A Modular Metrics for Folk Verse

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1 Introduction

Hayes & MacEachern's (1998) study of quatrain stanzas in English folk songs was the first application of stochastic Optimality Theory to a large corpus of data.[1] It remains the most extensive study of versification that OT has to offer, and the most careful and perceptive formal analysis of folk song meter in any framework. In a follow-up study, Hayes (2003) concludes that stress and meter — or more generally, the prosodic structure of language and verse — are governed by separate constraint systems which must be jointly satisfied by well-formed verse. Apart from its convincing arguments for a modular approach to metrics, it is notable for successfully implementing the analysis in OT, a framework whose parallelist commitments might seem philosophically at odds with modularity.[2]

Taking modularity a step further, I argue here that the composer and performer of a song constructs a match between *three* tiers of rhythmic structure: linguistic prominence, poetic meter, and musical rhythm. They are organized along similar principles, as hierarchies of alternating prominence representable by trees or grids. But they are autonomous, in the sense that a text has an intrinsic prosodic form independently of how it is versified (Liberman and Prince 1979, Hayes 1995), a stanza has an intrinsic metrical form independently of how it is set to music (Hanson and Kiparsky 1996), and a tune has an intrinsic musical rhythm independently of the words that may be sung to it (Jackendoff and Lehrdahl 1983). Moreover, each rhythmic tier is subject to its own constraints. The stress pattern (or other linguistic prominence relation) which determines the intrinsic linguistic rhythm of a song's text is assigned by the language's prosodic system. The meter of its stanzas and the rhythm of its tune are normally drawn from a traditional repertoire of rhythmic patterns. How the tiers correspond to each other, and in what ways they can be mismatched and mutually accommodated, is regulated by conventions that evolve historically, though within limits grounded in the faculty of language.

These are familiar and heretofore uncontroversial ideas, but Hayes' work questions one aspect of them. It equates the metrical form of a verse with the way its text is aligned with the musical beats in performance. I present three arguments against this identification and in support of the traditional division of labor between meter and music. The first argument demonstrates the autonomy of metrical form by showing that constraints on the form of stanzas are invariant across musical performance and melodic variation. The second shows that the modular approach allows

[1] I am grateful to Bruce Hayes for his detailed comments and criticisms of an earlier version of this paper. I take full responsibility for any errors.

[2] The tension between empirically motivated modularity and OT's parallelist program arises in other domains as well: a counterpart in phonology is stratal OT (Kiparsky 2000, to appear).

major simplifications in the metrical constraint system, and, more importantly, makes them entirely grounded in elementary principles of poetic form. The third argument is that the simplified constraints not only define the occurring stanza forms, but also predict the relative frequencies with which they are used in folk songs. These results vindicate a fully modular view of the metrics/music interface.

Following H&M's lead, I will be using Optimality Theory, which is well suited to model the groundedness of metrical preferences and constraints and their competition within a metrical system. But I argue that variation is better treated by partial constraint ranking (Anttila 1997, 2003) than by stochastic OT.

The core data are also the same as H&M's, namely the ballads and other songs from England and Appalachia collected and transcribed by Sharp & Karpeles 1932 and by Ritchie 1965. For a fuller picture of the variation within this tradition I have complemented the corpus with the versions of the same songs from Niles 1961 and especially from Bronson 1959-72, and with the early 20th century American ballad recordings in the Folkways Anthology (Smith 1952/1997). I also drew on Isaac Watts' collection of hymns, a body of popular verse which differs minimally from folk songs in a way which provides an empirical test of a central prediction of my theory.

While delving a little deeper than H&M into the folk song tradition itself, I also narrowed my focus by excluding two more peripheral sets of data, namely H&M's judgments about the well-formedness of their own made-up pieces of verse, and the nursery rhymes with which they sometimes supplement their folk song corpus. H&M introduce their intuitions about constructed verses in order to assess the metricality of quatrain types which their theory predicts but which don't occur, and of those which their theory excludes but which do occur. I simply decided to treat all unattested quatrain types as unmetrical, except where the gap can plausibly be considered accidental,[3] and quatrain types attested more than once as metrical, letting the theory adjudicate the status of the singletons. Hugging the empirical ground this way turned out to pay off because the simplest analysis draws the line in almost exactly the right place. This is not to deny that well-formedness judgments have a place in the study of meter. However, in the case of a complex and sophisticated traditional genre of oral literature with its own metrical conventions the intuitions themselves require validation, e.g. by showing that they converge with usage in the clear cases.[4]

My reason for setting nursery rhymes aside are somewhat different. Their meters are simply too diverse to be entirely covered in the same constraint system as folk song quatrains. A corpus such as Opie & Opie 1997 contains a mixture of almost every popular conventional verse form with simple rhythms similar to those of sports cheers and chanted slogans (Gil 1978, Kopiez & Brink 1998). Selecting from this material without some independent criterion runs the risk of circularity, so the better course is to stick to a homogeneous corpus.

[3]This is only the case for refrain quatrains, which are so infrequent as a whole that the data is unlikely to be a full sample (section 2.4).

[4]That would especially be true for judgments about relative acceptability, if H&M are right that they arise from a probabilistic component of the metrical grammar which could only be acquired by exposure to a very large body of songs.

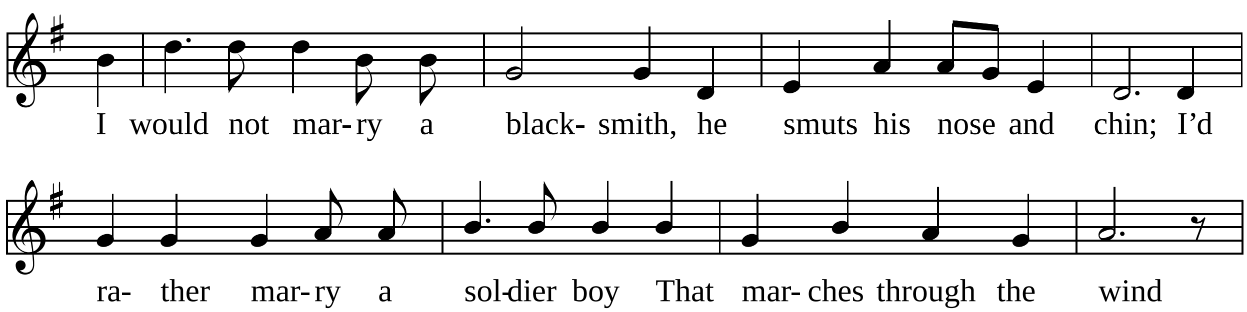
2 The structure of folk song quatrains

2.1 The core generalizations

Hayes and McEachern classify lines into four types on the basis of their rhythmic CADENCE, which they define in terms of the grid placement of the final two syllables (p. 476). The four types are **4**, **3**, **Green O** (abbreviated **G**), and **3-feminine** (abbreviated $\mathbf{3_f}$). (In the appendix to their paper they recognize other types, such as $\mathbf{4_f}$**, 5,** $\mathbf{5_f}$**, 6**; I return to the first of these briefly below.) The following stanza (Sharp & Karpeles 1932, #272A), also cited by H&M, illustrates three of the four types.

(1)	a.	I wóuld | not már|ry a bláck|—smíth,	(Type **G**)
	b.	He smúts | his nóse | and chín; | ∅	(Type **3**)
	c.	I'd rá|ther már|ry a sól|dier bóy	(Type **4**)
	d	That már|ches thróugh | the wínd. | ∅	(Type **3**)

The meter is iambic tetrameter in the odd lines, alternating with trimeter in the even lines. Accents mark syllables in the metrical strong positions, which in this simple children's song exactly coincide with the strongest beats of the tune; the dash and ∅ are H&M's conventions for marking empty beats. Here is how Sharp & Karpeles transcribe the song as Mr. Bridges sang it for them in Franklin County, Virginia in 1918:



Type **4** lines have a syllable in the fourth strong position, separated from the third strong position by another syllable (*-dier* in (1c)). In the grid representation employed by H&M, such a line looks like this:

(2) Type **4**

```
          x                                       x
          x                   x                   x                   x
x         x         x         x         x         x         x         x
x    x    x    x    x    x    x    x    x    x    x    x    x    x    x    x
I'd       ra-       ther      mar-      ry   a    sol       dier      boy
```

Type **3** lines (the even-numbered lines in (1)) terminate in the third strong position; the fourth strong beat remains empty (marked ∅ by H&M):

(3) Type **3**

```
          x                                       x
          x                   x                   x                   x
x         x         x         x         x         x         x         x
x    x    x    x    x    x    x    x    x    x    x    x    x    x    x    x
He        smuts     his       nose      and       chin
```

Type **G** lines (line (1a)) have a single syllable after the third strong position in the verse, which falls on the fourth strong beat in the song; H&M's dash in (1) signifies the empty beat before it (often filled by a prolongation of the preceding syllable).

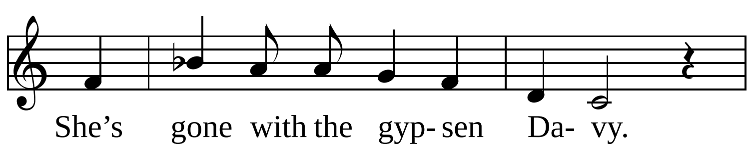
(4) Type **G**

```
            x                                               x
            x                       x                       x                       x
x           x           x           x           x           x           x           x
x     x     x     x     x     x     x     x     x     x     x     x     x     x     x     x
I           would       not         mar   ry    a           black                   smith
```

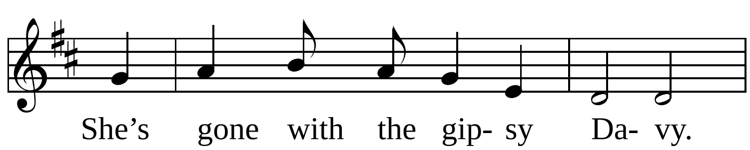
(1) is an instance of a quatrain type whose prototypical form is **4343** — known as the BALLAD STANZA (sometimes referred to as COMMON METER). H&M point out that the odd-numbered lines in such stanzas sometimes vary freely between **4** and **G**, as in (1). Indeed, this turned out to be by far the most important type of free variation among line types in the folk songs they studied.[5] H&M introduce a fifth line type, **F**, defined as the disjunction of **4** and **G**, to represent this variation. The schema for (1) would be **F3F3**, standing for $\begin{Bmatrix}4\\ \mathrm{G}\end{Bmatrix}\mathbf{3}\begin{Bmatrix}4\\ \mathrm{G}\end{Bmatrix}\mathbf{3}$.[6] They further note that the choice between **4** and **G** depends on the wording of the verse. In type **4** lines, the final syllable bears at least as strong a stress as the penult. In type **G** lines it is weaker: in traditional terms, they have a feminine ending.

