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The structure of metrical patterns in tunes and in literary verse. Evidence from discrepancies between musical and linguistic rhythm in Italian songs[1]

Abstract: A first exploration of acceptable and unacceptable discrepancies between linguistic and musical rhythm in Italian songs has uncovered two kinds of discrepancies which do not have counterparts in literary verse: durational discrepancies between adjacent syllables and stress-beat misalignments that involve nonadjacent syllables. The latter type is explored in greater detail than the former. Our survey suggests that analogous misalignments are in principle impossible in literary verse composed in accentual or accentual-syllabic meters, because, on the one hand, the abstract metrical templates that characterize such meters are not anchored in measured time, and, on the other hand, they do not recognize more than two degrees of metrical prominence.

Keywords: generative metrics, metrical grid, dipod

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1 Introduction

The formal regularities found in song lyrics show obvious similarities with those that characterize literary verse. Most metrists acknowledge this fact by assuming that the lyrics of songs have an inherent meter that can be characterized independently of their associated tunes and by describing this meter in terms of notions and theories which were originally elaborated with literary verse in

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view.[2] This may be appropriate for some singing traditions, but it is not for all. We believe that the regularities in the linguistic material of French and Italian songs are to a large extent byproducts of the way this material is associated with melodies.[3]

While song lyrics and literary verse show many formal similarities, they also differ in a number of ways. In this essay we will point out two such differences. Our starting point is the assumption that text-to-tune alignment in songs and conformity to a meter in literary verse both involve matching a linguistic string to an independently given structure, a melody in the former case and an abstract metrical pattern in the latter. A first exploration of acceptable and unacceptable discrepancies between linguistic and musical rhythm in Italian songs has uncovered two kinds of discrepancies which do not have counterparts in literary verse: durational discrepancies between adjacent syllables and stress-beat misalignments that involve nonadjacent syllables. This article focuses on the stress-beat misalignments. We argue that analogues of such misalignments are not even conceivable in literary verse composed in accentual or accentual-syllabic meters, owing to limitations in the shape of the abstract metrical patterns that characterize such meters.

The remainder of this article is organized as follows. In section 2 we present our general outlook and the representations that we will employ to characterize the metrical structure of melodies and the prosodic structure of linguistic sequences. Section 3 contains a first characterization of those configurations that constitute "misalignments" between linguistic stress and musical beat. Section 4 draws attention to durational discrepancies that are not due to the misalignment of stressed syllables. Section 5 extends our definition of misalignments to cases involving syllables that are not string-adjacent and briefly describes the main factors that cause misalignments to be acceptable or not. In section 6 we first show that misalignments involving syllables that are not string-adjacent are only possible with metrical grids that consist of at least three rows. We then argue that in accentual and accentual-syllabic meters only two grid rows are involved in prominence matching. Section 7 is a brief conclusion.

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2 This is Napoli's stance in her 1978 analysis of Italian nursery rhymes. For a recent illustration of this stance in the analysis of sung verse from a number of the world's poetic traditions, see Fabb & Halle (2008).
3 A similar position is taken in the case of English by Hayes and his co-workers in articles published during the last two decades, and by Dell & Halle (2009) in the case of French and English.

2 Preliminaries

A song is the result of combining a text (a linguistic object) with a melody (a musical object). There are severe limitations on how texts and melodies are combined. Not just any text can be sung to any tune. Consider for instance (1), where two different texts are sung to the same melody:

(1)

a	John	likes	po-	ta-	toes
b	*John	likes	ap-	ple	pie

In (1), M is a children's taunting song common to English, Italian and French.[4] Whereas combination (M, a) sounds natural to native ears, combination (M, b) sounds awkward.

We will use the term "setting" or "alignment" to refer to combinations such as (M, a) and (M, b). Our general outlook is that of generative grammar. We assume that fluent participants in a singing tradition have internalized a system of tacit principles and rules or constraints that enable them to tell apart those settings that are well-formed from those that are not. Our ultimate goal is to discover this system. We take our inspiration from earlier work on text-to-tune alignment in this line of research, notably Chen (1983), Dell (1989, 2011), Halle & Lerdahl (1993), Hayes & Kaun (1996), Hayes & MacEachern (1996, 1998), Kiparsky (2006), Turpin (2007), Dell & Elmedlaoui (2008), Dell & Halle (2009), Hayes (2009a, b), Rodríguez-Vázquez (2010), and Schuh (2011).

Instead of using conventional musical scores such as that in (1), we will represent melodies by means of diagrams like that in (2) below, which provide separate descriptions for the pitch contour of a tune and its rhythmic structure.

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4 On this song, see Liberman (1975).

(2)　　　　　1　　2　3　　4　　5　　6　7　　8

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          x                 x
          x        x        x        x                ⎫
          x     x  x     x  x     x  x     x          ⎬  metrical grid  ⎫
                                                      ⎭                 ⎬ melody
          G        E     A  G        E                ⎫                 ⎭
                                                      ⎬  pitches
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　　a　　　　　John　　likes po- ta-　　toes

　　b　　＊ John　　likes ap- ple　　pie

In (2), each of the five successive pitch events ("notes") from (1) is represented by a capital letter (symbolizing pitch) together with its alignment with the metrical grid.[5] The columns in the metrical grid represent points in time. These points in time are commonly referred to as "metrical positions". Each pitch symbol is aligned with a metrical position that represents the onset ("attack") of the note: the note G, which begins at moment 1, is followed by the note E, which begins at moment 3; the note E is followed by the note A, which begins at moment 4, and so on.

The marks on any grid row represent points that are evenly spaced in time. The fact that the columns in (2) are not evenly spaced on the printed page is not significant – it is a matter of typographical convenience.

In (2a) or (2b), since every syllable is aligned with a note, it is aligned with the metrical position at which the note in question begins. When a text is sung to a tune, the tune imposes its rhythmic structure on the text, and that rhythmic structure is represented by the alignment between the text and the metrical grid of the tune.

