressed syllable.
- b. A metrical position may contain one or two syllables.
- c. A disyllabic metrical position may not contain a lexical monosyllable.
- d. A disyllabic metrical position may contain a strong syllable of a lexical word only if the syllable is (i) light and (ii) followed within the same position by an unstressed syllable normally belonging to the same word.
- e. Line-initial inversion is avoided.

Why did Finnish poets come up with exactly this system of versification, unprecedented in the literary tradition, and without warrant in the prosodic theories of the time?

Around the time this meter took shape and began to gain ground over both the native KALEVALA METER and the borrowed forms with a fixed syllable count, Gerard Manley Hopkins in England introduced his Sprung Rhythm, a meter defined by almost exactly the same five properties in 1 (Kiparsky 1989, Hanson 1992). But mutual influence or a common source is clearly out of the question as an explanation for the development of either system. Moreover, the same variation in syllable count found in them arises in another meter otherwise

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significantly different. At the core of the English metrical tradition, Shakespeare's iambic pentameter is commonly described as requiring ten alternately weak and strong syllables per line, with certain exceptional variations. The conditions under which these variations occur are partially identical and partially complementary to those in 1 (Hanson and Kiparsky 1993, Hanson 1995).

- (2) a. A weak metrical position may not contain a strong syllable.
 b. = 1b
 c. = 1c
 d. = 1d
 e. Line-initial inversion is permitted.

Yet no meter comparable to this ever arose in Finnish. In this paper we propose a theory of poetic meter which, together with phonological theory, explains the constellation of conditions in 1 and its relation to that in 2, including the curious complementarity of 1a,e and 2a,e and the identity of 1b,c,d and 2b,c,d.

We base our theory on the traditional insight that meter is linguistically grounded at two levels. First, language itself has a rich intrinsic structure prior to any artistic form that may be imposed on it.¹ In particular, it is prosodically² organized in ways that are immediately exploitable for esthetic ends: no sooner do children learn to form simple sentences than they can fit them appropriately to the rhythm of a chant or song (Lieberman 1975). On another level, literature stylizes the inherent prosodic organization of language with conventional forms of versification which are themselves chosen from a limited set of formal options provided by Universal Grammar. The choices originate in cultural traditions, but evolve through competing efforts to maximize their naturalness on the one hand, and the scope for artifice that they afford on the other. Periods of literary renewal offer particularly instructive instances of this competition.³ Systems like 1 and 2 emerged independently under such conditions in languages that are structurally similar but not identical. In spite of having no basis in normative metrical theories, these systems are in each case optimal for their languages, as the metrical innovators who created them must have intuitively sensed, for reasons which we attempt to make explicit below.

The paper is organized as follows. In §1 we first formulate the principles of a metrical theory that derives the possible versification systems for a language from its phonology, and selects optimal ones from among them. We then show that for English 1 and 2 define exactly the two optimal meters in which a metrical position is measured by the prosodic unit which we assume parses English

¹ The idea that the writer's material differs from the painter's and the sculptor's material in this respect was much discussed in Romantic esthetics; it goes back at least to Herder (1768/1960: 91 ff.).

² In current usage the terms METRICAL and PROSODIC are both ambiguous, referring to rhythmic properties of either verse or language. Here we will systematically reserve metrical for reference to verse, preserving its transparent relation to meter, and use prosodic with reference to language.

³ A classic case study is Jakobson's analysis of the role of quantity in Czech accentual verse (Jakobson 1974).

words into their elementary rhythmic constituents, the **MORAIC TROCHEE** with **RESOLUTION**, or (as we shall call it) the **MINIMAL FOOT**. In §2 we analyze the stress system of Finnish, motivating the phonological status of the minimal foot in that language. In §3 we demonstrate that this phonology together with the proposed metrical principles defines 1 alone as the optimal meter for Finnish, and that its properties exactly match the practice of Finnish poets. In an appendix we compare our findings with those of the important studies of Leino (1982, 1986), which offer the most detailed analysis of Finnish meter to date, in order to demonstrate the explanatory role of phonology in metrical theory.

1. METRICAL THEORY

1.1. PARAMETERS FOR PERIODIC METERS. We assume that as a stylization of prosodic properties inherent in language, the basic form of any periodic meter comprises a fixed number of headed binary **FEET**, where the essential character of a head is rhythmic prominence. Each foot thus consists of two **METRICAL POSITIONS**; for convenience we label the head **STRONG (S)** and the nonhead **WEAK (W)** (Halle and Keyser 1971, Kiparsky 1977, Prince 1989).

- (3) a. F F F F
 ^ ^ ^ ^
 W S W S W S W S . . .
- b. F F F F
 ^ ^ ^ ^
 S W S W S W S W . . .

The feet are themselves grouped into higher-level structures (Kiparsky 1977, Piera 1981, Prince 1989, Golston and Riad 1993), though these will not be addressed here. At the level of the foot, we propose that a particular meter is defined by fixing two **STRUCTURE PARAMETERS** and three **REALIZATION PARAMETERS**.

The structure parameters, **NUMBER OF FEET** and **HEADEDNESS**, are formally independent of phonological structure. They determine straightforwardly the familiar properties of line length, and of whether a meter is rising (right-headed) or falling (left-headed).

The realization parameters, **POSITION SIZE**, **PROMINENCE SITE**, and **PROMINENCE TYPE**, determine the way the structure is linguistically manifested, and are dependent on the prosodic givens of language.

The **POSITION SIZE PARAMETER** defines the maximum size of a metrical position in terms of the constituents in the universal prosodic hierarchy: mora (μ), syllable (σ), foot (ϕ), or phonological word (ω).⁴

In virtually all forms of verse, an independent **EURHYTHMY** constraint, the counterpart of the ***CLASH** and ***LAPSE** constraints of metrical phonology (Prince

⁴ For the latter, see Russom (1987) on Old English. The idea of foot-based meter was presented by Kiparsky at Stanford in lectures in 1987 and 1989, and developed in Hanson 1992. Golston and Riad (1993) also claim that the basic structural units of meter are prosodic constituents and that metrical feet are strictly binary, although they do not try to derive these properties from any intrinsic substantial relation between the categories of metrics and language.

1983, Hayes 1984, Kager 1992), limits position size by barring empty positions and positions containing more than two syllables.⁵ The metrical adventurer Gerard Manley Hopkins introduced an English foot-based meter characterized by the violability of both parts of the eurhythmy constraint. In *SPRUNG RHYTHM*, as he called it, empty beats occur freely in weak positions, and Hopkins even has two instances of empty strong positions (Kiparsky 1989). Long strings of unstressed syllables are also allowed, and Hopkins explicitly states that the limit is set only by taste (Kiparsky 1989:331).⁶

The most familiar type of meter is *SYLLABLE-BASED METER*, where the maximum metrical position is a syllable. The other major type of stress-based meter is *FOOT-BASED METER*, where the maximum size of a metrical position is a prosodic foot.⁷ Because the primitive forms of prosodic feet are always composed of either one or two syllables (see below), meters of this family combine binary and ternary rhythms in a characteristic pattern exemplified by the Finnish and English meters in 1 and 2.⁸

The *PROMINENCE SITE* parameter establishes the metrical asymmetry between strong and weak positions. This is achieved by restricting either strong positions or weak positions, viz. requiring either (i) that strong positions contain no unprominent constituents ($S \Rightarrow \neg U$), or (ii) that weak positions contain no prominent constituents ($W \Rightarrow \neg P$). These constraints also occur in a weaker form, requiring respectively that strong positions contain at least one prominent constituent ($S \Rightarrow P$, which allows resolution in strong positions),⁹ and that weak positions contain at least one unprominent constituent ($W \Rightarrow U$).

While the settings of the structure parameters are mutually exclusive—no line can be both three feet and four feet long, no foot can be both right-headed and left-headed—the realization parameter settings are cumulative. A line may

⁵ Or conceivably other units, such as moras (see Kager 1992). At edges of constituents, however, empty positions can be specially licensed (see 3.6).

⁶ For hexameter and for the English ternary meters discussed in fn. 21 a further constraint on position size is apparently required: we must specify that positions are maximally filled, subject to the overriding prominence requirement.

⁷ Our use of the term *FOOT-BASED* should be distinguished from its use in traditional metrics to refer to the grouping of metrical positions themselves into metrical feet, which our theory assumes to be a property of all periodic meters.

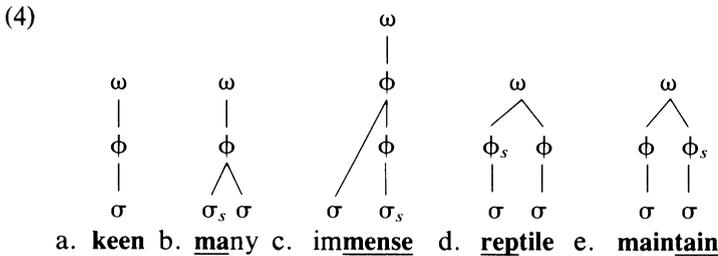
⁸ Instead of letting metrical positions be realized by left-headed prosodic (phonological) feet as we do, Prince's strictly binary theory of metrical forms (1989) allows metrical positions to be split like a musical beat. Prosodic systems with iambic feet would offer an empirical distinction between the two approaches. Prince (1989) argues that when a metrical position is split into two, a trochaic rhythm is assigned to the two resulting subpositions universally. On the theory presented here, a trochaic rhythm may derive from two kinds of prosodic foot, the moraic trochee or the syllabic trochee. But if there is also an iambic rhythm, grounded in the availability of the iamb as a foot type (Hayes 1987, 1995, but see Kager 1993, van de Vijver 1995), then on Prince's analysis, even languages whose phonology makes use of iambs should exhibit trochaic subgroupings of pairs of syllables in ternary feet of foot based meters, where on ours we might equally expect to find iambic structures there. The meters discussed by Prince, however, are from Greek and Arabic, where stress is assigned by trochaic feet, as in Finnish and English; so we have no relevant evidence to offer on this point.

⁹ See §1.3 (Hopkins, ternary meters) and §3.3, ex. 58 (Harmaja).

at the same time meet both the condition that its strong positions contain only prominent constituents ($S \Rightarrow \neg U$) and that its weak positions contain only unprominent constituents ($W \Rightarrow \neg P$).

The PROMINENCE TYPE parameter specifies the prosodic opposition with respect to which prominence or unprominence is defined for the meter. Phonological theory defines certain oppositions as establishing a prominence contrast: SYLLABLE WEIGHT (heavy vs. light), STRESS (stressed vs. unstressed), STRENGTH (strong vs. weak), or PITCH ACCENT (accented vs. unaccented).¹⁰ Linguistically relevant combinations of these prominence oppositions can define prominence type as well. In Finnish Kalevala meter (see fn. 28 below), syllables are prominent if and only if they are stressed and heavy. Draga Zec (p.c.) suggests that in some Serbo-Croatian meters, prominent syllables are those which have either pitch accent or stress or are heavy.

Formally, a syllable is stressed if and only if it is the head of a foot (Hayes 1981). A constituent is strong if it is the head of, or only descendant of a head of, a branching constituent, and weak if it is the nonhead of a branching constituent (Lieberman and Prince 1977). Thus a strong syllable must be stressed, but a nonstrong syllable may be stressed or unstressed. For example, *many* and *reptile* are both strong-weak, but only *reptile* has two stresses; *immense* and *maintain* are both weak-strong, but only *maintain* has two stresses. Monosyllables like *keen* are stressed but, qua words, they are neither strong nor weak. This is illustrated in 4, where stressed syllables are in boldface, strong syllables are underlined, and heads of branching constituents are marked by a subscript *s* (σ_s, ϕ_s).



Importantly, the relational nature of the strong/weak opposition permits it to be delimited by specifying a domain within which the relation must hold to be relevant (Hayes 1989). We assume that as for other metrical properties the relevant domain is normally the PHONOLOGICAL WORD. In English, each member of a compound constitutes a phonological word, so that, in a word such as *heartbroken*, only the second of the two stressed syllables counts as strong.

Our analysis is consistent with representations of prosodic structure other than the trees we use here, such as bracketed grids (Hayes 1995) and arboreal

¹⁰ By pitch accent we mean tone that has a culminative function, that is, occurs at most once per accentual domain. We leave open the question of whether other kinds of tone may be prominence-defining. The tonal oppositions of Chinese regulated verse have been argued to be quantitative (Hayes 1988).

grids (Hammond 1991). What we cannot adopt is the suggestion in Hayes 1983 that meter is defined entirely on grids (trees being relevant only for phonology). Hayes's argument is based on meters of type 2, which define prominence as strength within words, a property Hayes demonstrates to be characterized as well by grids as by trees. However, that success costs his grids the ability to distinguish stressed syllables, as required for meters of type 1. For example, English *patriarch* and Finnish *omenat* in 31b, would have the following grids according to Hayes:¹¹

- (5) x .. x . .
 patriarch *omenat*

The final stressed but weak syllables of such words should thus pattern metrically with unstressed syllables, the right result for meters of type 2 but the wrong result for meters of type 1. If the grids in 5 were enriched with an extra grid level to capture the stress on the final syllables, they could conversely account for meters of type 1 but not for meters of type 2. For this reason we retain the more highly articulated structure represented by trees.¹²

The parameters we propose for periodic meters are summarized in 6.

- (6) 1. STRUCTURE:
 a. Number of feet (1/2/3/4...)
 b. Headedness of feet (right/left)
2. REALIZATION:
 a. POSITION SIZE: maximal size of a metrical position ($\mu/\sigma/\phi/\omega$).
 b. PROMINENCE SITE: where prominence is constrained ($S \Rightarrow \neg U / S \Rightarrow P$) / $W \Rightarrow \neg P / W \Rightarrow U$)
 c. PROMINENCE TYPE: what prosodic category defines prominence (weight/stress/strength/pitch accent)

A linguistic expression is METRICAL if it can be parsed in accord with the constraints defining a given meter in a way consistent with (formally, unifiable with) the relevant phonological representations of the language. Such a parsing is a SCANSION.

Following Jakobson 1960, we assume that the categories defining position size and prominence must be represented in the language at the metrically relevant level of phonological representation. (Self-evidently, a metrical constraint excluding from certain positions a prosodic property always absent would be vacuously satisfied by any string, and hence would not define anything recognizable as a meter, while one excluding a property always present could not be instantiated by any string.) What the metrically relevant level of representation is is an interesting and still largely open question. Typically it is the level of lexical representation (Mohanani 1986, Manaster-Ramer 1994), though

¹¹ At least on the plausible assumption that grids are derived from trees by the same algorithm in the two languages.

¹² It may be significant that Hayes's evidence for grids over trees as the representation of metrically relevant prosodic structure comes from individual variation within a single tradition (see below). Such preferences might well be governed by the kinds of rhythmic evaluations which in any case must be the province of grids, while the core definition of meter depends on the line's articulation into feet.

postlexical properties can also play a role. Not all prominence categories represented in the lexical phonology are necessarily metrically relevant. In particular, nondistinctive categories can be ignored. For example, Latin quantitative meter disregards word stress; and Finnish Kalevala meter disregards nondistinctive length (fn. 28).

Our assumption that metrical well-formedness is determined by a parsing operation also suggests that the constituents that define the position size parameter will be the primitive ones which function in primary prosodic parsing and in prosodic morphology, and not those arising secondarily by stray-adjunction and other operations. This is true for the major meters examined here. In particular, the feet that define positions in meter conform to the restriction that primary parsing feet are maximally binary. We allow for the possibility that metrical constraints may involve constituents and structures which, though provided by Universal Grammar, play no role in the language but are definable at the relevant level of phonological representation. The major Finnish and English meters, however, involve only categories that figure in their phonological rules and representations.