Lines with a feminine ending have another rendition, H&M's type $\mathbf{3_f}$. In this type of line, the lone monosyllable after the third beat is initiated *before* the fourth strong beat, typically on the intervening weak beat (beat $3\frac{1}{2}$). Depending on the tune and in part on the singer's preferences, the very same line of verse may be sung either as $\mathbf{3_f}$ or as **G**, as illustrated by the following line from *The Gypsy Laddie* (Child #200). In order to make the distinction between **G** and $\mathbf{3_f}$ as clear as possible I reproduce the corresponding transcription of Sharp & Karpeles 1932 in (5).

(5) a. Type $\mathbf{3_f}$: She's góne | with the gýp|sen Dá|vy ∅ (S&K #33A)



b. Type **G**: She's góne | with the gíp|sy Dá| — vý (S&K #33J)



Here are the corresponding grid representations according to H&M's conventions in (6).

[5] The same is true of literary verse; Macaulay's *Horatius* is probably the best-known example. However, variation between $\mathbf{3_f}$ and **4** is not uncommon. Examples in the Folkways Anthology include *Bandit Cole Younger* (Edward Crain) and *Engine 143* (Carter Family).

[6] Hayes (2003) reformulates the constraints in such a way that they apply directly to **4** and **G**, doing away with the need for the category **F**.

			x								x					
			x				x				x				x	
	x		x		x		x		x		x		x		x	
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
(6) a.	She’s		gone		with	the	gyp		sen		Da-		vy		∅	
			x								x					
			x				x				x				x	
	x		x		x		x		x		x		x		x	
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
b.	She’s		gone		with	the	gip		sy		Da-				vy	

Thus, with respect to metrical form, type **G** lines are indistinguishable from type $\mathbf{3_f}$ lines, but with respect to musical performance they are more like type **4** lines. Here comes the first gain of our modular strategy. By separating the constraints on musical performance from constraints on the metrical form of stanzas, we can unify H&M’s categories $\mathbf{3_f}$ and **G** at the metrical level without positing a composite category **F**, while at the same time relating **G** and **4** at the level of musical performance (four strong beats). Metrically, we can consider all three as a single type characterized by a monosyllabic last foot; let us call this metrical type **3**′. A **3**′ line is of “type **G**” if its final syllable is placed on the fourth strong beat, and of “type $\mathbf{3_f}$” if its final syllable comes before it. Variation between **G** and **4**, then, is a consequence of exercising in the final foot of its four-foot lines the option which allows a foot to be monosyllabic. The *musical* implementation of such a final monosyllabic foot is appropriate to the tune to which it is sung: rendition **G** supplies four strong beats when the melody requires it, rendition $\mathbf{3_f}$ three; within the limits imposed by that constraint the singer is free to decide and variation is free to occur.

The unification of $\mathbf{3_f}$, **G**, and **F** as **3**′ is made possible by the separation of metrical constraints on stanzas from musical constraints and text-to-tune alignment. It is not just a simplification but has the benefit of straightforwardly excluding rare or non-occurring types of free variation, such as $\mathbf{G/3_f}$, or $\mathbf{4/3_f}$, or **G/3**, as gratuitous violations of musical parallelism: they introduce a rhythmic inconsistency by mixing three-beat and four-beat lines in corresponding positions of stanzas. Some of them do occur in exceptional circumstances. For example, $\mathbf{3_f}$ corresponds to **4** in the four-line refrain stanza of the song in (1). This correspondence is allowed because of the different melody to which that stanza is sung.

(7)	a.	Sól|dier bóy, | sól|dier bóy,	(Type **4**)
	b.	Sól|dier bóy | for mé; | ∅	(Type **3**)
	c.	If é|ver Í | get már|ried	(Type $\mathbf{3_f}$)
	d.	A sól|dier’s wífe | I’ll bé. | ∅	(Type **3**)

Another reason why the modularization is desirable is that it correctly predicts an additional type of interstanza variation, namely between feminine and masculine lines. Among the lines considered here, these would be $\mathbf{3/3_f}$ in H&M’s terms.[7] (The parallel variation $\mathbf{4/4_f}$ is even more common.) For the same reason that we expect **3**′ to be performed as “**G**” when it alternates in the verse with **4** (for example, in the odd-numbered lines of a **4343** quatrain, i.e. a so-called ballad stanza), we expect it to be performed as “$\mathbf{3_f}$” when it alternates in the verse with **3** (as in the even-numbered lines of a ballad stanza). Ordinarily this variation can’t happen *within* a single ballad stanza, because the even-numbered lines must rhyme, and a $\mathbf{3_f}$ line cannot rhyme with a

[7]Of course, in that case the extra final syllables cannot be considered degenerate feet of their own because that would destroy the metrical form of the stanza. Rather, at the metrical level, this variation corresponds to the familiar option of extrametricality in iambic lines.

3 line. *Across* stanzas, though, rhyme is not an obstacle to this variation, and there it is fact not uncommon, as in the following ballad stanzas.

(8)	Oh, she took him by the bridle rein,	**4**
	And she led him to the stable.	$\mathbf{3'}$ realized as $\mathbf{3_f}$
	"Here's fodder and hay for your horse, young man,	**4**
	And me to bed if you're able,	$\mathbf{3'}$ realized as $\mathbf{3_f}$
	And me to bed if you're able." (v. 1)	
	"I'll have to sheathe my dagger,	$\mathbf{3'}$ realized as **G**
	My codpiece is withdrawn.	**3**
	I'll don my bugle britches,	$\mathbf{3'}$ realized as **G**
	I hear the merry horn,	**3**
	I hear the merry horn." (v. 8)	

(*Bugle Britches*, Niles 65A, Child #299)

Note how $\mathbf{3'}$ is realized as **G** in odd positions, where it matches **4** in other stanzas, and as $\mathbf{3_f}$ in even positions, where it matches **3** in other stanzas. Note also that the theory correctly predicts another type of variation, between $\mathbf{4'}$ (realized as $\mathbf{4_f}$) and **4**, as seen in (9):

(9)	Oh, it's down, down, down went that ivory comb,	**4**
	And wild her hair did toss,	**3**
	For none did know as well as Margot	$\mathbf{4'}$ realized as $\mathbf{4_f}$
	How much she suffered loss. (v. 4)	**3**
	Lady Margot died like hit might be at night,	**4**
	Sweet Willie, he died of the morrow.	$\mathbf{3'}$ realized as $\mathbf{3_f}$
	Lady Margot, she died of a pure heart,	$\mathbf{3'}$ realized as **G**
	Sweet Willie, he died of his sorrow. (v. 13)	$\mathbf{3'}$ realized as $\mathbf{3_f}$

(*Lady Margot and Sweet William*, Niles 29A, Child #74)

A more general argument for separating stanza form from text-to-tune mapping is that the same words are commonly sung to different musical measures, yet maintain certain invariant constraints on stanza form. For example, one version of the song cited in (9) begins like this:

(10) Sweet Wíl|liam aróse | one mór|ning in Máy,
And dréssed | himsélf | in blúe
Pray téll | us this lóng, | long, lóve, | said théy,
Betwéen | lady Már|garet and yóu.

This song is in iambic/anapestic ballad stanzas, with the line pattern **4343** and ABAB rhyme. It was traditionally sung both in triple measure ($\frac{3}{2}$, S&K #20P, p. 145) and in duple measure ($\frac{2}{2}$, S&K #20A, p. 132, #20D, p. 137, or $\frac{4}{4}$, S&K #20J, p. 143). For H&M these would be different stanza forms: the former would be **5454** (see their Web Appendix), the latter would be **4343**. Let us compare it it with another famous ballad, *Lord Bateman* (a.k.a. *Young Beichan*, Child #53):

(11) Lord Báte|man wás | a nó|ble Lórd,
A nó|ble Lórd | of hígh | degrée
He shípped | himsélf | on bóard | a shíp
Some fó|reign cóun|try fór | to sée.

This song is in strict iambic LONG METER stanzas **(4444)**, again rhyming ABAB — another common metrical form in folk song quatrains. Traditionally it was sung to three different measures: $\frac{3}{4}$ time (#37 in Bronson 1959, 413 ff.), $\frac{4}{4}$ time (*ibid.* #2), and $\frac{5}{4}$ time (*ibid.* #25). These all correspond to different grids, *and therefore to different stanza forms according to H&M.* But the fact is that the stanza shape in each of these songs, however performed, is fixed: iambic/anapestic ballad stanzas in (10), and iambic long meter in (11). These meters are well-established traditional verse forms that folk poets work with. In the H&M scheme, they dissolve into a multiplicity of formally unrelated grid patterns.

The heart of the matter is how text and tune are related in a song tradition. Obviously they must be reasonably well matched to each other, and they have a more or less firm conventional association. Yet they are to some degree independent. They can originate and develop separately, and lines, couplets, and entire quatrains can float from one song to another. A newly composed song can be sung to an old melody, and an old song can get a new melody (Hayes 2003, fn. 12). This means that the relation of verse form to musical performance is not so close as H&M claim. Therefore, instead of defining a stanza form in terms of the grid alignment of positions in musical performance, I treat stanza form and melody as separate structures between which an orderly correspondence must hold. According to this view, the meter of a song, including its stanza form, is subject to its own constraints and has its own independent existence which does not change with the tune.

One does not have to listen to folk songs for very long to realize that that correspondence between the strong beats in meter and music can be extremely indirect. Some singers achieve exciting effects by playing with the timing, drawing out some syllables over many beats and crowding others into a single beat.[8]

A further argument for separating constraints on musical performance from metrical constraints on stanza form is that the metrical constraints are applicable also to literary verse that was never meant to be sung or chanted. This holds true not only for imitations of folk genres, but also for purely literary stanza forms which have no counterpart in songs. In general, literary inventions obey the same laws of stanza construction as folk poetry, namely parallelism and closure, merely in a less stereotypical, and sometimes experimental way. For example, the ballad stanza can be expanded by doubling the odd-numbered lines (**443443** with AABCCB rhyme, sometimes called common particular meter, e.g. Dylan Thomas' *A Process in the Weather of the Heart*), by adding a third couplet (**434343**, ABCBDB, e.g. Longfellow' *The Slave's Dream*). Doubling the quatrain and tying the two quatrains together by putting B=C yields the Romance *ballade* stanza (ABABBCBC), which does of course originate in songs. Other literary modifications for closure are ABABBCC (rhyme royal), ABABBCBCC (the Spenser stanza), and ABABCCB (the Thompson stanza, where CC is feminine), and ABABABCC *(Ottava rima)*. These stanza forms are simply more ornate manifestations of the same organizing principles that we see at their simplest in folk song quatrains.