Each position in the grid is characterized by the height of its column of grid marks, which we call its "metrical strength." Notes that are metrically stronger are heard as having greater prominence than their neighbors, e.g., when the children's chant is hummed or played on an instrument, we perceive the second note (E), which has a two-mark column, as more prominent than the third (A), which has only one mark. When a text is sung to a melody, each syllable inherits the metrical strength of the note it is aligned with, e.g., in (2b) the second syllable of *apple* is heard as more prominent than the first, which does not accord with its stress pattern.

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5 On metrical grids, see Liberman (1975) and Lerdahl & Jackendoff (1983).

We now turn to the other protagonist in the relationship between musical rhythm and linguistic stress. While the rhythmic structure of a melody is represented by a metrical grid, the stress pattern of a text is represented by a grid of another kind, which we call a prosodic grid.[6] Our prosodic grids purport to represent only those aspects of stress that are relevant in textsetting.[7] The rules for constructing these grids up to the level of the Phonological Phrase ("PhP" from now on) are given in (3) and the prosodic grid for the phrase *un piatto pieno* 'a full dish' is displayed in (4):

(3) i.   On row p1, associate a grid mark to every syllable.
    ii. On row p2, associate a mark to every syllable that bears the main stress in a polysyllabic word or is the sole syllable in a monosyllabic content word.
    iii. On row p3, associate a mark to every syllable that bears the main stress in a PhP. (The main stress of a PhP falls on the rightmost word in that PhP.)

(4)   [un piát- to pié-   no]

	un	piát-	to	pié-	no	
p1	●	●	●	●	●	by (3i)
p2		●		●		by (3ii)
p3				●		by (3iii)

In the textsettings in our examples, words are written in the standard spelling, but we add an acute accent over vowels that bear main stress in polysyllabic words; this includes replacing the grave accents used in the standard orthography to represent word-final stresses. Square brackets represent PhP edges.

Whereas the positions in a metrical grid are evenly spaced in time, this is not the case for the columns in a prosodic grid, which are aligned with the syllables of the linguistic representation. A concomitant difference between the two kinds of grid is that metrical grids, but not prosodic grids, may contain empty positions, i.e., positions that do not have an associated note or syllable. This can be seen in (5) below, an acceptable setting which is the result of singing the phrase *un piatto pieno* to the tune of the children's chant, just like the English example in (2a).

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6 Adopting a terminological stance similar to that taken by Hanson & Kiparsky (1996, fn2), we reserve the term "prosodic" for reference to the properties of linguistic objects and "metrical" for those of musical objects.

7 Our prosodic grids are similar to those that would result from those postulated for Italian in Nespor & Vogel (1989) if the levels Foot, Intonational Phrase, and Phonological Utterance were omitted from the prosodic hierarchy.

(5)

	1	2	3	4	5	6	7	8
m1	x				x			
m2	x		x		x		x	
m3	x	x	x	x	x	x	x	x

	[un	piát-	to	pié-	no]

p1	●	●	●	●		●
p2		●		●		
p3				●		

In the metrical grid for this song, positions 2, 6 and 8 are empty, i.e. they represent points in time that do not coincide with the attack of a note. The prosodic grid for *un piatto pieno*, on the other hand, does not contain any empty position, since rule (3i) guarantees a one-to-one correspondence between syllables and positions in the prosodic grid.

In order to construct the final row of the prosodic grid, rule (3iii) needs to have access to the division of the linguistic sequence into PhPs. The delimitation of PhPs in Italian is a thorny problem (see Ghini 1993), but as we will see later, the stretches involved in the stress-beat discrepancies which are crucial to the central point of this paper are never larger than a single word. Consequently, it will be sufficient for our purposes to adopt the principles of Phonological Phrase Formation proposed by Nespor & Vogel (1986), assuming that their restructuring rule (see p. 173), which is optional in ordinary language, is obligatory in songs. Here is how we reformulate these assumptions: A text must be exhaustively partitioned into PhPs such that a PhP boundary occurs at the end of every word that contains the head of a maximal projection, except when that head is followed by a complement that consists of a single word, in which case the head and the complement belong to the same PhP. We illustrate with (6a–c) below, where PhPs are enclosed in brackets.

(6) a. [mostragli][dei giochi][di società]   'show him parlour games'
   b. [mostragli][dei giochi divertenti]   'show him amusing games'
   c. [visitano Napoli]   'they are visiting Naples'

In the first two examples the verb is followed by a clitic pronoun *gli*. We assume that enclitics join with their hosts to form a single word. Since the verb *mostra* is the head of a Verb Phrase, a PhP boundary follows *mostragli*. In (6c) the verb *visitano* is not followed by a PhP boundary because it is followed by a one-word complement. *Giochi*, which is the head of a Noun Phrase in (6a) and (6b), is

followed by a PhP boundary in (6a) but not in (6b) because there it is followed by a one-word complement.

Having introduced the two grids that are put into correspondence when an Italian text is sung to a tune, we now turn to the correspondence itself.

3 Misalignments

Consider (7) below, which results from singing the sentence *Barbara verrà* 'Barbara will come' to the melody of the children's chant. This alignment is unacceptable.

(7) m3   x   x
    m2   x   x   x   x
    m1   x   x   x   x   x   x   x   x

           *[Bár-   ba- ra] [ver-   rá]

    p1   ●   ●   ●   ●   ●
    p2   ●   ●
    p3   ●   ●

The ill-formedness of (7) is due to the fact that the metrical grid of the melody is not congruent with the prosodic grid of the text. Specifically, the syllable *rá*, which bears the main stress in *verrá*, occupies a metrical position that is weaker than that of the adjacent syllable *ver-*. Let us say that the two syllables constitute a misalignment.[8]

(8) MISALIGNMENT (provisional definition): A misalignment is a pair of syllables that meet the following conditions:
    C1   They are adjacent in the linguistic sequence.
    C2   The syllable with stronger stress is metrically weaker than the other syllable.
    C3   Both syllables belong to the same prosodic constituent K, either a Prosodic Word or a Phonological Phrase, and one of them bears K's main stress.