These parameters define meters in the broad sense; that is, poetic forms which are recognized as essentially the same form across poets within a tradition. It has been amply demonstrated that within a given meter individual poets' metrical styles vary in systematic ways which we expect to be characterizable in linguistically sensible ways as refinements of the basic settings for position size and prominence. Since Halle and Keyser (1971) originally proposed a generative approach to meter, such variation has been extensively studied (e.g. Kiparsky 1975, 1977, Hayes 1983, 1988, Hammond 1991). Insofar as these theories constrain such variation, they are essentially complementary to ours and compatible with it. In particular, we adopt Hayes's claim that, in keeping with a general metrical principle of closure whereby beginnings may be lax but endings must be strict (cf. Smith 1968, Kiparsky 1977), the initial metrical constituents of a major metrical or prosodic constituent may be exempted from the prominence constraints to varying degrees; see fn. 28 and §§1.3 and 3.5 below for instances.¹³

These parameters thus distinguish a class of NATURAL METERS, relativized to a prosodic system. Excluded from this class for any language are, for example, meters with underlying patterns that are not binary, or meters with measures of position size or categories of prominence that have no counterpart in prosodic phonology.¹⁴ Of course, given the role of conscious formal artifice, there can

¹³ The principle of closure could be construed as a family of constraints directly assessing the well-formedness of metrical structures. Here we rather take it to be an overriding principle which governs metrical constraints and metrical variation within a given meter. Thus, a poet, or a tradition, may have a rule whereby a constraint is relaxed on an initial position, or on an initial foot, but not on a final or other noninitial position or foot. We provide evidence below that the closure principle constrains variation in the treatment of postlexical stress. No doubt it also dictates default preferences and underlies certain esthetic effects, though that is not what is at stake in the present discussion of inversion.

¹⁴ See footnote 21 on the binary status of apparently ternary anapestic meters.

be no truly 'impossible meters' in the sense in which there are impossible grammars. We shall however provide evidence that natural meters have a privileged role in verbal art, and the theory we formulate explains why they have the properties they do.¹⁵

1.2. SETTING THE PARAMETERS. Defining a particular meter involves a complex combination of conscious and unconscious choices. The settings of the structure parameters, being independent of language, are articulated with a high degree of explicitness in traditional metrics and can always be set at will by the poet. Particular settings may of course be favored in certain traditions because of phonological properties of the language (Reichard 1980, Youmans 1989, and the discussion of *Fit* below); but whether the basis of these preferences is understood by the poets who use them or not, the choices themselves are consciously made. Particular settings may also be associated by convention with a particular style and hence subject to constraints from the tradition—the limerick form is a poor choice for an epitaph—but such conventional constraints may be transgressed for stylistic effect at no cost to the metricality of the verse.

The realization parameters, however, referring as they do to complex aspects of phonological structure, define metrical choices of which even poets themselves may be largely unaware. The most important principle constraining the setting of the parameters is a criterion we call *FIT*, which requires all parameters to be set in such a way that the language's core vocabulary can be used as fully as possible in the resultant meter.

(7) *FIT*: Languages select meters in which their entire vocabularies are usable in the greatest variety of ways.

It is important to note that *fit* is a guiding functional principle that will have its effect where it can, and not an inviolable constraint that a meter must satisfy. For historical, cultural, or other reasons languages may have meters that fall short of naturally accommodating all their words. For example, a thriving meter in classical Greek and Latin, and in modern Hungarian (A. Kornai, p.c.), is the quantitative hexameter, which requires dactylic (heavy-light-light) or spondaic (heavy-heavy) sequences: from our point of view, a meter where each position is a moraic trochee, with prominence site set as $S \Rightarrow \neg U$, and prominence type set as *weight*.¹⁶ Yet those languages contain words with heavy-light-heavy or

¹⁵ In confining the theory to periodic meters, we leave open the analysis of meters in which line length is regulated without any category of prominence being required to recur (e.g. the apparently pure syllabic meters of Marianne Moore) or in which some structure of prominence recurs without the line length being regulated (e.g. Tohono O'odham songs in Fitzgerald 1994); further analysis may bring these closer to the meters that are the object of our study. See Chen 1979, 1980 and Yip 1980, 1984 (summarized in Hayes 1988:225–6) for an analysis of Chinese regulated verse which brings it within the purview of our approach.

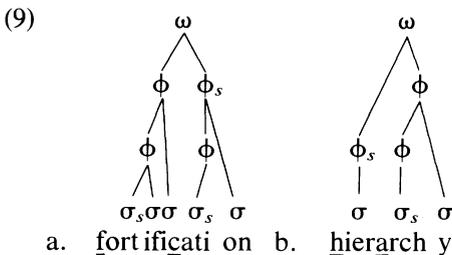
¹⁶ In Latin hexameters, the nondistinctive superordinate levels of metrical organization including word stress are metrically irrelevant. Here it is simplest to assume that the meter is defined on a pure moraic phonological representation. In Finnish, however, successful adaptations of the classical hexameter respect word stress.

light-light-light sequences of syllables, which do not fit the hexameter without special poetic licenses. And even in English some forms of iambic pentameter do not directly accommodate the entire vocabulary; the marginal word types are handled by special relaxations of the metrical rules (themselves grounded in linguistic principles), such as hypermetricality, catalexis and inversion, as discussed in §§3.5 and 3.6 below.

Moreover, Fit is not the only principle that may influence the form a meter takes. We will see that where more than one possibility is compatible with Fit, other considerations such as the esthetic possibilities afforded for subtlety and variety may play a role. We will see the particularly profound effects of Fit on the setting of the realization parameters below; settings of the parameters which blurred the distinction between verse and prose, or which enforced a monotonous rhythm, could well be formally possible but functionally pointless. Thus we propose a second principle complementary to Fit:

- (8) INTEREST: The parameters are set so as to maximize the esthetic interest of the verse.

1.3. ENGLISH METERS. We are now in a position to derive the prominence properties of the English meters in 1 and 2. If the position size parameter is set as a syllable, Fit requires that the prominence site must be W (i.e. the prominence requirement must be $W \Rightarrow U$ or $W \Rightarrow \neg P$ —these coincide for syllabic meters), and prominence must be defined as strength. The demonstration is as follows. If prominence site were S (i.e. $S \Rightarrow P$ or equivalently $S \Rightarrow \neg U$), words with adjacent light unstressed syllables, such as *charity*, *generative*, *abominable*, would be unusable regardless of whether prominence were defined as weight, stress or strength. For since in a syllable-based meter each syllable fills a metrical position, and every other metrical position is strong, at least one of the light, unstressed, weak syllables in such words would have to fill a strong position, in each case violating the constraint on S. If the prominence site is instead W, and the prominence type is either stress or syllable weight, simple words such as *maintain* or *reptile* with adjacent heavy or stressed syllables cannot be used, let alone common prefixed and compound words such as *outrun*, *heartsick*. The remaining possibility, prominence site as W and prominence type as strength, allows nearly all words of the language to be readily accommodated. Only words with two strong syllables at ternary intervals, such as *fortification*, and those with two adjacent strong syllables, such as the rare word type *hierarchy*, *Hoboken*, are not freely usable.

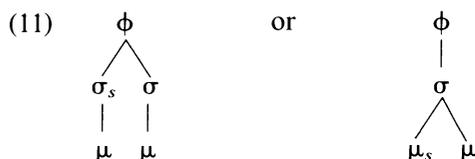


They can, however, be accommodated in iambic meter by inversion (§3.5).¹⁷ Thus in Milton's meter, which is strictly syllabic, words of the former structure occur in line-initial position only, as in 10a (Hanson 1995), and those of the latter structure occur only in positions where the boundaries of the prosodic constituent in which the mismatched strong syllable is defined exactly match those of the metrical foot, as in 10b (Kiparsky 1977:204).

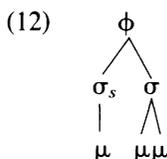
- (10) a. Justification towards God, and peace [*Paradise Lost* 12.296]
 ^s ^s ^s ^s ^s ^s
 b. Each in his hierarchy, the orders bright [*Paradise Lost* 1.737]
 ^s ^s ^s ^s ^s ^s

This is as close as English syllable-based meters can come to satisfying fit. Thus our theory predicts that syllable-based meters in English must prohibit strong syllables in weak positions. This generalization was arrived at empirically in Kiparsky (1977); the present theory derives it from the Fit principle.

If position size is set as a foot, some of these problems do not arise. We assume that the foot on which the English stress system is based is the MORAIIC TROCHEE with RESOLUTION. The basic moraic trochee consists of either a heavy syllable or of two light syllables:



We view resolution as a strategy available for resolving conflicts between stress and weight requirements (Hayes 1995, Kager 1993). In an LH sequence, the light syllable may be required to bear word stress even though it cannot head either form of moraic trochee in 11, nor form a foot on its own (because degenerate feet are prohibited). We suppose that in such cases it is possible for a RESOLVED MORAIIC TROCHEE to be constructed, in which the light syllable heads the foot and the following heavy syllable, its first mora supplying the additional weight required, is exceptionally allowed in the weak branch of the foot.



We will refer to the two basic forms of the moraic trochee in 11 and the resolved form in 12 collectively as the MINIMAL FOOT, or ϕ_{\min} .

¹⁷ Compounds such as *heartbroken* pose no problem in this meter, of course, since each member of a compound is a phonological word, and the monosyllabic member is consequently neither strong nor weak (see the text immediately following ex. 4). Another strategy is to exempt secondary stress from the prominence constraint on W (examples can be found, for example, in Tennyson). The class of prominent syllables prohibited in W is then 'the strong syllable of a phonological word', rather than 'a strong syllable within a phonological word', as in Shakespeare's practice.

The basic “Latin” stress pattern of English is derived by assigning basic moraic trochees right to left, disregarding final extrametrical syllables: ... [L̄ L] (X), ... [H̄] (X). In the configuration ... [H̄] L (X), the light syllable is skipped to avoid a degenerate foot, and then stray adjoined (Hayes, 1995:95). Resolved moraic trochees result when primary stress must fall on a light syllable followed by a heavy syllable, as in *Árab*, *réformation*. The two predicted meters based on the minimal foot have the properties in 1 and 2.

If the position size parameter is set as a foot, two settings of the prominence parameters are compatible with Fit. One foot-based meter has the same prominence constraints as syllable-based meter, and for this reason analyses of English metrics commonly identify the two. It has W as prominence site and strength as prominence type. As in the corresponding syllable-based meter, if prominence site is W, prominence type cannot be weight or stress, lest words with adjacent stressed heavy syllables like *maintain*, *reptile* or *heartsick*, *heartbroken* become unusable. Each of their syllables forms a ϕ_{\min} ; each must therefore occupy a metrical position; and since positions are alternately strong and weak, one would have to be in a weak position, in violation of the prominence requirement if stress or weight is what counts. If prominence is a matter of strength, no comparable problems arise, since *maintain*, *reptile*, *heartbroken* have only one strong syllable, and *heartsick* has no strong syllable (within the relevant domain of the phonological word). Thus Fit is satisfied. Moreover, the problems posed for syllable-based meters by words with strong syllables at ternary intervals like *fortification* no longer arise, since neither of the two syllables between the strong ones makes up a ϕ_{\min} , and both can therefore occupy a single metrical position. Only the rare words with adjacent strong syllables like *hierarchy* remain restricted. Thus, English is well suited to a foot-based meter which restricts weak positions.

- (13) a. Position size: ϕ_{\min} .
 b. Prominence site: $W \Rightarrow \neg P$
 c. Prominence type: Strength.

This is exactly the meter of Shakespeare, as characterized in 2. Strong positions have no prominence restriction, and so may be occupied by weak unstressed syllables, as for example *the* in 14a. But weak positions, although they may contain stressed syllables, may not contain any syllable that is strong within its word. Ex. 14b is unmetrical because it violates this restriction in the underlined syllables.

- (14) a. Pluck ^sthe ^skeen teeth from ^sthe ^sfierce tiger's ^sjaws [*Sonnet* 19.3]
 b. *Pluck ^simmense teeth from ^senraged tigers' ^sjaws [construct]

In Shakespeare's verse, metrical positions contain one or two syllables, provided that they do not exceed a ϕ_{\min} and the prominence constraint on W is observed. Weak positions can contain pairs of unstressed syllables, whether nonlexical words as in 15a, or subparts of words as in 15b. But because lexical monosyllables necessarily make up a ϕ_{\min} by themselves, they can never be accompanied by anything else in a metrical position, as in 15c.

- (15) a. $\overset{s}{\text{I}} \overset{s}{\text{' th}}$ ' name of fame and honor, that dies $\overset{s}{\text{i}} \overset{s}{\text{' th}}$ ' search
 [Cymbeline 3.3.51]
- b. This $\overset{s}{\text{fortification}}$, gentlemen, shall we see it? [Othello 3.2.5]
- c. * $\overset{s}{\text{The}}$ $\overset{s}{\text{false}}$ name of fame and honor, that dies $\overset{s}{\text{in}}$ $\overset{s}{\text{vain}}$ search
 [construct]

Similarly, since $\acute{L}X$ sequences also constitute a single ϕ_{\min} , strong syllables can form part of disyllabic metrical positions in just this configuration; compare 16a with the unmetrical 16b and 16c, where the disyllabic sequences *sundry* and *diverse* are not of the form $\acute{L}X$.

- (16) a. Come to one mark, as $\overset{s}{\text{many}}$ ways meet in one town
 [Henry V 1.2.208]
- b. *Come to one mark, as $\overset{s}{\text{sundry}}$ ways meet in one town [construct]
- c. *Come to one mark, as $\overset{s}{\text{diverse}}$ ways meet in one town [construct]

Such disyllabic occupancy of a single metrical position is traditionally referred to as RESOLUTION, and its relation to the phonological phenomenon of the same name discussed in §2 below can be seen to arise from the role of ϕ_{\min} in the meter. Because Shakespeare's verse imposes the prominence requirement that weak positions may not contain strong syllables, resolution is confined to strong metrical positions:

- (17) *Come to one mark as so $\overset{s}{\text{many}}$ ways meet there [construct]

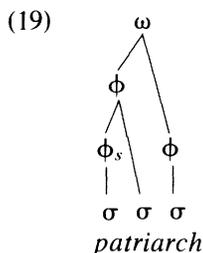
Finally, inversion in initial feet is possible in this meter, again in direct consequence of the form of the prominence constraints. We assume that inversion in general derives from the possibility of relaxing normal metrical constraints at the beginning of major metrical (or prosodic) units, in accord with the above-mentioned principle of closure. In rising meters it is a weak position that is initial, so a relaxation of the $W \Rightarrow \neg P$ condition on the initial position of a line (or of a phonological phrase) will allow strong syllables in weak initial positions. The following syllable in the word will then normally be weak, and this is freely allowed in strong positions, resulting in an inverted cadence.¹⁸

- (18) $\overset{s}{\text{Kiss}}\overset{s}{\text{ing}}$ with golden face the meadows green [Sonnet 33.3]

But there is a second foot-based meter in English which is compatible with Fit. The setting of position size as a ϕ_{\min} also allows the prominence condition $S \Rightarrow \neg U$, which requires strong positions to contain only prominent syllables, or the weaker variant $S \Rightarrow P$, which requires strong positions to contain at least one prominent syllable. In either case, Fit dictates that the prominence type parameter must be set as stress, rather than as weight or prosodic strength.

¹⁸ Thus, the term INVERSION is really a misnomer, for the license concerns only the first (weak) position. Still less is it a matter of substituting a dactylic foot for the initial iamb (since the second weak position would then be empty), or of placing a disyllabic foot in its strong position (since the first weak position would then be empty).