[8]Many examples can be heard on the Folkways Anthology: *The Butcher's Boy* (Buell Kazee), *John Hardy was a Desperate Little Man* (Carter Family), *Stackalee* (Frank Hutchison), *White House Blues* (Charlie Poole and the North Carolina Ramblers).

To summarize, the modular approach unifies the treatment of meter in songs and spoken verse, and accounts for the fact that metrical form remains invariant across different musical measures. At a more technical level, it makes for a simpler metrical inventory, and correctly predicts why some line types alternate with each other, and why others do not occur at all. The particulars follow.

2.2 Deriving the quatrain typology

Returning to folk verse, let's review where we stand. Classifying lines by their final cadence, like H&M, but simplifying the typology by folding their line types **G, $\mathbf{3_f}$**, and **F** into a single metrical type **3′**, we are left with three types of lines in all, **4, 3′**, and **3**, which are distinguished by whether the last foot is binary (call it **F**), unary (**f**), or empty (∅). What types of quatrains could be built from these lines, and which of those quatrains are in actual use? We'll answer this question in two steps, by considering first the subclass of RHYMING QUATRAINS, which are of the form ABCB, where at least the even-numbered (B) lines rhyme. (The odd-numbered lines A and C may also rhyme, but more often they do not.) That includes the great bulk of the folk song material under study. The second subclass comprises quatrains in which closure is achieved by another structural device, the refrain.

By unifying **G, $\mathbf{3_f}$**, and **F** as **3′**, we have reduced H&M's 625 theoretically possible rhyming quatrains to 3^4=81, of which nine are reliably attested. In table (12) they are laid out as combinations of two couplets (distichs), the first given by the row and the second by the column. The figures in parentheses give the number of examples of each type that H&M report from their corpus.[9]

(12)

	44	**43′**	**43**	**3′4**	**3′3′**	**3′3**	**34**	**33′**	**33**
44	4444 *(203)*	4443′ *(0)*	4443 *(35)*	443′4 *(0)*	443′3′ *(0)*	443′3 *(0)*	4434 *(0)*	4433′ *(0)*	4433 *(1)*
43′	43′44 *(0)*	43′43′ *(64)*	43′43 *(0)*	43′3′4 *(0)*	43′3′3′ *(0)*	43′3′3 *(1)*	43′34 *(0)*	43′33′ *(0)*	43′33 *(0)*
43	4344 *(1)*	4343′ *(1)*	4343 *(188)*	433′4 *(0)*	433′3′ *(0)*	433′3 *(0)*	4334 *(0)*	4333′ *(0)*	4333 *(0)*
3′4	3′444 *(0)*	3′443′ *(0)*	3′443 *(0)*	3′43′4 *(0)*	3′43′3′ *(0)*	3′43′3 *(0)*	3′434 *(0)*	3′433′ *(0)*	3′433 *(0)*
3′3′	3′3′44 *(0)*	3′3′43′ *(0)*	3′3′43 *(0)*	3′3′3′4 *(1)*	3′3′3′3′ *(5)*	3′3′3′3 *(3)*	3′3′34 *(0)*	3′3′33′ *(0)*	3′3′33 *(0)*
3′3	3′344 *(0)*	3′343′ *(0)*	3′343 *(8)*	3′33′4 *(0)*	3′33′3′ *(0)*	3′33′3 *(84)*	3′334 *(0)*	3′333′ *(0)*	3′333 *(1)*
34	3444 *(0)*	3443′ *(0)*	3443 *(0)*	343′4 *(0)*	343′3′ *(0)*	343′3 *(0)*	3434 *(0)*	3433′ *(0)*	3433 *(0)*
33′	33′44 *(0)*	33′43′ *(0)*	33′43 *(0)*	33′3′4 *(0)*	33′3′3′ *(0)*	33′3′3 *(0)*	33′34 *(0)*	33′33′ *(0)*	33′33 *(0)*
33	3344 *(0)*	3343′ *(0)*	3343 *(6)*	333′4 *(0)*	333′3′ *(0)*	333′3 *(1)*	3334 *(0)*	3333′ *(0)*	3333 *(1)*

[9] I have tried to separate non-rhyming refrain quatrains, which are treated separately in 2.4 below. Some of the figures in (12) are inflated because H&M don't consistently separate the statistics for the two types. This is not important for now, but it will potentially be a consideration later when we turn to the relative frequencies of the types. Note also that, for the reasons stated in the text, I have classified H&M's type **F** as **3′**.

This reduced table is an improvement in that all the combinations now at least fit on a page, but even so it is still rather daunting. It can be further pared down by noting that, of the nine theoretically possible types of couplets, only six occur, namely **44, 43′, 43, 3′3′, 3′3**, and **33**. The other three types, **3′4, 34**, and **33′**, are absent from both halves of quatrains (with the exception of one occurrence of **3′3′3′4**). The missing types of couplets are not a random class: they are just those in which *the second line is longer than the first.* The generalization, then, is that the lines of a couplet must not increase in length. Adopting H&M's concept of SALIENCY as measured by the inverse of length (shorter lines are more salient than longer lines), one way of formulating the descriptive generalization would be (13).

(13) A couplet must not have decreasing saliency.

Alternatively, we can define a couplet as PARALLEL if its lines are equally salient (i.e. of the same length) and SALIENT if its lines are decreasing in length, and rephrase the descriptive generalization as (14).

(14) A couplet must either be parallel or salient.

In a framework where constraints are inviolable, (13) might seem preferable to the disjunctive formulation in (14). In OT, however, (14) can be thought of naturally in terms of competition between two constraints, which cannot both be obeyed at the same time:

(15) a. SALIENCY: A couplet is salient.
b. PARALLELISM: A couplet is parallel.

Of these different ways of formulating the generalization, (15) is most like H&M's (although they do not define saliency and parallelism exactly like this), and we shall see that it indeed turns out to work out best for the full system. To the extent that we can derive stanza form from the competition between saliency and parallelism, we have support for an OT model in which such constraint competition can be treated by free ranking.

Taking into account the generalization just obtained (whether expressed as (13), (14), or(15)), we can erase the rows and columns corresponding to the three systematically missing couplet types from the chart. Doing so gives us the more manageable display in (16). I have reversed the order of **43** and **43′** to make the following exposition more perspicuous, and numbered the rows from (1) to (6) and the columns from (a) to (e) for easy reference, so that e.g. (3c) refers to the quatrain form **43′43′**.

(16)

	a. **44**	b. **43**	c. **43′**	d. **3′3′**	e. **3′3**	f. **33**
1. **44**	4444 *(203)*	4443 *(35)*	4443′	443′3′	443′3	4433 *(1)*
2. **43**	4344 *(1)*	4343 *(188)*	4343′ *(1)*	433′3′	433′3	4333
3. **43′**	43′44	43′43	43′43′ *(64)*	43′3′3′	43′3′3 *(1)*	43′33
4. **3′3′**	3′3′44	3′3′43	3′3′43′	3′3′3′3′ *(5)*	3′3′3′3	3′3′33
5. **3′3**	3′344	3′343 *(8)*	3′343′	3′33′3′	3′33′3 *(84)*	3′333 *(1)*
6. **33**	3344	3343 *(6)*	3343′	333′3′	333′3 *(1)*	3333 *(1)*

Inspection of the new chart reveals that most of the occurring quatrain types are lined up along the NW/SE diagonal, in roughly descending frequency, with a smaller group down the second column (column b), but skipping two of the cells (3b and 4b). So to a first approximation we can say that the two couplets of a rhyming quatrain must either be identical in form (the diagonal), or the second of them must be a maximally salient couplet **43** (column b). This suggests that, at a higher level, quatrains are organized by a similar principle as couplets: quatrains must be composed of parallel couplets, or their second couplet must be maximally salient, which is to say **43**. To make this visually clear let us shade all cells in the chart which do *not* conform to the conditions just stated.

(17) **Rhyming Quatrains**

	a. **44**	b. **43**	c. **43′**	d. **3′3′**	e. **3′3**	f. **33**
1. **44**	4444 *(203)*	4443 *(35)*	4443′	443′3′	443′3	4433 *(1)*
2. **43**	4344 *(1)*	4343 *(188)*	4343′ *(1)*	433′3′	433′3	4333
3. **43′**	43′44	43′43	43′43′ *(64)*	43′3′3′	43′3′3 *(1)*	43′33
4. **3′3′**	3′3′44	3′3′43	3′3′43′	3′3′3′3′ *(5)*	3′3′3′3	3′3′33
5. **3′3**	3′344	3′343 *(8)*	3′343′	3′33′3′	3′33′3 *(84)*	3′333 *(1)*
6. **33**	3344	3343 *(6)*	3343′	333′3′	333′3 *(1)*	3333 *(1)*

The unshaded area now contains all the attested rhymed quatrain types (except for the unique instances in the shaded cells, which I assume are not part of the core system), but there is still overgeneration in two cells: types (3b) **43′43** and (4b) **3′3′43** do not occur. (H&M's constraint system precludes the former and admits the latter, but neither is attested in their corpus.) The reason for this gap is obvious when we recall that in rhymed folksong quatrains the second line must rhyme with the fourth.[10] Simply because of the phonological equivalence that rhyme requires, a masculine line can only rhyme with a masculine line, and a feminine line can only rhyme with a feminine line. For example, in folk songs we find no "rhymes" between stressed and unstressed syllables, such as those between *Davy* and *see* and between *morning* and *ring* in the following constructed couplets:[11]

(18) a. Lady Márgot has pút on her sílken gówn
To gó with the gípsy Dávy.
She's ríding with hím on a mílk-white stéed
Some fóreign lánd to sée. (construct)

b. Lady Márgot díed like it míght be at níght,
Sweet Wílliam, he díed in the mórning.
Lady Márgot was búried in her sílken gówn,
Sweet Wílliam was búried with her ríng. (construct)

The even lines do not rhyme *even if performed as **G** lines.* Therefore, since a line of type **3′** cannot rhyme with a line of type **4** or **3**, both couplets of a rhymed quatrain must end the same way, either in a masculine line (types **44, 43, 3′3, 33**) or in a feminine line (types **43′, 33′**). This excludes the two unshaded but unattested quatrain types **43′43** and (4b) **3′3′43** in (17), as well as fourteen others which have already fallen by the wayside because they are neither parallel nor salient. Blocking out these sixteen rhyme-incompatible types with a darker shading leaves nine white cells, and they correspond to the nine attested types of rhyming quatrains.