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8 Our "misalignments" are similar to the configurations that violate the constraint MATCH STRESS in Hayes (2009a).

The pair of syllables (*ver-*, *rá*) is a misalignment as defined in (8), and it is this misalignment that is responsible for the fact that (7) is unacceptable to native ears.

It is important to note that not all misalignments give rise to unacceptable settings. In the well-formed setting depicted in (9) below, the first two words each contain a misalignment:[9]

(9)

m3	x						x			
m2	x			x			x		x	
m1	x	x	x	x	x	x	x	x	x	x	x	x

[ad- dío] [cá- ri   com- pá-   gni]

p1	●	●	●	●	●	●		●
p2		●	●			●		
p3		●				●		

The two misalignments in (9) are in opposite directions. In *addío* it is the syllable on the left[10] that is metrically stronger, and so we shall say that (*ad-*, *dío*) is a left-misalignment. In cases like (*cá-*, *ri*), on the other hand, where it is the syllable on the right that is metrically stronger, we will speak of a right-misalignment.

In order to discover the principles that underlie native speakers' acceptability judgments, one must first establish what those judgments are; one must then work out the regularities that separate natural-sounding settings from those that grate on the ear. We have examined two kinds of data, extant songs and native speakers' reactions to settings that we constructed in order to test our conjectures about putative regularities.

The 112 songs we have examined are listed in Appendix B. We began by reviewing all the songs recorded in a two-CD set of nursery rhymes. We soon realized that not many misalignments are found in nursery rhymes; further-more, those that are found tend to occur in grammatical words located near the beginning of phrases. To increase our chances of finding misalignments

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9 *Addio cari compagni* 'Farewell, dear comrades', 4-1/7-1. In this paper, in reference numbers of the form *y/z*, *y* is the number of a song in Appendix B and *z* indicates a line in a stanza of that song; hence "4-1/7-1" refers to the first line in the seventh stanza of song 4-1.
10 *Addio* is actually a trisyllabic word with stress on its second syllable (*ad-dí-o*). In (9) the two vowels in hiatus are aligned with the same metrical position, a common occurrence in Italian singing and poetry.

we decided to look also at some widely known folk songs. The total number of lines in our corpus comes close to 2000.[11] We have supplemented this data with acceptability judgments on close to 400 invented settings. These judgments are those of one of the authors, who is a native speaker of Italian, and of her sister.

4 Durational discrepancies

Before we get on with our discussion of stress-beat misalignments, it must be briefly noted that they are not the only kind of rhythmic discrepancy that give rise to unacceptable settings in Italian songs. As defined in (8), misalignments have to do with the metrical strength of a stressed syllable. While testing constructs, we have come across several alignments whose ill-formedness is due to discrepancies that are not misalignments in the above sense. The property of stressed syllables that is involved in these discrepancies is not their metrical strength but their duration relative to that of an adjacent syllable belonging to the same word. One such discrepancy is represented below in (10b). The scores in (10) represent the sentence *Leggi le favole nel lettino* 'Read the fairytales in the little bed' matched to two melodies that differ minimally from one another. Neither setting contains a misalignment, and yet one is acceptable, and the other is not.

In (10a), which is acceptable, the melody is that of the first couplet in song 2–16 in Appendix B.[12] The melody in the unacceptable setting (10b) sounds natural when heard without any associated lyrics and results from simply interverting the durations of the two notes in the second measure of (10a). The grid in (11) below represents the rhythmic structure of the settings in (10).

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11 Repeated lines and lines consisting of nonsense syllables are not counted.
12 The original text is *Dormi bambino nel tuo lettino* 'Sleep, baby, in your little bed'.

(11)

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                          x                        x
           x              x              x         x
           x   x   x      x   x      x   x     x   x   x   x   x