For weight, this can be illustrated with words of the type *honeysuckle*, *apparition*. They constitute two ϕ_{\min} each, and hence fill at least two successive metrical positions (and at most four). Since every other metrical position is strong, one of the two successive positions must be strong, yet none contains a heavy syllable; therefore, weight cannot be the criterion for prominence in this kind of meter. For similar reasons, words like *cóntemplàte*, *pàtriàrch* preclude setting the prominence type parameter as strength:



The first and third syllables, being stressed and heavy, each constitute a ϕ_{\min} on their own, and hence a metrical position, so that the second syllable must also constitute a metrical position on its own. Since the second and the third are adjacent, the metrical position of one of them must be strong; but both these syllables are prosodically weak. Prosodic strength, therefore, cannot be the criterion for prominence either. Hence foot-based S-restricting meter cannot base prominence on either weight or strength. If prominence type is stress, in contrast, the vocabulary can be as freely used as in W-restricting foot-based meter. Thus, English is also well suited to a meter with the parameter settings in 20.

- (20) a. Position size: ϕ_{\min}
 b. Prominence site: $S \Rightarrow \neg U$
 c. Prominence type: Stress

This second predicted form of foot-based meter is the basis of Hopkins's sprung rhythm, characterized in its essentials by 1 above (Kiparsky 1989, Hanson 1992). The basic criteria for position in sprung rhythm are the same as for Shakespeare's meter. Again, weak positions can contain two unstressed syllables as in 21a,¹⁹ but a lexical monosyllable can't share a position with any other syllable, as in 21b.²⁰

- (21) a. \overset{s} Tówery \overset{s} city and \overset{s} branches \overset{s} betwéén \overset{s} tówers [*Duns Scotus's Oxford*]
 b. * \overset{s} Towery \overset{s} city where \overset{s} branches \overset{s} grace \overset{s} great \overset{s} tówers [construct]

¹⁹ As mentioned above, one of the hallmarks of Hopkins's meter is that weak positions can also contain more than two syllables, or no syllables, i.e. violations of the eurhythmy constraint that militates against clashes and lapses.

²⁰ The diacritics in 21 and 22 are Hopkins's own. The slur marks under *thee*, *him* and *-ing* in 22 identify them as 'outrides', or syllables which are extrametrical before a major syntactic boundary; see Kiparsky 1989 for discussion.

And again $\bar{L}X$ sequences can constitute single positions:

- (22) a. The ^sdapple-^seared ^slily below ^sthee; that country and town did
 [*Duns Scotus's Oxford*]
- b. Of the ^srólling ^slevel ^súndernéath ^shim ^ssteady ^sáir, and ^sstríding
 [*The Windhover*]

That prominence site is S and prominence type is stress means that lines like 23b are not tolerated.

- (23) a. Who ^sfíred ^sFránce for ^sMáry withóut ^sspót [*Duns Scotus's Oxford*]
- b. *Who ^sfired ^sFrance for ^sMary ^sthe ^sDevout [construct]

Hopkins uses specifically the weaker version of the prominence site constraint ($S \Rightarrow P$), which requires strong positions to contain at least one stressed syllable, as in 23a. Resolution thus occurs not only in strong positions, as in Shakespeare's meter (see 22a), but also in weak positions, since $S \Rightarrow P$ meter does not restrict those (see 22b). Since Hopkins's prominence condition constrains strong positions, a relaxation of it for an initial weak position will have no effect. Hence his sprung rhythm allows no inversion, as Hopkins himself noted in his claim that "strict sprung rhythm cannot be counterpointed" (Kiparsky 1989:312). In sprung rhythm, clashes and initial prominent syllables are perceived as empty weak positions, not displacements of stress from strong to weak positions.

In sum, then, our theory predicts that English has one optimal syllable-based meter, where W is constrained by strength, and two optimal ϕ_{\min} -based meters, one where S is constrained by stress (sprung rhythm), and the other where W is constrained by strength (Shakespearean iambic verse with resolution). Other syllable-based and ϕ_{\min} -based meters, including all those which restrict both W and S, would violate Fit. Such nonoptimal meters could very well be used, but at some tension with the linguistic givens; their artificiality might serve certain esthetic ends but would confine them to marked genres and styles.²¹

For reasons which we briefly address at the end of our paper, W has been the dominant prominence site in English ϕ_{\min} -based meter, as in its syllable-

²¹ A full discussion of ternary meters would be beyond the scope of the present paper. The traditional degenerate dipod account of them seems plausible (Kiparsky 1977, Prince 1989, Hanson 1992), but it is not clear how it should be integrated into our framework.

English also has meters in which ternary (occasionally even longer) verse feet are mixed with binary ones but syllable weight is not constrained categorically; that is, meters which are like those in 1 except that constraints 1c,d(i) hold only as statistical preferences (Hanson 1992, and, from a different perspective, Tarlinskaja 1993). Such meters raise the more general question of how one should relate absolute constraints to statistical preferences (Youmans 1989). Tennyson's and Swinburne's poems in this meter have varying overall frequencies of trisyllabic feet, of disyllabic weak positions with lexical monosyllables, and of disyllabic weak positions whose first syllable is heavy. These three frequencies are all correlated with each other, which suggests that this type of ternary meter might be viewed as a mixture, in varying proportions, of 20 with anapestic meter. In fact, Hopkins seems to have originated his sprung rhythm as a reform of Swinburne's ternary meter by eliminating what he perceived as its quantitative infelicities (Schneider 1968, Kiparsky 1989).

based twin. In Finnish, however, the S-restricting ϕ -based meter of 'sprung rhythm' has been the dominant metrical form. We turn now to a full examination of the basic structure and range of possibilities of this meter, beginning with a brief account of the relevant aspects of Finnish phonology.

2. FINNISH STRESS. Like English, Finnish has a stress system that combines binary and ternary feet in a distribution constrained by syllable weight. Primary stress always falls on the initial syllable of a word, except in unassimilated foreign names. Secondary stress is subject to phonological and morphological conditioning (with variability in some contexts), so that it must be assumed to be present in the representations at the level of lexical phonology.²² The essential phonological generalizations are as follows (Carlson 1978, Leino 1982, 1986, Sadeniemi 1949): Secondary stress falls on every second syllable after the initial one, skipping an additional light syllable if the syllable after that is heavy, unless that heavy syllable is final, in which case the skipping is optional. (Syllables ending in short vowels (-V) are light, and all others (-VC, -VV, -VVC) are heavy.)²³ Final syllables not preceded by a stressed syllable are optionally stressed if they are heavy. Final light syllables are never stressed, and adjacent syllables within a word are never stressed.²⁴ All lexical words are stressed, and contain minimally two vocalic moras (CVV or CVCV).

Thus one- and two-syllable words have stress only on the initial syllable. Three-syllable words may in addition have secondary stress on heavy final syllables, but never on light final syllables.

- (24) a. $\acute{X} X L$: *ómena* 'apple'
 b. $\acute{X} X \grave{H} \sim \acute{X} X H$: *ómenàt* ~ *ómenat* 'the apples'

Four-syllable words have secondary stress on either the third or the fourth syllable. It can always fall on the third syllable, and must do so if the third syllable is heavy, as in 25a, or if it is light and followed by another light syllable, as in 25b. But if the third syllable is light and followed by a heavy syllable as in 25c, stress may fall either on the third or on the fourth.

- (25) a. $\acute{X} X \grave{H} X$: *lúmottùihin* 'enchanted' (illative pl.)
 b. $\acute{X} X \grave{L} L$: *lúmottùna* 'enchanted' (essive sg.)
 c. $\acute{X} X L \grave{H} \sim \acute{X} X \grave{L} H$: *lúmosivàt* ~ *lúmosivat* 'they enchanted'

In five-syllable words the pattern is continued except that in words analogous to those in 25c the option of secondary stress on the third light syllable disappears, and the fourth must be stressed instead, as in 26c.

²² Another indication of this is that secondary stress conditions certain lexical phonological rules in Finnish (Keyser & Kiparsky 1984, Kehrein 1992, Kiparsky 1993).

²³ The vowel sequences *ei, äi, yi, öi, ai, ui, oi, au, ou, eu, iu, ey, äy, öy, ie, yö, uo, iy* are diphthongs in Finnish. Other vowel sequences, such as *ia* (38b,c, 49b), *ua* (63d, 66f), *ea* (69b), *oa* (71a) are disyllabic.

²⁴ For purposes of the present discussion, each member of a compound is considered as a separate phonological word. Finnish spelling does not show compound boundaries, but following the practice of Leino 1986, we mark compound boundaries in the Finnish examples by =.

- (26) a. $\acute{X} X \grave{H} X X \sim \acute{X} X \grave{H} X \grave{X}$: *kóskemättoman* ~ *kóskemättomàn*
 'untouched' (gen.sg.)
 b. $\acute{X} X \grave{L} L X \sim \acute{X} X \grave{L} L \grave{X}$: *ópettèlivat* ~ *ópettèlìvåt* 'were studying'
 (3 pl.)
 c. $\acute{X} X L \grave{H} X$: *ópettamàsta* 'from teaching'

And in all longer words the same pattern can be seen:

- (27) a. $\acute{X} X \grave{H} X L \grave{H} X L$: *járjestèlmällisyydellä* 'systematicity' (adessive)
 b. $\acute{X} X \grave{H} X \grave{X} X$: *ilmoittàuduttàva* 'having to report oneself'
 c. $\acute{X} X L \grave{H} X L \grave{H} X$: *vóimistelüttelelàsta* 'from having on and off caused to do gymnastics'

The question of word-final secondary stress in Finnish is complex and the generalizations presented here abstract away from certain phonetic effects. While light final syllables are always unstressed, heavy final syllables are generally heard as having some degree of prominence even in cases where we treat them as phonologically unstressed. First, all final heavy syllables, including those of disyllabic words, at least when spoken in isolation, have a degree of prominence proportional to their weight, as seen for example in the series *vaiva* : *vaivan* : *vaivaa* : *vaivaan*. Since Finnish otherwise never allows stress on adjacent syllables within a word, we suppose that these syllables are phonologically unstressed and that their prominence is a phonetic effect of their weight. The final syllables in trisyllabic words like *omenat* (24b) are more difficult. Some works on Finnish phonology state that they bear secondary stress obligatorily. We think this is true at best for isolated pronunciations; to our ear, *ómena viipalèina* 'the apple in slices' and *ómenat viipalèina* 'the apples in slices' can be rhythmically identical, as indicated. Moreover, when such words are followed by a heavy clitic, secondary stress can appear on the clitic instead of on the final syllable of the word, leaving a ternary stress interval in which the second unstressed syllable is actually heavy.

- (28) *ómenat#kàan* ~ *ómenàt#kaan* '(not) even the apples'

This pattern is difficult to explain if the third syllables of such words are obligatorily assigned stress in the lexical phonology. We assume instead that stress is also assigned postlexically under the conditions outlined above and formalized in 30 below (see also §3.7). On this assumption, heavy clitics can be stressed provided they are not adjacent to another stressed syllable, and the pattern of variation in 28 simply reflects the optionality of lexical stress on final heavy syllables. Any obligatory stress that appears on the final syllables of such words in isolation can be attributed to the postlexical application of the stress rules. For these reasons we assume that secondary stress on final syllables is assigned optionally in the lexical phonology under the conditions stated here.

The lexical stress pattern outlined in 24–27 points to MORaic TROCHEES with RESOLUTION, as in Old English, modern English, and Latin (Allen 1973; Dresher and Lahiri 1991; Hanson 1992, 1993). In Finnish, foot parsing is constrained

by the requirement that adjacent syllables may not be stressed (the STRESS CLASH PROHIBITION demonstrated for English and other languages by Prince 1983, Hammond 1984, Hayes 1984, Kager 1989; and others).

This strategy is employed in Finnish, which assigns stress by moraic trochees, but requires primary word stress to fall on initial syllables, and absolutely disallows degenerate feet, as evidenced by its minimal word requirement. These requirements are incompatible in the case of words that begin with an LH sequence, as in 25a,b; 26b,c, and we assume that a resolved moraic trochee of the form 12 is constructed in just this case.

Word internally, where the initial stress requirement is no longer at stake, unparsable LH sequences are dealt with by skipping the L and incorporating it into the preceding foot by STRAY ADJUNCTION, yielding the characteristic mix of binary and ternary feet seen in 25–27. We will assume that stray adjunction is leftward Chomsky-adjunction. Thus Finnish has two sizes of feet, the moraic trochee (11, 12) obtained by primary parsing, referred to here as ϕ_{\min} , and the derived foot which results from stray adjunction, ϕ_{\max} . We have assumed above that metrical constraints involve parsing a string into units of specified size and prominence. Since only the minimal foot ϕ_{\min} is involved in parsing operations, it then follows that it is ϕ_{\min} which the metrical rules of Finnish use.

Additional motivation for ϕ_{\min} as a metrical constituent in Finnish comes from a rule of expressive lengthening (Carlson 1978). In emphatic pronunciation, expletives are lengthened according to the pattern in 29.

- (29) a. *perkele* [pér:kele]
 b. *saatana* [sáa:tana]
 c. *kamala* [káma:la]
 d. *vituttaa* [vítu:t:taa]

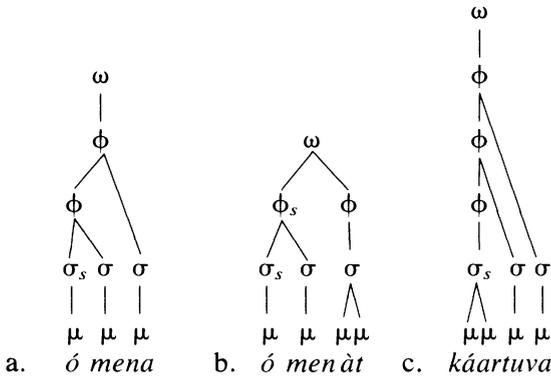
If the initial syllable is heavy, as in 29a,b, segments in its second mora are lengthened; if it is light, as in 29c,d, all moraic segments in the second syllable are lengthened. On our analysis, both initial \acute{H} and initial \acute{LH} form a ϕ_{\min} , and expressive lengthening applies to the weak branch of the initial (head) ϕ_{\min} .

Thus we formulate the following basic rules for Finnish stress:

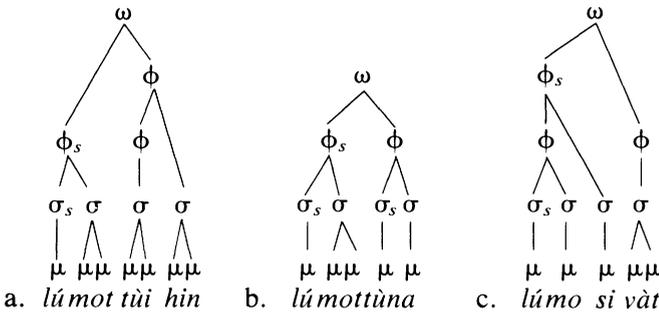
- (30) a. The leftmost syllable is the head of the word.
 b. Syllables are parsed into moraic trochees (ϕ_{\min} as in 11) from left to right.
 c. Degenerate feet are disallowed.
 d. Inconsistencies among (a), (b) and (c) are eliminated by constructing resolved moraic trochees (ϕ_{\min} as in 12).
 e. Stress may not be assigned to two adjacent syllables.
 f. Stray syllables are Chomsky-adjoined leftward (ϕ_{\max}).
 g. Final moras are optionally extrametrical.