(19) **Rhyming quatrains**

	a. **44**	b. **43**	c. **43′**	d. **3′3′**	e. **3′3**	f. **33**
1. **44**	4444 *(203)*	4443 *(35)*	4443′	443′3′	443′3	4433 *(1)*
2. **43**	4344 *(1)*	4343 *(188)*	4343′ *(1)*	433′3′	433′3	4333
3. **43′**	43′44	43′43	43′43′ *(64)*	43′3′3′	43′3′3	43′33
4. **3′3′**	3′3′44	3′3′43	3′3′43′	3′3′3′3′ *(5)*	3′3′3′3	3′3′33
5. **3′3**	3′344	3′343 *(8)*	3′343′	3′33′3′	3′33′3 *(84)*	3′333
6. **33**	3344	3343 *(6)*	3343′	333′3′	333′3	3333 *(1)*

Having mapped ot the terrain provisionally, let's proceed to the analysis.

[10]Quatrains composed of rhymed couplets (rhyme scheme ABAB) also occur, but almost all of them seem to be of the **4444** type.

[11]Apparent exceptions result from the fact that the folk tradition allows some types of trochaic words, especially those in *-y*, to be actually pronounced iambically in line-final position, usually under stress clash (see Hayes 2003 for a formal account). I think this stress inversion would not occur in (18), but it would be normal in a (constructed) line such as *She's góne with yóung Davý*, turning it into a regular **3** line, which of course *can* rhyme with another **3** line or **4** line.

2.3 The constraints

Like H&M, I understand saliency to be a gradient property and define it *relationally*: a line or other unit is salient in relation to another similar unit. But I take saliency to be a *syntagmatic* relation between sister constituents. A couplet whose second line is **3** is salient if its first line is **4** or **3′**, but not if its first line is **3**. And just as saliency is a matter of contrast between sister constituents, so degree of saliency is a matter of the degree of that contrast.

Assume, uncontroversially, the following hierarchy of verse constituents (cf. H&M 475).

(20)
```
        Quatrain
            |
    Couplet (distich)
            |
          Line
            |
  Half-line (hemistich)
            |
          Foot
            |
          Beat
```

Each unit but the lowest is made up of exactly two units of the next lower level (except possibly for the special case of refrain quatrains, if my above conjecture about their constituency is right). It is because of this highly regimented binary metrical hierarchy that a type **3** line is perceived as ending in a null (empty) foot (∅), and a type **3′** line is perceived as ending in a unary (degenerate) foot (**f**).[12]

We define saliency as a primitive at the lowest level, the foot, and define the saliency of larger constituents recursively. A line consists of four feet, each having two metrical positions, or BEATS, of which one or both may remain empty. Descriptively, saliency is the inverse of length, measured in beats: a full foot **(F)** is NONSALIENT, a reduced foot (**f**, ∅) is SALIENT. Theoretically, we take saliency to be unfaithfulness, specifically mismatches between metrical positions and the linguistic elements that correspond to them. In English verse, saliency results from an unfilled position in the metrical grid, definable as a violation of the faithfulness constraint MAXBEAT:

(21) MAXBEAT: Beats are realized.

Assume that each unrealized beat incurs a violation of (21). Then **F** is the maximally faithful foot type, and ∅, with both its empty beats, is maximally unfathful. By putting saliency = unfaithfulness, we obtain the hierarchy:

(22)	a.	Full foot **(F)**:	[σ σ]	(perfect match, nonsalient)
	b.	Degenerate foot **(f)**:	[σ]	(mismatch, salient)
	c.	Null foot **(∅)**:	[ ]	(maximum mismatch, maximally salient)

[12]To be consistent with our notation for lines, the reduced foot types should really be labeled ∅ and ′, and the full foot **1**, but I will continue to use the ∅, **f**, and **F** for clarity.

Diverging from H&M, we then define saliency and parallelism at higher levels of metrical structure in recursive fashion.

(23) *Definitions*:

a. A constituent is SALIENT if its last immediate constituent is the most salient.

b. A constituent is PARALLEL if its immediate constituents are equally salient.

At the quatrain level, the couplet type **43** has a privileged status in that it is the only type of couplet that can close a nonparallel quatrain. There are two plausible ways to distinguish **43** formally from the other salient couplet types **43′** and **3′3**. One way is to view **43** as the MAXIMALLY SALIENT couplet type. Another characterization of **43** is as a salient couplet which contains only unmarked (binary) feet. The latter means formally that it obeys the constraint FOOTBIN, which is standard in metrics and metrical phonology.

(24) FOOTBIN: Feet are binary.

With the present data, at any rate, these two ways of singling out **43** are empirically indistinguishable. Conceptually, the second is perhaps preferable because FOOTBIN is needed anyway to pick out meters which prohibit degenerate feet (**3′** lines), that is, meters which allow only **4343, 4444, 3343**, and **3333** quatrains. (We will encounter one such meter in section 4 below.)

The constraints on folk song stanzas, then, are these:

(25) *Constraints*:

a. SALIENCY: A constituent is salient.

b. PARALLELISM: A constituent is parallel.

c. CLOSURE: The salient couplet of a salient quatrain contains no marked feet.

No metrical constituent at any level can be both salient and parallel. Therefore, if both (25a) and (25b) are visible in a metrical system, they must be able to dominate each other, i.e. they are crucially freely ranked with respect to each other. Except for this, the constraints can be arbitrarily ranked, or unranked.

Application of (23a) at each level of the metrical hierarchy yields the following:

(26) a. A half-line (hemistich) is salient if its second foot is more salient than the first. Hence, the salient hemistichs are **F** $\emptyset$, **f** $\emptyset$, and **F f**.

b. A line is salient if its second hemistich is more salient than the first. Hence, the salient lines are those of type **3′** and **3** (in terms of hemistichs, **21′** and **21**).

c. A couplet is salient if its second line is more salient than the first. Hence, the salient couplets are **43**, **43′**, and **3′3**.[13]

d. By (25c) the final couplet of a salient quatrain is not only salient, but unmarked, i.e. it is of the form **43**.

The following summary table shows how saliency and parallelism at different levels of the metrical hierarchy combine to derive the observed typology.

(27)

	Nonsalient (parallel)	Salient
Feet	**F (σσ)**	**f (σ)**, ∅
Hemistichs	**2** (=**FF**)	**1′** (=**Ff**), **1** (=**F**∅)
Lines	**4 (=22)**	**3′ (=21′)**, **3 (=21)**
Couplets	**44, 3′3′, 33**	**43′, 3′3**, **43**
Quatrains	**4444. . . , 3333**	***4443′. . . , *333′3**, **4443. . . , 3343**

2.4 Refrain quatrains

Refrain quatrains are much less common. Unlike the type discussed so far, they do not have to rhyme, probably because the closure function of rhyme is served by the refrain constituent. In fact, in the limiting case, the repeated element of the refrain is just the last word of the last line, effectively functioning as a cross-stanza rhyme. For example, this song has ten stanzas, each consisting of three rhyming **4** lines plus a refrain line which ends in *Shiloh*:

(28) All you Southerners now draw near, **4**
Unto my story approach you here, **4**
Each loyal Southerner's heart to cheer **4**
With the victory gained at Shi — loh. **3′**

The Battle of Shiloh (Sharp & Karpeles #136)

As far as I can tell, refrain quatrains allow all metrical types in (19), plus a few additional ones: **4443′** (8x), **3′3′3′3** (3x), **4433** (5x), **43′43** (2x), in addition to a sprinkling of entirely unique quatrains (Hayes and McEachern 1998:496 ff.).

The occurrence of the new type **43′43** in refrain quatrains fills a gap in the typology of (19): remember that our metrical constraints predict this type, and the reason is doesn't occur in rhyming quatrains is that the even-numbered lines **3′** and **3** cannot rhyme. In refrain quatrains rhyme is not a factor, so this type is expected.

To fit refrain quatrains into our constraint system we must make some assumptions about their constituent structure. They do not seem to consist of two couplets, but simply of four coordinated lines (**[4443′]**), or in some cases even three lines capped by a refrain (**[444][3′]**), as in this children's song (Sharp & Karpeles #264):

[13]Grossly speaking, the effect is to put short hemistichs at the end of lines and short lines at the ends of couplets. (See Friedberg 2002 for a related generalization about Russian tetrameter.) This might seem to contradict the well-known tendency to put heavy elements last. But according to the proposal in the text, it is an entirely separate principle, based on putting salient (marked) elements last. The former is grounded in parsing efficiency, the latter is a poetic closure effect.

(29) This is the way we go to church, **4**
Go to church, go to church, **4**
This is the way we go to church, **4**
Early Sunday mor — ning. **3′**

This is the way we wash our clothes, **4**
Wash our clothes, wash our clothes, **4**
This is the way we wash our clothes, **4**
Early Monday mor — ning. **3′**

(and so on for each day of the week)

In either case, constraint (25c) is not applicable as formulated, so that refrain quatrains of types **4443′** and **3′3′3′3** satisfy all constraints in (25). Moreover, since the refrain need not rhyme, the masculine/feminine mismatch between the even-numbered lines is not an inhibiting factor. The occurrence of these additional quatrain types in such refrain quatrains is then expected.[14] As for quatrains of type **4433** (unmetrical by H&M's constraints but attested 5 times in refrain quatrains in their corpus, in addition to the single non-refrain occurrence in (19)), I have no firm analysis to propose. They could arise from **43** couplets by doubling of both lines. Alternatively, if they have the structure **[443][3]**, they would literally satisfy our definition of parallelism, since in such a structure both the tercet **443** and the refrain **3** (= **21**) are maximally salient.

2.5 Restrictiveness and locality

Besides being simpler than H&M's, and using very general off-the-shelf constraints rather than custom-made ones, this analysis has some other empirical and conceptual advantages. It is more accurate in that it successfully rules out several non-occurring rhyme quatrain types that H&M's system admits: $\mathbf{*3_f3_f43_f}$ and ***GG4G** (our ***3′3′43′**, type 4c in (19)), ***33F3** and ***33G3**[15] (our ***333′3**, 6e in (19)), and $\mathbf{3_f3_fF3_f}$ (excluded for the same reason as ***3′3′43′**). This OVERGENERATION PROBLEM is a direct consequence of their failure to separate meter from text-to-tune alignment.

SALIENCY and PARALLELISM apply at each level to determine how a unit combines into a unit of the next higher level: feet into half-lines, half-lines into lines, lines into couplets, and couplets into quatrains (where the last combination is subject to an additional restriction, (25c)). That is why the properties of units at different levels of the metrical hierarchy are substantially the same. This cross-level generalization was noted by Hayes & MacEachern in the Web appendix to their article, but not formally built into their theory. The present approach exploits it to obtain a substantial simplification of the constraint system and along with it a more explanatory analysis.