    a      lég- gi  le    fá-        vo- le     nel let- tí-      no

    b    * lég- gi  le    fá- vo-        le     nel let- tí-      no
```

In (11b) the duration of the stressed vowel is half that of the following stress-less vowel. Setting (11b) presumably conflicts with the following "rule schema for textsetting" postulated by Hayes & Kaun (1996: 260): "Reflect the natural phonetic durations of syllables in the number of metrical beats they receive." As our investigations were focused on stress-beat misalignments, we have not examined discrepancies like those in (11b), but given the role of vowel duration in the phonology of Italian,[13] it is clear that they warrant careful investigation.

5 Broadening the definition of misalignments

Returning now to the definition of misalignments presented in (8), there are several points to note about it. Firstly, not all discrepancies between stress and rhythm are misalignments as defined in (8). In the setting below, which is drawn from our corpus, we have boxed a stress-rhythm discrepancy that does not give rise to unacceptability and does not fall under our definition of misalignments.[14]

(12)

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m3     x                                x
m2     x                   x            x                   x
m1     x     x     x     x      x     x     x     x   x   x   x

       [non  dú-   bi-   ti]         [si-   gnó-   ra]

p1      •     •     •     •            •     •      •
p2            •                              •
p3            •                              •
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13 See D'Imperio & Rosenthall (1999) and Krämer (2009) and references therein.

14 *Non dubiti, signora* 'Rest assured, Madam', 3-60/6-1.

In *dúbiti* the main stress is on the initial syllable, but it is the word's last syllable that occupies the strongest metrical position. Nevertheless, (*dú-*, *ti*) is not a misalignment because the two syllables are not adjacent, contrary to condition C1 in (8).

A second point worth noting is that the main stresses of words are the only ones taken into account in the definition of misalignments. Our data suggest that stress–rhythm discrepancies involving secondary stresses do not affect well-formedness. The very existence of secondary stresses in Italian words is a matter of some dispute (see Krämer 2009: 194ff.). For the sake of discussion, let us accept the claim in Vogel & Scalise (1982) that word-initial syllables have secondary stress unless they immediately precede the syllable with main stress: *Àristótele* 'Aristotle', *càpacitá* 'capacity' (see also Sluyters 1990). If secondary stresses were taken into account in textsetting, we would expect a tendency for the initial syllable of such words to be metrically stronger than the following syllable. This expectation is not borne out by the data, however. Consider words of the form /... sssś.../, that is, words in which there are three syllables or more before the main stress. Our corpus contains 56 instances of such words, excluding a handful of cases in which the main stress of these words is involved in a misalignment. In 48 out of 56 the initial syllable is metrically weaker than the syllable that follows it. We would expect the opposite if secondary stresses mattered.[15]

Vogel & Scalise state (p. 216) that in Italian "there are no stresses to the right of the primary stress in a word" and we have not found any reason to dispute this claim.[16]

We now come to two more central points, both about condition C3 in definition (8), which concerns the grammatical affiliation of the two syllables involved in a misalignment. First, they don't have to belong to the same word; they happen to belong to the same word in (7), but they can just as well belong to different

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15 All 56 words have, in fact, exactly three syllables before the stressed syllable, and out of these, 48 are set to the rhythmic pattern /sssś.../, where the underscores indicate syllables that are metrically stronger than their neighbours, e.g. *lavoratóri* 'workers', *ritornerò* 'I will return'. We do not have an explanation for the 48/56 ratio.

16 Assuming, as we do, that enclitics belong to the same word as their host, Italian allows up to four syllables after the stressed syllable, e.g. *caricamelo* (*cárica#me#lo*) 'load it for me'. Our corpus does not contain any word with more than two syllables after the stressed syllable. This is due to its limited size and to the relative rarity of such words. The behavior of compound words in our corpus can be exemplified by *spazzacamino* 'chimney sweep' in song 3–60, with main stress on the penultimate syllable; it is set to the rhythmic pattern /sssś.../ in some lines and to the pattern /sssś.../ in others.

words within the same phrase, as when the text sung to the children's chant is *Barbara sta qui* 'Barbara is here'. The resulting setting, which is again unacceptable, is represented in (13) below. The pair (*sta*, *qui*) is a misalignment as defined in (8).

(13)

m3	x				x			
m2	x		x		x		x	
m1	x	x	x	x	x	x	x	x
	*[Bár-		ba-	ra]	[sta		qui]	
p1	●		●	●	●		●	
p2	●				●		●	
p3	●						●	

Since in Italian the main stress of a phrase falls on its last word (see (3iii)), in misalignments that involve the main stress of a phrase, one of the two syllables necessarily belongs to the last word in that phrase. The other syllable may also belong to that word, as in (7), or else it may belong to the penultimate word in the phrase, as in (13).

To distinguish it from word-internal misalignments like (*ver-*, *rá*) in (7), we shall call (*sta*, *qui*) an inter-word misalignment. An important difference between the two kinds of misalignments is that inter-word misalignments can only be left-misalignments. One of the syllables involved in an inter-word misalignment must bear the main stress of a PhP (see C3 in (8)), so one of the syllables must always belong to the last word. The other syllable must belong to the preceding word, and PhPs are stressed on their last word. Consequently, it is always the second syllable of an inter-word misalignment that bears stronger stress, and the misalignment is a left-misalignment. Right misalignments, when they occur, are necessarily word-internal.

Our second comment about condition C3 is about its final clause "and one of them bears K's main stress" This clause is needed to prevent the boxed pair in the constructed example (14) and others like it from being considered misalignments.

(14)
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              1              2              3              4

m3                          x                            x
m2           x              x                    x       x
m1           x   x   x      x      x    | x   x | x   x   x   x   x

            [se      Mi-   mí]   [vor-  | rá  te-| le-  fo-  ná-  re]

p1           •       •     •      •     | •   • | •    •    •    •
p2                         •             | •    |            •
p3                         •                                •
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The setting in (14) is the result of singing the clause *Se Mimì vorrà telefonare* 'if Mimi wants to telephone' to the melody of the first line in song 3-10.[17] This construct is acceptable. The pair (*rá*, *te-*) meets conditions C1 and C2 in the definition, but not condition C3: both syllables belong to a common prosodic constituent, the PhP *vorrà telefonare*, but neither bears the PhP's main stress. As implied by condition C3, there is more to misalignments than a misalignment of two grids. The prosodic bracketing of the text must also be taken into account.

We now move on to cases which suggest that the definition of misalignments given in (8) is too restrictive, in that it only takes into account syllables that are adjacent to each other. Consider the setting in (15) below, which is the result of singing the sentence *Spesso ne dubitano* 'They often have doubts about it' to the melody of (9). This setting is unacceptable.

(15)
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m3        x                      x
m2        x              [x]     [x]           x
m1        x   x   x   x   x   x   x   x   x   x   x

      * [spés- so]  [ne  dú-     bi-  ta-      no]

p1        •    •    •    •       •    •         •
p2        •              •
p3        •              •
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17 The text of the original line is *Amor, dammi quel fazzolettino* 'My love, give me that small handkerchief'.

The ill-formedness of (15) is due to the fact that in *dúbitano*, the tonic syllable *dú-* is metrically weaker than *ta-*. The two syllables do not satisfy definition (8), since they are not adjacent.

Although *dú-* and *ta-* are not adjacent in the linguistic string, they can be considered adjacent on the second row of the metrical grid, since the intervening syllable *bi-* is not represented by a mark on that row. In *dúbiti* in (12), by contrast, syllables *dú-* and *ti* are not adjacent on any row of the metrical grid. One can go further and make up constructs in which the misaligned syllables are separated by two syllables instead of only one. The setting depicted in (16) contains such a configuration (*lé-*, *mi*) and is unacceptable like (15).[18]

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(16) m3                     x                          x
     m2       x             x              x̅           x̅
     m1       x   x   x   x   x   x   x   x   x   x  x  x

          *  [dó- po l'in- cón- tro] [te- lé- fo- na- mi]
```

We propose to generalize the definition of misalignments so that grid-level adjacency is what matters instead of string-adjacency. Let us first define grid-level adjacency. Let us say that two syllables are adjacent on a given row of the metrical grid if they have marks on the row in question and there is no intervening syllable with a mark on that row. By definition, string-adjacent syllables are always grid-level-adjacent.