These rules assign the following metrical structure for the forms in 24, 25 and 26. (We set aside momentarily the optional omission of stress in final heavy syllables by 30g.) A phonological word is denoted by ω , and the strong daughter of a branching constituent by a subscript s (σ_s , ϕ_s).

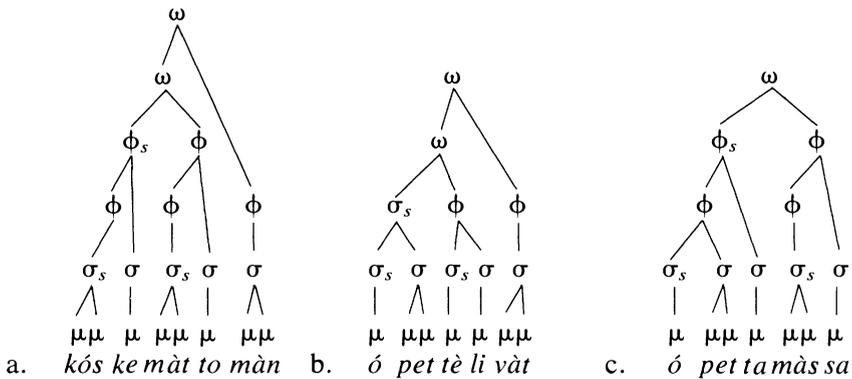
(31)



(32)



(33)

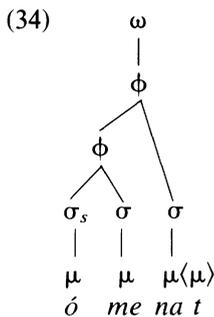


Exx. 32c and 33c show how ternary feet result when the stress rule encounters an LH sequence after an unstressed syllable. Unlike initial LH sequences, which by 30c,d must be parsed as resolved moraic trochees of the form in 12, internal LH sequences cannot be parsed as feet. Their light syllable is skipped and incorporated by stray adjunction, forming a ternary ϕ_{max} .²⁵

²⁵ A reviewer suggests instead analyzing Finnish by syllabic trochees plus weak local parsing (Hayes 1995) or relativized extrametricality (Hammond 1991) plus a condition limiting this to cases where the following syllable is heavy. We see no advantage to this alternative, and serious disadvan-

The early Germanic languages have a prosodic system similar to Finnish but lack the stress clash prohibition 30e. Stray adjunction will yield an initial ϕ_{\max} in many cases identical with the ‘‘Germanic foot’’ of Drescher and Lahiri (1991). Thus, the key aspects of their prosodic analysis of Old English could be reconstructed in our terms, with the important advantage that ϕ_{\max} is not a primitive foot type, and therefore, unlike the Drescher/Lahiri Germanic foot, could not be the basis of iterative alternating stress systems, which are in fact unattested.

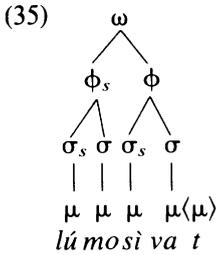
The stress options seen in 24b, 25c, and 26b result from the optional extrametricality of final moras by 30g. We assume that all light syllables have one mora and all heavy syllables have two moras.²⁶ Extrametricality of the final mora will thus make final light syllables invisible and final heavy syllables count as light. Final heavy syllables as in 24b = 31b or 26b = 33b are optionally unstressed because they are optionally parsed as light, in which case they are unstressable by 30c.



The optional stressing of light third syllables followed by final heavy syllables in 25c = 32c then follows as well. For where the final mora in such words is extrametrical, the stress rule can construct a moraic trochee over the last two syllables, just as in words ending in two light syllables.

tages both on the phonological side and on the metrical side. It offers no principled account for why the ternary foot requires a following heavy syllable, rather than a light syllable, or why it should depend on the quantity of the following syllable at all. Also, it gives no basis for the lengthening pattern in 29. On the metrical side, while descriptively compatible with our analysis of Finnish versification (as long as the moraic trochee with resolution is retained in Universal Grammar), it drives a gratuitous wedge between the language’s stress system and its meter: if its stress foot is the syllabic trochee, why aren’t its meters based on that foot? Thus it conflicts with the assumption that meters prefer categories and constituents represented by the phonology.

²⁶ However, application of the extrametricality rule 30g seems to be subject to preferences related to syllable weight. The likelihood that a final syllable is stressed increases with its weight: final -CVVC syllables are most often stressed, and final -CVV syllables are more often stressed than final -CVC syllables. The same pattern appears with heavy clitics after word-final heavy syllables as in 28 above (e.g. *ómenat#kàan* seems more likely than *ómenaa#kàan*, and this in turn more likely than *ómenaan#kàan*). Given our assumption that clitics are stressed postlexically subject to the clash prohibition (30e), the frequency with which stress is assigned to these clitics is reducible to the frequency with which the final syllables of the words they attach to are left unstressed, and hence reflects the same preferences related to syllable weight.



Since extrametrical constituents in phonology are always weak, the application of 30g is restricted to weak moras. Being strong, syllable heads are not eligible to be extrametrical, so final light syllables always count in foot assignment. That is why in four-syllable words that end in two light syllables, such as 25b and 32b, the third syllable is obligatorily stressed.

A derivational account must order the rule-assigning word stress before the foot-formation algorithm (see Hayes 1995, Kager 1992, van der Hulst 1992 for discussion). Within Optimality Theory, the top-down effect central to this analysis of the Finnish stress system is entirely expected (Prince & Smolensky 1993:31); our analysis translates as follows. Undominated constraints forbid stress on adjacent syllables (*CLASH) and degenerate feet (FTBIN). (In the constraint table below, we leave out these constraints, and the candidates violating them, in order to save space.) Initial stress is enforced by ALIGNMENT (likewise undominated). The distribution of secondary stresses is governed by eurhythm and eupody, ranked in that order after alignment.

- (36) 1. ALIGNMENT: Align left edge of word with foot boundary.
 2. EURHYTHMY: Alternating syllables are stressed.
 3. EUPODY: No resolution.

These constraints select the correct stress pattern in the cases discussed, as the table illustrates for *káartuva*, *lúmottùihin*, and *ópettamàssa* (see 31–33).

(37)

Candidates	ALIGNMENT	EURHYTHMY	EUPODY
1. ⇒ [kaar]tuva		*	
2. kaar[tuva]	*!		
1. ⇒ [lumot][tui]hin			*
2. lu[mot]tui[hin]	*!		
3. [lumot]tui[hin]		*!	
1. ⇒ [opet]ta[más]sa		*	*
2. o[pet]ta[más]sa	*!		
3. [opet][tamas]sa		*	**!

The counterpart of optional extrametricality is a NONFINALITY constraint, which prohibits stress on final syllables (Prince & Smolensky 1993, ch. 4) and optionally dominates Eurhythmy.

Finally, morphology plays an important role in Finnish secondary stress. A class of suffixes, illustrated in 38, attracts secondary stress to the syllable preceding the suffix. The requirement 30e that adjacent syllables may never be stressed then blocks secondary stress on the syllable preceding that one when it might otherwise be expected there, as in 38a,b. When two such preaccenting suffixes occur in a row, the regular phonological pattern reappears, as in 38c.²⁷

- (38) a. *jýrähtelè* + *vä* 'booming' (present participle)
 b. *kómppanià* + *na* 'as a company' (essive sg.)
 c. *kómppanià* + *nà* + *ni* 'as my company' (essive sg., 1 sg. possessive)

Certain suffixes also have an inherent stress; this is particularly true of suffixes which have come into the language through loanwords, such as *-loginen* '-logical' in 39a, but even the native nominalizing suffix *-uut/-yyt-* sometimes attracts stress (Sademiemi 1949), resulting in alternative stress patterns as in 39b.

- (39) a. *éskatolöginen* 'eschatological'
 b. *yksinäisyys* ~ *yksinäisyys* 'solitude'

Key to the foregoing analysis of Finnish stress is the assumption that because of resolution the set of minimal feet into which words may be parsed includes both the canonical moraic trochees in 11 and the resolved moraic trochee in 12. These feet form the natural class ϕ_{\min} . We will now show that ϕ_{\min} is the basis of Finnish foot-based meter.

3. FINNISH METER. The prosodic analysis in §2 together with the metrical theory in §1 implies that Finnish should be particularly well suited to a meter defined by the following settings for the realization parameters, which as seen above will have the properties of 1.

- (40) a. Position size: ϕ_{\min}
 b. Prominence site: S
 c. Prominence type: Stress

We can see this through a brief comparison with the possible meters we considered for English in §1.3. A syllable-based meter in Finnish will define prominence site as W and prominence type as strength, just as English does. Simple words like *ópeta* with adjacent syllables that are light, unstressed and weak, and compound words like *työ* = *päivä* 'workday' with adjacent syllables that are heavy and stressed will preclude any other settings, for the reasons previously discussed in connection with words like *charity*, *generative*, *abominable*, *maintain*, *reptile*, *heartsick* in English. The remaining alternative of prohibiting strong syllables in weak positions is the best choice, and in fact the one that is found in syllable-based meter in Finnish. We have seen, however, that such a meter does not readily accommodate the class of words with strong syllables

²⁷ This outcome is predicted by our OT analysis: the *Clash constraint prevents both preaccents from appearing, and eurhythmy decides in favor of the second.

at ternary intervals. Where words like *fortification* with this structure are fairly uncommon in English, in Finnish they are entirely common: recall 25c, 26c, 27a,c. For this reason the borrowed syllable-based meters are really not optimal for the language, and have encountered strong competition from foot-based meters, which can accommodate the vocabulary more naturally (Leino 1982, 1986).²⁸

For foot-based meter, where position size is limited to a ϕ_{\min} , Fit allows the same two settings of the prominence parameters that it does in English. If $W \Rightarrow U$, words like *työ = päivä* 'workday' (with adjacent heavy and/or stressed syllables) preclude prominence type from being set as weight or stress, as previously explained for the analogous English cases. Therefore prominence type must again be strength. And if $S \Rightarrow \neg U$, prominence type must be stress, for words like *lómottüna* 'enchanted (ess.)', *vúoteellään* 'on his/her bed' will preclude weight or strength, just as words like *honeysuckle*, *contemplate* do in English.

Although Fit thus allows the same two foot-based meters in Finnish as in English, only the S-restricting form is actually used. We attribute this to the fact that in Finnish it permits greater esthetic interest (see 8). Because initial syllables bear primary stress in Finnish, a foot-based meter in which strong syllables are prohibited in weak positions would force every word of more than one syllable to begin a strong metrical position. This regularity seems to have been eschewed in favor of the variety afforded by $S \Rightarrow \neg U$ foot-based meter, which permits initial syllables in either weak or strong position, subject only to the meter's constraints on syllable weight (see also fn. 28). S-restricting foot-based meter is thus the meter in which the entire vocabulary is usable in the greatest variety of ways.

We will now document the properties of Finnish mixed meter in 1 and show how the metrical rules in 40 coupled with the phonological rules in 30 account for them. Our evidence is drawn primarily from the work of the major Finnish

²⁸ The traditional Kalevala meter is a syllable-based meter which avoids falling foul of fit through its more special setting of prominence type as weight in stressed syllables only. In this meter, a line consists of eight syllables, alternately strong and weak, where word-initial syllables, bearing the primary word stress, must be heavy in strong positions and light in weak positions, except in the first foot of the verse (Sadaniemi 1949, Kiparsky 1967, Leino 1986). Taking prominence to be weight in stressed syllables (and undefined otherwise), we have the following parameter specifications:

- (i) a. Position size: σ
- b. Prominence site: $S \Rightarrow \neg U$, $W \Rightarrow \neg P$
- c. Prominence type: Weight in stressed syllables

Sadaniemi 1949 suggests a reason why weight only counts in stressed syllables: it is only in them that quantity is lexically distinctive. This was the case at the stage when the meter was established; Keyser & Kiparsky 1984 provide phonological evidence that the restriction is still active in modern Finnish. Unstressed syllables would then be exempt from the weight constraint in much the same way as monosyllabic words are exempt from strength constraints in English and other languages. Also, barring stressed short syllables from strong positions ensures that the first ϕ_{\min} of a word (as defined in 11) will never coincide with a verse foot; without this condition the Kalevala meter would lose much of its subtle variety.

poets of the first half of this century, who brought foot-based meter to its full maturity.²⁹ We address the distribution of lexical words in §§3.1–3.4, and extend the analysis to nonlexical words in §§3.7–3.8.

3.1. STRESS IN STRONG POSITIONS. A strong position cannot contain an unstressed syllable (generalization 1a, parameter settings 40b,c). It can contain: (1) a monosyllabic lexical word, such as *yön* ‘night’ in 41a, or *toi* ‘brought’ in 41f; (2) the initial syllable of a polysyllabic word, such as *vie-*, *ar-* in 41a, and all the syllables in strong positions in 41b; or (3) a syllable capable of bearing secondary stress, such as *-nai-*, *-lain-* in 41c, *-lan-*, *-lain* in 41d, *-tään* in 41e, or *-vim-* in 41f. Note in particular that a light stressed syllable, such as *i-* in 41c, *ju-* in (41d) or *tu-*, *e-* in 41e, may fill a strong position on its own even though it is not a ϕ_{\min} , because the position parameter (40a) fixes the maximal realization of a metrical position, not the minimal one.³⁰

- (41)
- a. koko yön olin vierellä armaan ‘all night I was beside my love’
[Kailas, *Trubaduuri*]
- b. Povin taatelin=kypsin ja silmin kuumin // Ja hennosti kaartuvin
polvin ja uumin
‘with breasts ripe as dates, and hot eyes, // and delicately curved
knees and loins’ [Kailas, *Trubaduuri*]
- c. Pien ihanaiseni, vuoteellain ‘My little lovely one, on my bed’
[Kailas, *Pieni syntinen laulu*]
- d. tytär jumalan, minun vuoteellain // olet ollut alaston
‘divine daughter, on my bed // you have been naked’
[Kailas, *Pieni syntinen laulu*]
- e. tuhat=tuhatta elämää siitetään
‘one thousand thousand lives are conceived’
[Sarkia, *Luode ja vuoksi*]
- f. tukevimmän nyt ruoskan toi
‘now he brought the stoutest whip’
[Cajander, *Von Essen*]

²⁹ We have used the complete works (excluding translations) of the following poets (the dates of their first collections are given in parentheses): V.A. Koskenniemi (1906), Juhani Siljo (1910), Aaro Hellaakoski (1916), Uuno Kailas (1922), Lauri Viljanen (1924), P. Mustapää (1925), Kaarlo Sarkia (1929), and Saima Harmaja (1932), as well as the first collection of Lauri Viita (1947). This basic corpus has been complemented stylistically and chronologically by two representatives of an older and more informal “ballad” tradition, Paavo Cajander and Larin-Kyösti, and by some verse from the 1940s and 1950s by various authors.

³⁰ All lines cited in what follows come from poems with regular meters which firmly establish the scansion we indicate. These poems represent a variety of meters. As our scansion shows, some are rising (starting with material in W) and others are falling (starting with S), and the number of feet per line in them is fixed at three, four, five, or six, as shown by the number of S’s.

Options in secondary stress correspond to different metrical alignments. The final H of a three-syllable word may be either in strong position, as are the underlined syllables in 42, or in weak position, as in 43, especially if its vowel is short, as in 43a–c.