The modular approach advocated here leads us to expect certain locality effects in the evaluation of metrical constraint. The acceptability of given type of constituent is assessed locally and its distribution depends on saliency and parallelism at the next higher level. The well-formedness

[14] Such types as ***433′3, *33′43**, and ***333′3** are still unmetrical because they have a gratuitous parallelism violation. The first three lines are neither parallel nor salient and therefore the quatrain is unmetrical.

[15] H&M (p. 481) discuss a possible example of ***33G3**, rightly pointing out that it could be a **44** couplet, as indeed Sharp & Karpeles treat it in their edition.

of a quatrain depends on the properties of the couplets that it consists of, the well-formedness of a couplet depends on the properties of the lines that it consists of, and so on.

The data provides some evidence for this kind of "metrical subjacency". For example, no quatrain type requires a special type of foot, and no type of foot is restricted to just one place in a quatrain. Because of this, the reduced foot types $\emptyset$ and **f** are in principle available not only at the end of a line or hemistich (in the line types **3** and **3′**), but anywhere in the line:

(30)
a. Green | grow | the rush|es O — type **4**
b. Lang, | lang | may their la | dies sit — *Sir Patrick Spens*, type **4**
c. Fírst | níght | when Í | got hóme — *Drunkard's Special* (Folkways Anthology), type **4**
d. Háir | ón | a cábbage | héad — *ibid.*, type **3f**

However, in non-final positions they are not motivated by saliency, hence much rarer.

Still, the data does clearly reveal two types of global dependencies, both involving constraints on foot structure imposed at higher levels. First, saliency in final position is inherited upward from lower to higher constituents — a cornerstone of our analysis. Secondly, constraint (25c) as formulated prohibits marked feet anywhere in the closing couplets of salient quatrains, which requires universal quantification at the quatrain level over the smallest constituents. Although the limited nature of this globality is encouraging, the question whether a restrictive metrical typology can be developed must be left to future research.

3 Hayes and MacEachern: the details

3.1 OT metrics

Formal approaches to metrics were constraint-based long before OT. Many operated with two kinds of constraints, INVIOLABLE constraints, which must be satisfied by all and only well-formed verse, and PREFERENCES, which are violable but at the cost of complexity. A metrical system or subsystem, such as a rhyme scheme or a stanza form, is defined by the designated subset of constraints that it must satisfy obligatorily. The preferences among the permissible realizations of that form are defined by some selection of the remaining universal constraints. In one or another way, every theory must have something that corresponds to this distinction between inviolable constraints and preferences. Among currently available theoretical architectures, OT is the theory of choice for this, because it models competing constraints and preferences, predicts that preferences in one system typically correspond to obligatory constraints of another, and makes strong testable typological predictions. But it is important to understand that OT is just a formal theory of constraint interaction and does not by itself have anything to say about metrics. For that we need an actual set of metrical constraints, and there are many different ideas about what these look like (see Golston 1998 and Friedberg 2002 for two recent proposals).

H&M's theory has the form of a set of markedness constraints analogous to those used in phonology. Each markedness constraint imposes some metrical well-formedness condition. Every well-formed quatrain pattern is not only good enough — it is the *best* under some ranking of the markedness constraints. H&M deal with preferences by augmenting their markedness constraints with a quantitative component, for which they use stochastic OT. Each constraint is assigned a place on a scale of real numbers, which governs its likelihood of outranking other constraints and being ouranked by them.

One problem with this approach is that it does not relate frequency intrinsically to unmarkedness. Much traditional work shows that the most frequent metrical structures tend to be those which are the simplest. For H&M, the question of differences in relative complexity simply does not arise. Each quatrain type is simply the best under some constraint ranking. It is the numerical part of the metrical grammar that models the patterns of relative preference among the competing optima. Small or large adjustments of the numbers, even keeping the ranking invariant, change these patterns in delicate or radical ways. Let's call this the MARKEDNESS PROBLEM.

Another general problem with characterizing a stanza form as the optimal output of a set of ranked markedness constraints is the HARMONIC BOUNDING PROBLEM: how to distinguish two stanza forms that differ in only in strictness. The looser of them, requiring satisfaction of fewer constraints, cannot be characterized by any ranking of independently motivated markedness constraints. For example, consider the the two commonest rhyming patterns found in folk song quatrains, ABCB and ABAB. They share the requirement that the even-numbered lines must rhyme, but the ABAB scheme in addition requires that the odd-numbered lines must rhyme. A stanza where both line pairs rhyme, such as (10), obviously satisfies both these constraints. How to define formally a verse form, normal in folk songs, that requires only odd-numbered lines to rhyme? The problem is that the ABAB stanza type satisfies all the markedness constraints that ABCB does and then some — in OT terms, ABCB is HARMONICALLY BOUNDED by ABAB. In order to characterize the looser rhyme scheme ABCB as the optimal output to some system of ranked markedness constraints, we would have to find some respect in which it is more harmonic than ABAB. We would need something like an "anti-rhyme" constraint, but that will not do because ABAB stanzas like (10) are not *prohibited* in ABCB verse, they are just not *required*. For example, (10) is an ABAB stanza in an otherwise ABCB song, see (9).[16]

To anticipate the discussion below: the analysis proposed below eliminates the harmonic bounding problem by positing a FAITHFULNESS constraint which may be ranked among the markedness constraints. (Hayes 2003 himself uses this device to solve the problem of optionality in prosodic correspondence.) FAITHFULNESS dictates that the wording of the input be retained in the output, even if that leads to violations of lower-ranked constraints. On this assumption, the difference between the ABAB and ABCB rhyme schemes could be characterized by alternative rankings of the following constraints:[17]

(31) a. CLOSING RHYME: The even-numbered lines of a quatrain must rhyme.
b. FULL RHYME: Alternate even-numbered and odd-numbered lines of a quatrain must rhyme.
c. FAITHFULNESS: Keep the input wording.

The ranking (31b) $\gg$ (31c) defines a verse form with an ABAB rhyme scheme. The ranking (31a) $\gg$ (31c) $\gg$ (31b) defines a verse form with an ABCB rhyme scheme, in which the even-numbered

[16] Such examples can be easily multiplied. The rhyming requirement of Skaldic verse is satisfied every bit as well by half rhyme (assonance) as by full rhyme. Systems where alliterating words must have the same C- also allow CV-alliteration. Fully binary (iambic/trochaic) lines are permitted in *dolnik* verse.

[17] These constraints are merely illustrative. Other characterizations of the rhyme patterns are conceivable, but the point should be independent of which of them is correct.

lines of a quatrain must rhyme (and the odd-numbered lines may rhyme). Thus, although the traditional idea of a meter being “subject to” or “not subject to” that constraint makes no sense within OT, it can be adequetely simulated by the ranking of FAITHFULNESS with respect to that constraint.

The harmonic bounding problem is not the only infelicitous consequence of the notion that each stanza type is optimal under some ranking of universal markedness constraints. It leads directly to gaps in coverage and unnecessary complications. I develop this point in sections 3.2-3.4, and then show how my proposed alternative avoids them, without losing any of the real insights of the H&M theory.

We can divide H&M’s constraints roughly into three classes, which deal respectively with saliency, parallelism, and correspondence between metrical position and musical beats. These are taken up in turn in 3.2-3.4.

3.2 Saliency

H&M define saliency by means of the auxiliary concepts of a CADENCE and CADENTIALITY. A (rhythmic) cadence is the grid placement of the final two syllables of the line (p. 476). The cadentiality of a line type is measured by the number of beats assigned to its cadence. The more grid positions the cadence occupies in the song, the more cadential the line. More precisely, cadentiality depends primarily on the number of grid positions assigned to its final syllable; when this yields a tie, it is resolved by the number of grid positions assigned to the penultimate syllable. The following hierarchy of cadentiality results (p. 484-485):

(32) $\mathbf{3} \gg \mathbf{3_f} \gg \mathbf{G} \gg \mathbf{4}$

As explained above, I view the distinction between $\mathbf{3_f}$ and **G** as a choice between two musical settings of a **3**′ line of verse. I adopt the rest of the hierarchy unchanged, but as explained in (22)–(25) I don’t stipulate it but rather derive it from faithfulness. The following discussion demonstrates the virtues of this approach.

In H&M’s OT system, saliency must be both a categorical property and a gradient property. Categorical saliency is defined in (33).

(33) A metrical constituent is (categorically) SALIENT if

a. its final rhythmic cadence is more cadential than all of its nonfinal cadences,

b. all of its nonfinal cadences are uniform.

The (b) part of H&M’s definition of saliency is satisfied if all cadences in question are of the same type. Thus, the salient quatrains are $\mathbf{444G, 4443_f, 4443, GGG3_f, GGG3, 3_f3_f3_f3}$, the salient couplets are just the second halves of the salient quatrains, namely $\mathbf{4G, 43_f, 43, G3_f, G3, 3_f3}$, and each line type is trivially salient. The *degree* of saliency of a constituent is assessed by the cadentiality of its final cadence according to the hierarchy (32). As an illustration, consider the quatrain $\mathbf{3_f343}$. By (33), the whole quatrain is nonsalient, both its couplets are salient, and each line is salient in proportion to its cadentiality: the second and fourth lines are maximally salient, the third line is minimally salient, and the first has an intermediate degree of saliency.

The notion of saliency plays a key role in most of H&M’s constraints, most directly in (34)–(36):

(34) LINES ARE SALIENT (H&M (38)): Assess violations for any nonsalient line, according to its degree of nonsaliency.

(35) COUPLETS ARE SALIENT (H&M (39)): Assess violations for any nonsalient couplet, according to its degree of nonsaliency.

(36) QUATRAINS ARE SALIENT (H&M (40)): Assess violations to the extent that the quatrain is nonsalient.

This brings out another difference between the two approaches: for H&M, a constraint such as (34) LINES ARE SALIENT plays a direct role in the evaluation of quatrains; in fact, if this constraint is ranked first, a quatrain **3333** results. For me, the relevant property of **3333** for quatrain structure is parallelism.

A subtlety of the H&M system is that, in the gradient evaluation of (34) LINES ARE SALIENT and (35) COUPLETS ARE SALIENT, quality trumps quantity: for example, the quatrain **3343** is a worse violation of (34) than the quatrain $\mathbf{3_f3_f3_f3_f}$ is, because even one minimally salient line of the form **4** is worse than four medium-salient lines of the form $\mathbf{3_f}$. My solution needs no counterpart to this stipulation.