We now reformulate condition C1 in definition (8) in terms of grid-level adjacency. As a result, we get (17):

(17) MISALIGNMENT: A misalignment is a pair of syllables that meet the following conditions:
  C1 They are adjacent *on some row of the metrical grid*.
  C2 The syllable with stronger stress is metrically weaker than the other syllable.
  C3 Both syllables belong to the same prosodic constituent K, either a Prosodic Word or a Phonological Phrase, and one of them bears K's main stress.

Configurations like that in (15) and (16) are misalignments according to the new definition, while configurations like (12) still fall outside its purview.

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18 *Dopo l'incontro, telefonami* 'After the meeting, call me'. The melody is that of 3-10/1-2. The text of the original line is *Vado alla fonte; lo voglio lavar* 'I will go to the spring; I want to wash it'.

If a misalignment involves syllables that are not adjacent in the linguistic string, let us call it a skip. Left-skips are almost always acceptable. However, right-skips are never fully acceptable; acceptability judgments about them range from "awkward" to "very bad." The setting in (18) below, in which the pairs (*noc-*, *lí-*) and (*noi*, *giám*) are both left-skips, is given to illustrate the general acceptability of left-skips.[19]

(18) m3   x   x
     m2   [x]   [x]   [x]   [x]
     m1   x   x   x   x   x   x   x   x

           [le noc- cio- lí- ne] [noi man- giám]

     p1   ●   ●   ●   ●   ●   ●   ●   ●
     p2   ●   ●
     p3   ●   ●

Setting (18) furthermore illustrates the following two features of left-skips. Firstly, their acceptability does not depend on whether the two syllables belong to the same word: (*noc-*, *lí-*) is word-internal and (*noi*, *giám*) is inter-word.[20] Secondly, left-skips are acceptable even at the end of lines, a context that is particularly averse to misalignments in Italian songs. (*noi*, *giám*) is an inter-word misalignment, but line ends also tolerate left-skips that are word-internal, as happens in the line that comes before (18) in the same song. The line's metrical pattern is the same as that in (18) and its final word *ascoltár* gives rise to a word-internal left-skip.[21]

Left-skips are the only misalignments allowed at the end of lines in Italian folk songs.[22] In this respect, the Italian tradition differs from the English one, where most misalignments are right-misalignments and occur at the end of lines.[23]

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19 *Le noccioline noi mangiam* 'We eat peanuts', 2-3/2-4.
20 Inter-word skips are necessarily left-skips, since as explained in the previous section, inter-word misalignments are always left-misalignments.
21 *E mentre stiamo ad ascoltar* 'And while we are listening'.
22 We have found only two counterexamples to this generalization in our corpus. The first is found in song 4-3 in line-final paroxytones whose final syllable is on a stronger metrical position than the penultimate. However the penultimate bears a three-note melisma, and we have reasons to believe that melismas can add to the metrical strength of syllables. The second counterexample occurs in the last word of the refrain of song 3–65. We have not been able to work out what makes this refrain different from the rest of our corpus.
23 Cf. Hayes & Kaun (1996), Hayes (2009a).

The exclusion of line-final misalignments in Italian might well be an instance of the "Beginnings Free, Endings Strict" principle, which disfavors their occurrence at the end of metrical units, e.g., lines of verse, as well as of prosodic domains, e.g., PhPs.[24] However, our analysis shows that in Italian, proximity to the end of metrical or prosodic units is not the only factor that impinges on the acceptability of misalignments and that at least two other factors play a role: directionality and the level of adjacency on the metrical grid. A detailed study of how these factors interact is clearly needed.

We are now ready to examine one implication of the prohibition of right-skips. It involves the comparison between textsetting in songs and metrical scansion in literary poetry.

6 Prominence matching in literary verse

One remarkable difference between textsetting in songs and metrical scansion in literary verse is the following: conditions on the occurrence of misalignments make reference to *pairs* of metrical positions. In literary verse, on the other hand, the rules and conditions that govern metricality involve single metrical positions.[25]

Before suggesting an explanation for this difference, let us outline briefly the conception of meter that is currently prevalent in studies of metrical texts that are not sung or chanted. For most metrists in the generative tradition, the metricality of a linguistic sequence is a reflection of the fact that the sequence can be matched to an abstract metrical pattern in such a way that the correspondence meets various well-formedness conditions. The role played by this abstract metrical pattern is analogous to that played by the metrical grid in songs. By way of illustration, we give in (19) the metrical template for the English iambic pentameter according to Kiparsky (1977: 230). This template is a binary-branching tree in which the terminal nodes are metrical positions. In each pair of nodes in that tree, one is labeled strong and the other weak. (The numbers are for ease of reference.)

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24 Hayes & Kaun formulate this generalization as follows (p. 258): "Correspondence of linguistic material to a metrical pattern tends to be free at the beginning of units, strict at the ends." Rather than a real linguistic "principle," we construe this statement as an empirical generalization valid across languages and poetic traditions.

25 We are grateful to Nigel Fabb for bringing this difference to our attention; see Fabb (2011: 5). Jespersen (1933: 114) and Hanson & Kiparsky (1996: 298) already noted this property in the case of the iambic pentameter. For examples of well-formedness conditions that involve single metrical positions, see, e.g., Kiparsky (1977), Hayes (1983, 1989), and Hanson & Kiparsky (1996).

(19)

The correspondence between a linguistic sequence and a metrical pattern is called a scansion. Here is for instance the scansion of a line by Shakespeare. (Only the terminal nodes of (19) are represented.)

(20)   w   s   w   s   w   s   w   s w   s
       When to the séssions of sweet sílent thought   (Son. 30)

Here is one of the conditions that regulate the well-formedness of the mapping in (20):

(21) A *w* position may not be occupied by a stressed syllable belonging to a polysyllabic word.[26]

The line in (22) below, which was made up by Hayes, is unmetrical because it violates condition (21): in the polysyllable *seréne* the stressed syllable occupies a *w* position.