- (42) a. ^s ^s ^s ^s ^s
 sylis koskemattoman autuuteteen ikävöin ‘I long for the bliss of
 your untouched *syli*’ [Sarkia, *Unelma*]
- b. ^s ^s ^s
 tuli=punaisen kukkasen ‘of the flower red as fire’
 [Koskela, *Kuubalainen serenaadi*]
- c. ^s ^s ^s ^s
 minä halailen sun polvias ‘I embrace your knees’
 [Hellaakoski, *Tyhjin käsin*]
- (43) a. ^s ^s ^s ^s ^s
 nuo silmät, kuultavat sinisen emaljin tavoin ‘those eyes,
 pellucid as blue enamel’ [Viljanen, *Lempeä tuomio*]
- b. ^s ^s ^s
 sinä sydän, rauhaton, kuuma ‘you restless, hot heart’
 [Koskenniemi, *Kesäyössä*]
- c. ^s ^s ^s ^s ^s
 pyhän nuorutes ehtoollista kun nautitsen öin ‘when I delight
 nightly in the Communion of your sacred youth’ [Sarkia, *Unelma*]
- d. ^s ^s ^s ^s
 joku rakastaa silmää, kätöstä somaa ‘one man loves the eye,
 the pretty little hand’ [Hellaakoski, *Pientä kokoa*]
- e. ^s ^s ^s ^s
 Oi Ragusan aamu, oi Benaren yö! ‘O dawn of Dubrovnik, O
 night of Benares!’ [Viljanen, *Iltatunnelma*]

Similarly, the final LH sequences of four-syllable words shown in 25c allow two alignments, confirmed by both meter and rhyme. The number of metrical feet requires a strong position for the underlined third syllables in 44, and for the underlined fourth syllables in 45.³¹

- (44) a. ^s ^s ^s ^s ^s
 kuin kimmeltävät, villit unelmat ‘like shimmering, wild dreams’
 [Koskela, *Purjeet sumussa*]
- b. ^s ^s ^s
 ei nukuttamaan suostu ‘won’t make you fall asleep’
 [Sarkia, *Myös rikas*]
- c. ^s ^s ^s ^s ^s
 löit kysyvän katseen vaaleneviin maihin ‘you cast a questioning
 glance on the lightening lands’ [Sarkia, *Velka elämälle*]
- d. ^s ^s ^s
 he suikkaisevat suuta ‘they kiss’ [Mustapää, *Laulu kriikunapuista*]

³¹ We repeat that taken in isolation, several of the lines allow alternative scansion, either with fewer or with more strong positions. The scansion shown here are the ones required by the metrical schema of the poems they appear in.

- (45) a. janos sielummekin elämää 'even our souls thirsted for life'
[Sarkia, *Syyskirje*]
- b. niin kummallin sydän on 'so strange is the heart' [Sarkia, *Sydän*]
- c. kujas kuiskailevaan pimentoon 'into the whispering darkness of
your alley' [Sarkia, *Ensi lumen aika*]

Similarly, only if the underlined third syllables are in strong position in 46 and the underlined fourth syllables are in strong position in 47 will the rhyming syllables occupy parallel metrical positions, which we assume to be required of rhymes.³²

- (46) a. Miten ihanan tuskallinen 'How delightfully painful'
[Kailas, *Sairaalan ikkuna*]
- b. Olin kyllin jo kaarreksinut 'I had gone in circles enough
already' [Siljo, *Häkkilintu*]
- c. mua lentoon ylenevän 'me into rising flight' [Siljo, *Häkkilintu*]
- d. Suli murhees sentään päivään säteilevän 'At least your grief
melted into the radiant day' [Sarkia, *Velka elämälle*]
- e. kurottuivat iltaan säteilevän 'reached into the radiant evening'
[Kailas, *Sairaalan ikkuna*]
- f. Minä tuoko? Tuotako itkeksitän? 'Me him? Is that whom they
are weeping for?' [Hellaakoski, *Soittaja kuolee*]
- g. pojan=silmin uhmasta liekehtivin 'with boy's eyes, aflame
with defiance' [Viita, *Pohjan satakieli*]
- (47) a. Korfun torilla vakuuttivat 'On the marketplace in Corfu they
claimed' [Mustapää, *Korfun kuu*]
- b. kadun äänien kohisevän 'the street noises sounding'
[Kailas, *Sairaalan ikkuna*]
- c. tuli=pallot leimuavat 'the fire-balls flame' [Sarkia, *Kärsivä tuli*]
- d. hänen yrttejä meille ojentavän 'him handing us herbs'
[Hellaakoski, *Kevätlaulu*]
- e. Läpi=kuultoiset, läpi=hohtelevat 'transparent, diaphanous'
[Hellaakoski, *Järvellä*]
- f. ja sentään: olenko onnellinen 'and still: am I happy?' [Viita, *Onni*]

³² E.g. *túskallinen/sínen* in 46a, and *vákuuttivat/ásian=tuntijät* in 47a.

In accord with the stress preferences noted in footnote 26, long final syllables count as unstressed more often if their vowel is short, as in 44a,d; 46a,b,g. In fact, some poets, such as Manninen and Jylhä, only allow them in this case (Sadaniemi 1949:160). And in words where a third -VC syllable is followed by a -VVC clitic, while the third syllable is more commonly in strong position, as in 48a, the fourth occasionally appears as strong instead, as in 48b, a possibility which reflects the stress option discussed at 28 above.³³

- (48) a. ^smitä ^soutoa ^sunta ^snyt ^srinnassa ^ssylyt ^sitkään 'what a strange
dream you now cradled in your breast' [Sarkia, *Velka elämälle*]
- b. ^sSinut ^smiksi ^she ^ssiihen ^ssulkivat ^skaan 'why did they enclose you in
it at all?' [Kivikk'aho, *Sankarihautani*, Kaila et al. 1967, 490]

Morphologically conditioned secondary stress of the type illustrated in 38 also licenses syllables' placement in strong positions:

- (49) a. ^skivi=^skärryyn ^sjyrähte^slevin 'with thundering stone carts'
[Hellaakoski, *Järvellä*]
- b. ^skun ^smarssimme ^sjäykkänä ^skunnia=^skomppania^s 'when we
marched as a rigid honor guard' [Mustapää, *Sotamiehen hautauksesta*]

So does inherent secondary stress. Thus the option in 39b permits the alternative scansion in 50.

- (50) a. ^sMikä ^stodempi ^sponnistus ^sois: ^sulos ^syksinäisy^sydestä! 'what would
be a truer effort: out from solitude!' [Sarkia, *Kova koetus*]
- b. ^sja ^syksinäisy^syden 'and of solitude' [Hellaakoski, *Hauen laulu*]

In sum, then, any type of stressed syllable in a lexical word may occur in strong positions of foot-based meter.

Conversely, syllables that can never be stressed, such as final light syllables, cannot be in strong positions (except as discussed in §3.6 below). This requirement stands in striking contrast to syllable-based meters, where unstressed syllables can occur in any strong position (Sadaniemi 1949:160; for the reasons see the discussion after 40), as in the following iambic and trochaic verses:

- (51) a. ^sJa ^sprinsessa ^son ^skumartanut ^snuoren ^späänsä ^smaahan 'And the
princess has turned her young head to the ground' [Mustapää, *Uni*]
- b. ^sVaro ^sraippoja, ^sSebastian! 'Beware of whiplashes, Sebastian!'
[Cajander, *Zombi teki sen*]
- c. ^sVarsova ^sja ^sKrakova ^sja ^sPosen 'Warsaw, Cracow, and Poznan'
[Mustapää, *Sukukirja*]

³³ In a few instances this happens even when the fourth syllable is not a clitic, e.g.

^spienen=^spienellä ^slinnun ^snokalla ^sposkeen ^skoputetti^sin 'there was a tap on my
cheek from a tiny bird's beak' [Hellaakoski, *Portit*].

This stress pattern is unusual, and not covered by the rules in §2.

We have now documented the first distinctive property of foot-based meter in 1 for lexical words, and derived it from phonological and metrical principles. We turn now to the other four, which involve primarily its weak positions.

3.2. LEXICAL MONOSYLLABLES IN WEAK POSITIONS. The most distinctive property of foot-based meter is that either one or two syllables may occupy a position (generalization 1b). Disyllabic weak positions usually contain unstressed syllables, such as the underlined sequences in 52.

(52) a. Ja sun punainen sukka=nauhas ‘and your red garter’

[Koskela, *Kuubalainen serenaadi*]

b. Sua ruoskalla herjata voin? ‘I can dishonor you with a whip?’

[Cajander, *Von Essen*]

But under two conditions they may contain stressed syllables, and these reveal the fundamental role of ϕ_{\min} in the meter.

First, lexical monosyllables may occur in weak positions (e.g. *l \ddot{o} it* ‘you cast’ in 44c), but only if they are the only syllable in that position (generalization 1c). While nonlexical monosyllables and other unstressed syllables may share a weak position with another syllable, as do *ja, sun* ‘and, your’ in 52a, or *-kal-, -la* in 52b, lexical monosyllables like *y \ddot{o} n* ‘night’s’ and *o \ddot{i} n* ‘nightly’ in those same positions would be unmetrical.

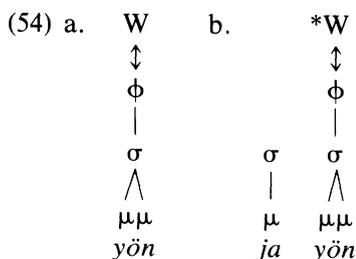
(53) a. *Ja y \ddot{o} n punainen sukka=nauha ‘and the night’s red garter’

[construct]

b. *Sua ruoska o \ddot{i} n herjata voi ‘The whip can dishonor you nightly’

[construct]

The reason a monosyllabic word in a disyllabic weak position must be nonlexical is that a position may contain no more than a ϕ_{\min} (parameter setting 40a). A lexical monosyllable like *y \ddot{o} n* ‘night’s’ is always stressed, and by itself constitutes exactly a ϕ_{\min} , as in 54a. It can therefore occupy a weak position alone.³⁴ But if there is any other linguistic material in that position, as in the collocation *ja y \ddot{o} n* ‘and the night’s’ in 54b, the position will contain more than a ϕ_{\min} , in violation of 40a.



³⁴ The assumption that lexical monosyllables have no strength relationship defined with respect to adjacent material is crucial here.

3.3. RESOLUTION: STRONG SYLLABLES IN WEAK POSITIONS. The second condition under which a stressed syllable of a lexical word may occupy a weak position is when it is light and followed by an unstressed syllable within the same word which also forms part of the weak position (generalization 1d). This is amply illustrated in the foregoing lines as in *koko* and *olin* in 41a, *povin* in 41b, *tytär* and *minun* in 41d, *tuke-* in 41f, *tuhat* in 41e, *sylis* and *ikä-* in 42a, and many others, as well as by the underlined sequences in 55.

- (55) a. $\overset{s}{\text{iki}}=\overset{s}{\text{yö}}$, $\overset{s}{\text{syvin}}$ varjosi heitä 'eternal night, throw your deepest shadow' [Siljo, *Jalanjälki jok'ainoa*]
- b. $\overset{s}{\text{heti}}$ ruoska se tuo $\overset{s}{\text{tukevin}}$ 'bring the stoutest whip at once' [Cajander, *Von Essen*]
- c. $\overset{s}{\text{valaa}}$ kirkontornin tiilet 'it casts the steeple's bricks' [Koskenniemi, *Ihme*]
- d. $\overset{s}{\text{pariss}}$ orjien tumma=ihoisten, alastomain 'among dark-skinned, naked slaves' [Sarkia, *Entinen elämä*]
- e. $\overset{s}{\text{syleilyyn}}$ veen sini= $\overset{s}{\text{vyön}}$ 'into the embrace of the water's blue girdle' [Sarkia, *Kaipauksen saari*]
- f. $\overset{s}{\text{Tuleentumis}}=\overset{s}{\text{tuntisi}}$ koittaa 'the hour of your ripening is nigh' [Sarkia, *Jyvä ja laiho*]

The second syllable in such configurations can be any weight, as shown, though it is most common for its vowel to be short. But the first cannot be heavy; the following variant of 55a would be unmetrical in foot-based meter.

- (56) $\overset{s}{*}\text{talvi}=\overset{s}{\text{yö}}$, $\overset{s}{\text{kylmän}}$ varjosi heitä 'winter night, throw your cold shadow' [construct]

This second condition under which a stressed syllable of a lexical word may be admitted into a weak position follows jointly from the constraints 40a–c, by which a strong position may not contain an unstressed syllable, and a metrical position may contain no more than a ϕ_{min} . Consider the possible metrical alignments of words of the form $\overset{s}{\text{HX}}$ (57a) and $\overset{s}{\text{LX}}$ (57b):

- (57) a. ϕ b. ϕ
- | | |
|--|--|
| ϕ
$\begin{array}{l} \quad \\ \sigma_s \quad \sigma \\ \wedge \quad \\ \mu\mu \quad \mu \\ \quad \quad \\ \text{tal} \quad \text{vi} \end{array}$ | ϕ
$\begin{array}{l} \quad \\ \sigma_s \quad \sigma \\ \quad \\ \mu \quad \mu \\ \quad \\ \text{i} \quad \text{ki} \end{array}$ |
| (i) *w s | (i) *w s |
| (ii) s w | (ii) s w |
| (iii) *w | (iii) w |
| (iv) *s | (iv) *s |

Scansions (i) and (iv) are impossible in both 57a and 57b, because by 30e, a syllable following a strong one within a word will always be unstressed, and so by 40b,c can occur only in a weak position. Scansion (ii) is possible both in 57a and in 57b, because a strong syllable by itself can freely occur in strong position. Scansion (iii) is possible if the initial syllable is light, as in 57b, in which case it forms a ϕ_{\min} with the following unstressed syllable, and the two together may make up a weak position. But if it is heavy, as in 57a, it constitutes a ϕ_{\min} on its own, and so the unstressed syllable following it cannot share the weak position, because the position would then exceed a ϕ_{\min} . Thus in a configuration $\acute{H}X$, H must be in a strong position by itself as in (ii), while in $\acute{L}X$, L may either be in a strong position as in (ii), or be the first of two syllables in a weak position as in (iii).

Furthermore, at most two syllables may occupy a weak position containing $\acute{L}X$, for any additional syllable would violate the constraint that a position contain no more than a ϕ_{\min} . Hence an $\acute{L}XL$ word, for example, such as *todempi* in 50a, can only have its initial syllable in strong position. If it were in weak position, the third syllable could neither belong to that weak position, because of 40a, nor make up a strong position of its own, because of 40b,c. The practice of Finnish poets conforms to this prediction.

Finnish verse obeys the stronger condition $S \Rightarrow \neg U$, which allows only stressed syllables in strong positions, i.e. 57b (iii) but not 57b (iv). But a very few poets sometimes experiment with resolution in strong positions. There are two manifestations of this possibility: occasional four-syllable metrical feet, and lexical monosyllables in apparently disyllabic weak positions. The rare instances of four-syllable feet almost always begin with a word-initial light syllable (Sadeniemi 1949:166); this follows if we assume that it forms a resolved strong position with the syllable following it.³⁵

(58) a. Joku ^sv^särisev^sä kuutam^son=hetki ‘some trembling moonlit
moment’ [Harmaja, *Rajalla*]

b. Minun ^ssy^sdämeni helisee moukarin alla // Mitä ^ski^sipeämmin
^slyöt, sitä ^ssy^svemmin se soi

‘My heart is sounding under the sledgehammer, // the harder
you strike, the deeper it rings’ [Harmaja, *Taottu sydän*]

The same seems to be true of the few apparent exceptions to the generalization just presented in §3.2 that lexical monosyllables don’t occur in disyllabic weak positions. In 59, where the word *teen* ‘I make’ seemingly shares its weak position with the unstressed syllable *-si*, the fact that *-pa-* is light means that we might take *-pasi* as a single strong position.³⁶

(59) Sinun ^skalleimpasi ^steen ^ssuureks ‘I will make your most precious
thing big’ [cited in Leino 1982:136]

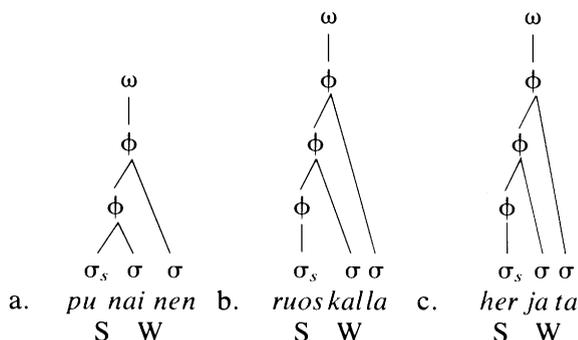
³⁵ Each of the four-syllable words could of course constitute two disyllabic feet, but the resulting scansion would in each case violate the otherwise regular meter of these poems.