Both gradient and categorical saliency play a role in three further constraints which deal with the category of a LONG-LAST CONSTRUCTION, defined in (37) (H&M's (29)):

(37) A quatrain is a LONG-LAST CONSTRUCTION if:

a. its second couplet is salient by the all-or-nothing definition (33) (= H&M (22));
b. both its [the couplet's] first and second lines are more salient than the third line (by the gradient definition [of H&M (23), essentially according to the hierarchy in (32) above].

Although the definition covers a number of quatrain types, the only long-last stanza form that is actually used is **3343** (so-called SHORT METER). Long-last stanzas are derived when the following constraint is undominated:

(38) PREFER LONG-LAST (H&M (41)): Avoid any quatrain that is not a long-last construction.

The next two constraints form a hierarchy. (39a) is subsumed by (39b), but (39b) is inviolable (undominated) whereas (39a) can be ranked differently to give different quatrain types.

(39) a. TOTAL LONG-LAST COHESIVENESS (H&M (42a)): Avoid long-last constructions whose third line is not 4.
b. PARTIAL LONG-LAST COHESIVENESS (H&M (42b)): Avoid long-last constructions whose third line is not 4 or G.

The treatment of this stanza type reveals another difference between the approaches. The concept of a "long-last construction" is simply a type of salient quatrain, which requires no special definitions or constraints.[18] The concept of "long-last construction" and the constraints that refer to

[18] A caveat: singling out **3343** stanzas as a special type, if such a thing proves to be necessary, is not easy on my approach. It would probably require specifying maximal saliency at both the quatrain and line levels.

it are probably artifacts of H&M's OT approach.[19] It needs them because the quatrain type **3343** must not only be good enough — it must be the *best* under some constraint ranking. If we don't adopt this framework, we can get rid of (37)–(39), which certainly is a welcome move because just this part of the system is responsible for the H&M system's above-mentioned overgeneration of the unattested quatrain types **$*3_f3_f43_f$**, ***GG4G**, **$*3_f3_fF3_f$**, ***33G3** and ***33F3**.

3.3 Parallelism

H&M define PARALLELISM by means of the auxiliary concept of a MAXIMAL ANALYSIS. A maximal analysis is the largest sequence of salient constituents comprising a quatrain (H&M 488), formally defined like this (H&M's (24)):

(40) **Def:** Let $C_1, C_2, \ldots\ C_n$ be a sequence of adjacent metrical constituents exhausting the material of a quatrain Q. If for each **C** of $C_1, C_2, \ldots\ C_n$

a. **C** is salient by the all-or nothing definition (33) [H&M's (22)]; and

b. there is no salient constituent **C**′ dominating **C**;

then $C_1, C_2, \ldots\ C_n$ is the MAXIMAL ANALYSIS of Q.

The following two constraints are undominated.

(41) PARALLELISM (H&M (25)): The cadences ending the units of the maximal analysis of a quatrain must be identical.

For example, the quatrain type **3_f343** satisfies parallelism in virtue of its maximal analysis **$[3_f3][43]$**.

(42) STANZA CORRESPONDENCE (H&M (37)): In a song, the set of salient domains must be invariant across stanzas.

This constraint crucially employs the categorical version of saliency defined in (33).

Recall that for H&M, saliency requires nonfinal cadences to be uniform, which is just what PARALLELISM requires of maximal analyses (see (41)) — a redundancy. Note also that H&M's definition of saliency contains a parallelism condition (33b), and the definition of parallelism in turn relies on saliency (via (40)). Both the redundancy and the whiff of circularity are eliminated in the alternative I proposed through the recursive application of the parallelism and saliency constraint at each level.

[19] This would *not* be the case if (38) were truly unifiable with the literal "long-last" constraint, as it appears in natural language (irreversible binomials, Heavy NP-Shift) and in verse (placement of caesuras). At the moment this seems rather a stretch, given the very specific form of (37).

3.4 Metrical Constraints

In H&M's OT system, $\mathbf{3_f}$ and **G** must each be optimal under some constraint ranking, a result achieved by positing the following two constraints, which roughly correspond to MAXBEAT but are split into two antagonistic constraints, one requiring **G**, the other requiring $\mathbf{3_f}$, and allowing them to rank freely with respect to each other.

(43) FILL STRONG POSITIONS (H&M (31)): Fill the four strongest positions in the line.

High-ranked FILL STRONG POSITIONS forces **G** instead of $\mathbf{3_f}$. High ranking of the next constraint has the opposite effect, of forcing $\mathbf{3_f}$ instead of **G**.

(44) AVOID LAPSE (H&M (32)): Avoid sequences in which no syllable is placed in the interval between any two of the four strongest positions of the line.

Any theory needs something like (43), but (44) is more surprising. The configuration in question — an empty weak beat — is not a "lapse" in the traditional sense of metrical phonology (nor is it exactly a "clash" either). For us, the work of this constraint is done in the text-to-tune system: $\mathbf{3'}$ is implemented as $\mathbf{3_f}$ when the melody has a rest in the fourth strong beat.[20]

The realization of a line as type **G** or type **4** is governed by MATCH STRESS. Instead of H&M's version, I reproduce that of Hayes 2003, which supersedes it:

(45) MATCH STRESS

Assess a violation if:

- σ_i and σ_j (in either order) are linked to grid positions G_i and G_j respectively;
- σ_i is more stressed that σ_j;
- G_i is stronger than G_j; and
- σ_i and σ_j occupy the same simplex word.

In effect, a lexical stress is matched to the strongest available position. I would assume an equivalent constraint as part of the metrical theory.

In sum: the notion that each attested line type is the best under some constraint ranking forces H&M to posit a number of complex and otherwise unmotivated constraints plus additional conventions on their interpretation. Some of them have no other purpose than to single out directly a particular line type. This proliferation of constraints compromises the factorial typology of metrical systems.

[20] In H&M's analysis, AVOID LAPSE also serves to limit the distribution of empty weak beats in lines like (30).

4 Relative frequency

4.1 Stochastic OT versus partial ranking

Quantitative metrical data provide a novel proving ground for OT theories of variation and for OT itself. The challenge here is to make sense of the massive disparities in relative frequency among the different quatrain types.

An interesting and empirically well-supported studied theory of variation in the OT framework holds that variation arises when the grammar specifies a partial ranking (Anttila 1997, 2003). A form F is grammatical if there is a fully ranked tableau consistent with that partial ranking in which F is the optimal candidate. The probability of a form F is predicted from the proportion of those tableaux relative to all tableaux that are consistent with the partial ranking. For example, in a grammar with three unranked constraints, there are six tableaux for any given input. Suppose that for a certain input A, two of these tableaux select output A_1 and four select output A_2. Then A_2 is predicted to be twice as frequent as A_1 is, as a realization of A. In practice, of course, the number of constraints, rankings, and tableaux is much larger, the options more numerous, and the gradations of relative frequency are correspondingly more delicate.

H&M's analysis is clearly incompatible with this perspective on variation. The frequency of the different quatrain types bears no orderly relation to the number of constraint rankings on which they are derived. For example, the rarest well-formed quatrain type **3333** is obtained by any ranking in which (34) LINES ARE SALIENT is undominated. Since there are seven other constraints whose ranking can vary, that makes a total of 7!=5,040 tableaux. On the other hand, one of the commonest line types, **4343**, requires the rather particular ranking (35) COUPLETS ARE SALIENT ≫ (43) FILL STRONG POSITIONS ≫ (44) AVOID LAPSE, which is consistent with a mere 5!=120 tableaux. The prediction is completely off course.

Instead, H&M assume a stochastic OT theory of variation which posits that each constraint has a range of fixed width, within which it can freely vary. Constraints may outrank each other to the extent that their ranges overlap. (The theory proposed by Boersma, and adopted in later work also by Hayes, posits a probabilistic distribution within the range; the center of the range represents its most likely place in the ranking, with probability decreasing towards the margins.) To discover the range of a constraint on the continuous scale, the learner must gather, store, and process frequency data about the output variants. This contrasts with Anttila's theory, which derives variation patterns from the *absence* of information about the mutual ranking of constraints, in effect claiming that they can be acquired without frequency information.

The folk song data is actually somewhat awkward for stochastic OT as well, under H&M's constraints. The problem again lies with the constraints (35) COUPLETS ARE SALIENT, (43) FILL STRONG POSITIONS, and (44) AVOID LAPSE. Ranked as in (46a), they give the output **4343**. Full demotion of COUPLETS ARE SALIENT as in (46b) gives **4444**. These are the two most frequent quantrain types of all. By the logic of the stochastic OT model, the intermediate ranking of COUPLETS ARE SALIENT in (46c) should produce an even more frequent output than at least one of the other rankings. But, disconcertingly, it gives a type which is substantially *less* common than either, namely **4G4G** (see H&M's fn. 43 for discussion).

(46) a. COUPLETS ARE SALIENT ≫ FILL STRONG POSITIONS ≫ AVOID LAPSE: Output **4343** (very frequent)

b. FILL STRONG POSITIONS $\gg$ AVOID LAPSE $\gg$ COUPLETS ARE SALIENT: Output **4444** (very frequent)

c. FILL STRONG POSITIONS $\gg$ COUPLETS ARE SALIENT $\gg$ AVOID LAPSE: Output **4G4G** (less frequent)

This is an instance of what we called the MARKEDNESS PROBLEM.

One of the most appealing ideas behind Anttila's theory is that variation is *more* easily learned than non-variation, because it comes about when some constraint ranking is not learned and the learner remains, in that respect, in the initial state of entertaining alternative rankings. Remarkably, Anttila-style analyses, in spite of their discrete and minimalist character, tend to match the observed frequencies reasonably well, sometimes as accurately as the stochastic approach, which which places a much greater burden on acquisition, and extends the power of the theory by bringing in the real numbers.

While the stochastic model is less restrictive than Anttila's in this respect, it is more restrictive in another. It predicts that the constraints are strictly stratified along the scale; the width of a constraint's range is fixed, and only its place on the continuous scale relative to the other constraints determines the probability of the rankings. In Anttila's partial ranking model, and in H&M's version of the stochastic model, the range of a constraint can overlap with the range of a set of ranked constraints. Here is a simple example. Suppose we have two ranked constraints $C_1 \gg C_2$, and a constraint C_0 which is unranked with respect to them. Assume the candidates $Cand_0$, $Cand_2$, and $Cand_2$, which satisfy only C_0, C_1 and C_2, respectively. Then there are three fully ranked tableaux:

(47) a. $C_0 \gg C_1 \gg C_2$ optimal output: $Cand_0$

b. $C_1 \gg C_0 \gg C_2$ optimal output: $Cand_1$

c. $C_1 \gg C_2 \gg C_0$ optimal output: $Cand_1$

Anttila's theory entails that $Cand_1$ is twice as frequent as $Cand_0$, and that $Cand_2$ has zero frequency. The unordered constraint in this partial ranking is C_0. $Cand_1$ and $Cand_2$ each violate this constraint once. But $Cand_1$ and $Cand_2$ do not have the same frequency. In such cases, the frequency of a form is not simply proportional to the number of its violations of unordered constraints in a partial ordering. Quantitative studies of variation have turned up several instances of this type (Anttila 1997 Ch. 3,4, 1998, 2003, Anttila & Revithiadou 2000). We shall see that the metrical system under investigation is another such case.