(22)   w   s   w   s   w   s w   s w   s
       *When in the course of seréne sílent thought[27]

In studies in the generative tradition, the metrical idiom characteristic of a period or a poet consists of a set of conditions like (21), which state that a *w* or *s* position may not be occupied by a syllable occurring in a certain environment. When a linguistic sequence can be mapped to a metrical pattern so that these

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26 (21) is filter (60) in Hayes (1983: 381).
27 (7b) in Hayes (1988: 223).

conditions are not violated or violations are minimal, the sequence is deemed metrical. Borrowing a term from Hayes (1983), we will refer to rules like (21) as "filters."

While in some works metrical patterns are viewed as trees like (19), in other works they are given the form of grids. Assuming for instance the metrical pattern proposed for the iambic pentameter in Hayes (1983: 376), the metrical scansion of the line in (20) would be represented as follows:

(23)   x   x   x   x   x   2
        x   x   x   x   x   x   x   x x   x   1

     When   to   the   séssions   of   sweet   sílent   thought

The relationship between the tree in (19) and the grid in (23) is straightforward. Each metrical position in the tree has a corresponding grid mark in the bottom row of the grid and each strong position has a mark in the row above. Using grids to represent the metrical patterns of literary poetry brings out the analogy between metrical scansion in literary poetry and text-to-tune alignment in singing. The task of the students of either domain is to discover, among other things, the constraints that regulate the alignment between two kinds of grids: prosodic grids, which represent stress patterns of linguistic strings, and metrical grids. In both domains the role of the constraints is to guarantee a certain degree of congruency in the alignments; crests in one grid and crests in the other must line up to a certain extent.

Most filters in the literature are formulated according to (24) or they can be reformulated so as to have this shape:

(24) Avoid alignments of the form   METER   valley
                                                          |
                                          TEXT   *crest in environment E*

(24) prohibits or disfavors scansions in which a "valley" in the meter is aligned with a crest in the prosodic structure of the text. A valley is the sort of metrical position represented as a trough in grids like (23) or labeled *w* in trees like (19). (24) is a general schema that is instantiated as a specific filter by specifying its variable part, which is indicated in italics. For instance, the schema is instantiated as (21) when the italics are replaced by "stressed syllable belonging to a polysyllabic word."

While checking a scansion for conformity with a filter does not require examining more than one position at a time in the metrical pattern, the portion of text

involved is usually larger than a single syllable, as is the case in (21), where the conditions of the filter are met only if the target syllable and an adjacent syllable belong to the same word.

If one's aim is to devise a unified framework that would cover text-to-tune alignment as well as text-to-meter alignment, the following question presents itself: In the study of textsetting, would it be possible to limit the descriptive apparatus to filters of the form given in (24)? We now show that the ill-formedness of right-skips in Italian would pose a special challenge to someone attempting to use filters to exclude them.

The reader may recall that a skip is a misalignment involving two syllables that are not string-adjacent. Consider the settings (25) and (26) below. They both contain an occurrence of *sigaro*, an initially stressed word with its first and its last syllable adjacent on the second row of the metrical grid. While there is no misalignment in (25), an attested setting that is acceptable,[28] there is one in (26), a construct that is not acceptable.[29]

```
(25) m3                      x                   x
     m2              |x|            |x|          x              x
     m1        x     x     x  x  x  x  x  x      x     x   x  x

           [fú-  ma] [un  sí-     ga- ro     to- scá-  no]

(26) m3                  x                       x
     m2        x         x                |x|          |x|         x
     m1        x  x  x   x      x     x    x  x  x      x  x  x  x

        *  [sta     fu- mán- do] [quel sí-     ga- ro]
```

In a framework with filters only, how would one exclude the right-skip in (26)? Let us concentrate on the fact that in order to detect a right-skip, it is necessary to be able to consider two metrical positions at the same time, two positions which, furthermore, do not correspond to adjacent syllables.[30]

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28 *Fuma un sigaro toscano* 'He is smoking a Tuscan cigar', 2-2/2-3.

29 *Sta fumando quel sigaro* 'He was smoking that cigar'. The melody is that of 1-14/1-4; the text of the original line is *Era nata nel Canadà* 'She was born in Canada'. (25) and (26) do not form a perfect minimal pair, because in addition to their different rhythms, the two occurrences of *sigaro* also differ in their locations relative to the end of the line. One may wonder whether rhythmicizations like that of *sigaro* in (25) are acceptable line-finally. They are: such rhythmicizations occur line-finally in song 3-9.

30 Note that filters of the form (24) target valleys in the metrical pattern, while the difference between (25) and (26) has to do with crests, not valleys. In the framework proposed by Hanson

To compare the metrical strengths of syllables that are separated by one or more syllables is far beyond the expressive capabilities of filters. Why? In a nutshell, filters only distinguish two degrees of prominence on the metrical side, weak vs. strong or valley vs. crest, as in the two-row grid in (23), while skips need at least three grid rows to exist.

It is easy to see why three rows are necessary: in a skip the misaligned syllables must be adjacent on a grid row that is not the bottom row, and the syllable with the higher grid column must have a mark on yet another grid row above the row where adjacency obtains.

Filters, on the other hand, were invented in order to deal with metrical patterns that are two-level grids like (23) or with equivalent objects that encode a contrast in metrical prominence that is essentially binary. No wonder, then, that filters cannot cope with the more differentiated structures found in melodies.

We have just proposed the following generalization:

(27) BMP (Binarity of Metrical Prominence): In literary verse based on accentual or accentual-syllabic meters, conditions on prominence matching only recognize a two-way partition of metrical positions.