³⁶ The scansion could also be based on the elided pronunciation *kalleimpas*.

The lines in 58 and 59, though falling outside of the core system of Finnish foot-based meter, can nevertheless be systematically related to it in terms of the present analysis, in that they can be characterized by the weaker condition $S \Rightarrow P$, which requires at least one stressed syllable in a strong position, as in Hopkins's Sprung Rhythm, where the alignment in 57b (iv) is metrical.

3.4. UNSTRESSED SYLLABLES OF LEXICAL WORDS IN WEAK POSITIONS. An unstressed syllable in a lexical word, on the other hand, can freely occupy a weak position, whether alone or with another unstressed syllable, light or heavy. Being unstressed, it does not constitute a ϕ_{\min} , and therefore can never by itself fill a position to the limit. Thus even a sequence of two heavy syllables, as in 60a, or a heavy-light sequence, as in 60b, can be accommodated in a weak position, provided all the syllables are unstressed.

(60)



This follows from our conception of scansion as a parsing operation, rather than as a counting operation. It measures the size of a position by the structural configuration of the material at the relevant level, as determined by the setting of the position size parameter. The meter and the phonology do of course place other constraints on the distribution of unstressed syllables, the meter prohibiting them in S, and the phonology limiting the number of adjacent ones possible within a word to at most two.

3.5. INVERSION. The first foot of an iambic line may have an inverted stress pattern.

- (61) a. $\overset{s}{\text{V}}\overset{s}{\text{ä}}\overset{s}{\text{r}}\overset{s}{\text{j}}\overset{s}{\text{ä}}$, $\overset{s}{\text{t}}\overset{s}{\text{u}}\overset{s}{\text{o}}\overset{s}{\text{k}}\overset{s}{\text{s}}\overset{s}{\text{u}}\overset{s}{\text{j}}\overset{s}{\text{ä}}$ ja $\overset{s}{\text{t}}\overset{s}{\text{ä}}\overset{s}{\text{h}}\overset{s}{\text{t}}\overset{s}{\text{i}}\overset{s}{\text{o}}\overset{s}{\text{i}}\overset{s}{\text{t}}\overset{s}{\text{ä}}$ 'colors, fragrances, and constellations' [Sarkia, *Jumalainen tuntematon*]
 b. $\overset{s}{\text{h}}\overset{s}{\text{i}}\overset{s}{\text{v}}\overset{s}{\text{u}}\overset{s}{\text{s}}\overset{s}{\text{t}}\overset{s}{\text{e}}\overset{s}{\text{s}}$ $\overset{s}{\text{s}}\overset{s}{\text{i}}\overset{s}{\text{l}}\overset{s}{\text{k}}\overset{s}{\text{k}}\overset{s}{\text{i}}\overset{s}{\text{-}}\overset{s}{\text{y}}\overset{s}{\text{o}}\overset{s}{\text{t}}\overset{s}{\text{ä}}$ $\overset{s}{\text{s}}\overset{s}{\text{i}}\overset{s}{\text{v}}\overset{s}{\text{e}}\overset{s}{\text{l}}\overset{s}{\text{l}}\overset{s}{\text{e}}\overset{s}{\text{e}}\overset{s}{\text{t}}$ 'stroked the silken night of your hair' [Sarkia, *Sonetti tuntematomalle*]

Iambic-anapestic foot-based meter, however, normally disallows such inversion (generalization 1e).

As discussed in §1, inversion in iambic meter can be seen as a relaxation of the usual prominence constraints for line-initial position, in accord with the principle of closure. On this assumption, the contrasting lack of inversion in iambic-anapestic meter follows directly because that meter constrains the prom-

inence of strong positions. In both iambic and iambic-anapestic meter, the line-initial position is weak. For iambic meter, therefore, where the prominence condition is that weak positions may not contain a strong syllable, a relaxation in the initial position will allow that weak position to contain a strong syllable. In iambic-anapestic meter, however, where the prominence requirement regulates strong positions, a relaxation of that constraint for the line-initial position can have no effect. This analysis also correctly predicts the absence of initial inversion in trochaic verse.

Some nineteenth-century poets did exceptionally combine the iambic convention of inversion with foot-based meter. They allowed lines like 62, where an initial weak position contains a strong syllable alone, followed by an unstressed syllable in the strong position (Leino 1986:99). In the twentieth century too we find a few experiments with this hybrid meter (e.g. 62c).

- (62) a. ^sLukossa on rauta=^sportit, ei valoa sieltä näy ‘the iron gates are closed, no light is visible from there’
[Cajander, *Vapautettu Kuningatar*]
- b. ^sSaalistahan linnan herrat yöt, päivät vahtivi nyt ‘The masters of the castle guard their booty night and day now’ [ibid.]
- c. ^slevolle ehtien ‘having time to rest’ [Sarkia, *Kouluvihko*]

Even though lines like 62 break the norm of foot-based meter, the nature of the deviation can again be characterized in a systematic way in our framework. The more radical inversion amounts to a relaxation of the prominence requirements not on the initial metrical position, but on the initial metrical foot, including both the first weak and the first strong position. Thus our theory offers an account of why these particular ways of extending the metrical conventions, and not others, appear in the tradition.³⁷

This completes our account of the generalizations summarized in 1 for the case of lexical words. To recapitulate: strong positions always contain a stressed syllable. Metrical positions may contain one or two syllables, resulting in surface metrical feet of two, three, or very occasionally four syllables. Weak positions may contain a stressed syllable of a lexical word subject to two restrictions. If the stressed syllable constitutes a lexical monosyllable, it must be the sole syllable in its position. If the stressed syllable is also strong, it must be light and followed by an unstressed syllable within the same word which also belongs to the weak position. Inversion in iambic-anapestic foot-based meter is normally avoided, but possible in some varieties. These properties follow in their entirety from the proposed phonological analysis and metrical principles.

3.6. HYPERMETRICITY AND CATALEXIS. A class of apparent exceptions to these generalizations appears at the edges of major metrical constituents (lines

³⁷ A parallel situation obtains in English: while Hopkins does not allow inversion in foot-based meter, Tennyson, in his experiments with this form, does (Hanson 1992).

do not head phrasal projections)⁴³ get stress postlexically, if at all. This distinction is corroborated by the fact that lexical words observe a minimal foot constraint while nonlexical words do not: only the latter may be light monosyllables, such as *se* 'it', *ja* 'and', or *jo* 'already'.

Nonetheless, disyllabic nonlexical words do get stress on the initial syllable, exactly like lexical words, e.g. *mútta* 'but'. And monosyllabic nonlexical words are typically subject to rhythmic stressing, if they are not surrounded by other stressed syllables and the minimal weight requirement for a foot is met. In 65, either *kun* 'when' or *hän* 'he' would normally be relatively more prominent than the other, just as in the English counterpart; and *ja* 'and' may have some prominence provided the next syllable doesn't.

- (65) a. *ja kùn hän on täällä* 'and whèn he is hère'
 b. *jà kun hån on täällä* 'ànd when hè is hère'

We will assume that stress on nonlexical words is assigned by the postlexical application of 30. Since the rules of foot assignment require two moras, only heavy monosyllabic nonlexical words may be stressed, though pairs of nonlexical monosyllables can be grouped together into units that satisfy the bimoraic minimality constraint. For example, in 65 where the light nonlexical monosyllable *ja* is followed by another nonlexical monosyllable, *kun*, the two can combine into a resolved moraic trochee as in 12 (Leino 1986:72–74), resulting in the stress pattern in 65b. In addition, a rule of LIAISON can resyllabify a final consonant of a monosyllabic word as the onset of a following vowel-initial word (Leino 1986, Penttilä 1957). Therefore in sequences of nonlexical monosyllables affected by this rule, the first may count as light even if it is closed (see 73).

Although the minimal foot requirement constrains the application of 30 at the postlexical level, it does not constrain other postlexical stress assignment processes. In particular, phrasal and emphatic stress can be assigned even to a light nonlexical word: *joko mé tai té* 'either us or you'.⁴⁴

For all poets, nonlexical words may occupy strong positions only if they are potentially stressed in accord with these rules. Initial stressed syllables of disyllabic nonlexical words, such as those underlined in 66, may occupy a strong position, as may heavy nonlexical monosyllables such as those underlined in 67.

- (66) a. yhä ^s sinuun ma vain ikävöin 'I still long only to enter you'
 [Sarkia, *Kaipauksen saari*]
 b. En ^s ole ma enää entinen 'I'm not what I was any more'
 [Koskenniemi, *Jobin ikävä*]

⁴³ These nonlexical adverbs fall into two classes: words which pattern like determiners (specifiers), such as *edes* 'at least', and words which like pronouns constitute entire phrases and so permit no modification or complementation, such as *nyt* 'now' (Hanson 1992).

⁴⁴ In the Swedish spoken in Sweden, short syllables that receive phrasal or emphatic stress get lengthened in satisfaction of the minimal foot requirement; thus *Vad var det?* can be [vá: va dé:] 'What was THAT?', or [va vá: de] 'What WAS that?'. The Swedish spoken in Finland, like Finnish, does not enforce the minimal foot requirement at this late level of the phonology, allowing pronunciations like [vá va dé] 'What was THAT?', [va vá de] 'What WAS that?'

- c. ja ^s joh^s on^s tuka^s hdun 'and which suffocates me'
[Hellaakoski, *En minä—*]
- d. Hän ^s joka^s on ^s val^s tias^s vainajain 'He who rules over the dead'
[Hellaakoski, *Parantajat*]
- e. se ^s mi^s kä^s on ^s mie^s hessä^s rakastajaa 'what a man has of a lover in
him' [Hellaakoski, *Jälkiä lumessa*]
- f. minun^s oli^s niin^s autuas^s olla 'I was so blissful' [Kailas, *Riemulaulu*]
- (67) a. Mitä ^s on^s he? ^s ulvova^s lauma^s vain 'what are they? just a howling
pack' [Hellaakoski, *Vuimeinen dinosauri*]
- b. suvi^s kun^s oli^s muisto^s jo^s vain 'when summer was already just a
memory' [Manninen, *Joutsenet*]
- c. Et tiedä, ken^s on^s hän, mistä 'you don't know who he is, and
where he is from' [Jylhä, *Kohtaus metsässä*]

But light nonlexical monosyllables do not normally occur in strong positions in foot-based meter; lines like 68 would be unmetrical.

- (68) *Kun pihalle sä^s sait^s jää^s dä 'When you were left in the courtyard'
[construct]

The apparent exceptions mostly involve catalexis (69a), sometimes emphatic stress (69b), and sometimes both (69c).

- (69) a. isäntäänsä^s käärme^s se^s 'that snake its master' [cited in Leino 1982:140]
- b. Oli^s valkea^s jo^s koko^s maa 'the whole ground was white already'
[cited in Leino 1986:80]
- c. ja kokeesta^s säästyit^s sinä—ja^s me^s 'and from the test were spared
you—and we' [Siljo, *Miehiä*]

We would also expect light nonlexical monosyllables to occur in strong positions just in case they form a resolved ϕ_{\min} ($\check{L}X$) with a following nonlexical monosyllable. Line 70a represents this possibility, and because of liaison so does 70b, but there is a clear tendency to avoid putting such words in strong positions.

- (70) a. yks^s sisään, ja^s muu^s kaikki^s ulos 'one in, everything else out'
[Hellaakoski, *Pientä kokoa*]
- b. Kysy, mit'^s on^s sen laki ja oikeus 'ask what is its law and justice'
[Nuormaa, *Itätuulessa*]

In sum, then, nonlexical words, as predicted, occupy strong positions only if they are capable of being stressed.

3.8. NONLEXICAL WORDS IN WEAK POSITIONS. Even heavy nonlexical monosyllables need not be stressed, depending on their position, and hence may be

able to share a weak position with another unstressed syllable, which we have seen a lexical monosyllable can never do.

- (71) a. sua, ainoa, tahdo en kieltää 'you, alone, I do not want to deny'
 [Hellaakoski, *Käy sisälle hiljaisuus*]
 b. ei olla voi köyhempää 'there can be no one more poor' [ibid.]

But in other ways the disposition of nonlexical words in weak positions is a locus of significant stylistic variation. With respect to the treatment of nonlexical monosyllables, we can distinguish two styles of foot-based meter, which we call LYRICAL and BALLAD style after what seem to be their predominant uses. The lyrical style appears throughout the period under study. The ballad style was most common in the nineteenth century, as in the works of Cajander, though it continues in Larin-Kyösti's folksy yarns and sometimes even in the rather academic Koskenniemi. Self-conscious modernists like Siljo, Kailas, Sarkia, Hellaakoski, and Mustapää use it only occasionally for special stylistic effect.

The principle of the lyrical style is that the rules of postlexical stress assignment must always be satisfied for a line to be metrical. In consequence, nonlexical words, if stressed, are subject to exactly the same constraints as hold for lexical words. This means, first, that the strong syllable of a disyllable is allowed in weak position only if it is light (e.g. *sua* 'you' in 71a);⁴⁵ and secondly, that two nonlexical monosyllables are allowed in weak position only if the first is light (Leino 1982, 1986), since only then do they form no more than a ϕ_{\min} .

- (72) a. Nyt on se jo mahtava peikko 'Now it is already a mighty troll'
 [Hellaakoski, *Peikko*]
 b. ja ne kultaiset päivät 'and those golden days' [Viita, *Lennätinlangat*]
 c. se on punaista laavaa 'it is red lava' [Hellaakoski, *Metamorfoosi*]
 d. ja niin lyhyt kuitenkin 'and still so short' [Viljanen, *Asepoika*]

Sequences that have this structure as a result of liaison may also figure in weak position in lyrical foot-based meter.

- (73) a. sit'en itse voi, sit'en itse saa 'I cannot do it myself, I may not do it myself' [Hellaakoski, *Se on saapunut*—]
 b. sit' et myöntänyt ainutta kertaa 'you did not admit it even once'
 [Siljo, *Häkkilintu*]

⁴⁵ Apparent exceptions arise for otherwise lyrical-style poets with *mutta* 'but' and a few other nonlexical words. In poetic and in colloquial usage these words have truncated monosyllabic forms such as *mut* (e.g. 75a). These can license monosyllabic scansion even written as disyllables, much as even the strictest English poets allow words like *even* and *never* which have lexicalized poetic monosyllabic forms such as *e'en* and *ne'er* to exceptionally make up a weak position in iambic meter.