4.2 Formalizing the constraint system

The correlation between the frequencies of the quatrains tabulated in (16) with the markedness of their lines and couplets is a promising starting point for an explanatory quantitative analysis. The constraints needed for the categorical data, given above in (21), (24), and (25), are repeated below in (48).

(48) a. SALIENCY: Constituents are salient.

b. PARALLELISM: Constituents are parallel.

c. MAXBEAT: Beats are realized.

d. FOOTBIN: Feet are binary.

With some additional assumptions, we can derive from these constraints a quantitative model of the actual frequency distribution.

First, we have to spell out how the constraints in (48) are assessed and how they interact in the metrical grammar to distinguish metrical from unmetrical lines.

Recall that lines composed of four full binary feet (type **4** lines) violate neither MAXBEAT nor FOOTBIN. All other lines have one or more missing beats; they violate the constraint MAXBEAT. Lines containing unary or 'degenerate' feet (type **3′**) violate, in addition, the constraint FOOTBIN. Couplets and quatrains obviously violate a constraint if they contain any line that violates it. In addition they may violate SALIENCY or PARALLELISM at the couplet and/or quatrain level. Of the nine theoretically possible couplet types, two (namely **3′4** and **33′**) never have a chance because they are rejected by all four constraints; the others satisfy one or more of them as follows:

(49) a. PARALLELISM: **44, 3′3′, 33**

b. SALIENCY: **43, 43′, 3′3**

c. MAXBEAT: **44**

d. FOOTBIN: **44, 43, 33, 34**

There are 4!=24 possible rankings of the constraints in (49). Each ranking defines a type of metrical structure, either a stanza, a couplet, a line, a hemistich, or a foot, according to the level of analysis. Let us suppose that lines shorter than **3** and lines longer than **4** are categorically excluded by other, undominated constraints, which leaves us with **3, 3′**, and **4**. These can combine with each other into nine kinds of couplets, of which six are metrical, as we have seen. Each type of metrical couplet can be paired with another of the same type to make a parallel quatrain. Thus, the problem of characterizing the types and relative frequency of parallel quatrains (the ones that appear on the diagonal in table (16), which form the vast majority of all quatrains) can be reduced to that of characterizing the types and relative frequency of couplets.

Of the nine theoretically possible couplet types, only **43** satisfies both SALIENCY and FOOTBIN. Therefore, when both these constraints outrank PARALLELISM and MAXBEAT, **43** is selected as the optimal couplet. And **44** is the only couplet type that satisfies MAXBEAT. So, when MAXBEAT outranks the other constraints (or even whenever it outranks just SALIENCY), **44** is the optimal couplet. In fact, all 24 possible rankings of (48a-d) yield either **43** or **44**. Therefore, to derive the four other couplet types (namely **43′, 3′3′, 3′3, 33**), and the parallel quatrains containing them, something must be added to the system.

H&M solve the analogous problem by adding constraints that favor all the other couplet and quatrain types, so that each of them gets be the optimal output of at least one constraint ranking. The problems we identified above are traceable to this strategy: *(1)* the OVERGENERATION PROBLEM (too many quatrain types are predicted), *(2)* the HARMONIC BOUNDING PROBLEM (how to characterize metrical forms which differ merely in strictness), and *(3)* the MARKEDNESS PROBLEM (the frequency distribution of the quatrain types is not systematically related to complexity or markedness).

A better method is to complement the four constraints in (48) with just one other constraint, FAITHFULNESS. By Richness of the Base, the input to the constraint system is any metrical form whatever. FAITHFULNESS dictates that the input is realized as such (rather than being replaced by something else, or suppressed). The effect of FAITHFULNESS is to license any candidate not exluded by higher-ranked constraints as metrical. Constraints ranked above this cutoff-point restrict metricality, while constraints ranked below it are inactive. We shall say that M is METRICAL with respect to a constraint system if it is the optimal output for some input. Tableau (50) shows how **43′** is metrical under the constraint ranking shown, when **43′** itself is taken as the input.[21]

(50)

Input: **43′**	SAL	PAR	FAITH	FTBIN	MAX
1. **44**	*		*		
2. ☞ **43′**		*		*	*
3. **43**		*	*		*
4. **3′3′**	*		*	*	*
5. **3′3**		*	*	*	*
6. **33**	*		*		*
7. **34**	*	*	*		*
8. **33′**	*	*	*	*	*
9. **3′4**	*	*	*	*	*

The reader can verify that **43** and **3′3** are also metrical on the same ranking, for they are the optimal outputs corresponding to the inputs **43** and **3′3** respectively. However, **44** is unmetrical under this ranking, for it never the optimal output. As tableau (51) shows, is bested by three other candidates even in the most propitious case where it is the most faithful candidate, i.e. when the input is **44** itself.[22]

(51)

Input: **44**	SAL	PAR	FAITH	FTBIN	MAX
1. ✘ **44**	*				
2. **43′**		*	*	*	*
3. ☞ **43**		*	*		*
4. **3′3′**	*		*	*	*
5. **3′3**		*	*	*	*
6. **33**	*		*		*
7. **34**	*	*	*		*
8. **33′**	*	*	*	*	*
9. **3′4**	*	*	*	*	*

Similarly, **3′3′** and **33** are unmetrical on this ranking, for any input. And it should be clear that moving FAITHFULNESS to any lower rank cuts down the inventory generated to just **43**, for any input.

This approach escapes the three abovementioned objections. The overgeneration problem does not arise because regardless of input, the constraints generate all and only the attested types of lines,

[21] For simplicity, I mark violations of these constraints categorically rather than gradiently in the tableaux that follow. This should make no difference to the result.

[22] It is immaterial which of those three is the actual winner in this case. If FAITHFULNESS is gradiently evaluated, it would be the one which is "closest" to the input.

couplets, and quatrains. The harmonic bounding problem does not arise because the invariant metrical form of a poem or song is defined by a specific ranking of the constraints in (48) with each other and with FAITHFULNESS. One limiting case is where FAITHFULNESS ranks at the bottom, so that the only quatrains generated are **4343**, **4443**, and **4444**, depending on the ranking of (48a-d). As FAITHFULNESS is promoted over the metrical markedness constraints, the system becomes more permissive. Finally, in the other limiting case, where FAITHFULNESS outranks *all* the metrical constraints, any input is accepted, which is to say the output is prose. When at least one metrical markedness constraint is visible (dominates FAITHFULNESS), the system defines a meter.

The markedness problem is solved in the best possible way: we can derive the frequency differences among metrical types by using Anttila's partial ranking theory of variation. The free ranking of markedness constraints generates a limited number of preference pattern, among them those which are instantiated in the folk song corpus under study. This is shown in the next subsection.

4.3 A partial ranking account

Rankings can be either free or fixed. If each permissible ranking is assigned the same probability, then the more constraint rankings generate a metrical type, the more frequent it is. Therefore, we complete our definition of metricality by adding the quantitative aspect:

(52) a. M is metrical if is the optimal output in some tableau.

b. The frequency of M is proportional to the number of tableaux in which it is optimal.

In the simplest partial ranking, all four metrical constraints in (25) would be freely ranked among each other. But as mentioned, FAITHFULNESS must be dominated by at least one markedness constraint (otherwise we would have prose). Which markedness constraint dominates FAITHFULNESS? Certainly not MAXBEAT, for if it were to rank above FAITHFULNESS, only **44** would be derivable, which is too strict. On the other hand, FOOTBIN $\gg$ FAITHFULNESS would be too loose, because it admits the unmetrical ***34**. The remaining possibilities, namely SALIENCY $\gg$ FAITHFULNESS and PARALLELISM $\gg$ FAITHFULNESS, have exactly the desired effect. Either one of these rankings, or both exclude the unmetrical couplet types ***34, *3′4, *3′3** (and of course all quatrains that contain them) while still admitting all the metrical ones (as the reader can check). Thus, the possible metrical grammars for this system are:

(53) a. SALIENCY $\gg$ FAITHFULNESS

b. PARALLELISM $\gg$ FAITHFULNESS

c. SALIENCY, PARALLELISM $\gg$ FAITHFULNESS

While the categorical restrictions on couplets (and on parallel quatrains) can be modeled by any of these three fixed constraint rankings one of them, (53a), also predicts the observed frequencies quite well. To see this, consider the effect of eliminating all tableaux where FAITHFULNESS dominates SALIENCY. It halves the total number of admissible tableaux from 5!=120 to 60. These 60 tableaux are displayed compactly in table (54), which lists all 24 rankings of the four constraints in (48), followed by four columns representing the ranking of FAITHFULNESS among them in second, third, fourth, and fifth position, respectively. (Of course, it cannot be ranked in first position because that would violate (53a)). The cells show the possible outputs of the corresponding tableaux (for the totality of inputs). The cells representing the subset of 60 permissible tableaux are unshaded.