Note that quantitative meters such as those of Sanskrit, Classical Arabic or Tashlhiyt Berber are outside the purview of this generalization. So as to avoid tiresome repetitions, let us agree that from now on all our references to "literary verse" are shorthand for "literary verse based on accentual or accentual-syllabic verse." Note also that (27) is about *metrical* prominence, i.e., about the patterns to which linguistic strings are matched, not about the phonological properties of those strings that are metrically relevant: the BMP thesis should not be confused with a claim made by Lotz (1960: 140–141) and Fabb & Halle (2008: 267), which in the latter's formulation is as follows: "metrical rules and conditions recognize only a two-way partitioning of syllables [. . .], a partition which can be based on stress (accent), weight (quantity), tone, or [. . .] alliteration".

The BMP thesis, which is already implicit in the theory of meter presented in Hanson and Kiparsky (1996), is not obviously true. Appendix A reviews the recent theoretical literature and discusses possible counterexamples to the BMP thesis.

We have seen that filters of the form (24), which refer to a single metrical position, are not adequate devices for constraining the occurrence of misalignments in songs, because misalignments involve pairs of metrical positions. We conjec-

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& Kiparsky (1996), however, metrical crests are also possible targets for filters. An instance is found in Hanson's 1996 analysis of the Italian hendecasyllable. Her parameter setting (14a) (p. 64) is a condition on syllables that fill the strongest position in a colon.

ture that the ability of filters to constrain prominence matching in literary verse is due to the simple shapes of the metrical templates of written poetry. Because of these simple shapes, instances that are in fact misalignments can be characterized as violations in which only one metrical position is involved.

Consider for instance the operation of filter (21) in iambic pentameters. It is easy to see that every violation of the filter is also a mismatch, as happens in (22), where the pair (*se-*, *réne*) is a mismatch. But in order to prevent ill-formed mappings such as <u>*se*</u>*réne* in (22) there is no need to make reference to two metrical positions; it is sufficient to constrain weak positions. This is due to the fact that in any sequence of two syllables in an English polysyllable, at least one is treated as unstressed for the purpose of text-to-meter alignment,[31] while in the metrical template for the iambic pentameter every weak position is adjacent to a strong one (see (23)).

If one's aim is to devise a unified theory that would account for textsetting in songs as well as for text-to-meter alignment in literary verse, a problem for future research is to restate the various filters that have been proposed by students of literary verse in such a way that violations of these filters will amount to misalignments of a special kind.

7 Conclusion

Our work is predicated on the assumption that literary verse and sung verse both involve mapping linguistic material to an independently given prominence pattern. We have pointed out two differences between the prominence patterns involved in text-to-meter alignment and those involved in setting texts to music: one difference has to do with durational relationships between adjacent syllables, and the other, with the number of rows in a pattern.

Durational discrepancies like that in (11b) do not have any counterpart in literary verse, and it is easy to see why: in the oral rendition of verse the speech chain is a sequence of events that unfolds in time, but the abstract metrical patterns of literary verse are not temporal objects in and of themselves; they specify precedence and strength relations between their positions, but they do not regulate durational ratios between successive intervals in the grid.[32]

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31 Even in *maintain*, for instance, although the first syllable bears a secondary stress, its alignment with a weak metrical position does note violate (21), because it is adjacent to a stronger stress and it is treated as unstressed. On metrically irrelevant secondary stresses, see Hayes (1983: 371–373).
32 See Oehrle (1989).

The second difference concerns the number of levels in metrical grids. Grids with three or four rows are commonplace in text-to-tune alignment; in literary verse, on the other hand, conditions on prominence matching do not recognize more than two degrees of metrical strength. Here is why the metrical templates of literary verse are so restricted: these templates are not encoded in any direct way by means of specific markers (apart from the fact that the layout on the printed page can serve to indicate how texts are divided into lines and stanzas); they are made manifest only through stress patterns inherent in the linguistic material that is aligned with them. In sung verse, on the other hand, metrical grids are part of musical structure, which is perceptible on its own terms, and the clues that listeners' minds rely on in order to construct these grids are to a large extent independent of the linguistic material aligned with the music.

For a literary meter to be viable, listeners/readers must find it relatively easy to perceive its effects in shaping the linguistic material. Even in a language like English, with at least three levels of stress, rhythmic patterns with more than two degrees of prominence are too complex to be conveyed by ordinary speech rhythm. Whether the limited structure of literary templates should be ascribed to limitations that are specific to the language faculty or to perceptual restrictions of a more general nature is a matter for further research.

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Appendix A: the evidence for the BMP thesis

This appendix presents evidence in favor of our claim in (27) that in literary verse (that is, literary verse based on accentual or accentual-syllabic meters), conditions on prominence matching only recognize a two-way partition of metrical positions.

We first look at studies that deal only with metrical forms like the iambic pentameter which do not have a close association with sung poetry. Some studies posit only two degrees of metrical strength, e.g. Hammond (1991), Hayes (1983, 1989), Hayes & Moore-Cantwell (2011). Other studies posit more than two degrees or imply their existence, but only two degrees actually play a role in prominence matching. Consider again the metrical pattern proposed in Kiparsky (1977) for the English iambic pentameter, which is reproduced in (19). The digits arrayed alongside the tree in (19) represent the four-step prominence scale that is implied by that tree. In Kiparsky's analysis, however, the rules that govern the mapping of prosodic prominence to the metrical pattern only make reference to the two bottom rungs in the scale, i.e. those that are implied by the *w/s* labeling of the tree's terminal nodes. The labeling of the nonterminal nodes is used for specifying options in the placement of caesuras.
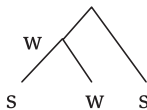
Unlike the metrical patterns employed by other metrists in the generative tradition, the bracketed grids advocated by Fabb & Halle (2008) are not meant to
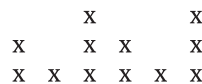
represent rhythmic structure, and they are not templates given independently of the linguistic strings. Nonetheless they are sufficiently similar, both in form and function, to be discussed here alongside those templates. From our point of view, Fabb & Halle's bracketed grids are in the same league as the tree in (19): in the various discussions of accentual or accentual-syllabic verse that are found in the book, only the lowest two gridlines are used to enforce a more or less periodic patterning of prosodic prominence. Higher-level grid structure does not play any role in regulating the distribution of prosodic prominence, or if it does, it does not serve to define higher-order periodicities.[33]

As a potential source of counterexamples to the BMP thesis,[34] consider the structure attributed to ternary feet by Kiparsky (1977) and Prince (1989). According to these authors, only binary branchings are allowed in tree-shaped metrical patterns, and the weak half of a ternary foot has a falling rhythm (*sw*). An anapest, for instance, has the structure displayed below in (28a), where the first position is stronger than the second, but weaker than the third. This is seen in the metrical grid in (28b), which is derived from (28a). (28b) depicts two abutting anapests, to give a better idea of what the metrical grid for an anapestic meter would look like.