- c. nyt on syys—vain muistoa onko ‘now it is autumn—is it only a memory’ [Viljanen, *Elokuun Kevät*]
- d. mun on kruunu ja valta ‘the crown and the power is mine’
[Jylhä, *Aleksanteri ja Bukefalos*]
- e. koti=polkua vain hän on mennyt päin sini=merta ‘he’s only taken the homeward road towards the blue sea’ [Kailas, *Punajuova*]
- f. ken on sulkeva jäsenes notkeat ‘who will enclose your supple limbs’ [Sarkia, *Viaton*]

Ballad-style foot-based meter, in contrast, takes account of postlexical stress only optionally, and consequently treats nonlexical words very differently. First, any heavy stressed syllable of a nonlexical disyllabic word can stand as the first of two syllables in weak position (Sademiemi 1949:167–68).

- (74) a. sinne nouseva aurinko hohtaa ‘there the rising sun shines’
[Koskenniemi, *En tahdo ma tietää minne*]
- b. sillä Kuoleman rakkaus väsynyt ei ‘for Death’s love did not tire’
[Koskenniemi, *Sydän ja kuolema*]
- c. siellä vapisi vallat polvillaan ‘there the powers shook on their knees’ [Koskenniemi, *Polykrates ja hänen ystävänsä*]
- d. Tässä kilua, kalua kimmaltaa ‘here all kinds of things are gleaming’ [Larin-Kyösti, *Paholaisen huutokauppa*]
- e. Koska saavutan taivahan rannat ‘when I reach heaven’s shores’
[Larin-Kyösti, *Vapaapurjehtija*]
- f. eikö kohta ne nahjukset nappaa ‘aren’t the blighters going to bite soon?’ [Larin-Kyösti, *Kirkonaidalla*]

Secondly, ballad-style foot-based meter also allows pairs of heavy nonlexical monosyllables in weak position.

- (75) a. mut kun vie hän mun maahansa loittoon ‘but when he takes me to his faraway land’ [Koskenniemi, *Kulkuset*]
- b. kuin ei kukaan toinen hän syytön on ‘he is innocent as no one else’ [Koskenniemi, *Maria*]
- c. vaan on laulujen pohjaton aarre ‘but is a bottomless treasure of song’ [Larin-Kyösti, *Hei, nosta, laivuri, ankkuris*]
- d. oon kuin mies, jok’ on viiniä juonut ‘I’m like a man who has drunk wine’ [Larin-Kyösti, *Päivän palvoja*]
- e. Niin on tappio sen—tuon vaan uudistuu ‘such is its defeat—it simply renews itself’ [Cajander, *Järjen taisto*]

- f. Sulla tääll' on mit' ikänä toivonetki 'Here you have anything
you might wish for' [Cajander, *Ei saanut hän lupaa lähteä*]
- g. Jos kuin orhi nyt ruoskaa saankin 'even if I will now be
whipped like a stallion' [Cajander, *Von Essen*]

On the assumptions about the assignment of postlexical stress introduced above, the initial heavy syllables of the underlined disyllabic words in 74 and one of the underlined heavy monosyllables in 75 are stressed, and so these weak positions contain a ϕ_{\min} and additional linguistic material as well. But because the stress is assigned postlexically, it need not be taken into account.

Although a weak position is constrained only in that it may contain no more than a ϕ_{\min} , even those poets who allow postlexical stress to be disregarded do not allow arbitrarily long strings of nonlexical words. Even in ballad style the maximum number of syllables in any position seems to be two. This is due not to the position size parameter, but to the independent eurhythmy constraint, which prohibits long lapses (§1.1).

Gradience in stylistic preferences is to be expected, and indeed not all poets' practices can be categorically accommodated in this dichotomy. Viljanen, for example, tends to restrict heavy monosyllables in weak positions according to the lyrical pattern seen in 72–73, but also to allow nonlexical HL words according to the ballad pattern in 74.

- (76) a. nyt on kallio asuntos 'now the cliff is your dwelling'
[Viljanen, *Saari meressä*]
- b. jok' ei sanoja saada voi 'which cannot get words'
[Viljanen, *Lumi viileä verhoo maata*]
- c. joll' on ääni kuin heleän hullun 'which has the sound of a
bright flute' [Viljanen, *Kullanetsijä*]
- (77) a. sulle neidot hymyili hukkaan 'the maidens smiled at you in
vain' [Viljanen, *Saari meressä*]
- b. mistä kukkia etelän saa 'where you can get flowers of the
south' [Viljanen, *Evoe!*]
- c. siellä kulkee mies ja nainen 'there a man and a woman are
walking' [Viljanen, *Rakkaus vainoikaan*]

In sum, the postlexical application of 30 constructs the same kind of feet in nonlexical words and certain groups of nonlexical words that its lexical application does in lexical words. This allows nonlexical words to satisfy the requirement that strong positions must contain stressed syllables. At the same time, the requirement that a position not contain more than a ϕ_{\min} may be satisfied even if the position contains two syllables of which one meets the minimum weight requirement for a foot, since not all such syllables are stressed postlexically and, for ballad-style foot-based meter, since postlexical stress may in

any case be disregarded. Lexical and postlexical stress are thus systematically distinguished in verse even when they are pronounced alike. This supports the claim that meter constrains the abstract structure of the linguistic material, rather than just its physically realized properties (Jakobson 1960, Kiparsky 1973, 1987).

Thus our account of Finnish metrical phonology together with our approach to meter makes available an analysis of Finnish foot-based meter entirely grounded in linguistic principles, not only for the basic structure of the meter but also for the variations permitted within it.

4. CONCLUSION. Our findings bear on the classic question of the relative claims of nature and convention in literary form. They support the position that the categories and constraints of poetic meter are natural in the sense of being derivative of linguistic form (Jakobson 1960)—in John Thompson's felicitous phrase, that meter is 'language imitating itself' (Thompson 1961). The basic structure of Finnish foot-based meter is defined entirely by the prosodic constituent ϕ_{\min} and the prosodic category of stress; familiar metrical variations such as inversion and hypermetricality are reflexes of general metrical and linguistic principles; significant stylistic differences across poets reflect the existence of different levels of linguistic representation; and even experimental deviations from the metrical canon under study prove to be systematic variations on the choices that fix its basic structure.

Beyond that, our parametric approach to meter itself gives a novel twist to the familiar Jakobsonian point, making available a precise way to express what it means for a meter to be 'natural' in a particular language, and how a preference for such a meter is manifested. The perfect match of meter to language in Finnish foot-based meter shows how the natural suitability of a meter contributes to its vitality in a language's poetic tradition. This is not to say that a language's choice of a meter is a matter of phonological determinism. English meters surely inherit their traditional preference for W as the prominence site from the syllable-based Romance forms they originate from. The ensuing assumption of syllabic alternation would have given rise to the prominence constraints we have seen, which might then have remained constant at the same time that many poets from Chaucer onward instinctively moved to the more accommodating foot-based constraint on position size. In a different way, the evolution of Finnish metrics also reflects the complex interplay of linguistic and cultural pressures. The borrowed Germanic meters were variously modified to accommodate the prosodic structure of the Finnish language, under the influence of a prevailing poetic ideology that deliberately sought the intrinsic guiding form of the language (an ideology which was itself the artistic counterpart of the political ideology of liberalism and nationalism characteristic of the period in which the meter evolved, which saw not only the development of Finland's national literature but also its struggle for independence). In this way, natural form grounded in the faculty of language emerges even in a domain as open to the play of formal combinatorics and conscious artifice as the metrical organization of verse.

APPENDIX A
THE ROLE OF PHONOLOGY IN METRICAL THEORY

Commenting on his own rules for Finnish stress-based meter (in his terms, DYNAMIC meter), Leino (1986:75) remarks that they 'describe a corpus, but ... lack a clear theoretical foundation,' which he regrets must be the case "as long as the prosodic description is inadequate." We have argued that recent metrical phonology has in fact made available the theoretical foundation and prosodic description that Leino called for. As he foresaw, it makes possible significant theoretical improvements in the analysis, reflected descriptively in increased empirical coverage, perspicuity, simplicity, and generality of the rules. In this appendix we demonstrate, by way of a comparison of Leino's rules with our own, just how much phonology contributes to the explanation of the metrical system.

Leino characterizes Finnish stress-based meter as a pattern of alternating strong and weak positions (rising (R) and falling (F), in his terminology). CORRESPONDENCE RULES specify how these positions may be filled by PROMINENT (P) and UNPROMINENT (U) syllables; the correspondence rule for foot-based meter (a) defines a strong position as consisting of one prominent syllable and a weak position as consisting of one or two unimportant syllables.

- (a) R → P
F → U¹

Which syllables are prominent and unimportant is in turn defined by a system of ten prominence rules, claimed to hold for all stress-based meters in Finnish. The prominence rules refer to weight, stress, phrasing, and a distinction between grammatical and lexical items. Leino makes nearly the same assumptions about Finnish syllable weight as we do, except for stipulating that heavy initial syllables of disyllabic grammatical (nonlexical) words are light. This is the only special property he claims for grammatical words, so his account also differs in not assuming a systematic difference between those and lexical words. But it is for stress in lexical words that his assumptions differ most significantly from ours: Leino counts only initial syllables of polysyllabic words as stressed; syllables with secondary stress, and monosyllabic words, irrespective of lexical status or weight, are all unstressed for him.

A rich system of prominence rules compensates for this minimalist phonology. Prominence rules are the heart of Leino's analysis and supply many of the distinctions we attribute to secondary stress. Although Leino holds that these in principle are phonological, in practice they include purely metrical constraints; and we will argue that their function is better served by a clean partitioning of stress rules and constraints on versification. Leino himself calls attention to some of the shortcomings of his rules, but argues that prominence rules are nevertheless needed to express the interrelationships between the several phonological properties which constrain the meter, such as stress and weight (Leino 1986:73), and to characterize the contextual conditions affecting a syllable's ability to occupy a particular position in the meter (p. 71). But to express such interrelationships and contextual conditions within the prosodic system of the language is precisely what prosodic phonology is designed for. Thus Leino's prominence rules duplicate what the independently motivated stress rules of the language do in a more adequate and principled way.

But it is not sufficient to simply replace the prominence rules with better phonological representations: a different type of metrical rule is also required. Leino's correspondence rules constrain only the number and relative order of prominent and unimportant positions, obscuring other important differences among the stress-based meters; for example, we have seen that the syllable-based iambic meter differs systematically from foot-based iambic-anapestic meter with respect to whether a strong position may or may not contain an unstressed syllable (§3.1). Leino's correspondence rules cannot deal with such differences among meters because they define metrical patterns in terms of arrays of prominent and unimportant syllables, rather than in terms of constraints on the distribution of syllables with specified phonological properties.

A detailed comparison of the two systems is therefore of theoretical interest. We divide it into three subtopics according to the main properties of foot-based meter: (1) resolution in weak posi-

tions, (2) prohibition of lexical monosyllables in disyllabic weak positions, and (3) requirement of stress in strong positions.⁴⁶

1. RESOLUTION IN WEAK POSITIONS. In foot-based meter, a heavy stressed syllable must constitute a strong position, while a light stressed syllable may either constitute a strong position or join with a following unstressed syllable to form a disyllabic weak position (see §3.3 above). Leino, who was the first to point out this cardinal generalization, accounts for it by his prominence rules PrR 1–3:

PrR 1: A heavy stressed syllable is prominent.

PrR 2: A light stressed syllable may be unprominent if it is preceded by a pause or by a heavy syllable following an unstressed syllable; otherwise it is prominent.

PrR 3: A heavy syllable preceded by an unstressed syllable is prominent if the light stressed syllable following it is unprominent.

That a stressed syllable in a weak position must be light is entailed by PrR 1. That it must be the first syllable in its metrical position is taken care of by PrRs 2 and 3, which together define two configurations that allow a light stressed syllable to be in a weak position: preceded by a pause, as in (bi), or preceded by a strong position, as in (bii), hence never preceded by another syllable in the weak position:

(b) i. $\begin{array}{|l} U \\ \hline \acute{L} \end{array}$ ii. $\begin{array}{c} P \\ X \quad H \quad \# \quad \acute{L} \end{array}$

That the syllable following unprominent \acute{L} must also be unprominent is expressed only indirectly, by the absence of any prominence rules that would ever make it prominent: PrRs 4, 6, 9 and 10 all force one syllable to be skipped after any stressed syllable before a candidate for a prominent syllable can be found.⁴⁷ Any syllable which is not made prominent is assumed to be unprominent, ensuring that the syllable following the unprominent \acute{L} in the configuration (b) is unprominent too. We achieve this directly through the phonological constraint 30e, which bans stress on successive syllables, together with 40b,c, which ban unstressed syllables in strong metrical positions.

Citing lines like 74a,b, Leino observes that stressed syllables of disyllabic grammatical words can be unprominent in configurations like those in (b) even if they are heavy. This leads him to stipulate that heavy initial stressed syllables in grammatical words count as light. This is not quite accurate, for lyrical style prohibits heavy initial stressed syllables in these configurations (§3.8 above). And even for ballad style, the facts follow more naturally from our assumptions that the postlexical stress of grammatical words counts only optionally in these poets' versification. That approach was shown to have ramifications in other aspects of metrical practice, such as the treatment of nonlexical monosyllables. Such explanation of the clustering of these differences across poets is lost if grammatical disyllables are simply treated as exceptions to PrR 3.⁴⁸

⁴⁶ For consistency with our own usage we have throughout replaced Leino's short and long (when referring to syllable quantity) by light and heavy, respectively. In formulas, we use L, H, X as before, as well as U for unprominent, P for prominent, # for a word boundary and || for what Leino calls a pause (which he stipulates obligatorily at line boundaries and optionally between constituents larger than the phrase, and within a constituent containing a phrase of at least two words; 1986: 44). In discussions of Leino's rules we use stressed and unstressed according to his definitions, which as explained above are quite different from ours. The scansion shown for lines cited in Leino 1982 are Leino's own, but for those from Leino 1986 only the scansion of the parts of the examples under discussion are his, and the scansion of the remainder of the lines (not given by Leino) are ours.

⁴⁷ For example, it will be seen at (o) below that PrR 6 requires that in a string of three unstressed syllables after a stressed one, the syllable two away from the stressed one is prominent.

⁴⁸ Elan Dresher (p.c.) suggests that Leino's idea that heavy syllables in grammatical words are light could be viewed as a 'visibility asymmetry' between heads and dependents, of the sort discussed in a forthcoming paper by Dresher and H. van der Hulst.

2. LEXICAL VS. NONLEXICAL MONOSYLLABLES. Foot-based meter restricts monosyllabic words in two ways: lexical monosyllables can never occur in disyllabic weak positions; and most poets also bar heavy nonlexical monosyllables from disyllabic weak positions. The absence of a phonological account of both the similarity between lexical and nonlexical words (when stressed they are stressed in the same way) and the difference between them (the former are stressed lexically, the latter postlexically) leads to both theoretical and descriptive shortcomings. The relevant prominence rules are:

- PrR 7: A postpausal heavy syllable followed by a syllable which is itself followed by a stressed one is prominent; a corresponding light syllable may also be unprominent.
 PrR 8: When three unstressed syllables occur between a pause and a following stressed syllable, the middle one of the three is prominent if it is heavy.
 PrR 9: When there are at least three unstressed syllables between a stressed or prominent syllable and a following pause, the syllable preceding the pause is prominent; if it is light and the syllable before it is heavy, either of the two may be prominent.
 PrR 10: When a string of four unstressed syllables occurs between two stressed syllables, whichever of the middle syllables of the string is heavy is prominent; if both the middle ones are heavy or light, either may be prominent.

The structure (c) described by PrR 7 defines the four configurations shown in (d), which differ in whether the first syllable is stressed (and hence initiates a disyllabic word), and whether the third is prominent.