(54) Couplet outputs of rankings consistent with SAL ≫ FAITH (unshaded cells)

Ranking of markedness constraints				Ranking of FAITHFULNESS			
				2nd	3rd	4th	5th
SAL	MAX	FTBIN	PAR	43 43′ 3′3	43 43′ 3′3	43	43
SAL	MAX	PAR	FTBIN	43 43′ 3′3	43 43′ 3′3	43 43′ 3′3	43
SAL	FTBIN	MAX	PAR	43 43′ 3′3	43	43	43
SAL	FTBIN	PAR	MAX	43 43′ 3′3	43	43	43
SAL	PAR	MAX	FTBIN	43 43′ 3′3	43 43′ 3′3	43 43′ 3′3	43
SAL	PAR	FTBIN	MAX	43 43′ 3′3	43 43′ 3′3	43	43
MAX	SAL	FTBIN	PAR	44	44	44	44
MAX	SAL	PAR	FTBIN	44	44	44	44
FTBIN	SAL	PAR	MAX	44 43	43	43	43
FTBIN	SAL	MAX	PAR	44 43	43	43	43
PAR	SAL	MAX	FTBIN	44 3′3′ 33	44 3′3′ 33	44	44
PAR	SAL	FTBIN	MAX	44 3′3′ 33	44 3′3′ 33	44 33	44
MAX	FTBIN	SAL	PAR	44	44	44	44
MAX	PAR	SAL	FTBIN	44	44	44	44
FTBIN	MAX	SAL	PAR	44	44	44	44
FTBIN	PAR	SAL	MAX	44 43 33	44 33	44 33	44
PAR	MAX	SAL	FTBIN	44 3′3′ 33	44	44	44
PAR	FTBIN	SAL	MAX	44 3′3′ 33	44 33	44 33	44
MAX	FTBIN	PAR	SAL	44	44	44	44
MAX	PAR	FTBIN	SAL	44	44	44	44
FTBIN	MAX	PAR	SAL	44	44	44	44
FTBIN	PAR	MAX	SAL	44 43	44	44	44
PAR	MAX	FTBIN	SAL	44 3′3′ 33	44	44	44
PAR	FTBIN	MAX	SAL	44 3′3′ 33	44 33	44	44

The prediction is that the relative frequency of each couplet type should be proportional to the total number of times it appears in the unshaded cells of (54). The table in (55) compares the expected frequencies of each couplet type with its corpus frequency.[23]

(55) Couplets in H&M corpus

[23]One might expect the frequency of couplets to be determined in part by saliency at the quatrain level. If that were the case, then a better gauge of the "intrinsic" markedness of a couplet type would be the frequency with which it occurs in in parallel quatrains. But this factor turns out to be insignificant. The relative frequencies of couplet types in parallel quatrains are practically the same as the overall couplet frequencies given here (within one percentage point in each case).

Type	frequency in tableaux		frequency in corpus	
44	33%	(30 tableaux)	37%	(461 couplets)
43	33%	(30 tableaux)	35%	(433 couplets)
43′	13%	(12 tableaux)	12%	(144 couplets)
3′3	13%	(12 tableaux)	15%	(183 couplets)
3′3′	4%	(4 tableaux)	1%	(14 couplets)
33	4%	(4 tableaux)	1%	(16 couplets)
other	0%	(0 tableaux)	0%	(3 couplets)
Total	100%	(92 tableaux)	100%	(1254 couplets)

The three-way split **44, 33** (most frequent), **43′, 3′3** (medium), **3′3′, 33** (rare) comes out cleanly, and even the actual corpus percentages are reasonably close to the predicted percentages. This means that, with a minimum of extra assumptions, the constraint ranking needed for the categorical data also make sense of the observed frequency profile.

To summarize: the single additional restriction that SALIENCY is more important than FAITHFULNESS does two things: it excludes the prohibited couplet types, and it generates the pattern of preferences among the remaining permissible couplet types.

4.4 Testing the theory: Isaac Watts' hymns

Now let us consider what the theory predicts about a metrical system which imposes the further constraint that feet must be rigorously binary (iambic), so that degenerate feet (or "extrametrical syllables") are disallowed. It has no lines of the form **3′**, hence no couplets that contain such lines (namely of the form **43′, 3′3**, and **3′3′**).

This stricter meter exists. Not surprisingly, it arose in the 18th century by the superimposition of neoclassical metrical norms on the popular quatrain forms of folk poetry and song. The prolific 18th-century hymn composer Isaac Watts follows it rigorously. Most of his hymns are in quatrains of common meter (**4343**), long meter (**4444**), and short meter (**3343**), in that order of frequency.[24] Formally, the couplet typology of this more restrictive system can be derived from the previous one by promoting FOOTBINARITY over FAITHFULNESS. In other words, we add to SAL ≫ FAITH a second fixed constraint ranking, FTBIN ≫ FAITH. There are again three ways to do that:

(56) a. SAL ≫ FTBIN ≫ FAITH

b. SAL, FTBIN ≫ FAITH

c. FTBIN ≫ SAL ≫ FAITH

And again it turns out that one of these rankings, (56a) SAL ≫ FTBIN ≫ FAITH, approximates the actual *quantitative* profile of the corpus. The outputs of the twenty tableaux permitted by (56a) are displayed in the unshaded portions of the table.

[24] The type **4443** is quite absent. It must be excluded by some quatrain-level constraint, perhaps requiring the even-numbered lines to be parallel. (This would jibe with the fact that in the overwhelming majority of quatrains, the even-numbered lines rhyme with each other).

(57) Outputs of rankings consistent with SAL ≫ FTBIN ≫ FAITH (unshaded cells)

Ranking of markedness constraints				Ranking of FAITHFULNESS			
				2nd	3rd	4th	5th
SAL	MAX	FTBIN	PAR	43 43′ 3′3	43 43′ 3′3	43	43
SAL	MAX	PAR	FTBIN	43 43′ 3′3	43 43′ 3′3	43 43′ 3′3	43
SAL	FTBIN	MAX	PAR	43 43′ 3′3	43	43	43
SAL	FTBIN	PAR	MAX	43 43′ 3′3	43	43	43
SAL	PAR	MAX	FTBIN	43 43′ 3′3	43 43′ 3′3	43 43′ 3′3	43
SAL	PAR	FTBIN	MAX	43 43′ 3′3	43 43′ 3′3	43	43
MAX	SAL	FTBIN	PAR	44	44	44	44
MAX	SAL	PAR	FTBIN	44	44	44	44
FTBIN	SAL	PAR	MAX	44 43	43	43	43
FTBIN	SAL	MAX	PAR	44 43	43	43	43
PAR	SAL	MAX	FTBIN	44 3′3′ 33	44 3′3′ 33	44	44
PAR	SAL	FTBIN	MAX	44 3′3′ 33	44 3′3′ 33	44 33	44
MAX	FTBIN	SAL	PAR	44	44	44	44
MAX	PAR	SAL	FTBIN	44	44	44	44
FTBIN	MAX	SAL	PAR	44	44	44	44
FTBIN	PAR	SAL	MAX	44 43 33	44 33	44 33	44
PAR	MAX	SAL	FTBIN	44 3′3′ 33	44	44	44
PAR	FTBIN	SAL	MAX	44 3′3′ 33	44 33	44 33	44
MAX	FTBIN	PAR	SAL	44	44	44	44
MAX	PAR	FTBIN	SAL	44	44	44	44
FTBIN	MAX	PAR	SAL	44	44	44	44
FTBIN	PAR	MAX	SAL	44 43	44	44	44
PAR	MAX	FTBIN	SAL	44 3′3′ 33	44	44	44
PAR	FTBIN	MAX	SAL	44 3′3′ 33	44 33	44	44

Here are the theoretical frequencies of the couplets predicted by (57) compared with their actual frequencies in Isaac Watts' hymns:[25]

(58) Couplets in Isaac Watts' hymns

Type	frequency in tableaux		frequency in corpus	
44	38%	(8 tableaux)	40%	(3140 couplets)
43	57%	(12 tableaux)	57%	(4538 couplets)
43′	0%	(no tableaux)	0%	(no couplets)
3′3	0%	(no tableaux)	0%	(no couplets)
3′3′	0%	(no tableaux)	0%	(no couplets)
33	5%	(1 tableau)	3%	(258 couplets)
Total	100%	(21 tableaux)	100%	(7936 couplets)

[25] The data is from Watts' *Hymns and Spiritual Songs* (1707) together with his *Psalms of David* (1719) according to the text in `http://www.ccel.org/w/watts/psalmshymns/TOC.htm`. The site identifies the meter of each hymn, which I have checked against the text, and corrected in a few cases. I have only counted quatrains, which are by far the most frequent stanza type in Watts' hyms. However, counting the other stanza types (sextets and octets) would not materially change the picture. There are also a few hymns in iambic pentameter.

The predictions are even more accurate for the hymns than for the folk songs. This was perhaps to be expected, for Watts' hymns are about as homogeneous a corpus as could be imagined, whereas the folk songs have been created and reshaped by many people in different periods and places.

What the folk songs and Watts' hymns have in common is the overall preference for saliency over parallelism at the couplet level. The other metrical grammars consistent with the same categorical facts for the folk songs and hymns, namely (53b,c) and (56b,c), predict different frequency profiles. In all of them, type **44** is more common than type **43**. In other words, these hypothetical verse forms are like the ones studied here except that their frequency distributions favor parallelism over saliency. These predicted alternative metrical practices do not seem to occur in English folk songs, and the question is why not. I conjecture that the rationale for the observed preference for saliency over parallelism lies on the musical side: it is a feature of stanzas intended to be sung. The most likely place to find parallelism dominant would then be in literary verse designed for reading rather than singing.[26]

4.5 Parallelism versus saliency at the quatrain level

The constraint systems developed above distinguish the well-formed lines, couplets, and quatrains from the ill-formed lines, couplets, and quatrains in two related but distinct traditions of popular songs. They also model the relative frequencies of the six kinds of well-formed couplets, which are of course identical to the relative frequencies of the corresponding six kinds of parallel quatrains (making up over 90 per cent of the total number of quatrains). The three well-formed types of salient quatrains are infrequent in comparison, but what data there is shows the same overall statistical preferences. What we have not yet done is to explain *why* parallel quatrains are so much more frequent than salient quatrains. The constraint rankings (53a) and (56a) which give the right results at the couplet level would predict just the opposite at the quatrain level. Either different levels at the metrical hierarchy can have different partial constraint rankings, or there are as yet unformulated level-specific constraints.[27]

Perhaps the generalization is that at the higher end of the metrical hierarchy (20), parallelism supersedes saliency as the dominant organizing principle. Indeed, above the level of the stanza, parallelism is almost completely dominant: this is the generalization behind H&M's STANZA CORRESPONDENCE constraint (see (42)). Once we understand the nature of the generalization and the principle or causal factors behind it, we can formulate the appropriate constraint and incorporate it into the metrical system. This will make another set of statistical predictions which can then be tested against the corpus data.

[26] Shape-note hymns, of which the best-loved collection is probably *The Sacred Harp*, have been hugely popular in Southern Appalachia, where much of the H&M folk song corpus originated. Niles (1961 *passim*) testifies to the influence that shape-note singing had on secular singing style. Metrically they are intermediate between the folk songs Isaac Watts' hymns. This is not surprising, for as Bruce Hayes *(in litt. el.)* points out to me, the *Sacred Harp* is a heterogeneous compilation, which contains, in addition to folk-like material that resembles the Sharp corpus, also a layer of older hymns influenced by Western classical music, plus 19th and 20th century additions of varying quality.

[27] Both these formal options are well-motivated in phonology (Kiparsky to appear).

5 Conclusion

The form of a song is determined jointly by the meter of its stanzas and the way they are set to the rhythm of the tune. A small number of constraints applying at each level in the metrical hierarchy characterize the form of quatrains in two English song traditions. Coupled with the idea that statistical preferences arise from the partial ranking of constraints, these constraint systems also account for the frequency profiles of the quatrain types.

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