- | | |
|---------------------------------------|-----------------------------|
| (c) i. H X \acute{X} | (obligatory) |
| ↑ | |
| P | |
| ii. L X \acute{X} | (optional) |
| ↑ | |
| P | |
| (d) i. \acute{X} X # \acute{X} | iii. X # X # \acute{X} |
| P | P |
| U | U |
| ii. \acute{X} X # \acute{X} | iv. X # X # \acute{X} |

Case (di) duplicates PrR 1 if the first syllable is heavy, and PrR 2 if it is light. In (dii, div), PrR 7 is incompatible with PrRs 2–3, and clearly cannot apply.⁴⁹ It is really only for case (diii) (two monosyllables after a pause) that PrR 7 does any work, requiring the first of two monosyllabic words in a weak position to be light, which is correct for some poets, though again not all (see exx. 72 and 75 above in the body of the article). But notice that PrR 7 imposes on sequences of two monosyllables in disyllabic weak positions exactly the same restriction that PrRs 2 and 3 impose on the first two syllables of a single word in those positions: they must have the form $\acute{L}X$. This system, then, offers no unified account of the special status of $\acute{L}X$ sequences in Finnish metrics. In §§3.7–3.8 we saw that this unity follows from the assumption that the language has a uniform foot structure at the lexical and postlexical levels.

Leino surely sees the connection: for sequences of monosyllables in which the first is heavy but counted as light by liaison—see 73 above—he proposes a rule which erases the intervening word boundary, so that they are admitted by PrR 2. But this liaison rule further underscores the cost of the lack of a distinction between lexical and nonlexical monosyllables. Leino formulates it as resyllabifying the final consonant of a monosyllabic word as the onset of a following auxiliary verb *ei* 'negation' or *olla* 'be', in order to exclude lexical monosyllables from disyllabic weak positions in the meter, because the more general formulation (liaison before a nonlexical vowel-initial monosyllable) is not available within the phonological system he assumes.

⁴⁹ PrRs 2–3, as just shown, require that unprominent \acute{L} be preceded by prominent H (or by a pause). If the syllable preceding that prominent H were also prominent, as required by PrR 7, the metrical requirement of alternating prominent and unprominent syllables would be violated.

PrR 7 moreover founders on a point of fact: the possibility of having two monosyllables in one weak position depends not on the weight of the two syllables directly, but on whether or not they are stressed, so that only nonlexical monosyllables are ever possible in disyllabic weak positions (§3.2). PrR 7 wrongly permits a lexical monosyllable as the second of two unimportant syllables, and thus cannot exclude such unmetrical lines as 53.

Our system also accommodates ballad style, where heavy nonlexical syllables do initiate disyllabic weak positions, by allowing postlexical stress to be disregarded. Leino cites lines similar to those in 75, but refrains from modifying his rules to admit them, on the grounds that a distinction between 'the general practice and the occasional exceptional usage of a few poets' (1986:80) would then be lost. But he captures this distinction (albeit inaccurately, by treating occurring lines as unmetrical) only at the cost of missing the more important similarity that ALL poets exclude lexical monosyllables from disyllabic weak positions, which our parametrization correctly predicts.

Moreover, PrR 7 incorrectly restricts only a weak position that follows a pause. In fact, ALL weak positions are restricted in the same way: poets who admit pairs of heavy monosyllabic nonlexical words initially, as in 75, also admit them medially, as in ...*hän mun...* 'he my' in 75a, as we correctly predict. Such lines fall outside the scope of PrR 1-10 altogether.

PrR 9 applies to the configuration in (e); where the leftmost syllable initiates a disyllable, the third and fourth are necessarily monosyllables. Where both are heavy, (e ii) requires the final to be prominent, as in (f).

- (e) i. $\left\{ \begin{array}{c} \acute{X} \\ P \end{array} \right\} X H L \parallel$ (optional)
- ↑
P
- ii. $\left\{ \begin{array}{c} \acute{X} \\ P \end{array} \right\} X X X \parallel$ (otherwise)
- ↑
P

(f) *tämän painava maahan Hän on* 'He'll press this to the ground' (Leino 1986: 167)

Our account imposes the additional constraint that the penult in such cases, e.g. *Hän* 'He' in (f), must be nonlexical, so as to share a weak position with the preceding syllable. The occurring examples, both those cited by Leino (1986:167) and those in our own corpus, are consistently of the type we predict. Moreover, it need not be the second of the two heavy syllables which is in strong position; the first can be, provided the second is nonlexical, and indeed the first must be if it is itself lexical. From the perspective of Leino's stated program of formulating prominence rules valid for all stress-based meters, it is essential to allow for line-final nonlexical words in weak position, since they occur standardly in trochaic and trochaic-dactylic meters (see (gi)). The same configuration arises in rising meter when a final syllable is hypermetrical (see (gii, giii)).⁵⁰

- (g) i. *Tämä säädös lain on* 'this is the decree of the law' [Sarkia, *Hyvää yötä*]
- ii. *Unikko juuri puhjennut suus tuo on* 'that mouth of yours is a newly blossomed poppy' [Sarkia, *Jumalainen tuntematon*]
- iii. *Surun pistoa tunne en nyt* 'I don't feel the sting of grief now' (Harmaja, *Uni*)

So while PrR 9 correctly excludes lexical monosyllables in line-final position, it fails to allow for heavy nonlexical monosyllables there, for lack of a way to distinguish the two.

Lines ending in more than three unstressed syllables fall outside the scope of Leino's rules entirely. Where the penult is nonlexical, we correctly predict two possible alignments:⁵¹

⁵⁰ That it is *tuo* 'that' and *en* 'I don't' which are in strong position in (gii, giii) is confirmed by the fact that the sequences rhyme with *ruo'on* and *mennyt*.

⁵¹ The scansions are confirmed by the rhymes *lie nyt/tiennyt, en/noituuden*.

- (h) i. meren^s=pohjainen^s luola se lie nyt^s 'it may be an undersea cave now'
 [Kailas, *Atlantis*]
 ii. ja ma elän—en kuolla voi, oi, en^s 'and I am alive—I cannot die, no'
 [Harmaja, *Tuska*]

PrR 8 says that in a line-initial sequence of three unstressed syllables (which has to consist of monosyllabic words) the middle one is prominent if heavy.

- (i) || X H X X̂
 ↑
 P

But this leaves unexplained why no parallel exclusion of a heavy syllable as the second in a weak position holds if the following syllable is stressed, as in 72, nor is it even the correct descriptive generalization; see (j), where *ei* 'not' is heavy (but unstressed in Leino's sense):

- (j) sit'^s*ei*^s siis ole syy erikoisesti viero^s 'so there is no reason to be especially shy of it'
 [Manninen, cited in Sadeniemi 1949: 157]

The problem is again the lack of a distinction between lexical and nonlexical monosyllables. PrR 8 applies correctly to exclude lexical monosyllables from this position, but incorrectly excludes heavy nonlexical monosyllables as well.

Similar issues arise for PrR 10, which applies to lines beginning with a polysyllabic word, possibly followed by some monosyllables, depending on the length of the polysyllable.

- (k) X̂ X X X X X̂
 ↑ ↑
 P P (whichever is heavy, otherwise either)

Where both syllables whose prominence is at stake are heavy, PrR 10 treats the choice between them as indifferent, while it is actually constrained by the requirement that a lexical monosyllable cannot share a weak position with any other syllable. Thus, in (l i), where *tuoss* 'that (inessive sg.)' is nonlexical, our account concurs with Leino's in allowing either that or *-hin* to be strong. But in (l ii, l iii), where *ees* 'fore-' and *jää* 'ice' are lexical, they must be in strong position, while PrR 10 allows the grossly unmetrical scansion of *-ten* or *on* as strong instead. The only scansions actually given by Leino himself are those predicted by our account:

- (l) i. Toki kaunihin tuoss^s on tyttö 'certainly the prettiest one there is the girl'
 [Leino 1982: 168]
 ii. Kuin keijuten ees^s=päin väikkyy 'as if hovering, shimmers ahead' [Leino 1982: 67]
 iii. hänen allaan on jää^s ja kivi 'under him is ice and stone' [Leino 1982, 168]

3. STRESS IN STRONG POSITIONS. Leino's prominence rules cannot adequately register the exclusion of unstressed syllables from strong positions in foot-based meter, because they are meant to apply to all stress-based meters, including syllable-based meters, for which that requirement does not obtain; and his correspondence rules, referring only to the number and order of prominent and unimportant syllables, do not supply the distinction. Here we see that phonology is needed not only for defining the linguistic properties available for the meter to refer to, but also for characterizing meter itself.

For primary stress in polysyllabic words, PrRs 1, 2 and 7 require a heavy syllable to be in a strong position and permit a light one, just as our rules do. PrR 4–6 do the work which secondary stress does for us.

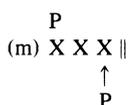
PrR 4: The third syllable of a four-syllable word is prominent. The fourth syllable may be prominent instead if it is heavier than the third and the word is followed by a pause or by an unimportant syllable.

PrR 5: A syllable which is preceded by a syllable following a prominent syllable, and which is followed by a pause, is prominent.

PrR 6: When three unstressed syllables occur between two stressed or prominent syllables, the middle one of the three is prominent.

PrR 4 by and large correctly accounts for the data in 44–48. Still, our approach has several advantages over PrR 4. It applies to words of any length, whereas words of more than four syllables are simply outside the scope of Leino's prominence rules. And because PrR 4 and the other rules which assign prominence to long strings of unstressed syllables do not distinguish between monosyllables and noninitial syllables of polysyllabic words, they make inconsistent claims about certain configurations. In all cases PrR 4 is the more accurate. For example, when the leftmost syllable in the configuration described by PrR 9 is stressed (see (e)) it may initiate a four-syllable word. But four-syllable words ending in LL must have stress on their third syllables as required by PrR 4, never on the fourth as required by PrR 9 and permitted by PrR 10. Moreover, the wrong division of labor between phonology and metrics forces PrR 4 to make an inaccurate claim. Even though either the third or the fourth syllable of a four-syllable word will always be stressed, both can be unprominent: in the rare configurations such as 58, with resolution in both strong and weak positions (in virtue of the weaker $S \Rightarrow P$ constraint), neither the third nor the fourth syllable is in a strong position.

PrR 5, which defines the configuration in (m), allows a syllable in strong position before a pause regardless of whether or not it is stressed.⁵²



Similarly, PrR 9 also allows a final syllable before a pause to be strong whether or not it is stressed (ei). Our rule of catalexis captures both cases by allowing unstressed syllables in strong positions line-finally (see 63). But PrRs 5 and 9 fail to characterize the exceptional character of this option. Syllables in this position in foot-based meter are in fact overwhelmingly heavy, whether lexical monosyllables, such as *jous* 'bow' in (ni), nonlexical monosyllables, such as *on* 'is' in (nii), or final syllables of polysyllabic words, as in (niii).

- (n) i. oli hänelle víulun jous 'was the bow of a violin for him' [Leino 1986: 28]
 ii. paras suoraan jatkaa on 'it's best to go right ahead' [Leino 1986: 34]
 iii. Miten lie, ei totellutkaan 'somehow didn't obey after all' [Leino 1982: 161]

From our point of view, these heavy syllables are eligible for strong position simply because they may bear stress, independently of their position in the line. The occurrence of unstressed light syllables in strong positions, on the other hand, is dependent on their being line-final and hence allowed by catalexis, as a systematic class of exceptions to a more general pattern. Moreover, in syllable-based meters this pattern is not exceptional at all, since those meters freely allow un-

⁵² It also wrongly rules out final disyllabic weak positions. Although catalexis is of course very common line finally in falling meters, such disyllabic realizations are by no means impossible:

että soikea lie pyöreä 'that oval is round' [Mustapää, *La Cuccagna*].

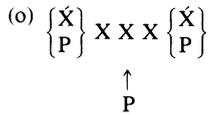
PrR 5 also requires prominence of the third syllable in configurations like that in (m), where nothing prevents the syllable preceding that third syllable from being unprominent \acute{L} . Since no such lines actually occur, this is probably a mistake in the formulation of PrR 5. As formulated, it would actually require that if a disyllabic word whose first syllable is unprominent occurs before a pause, its second (always unstressed) syllable will be prominent:

- (i) P U
 X \acute{L} X ||

This clearly does not occur: \acute{L} occurs in a weak position only when the syllable immediately following it likewise forms part of the weak position, as in 55 or 41. This then seems to be an accidental mistake in Leino's formulation, and we will assume that the rule should not in fact include these cases. PrR 5 correctly rules out the possibility of more than one syllable after the final strong position of a line or half-line. We do this by allowing only a single hypermetrical element.

stressed syllables in strong position. Leino's rules, in treating all stress-based meters together, cannot express this distinction between syllable-based and foot-based meters, let alone explain it.

The latter distinction is highlighted in line-medial position, where there is no question of catalexis. PrR 6 makes any middle syllable in the configuration (o) prominent, whereas our account correctly permits only a stressed one there in foot-based meter, as in (p):



- (p) i. Unet polttivat^s sen verta^s—'Dreams fired its blood' [Leino 1982: 160]
 ii. Erä=maa^s on suuri^s ja vapaa^s 'The wilderness is big and free' [Leino 1982: 160]
 iii. Eräs kuuma^s yö^s niin kantoi^s 'A hot night carried so' [Leino 1982: 161]

Light syllables in that position occur only in iambic and trochaic verse, as in 51, and would wrongly be admitted in foot-based meter by Leino's rules.

Similarly, PrR 10 allows a light syllable in a strong position where there is no alternative heavy choice (k). Actually foot-based meter allows a light syllable there only if it is stressed. We have found no lines in foot-based meter where the two medial syllables eligible for prominence on PrR 10 are unstressable; in all cases one or the other is heavy.

- (q) i. ei vekseli^sin^s ja^s maksuun^s 'not into the bank draft and the payment' [Leino 1982: 168]
 ii. *ei vekseli^s ja^s sen^s maksu^s 'not the bank draft and its payment' [construct]

For five-syllable words where the third and fourth syllables have the same weight, our stress rules 30 allow only the third syllable to be stressed and therefore strong, while PrR 10 allows either that or the fourth to be prominent. In fact, only the former possibility occurs.

The assumption that the stress properties are defined separately from those of the meter automatically takes care of polysyllabic words like those in exx. 38 and 39, where morphological and lexical factors govern the placement of secondary stress. Such exceptionally stressed syllables of course occur in strong positions (see 49, 50). These words would require special treatment in Leino's metrical rules, though they are metrically perfectly regular—their behavior follows from their special stress properties. In sum, the failure to sort out the proper domains of phonology and metrics complicates the metrical rules and obscures the difference between syllable-based and foot-based meter.

4. SUMMARY. A metrics based on an impoverished phonology, while capable of providing a welcome level of detail, is excessively complex and lacking in generality. Even Leino's extremely careful analysis is in places redundant, inconsistent, incomplete, and arbitrary. A proper partitioning of metrical and phonological principles avoids these shortcomings of form and allows a simpler description of foot-based meter. The major substantive difference between Leino's account and ours is that his prominence rules treat both stress and weight as constraining metrical possibilities directly, while our phonologically based account negotiates weight exclusively within the stress rules of the language. The major empirical consequence of this involves the distribution of monosyllables, which we derive not from the avoidance of particular combinations of weight, but of stress, which is more accurate in general, and also better able to accommodate differences in particular poets' practice. We also differ in criteria for occupancy of strong positions, with our account revealing a special property of foot-based meter not shared with syllable-based meter. Thus a more articulated phonological description allows a more precise metrical analysis, which is also much simpler, and makes illuminating distinctions between different stress-based meters and across different poets' practice.

APPENDIX B: SOURCES OF TEXTUAL EXAMPLES

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