(28) a.   b.

```
              W                              x           x
             /|\                        x    x  x        x
            / | \                       x  x x  x  x  x
           S  W  S
```

In English and Russian anapests, the first position, but not the second, may be filled by a stressed syllable. Although the structure displayed in (28) implies a three-way opposition in metrical prominence, this distinction is not put to use, as far as we know; the top row in (28b) is ignored for the purposes of text-to-meter alignment. In English, one could imagine an anapestic meter which would require that if the first and last positions of an anapest are filled by stressed syllables that belong to the same word, the first position may not be more strongly stressed than the third. In such a meter, a trisyllabic word like *sùperséde* could be aligned with

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33 See for instance, in Chapter 4 (written by Carlos Piera), the conditions (54) (p. 109) and (60) (p. 113) imposed on gridline 2; condition (60) is part of the rules that characterize Petrarch's hendecasyllables.

34 Unlike Fabb & Halle's theory, the Prosodic Metrics advocated by Golston (1998) does not involve any device comparable to a metrical template, and so it is not clear how metrical studies carried out within that framework could provide evidence against the BMP thesis.

an anapest, but not one like *ánecdòte*. We conjecture that such a meter does not exist.

In Hayes & Kaun (1996), Hayes & MacEachern (1996, 1998) and Hayes (2009a), the primary focus is on regularities in sung or chanted verse, with data drawn mainly from a corpus of traditional Anglo-American folk songs. The intent of Hayes and his co-workers is to develop a framework that encompasses both literary verse and sung verse and they attribute to literary verse metrical structures that are rather similar to those they posit for sung verse. In their analyses of the latter, texts are aligned with grids that represent the rhythmic structure of the melodies of the songs.

The grid in (29) below, which is reproduced from Hayes (2009a), represents the rhythmic structure of the melody to which the line *Young Emily in her chamber* is sung.[35]

```
(29)  [        x                        x              ]    4  line
      [        x            x   ] [        x            x   ]    3  hemistichs
      [x      x   ] [x      x   ] [x      x   ] [x      x   ]    2  dipods
      [x  x] [x  x] [x  x] [x  x] [x  x] [x  x] [x  x]    1  feet
       |      | |  |       |       |       |
      Young  E- mi- ly     in    her   cham-         ber
```

As exemplified in (29), melodies are endowed with a constituent structure similar to that postulated for meter in studies of literary verse. On row 1 positions are grouped into feet and the strongest position of every foot gets a mark on row 2, on row 2 feet are grouped into dipods and the strongest foot of every dipod gets a mark on row 3, and so on.

The grid in (30) below, also reproduced from Hayes (2009a), is a metrical pattern for Milton's iambic pentameters in *Paradise Lost*.[36]

```
(30) [                x                            x  ]  3  line
     [        x            x  ] [      x            x            x  ]  2  hemistichs
     [ x      x  ] [ x      x  ] [ x      x  ] [ x      x  ] [ x      x  ]  1  feet
       |      |       |      |       |      |       |      |       |      |
      For  Earth  hath  this  va-  ri-  e-  ty  from  Heav'n   *PL* 6.640
```

The alignments depicted in (29) and (30) are very similar. The most important difference between them is the fact that the grid in (29) is isochronous, i.e. its

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35 Ex. (10) on p. 120.
36 Milton's line, cited in (13b) on p. 122, is aligned with grid (15b) on p. 124.

metrical positions represent points that are evenly spaced in time, which is not true of (30). The fact that in (29) some positions are without associated syllables is a reflection of the fact that in the melody whose rhythmic structure is represented there, note attacks are not evenly spaced in time.

There is another important difference, less conspicuous, between the two alignments. In (29), all four rows are involved in prominence alignment, as is implied by Hayes's constraint MATCH STRESS, which states that for any two adjacent syllables that belong to the same simplex word, the more heavily stressed syllable should not be metrically weaker.[37] In (30), on the other hand, rows 1 and 2 are the only ones that play a role in prominence alignment, as in the other generative studies of literary verse that we mentioned earlier.

A point implicit in the articles on sung verse by Hayes and his co-workers is that what makes the texts of songs metrical is their alignment with melodies. In folk ballads, according to their approach, there is no textual meter defined independently of music; the metrical grid of the melody *is* the meter. Kiparsky (2006) has taken issue with this point and proposed an alternative account of the data presented in Hayes & MacEachern (1998). In this account, the texts of folk ballads are aligned with abstract metrical patterns, like those of literary verse, and in addition they are aligned with melodies. Adopting Kiparsky's stance does not affect the present discussion, which deals with the question of how text-to-tune alignment and text-to-meter alignment differ from each another.

In the literature on literary verse we have found two instances of accentual-syllabic meters that seem to employ a ternary opposition in metrical prominence: English "dipodic" meters and the Italian hendecasyllable. We now look at these cases and argue that neither invalidates the BMP thesis.

The so-called dipodic meters of English are mainly found in literary verse that imitates folk poetry. In this verse metrical prominence alternates on two levels. In addition to the basic alternation between strong and weak metrical positions, there is one among strong positions, which are alternatingly stronger and weaker. Here is for instance a quatrain from the poem *Mandalay* by Kipling.[38]

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37 The constraint is stated in (32) on p. 134. Although the wording of the constraint does not explicitly limit its purview to adjacent syllables, adjacency is clearly implied in the text above (32).

38 *Rudyard Kipling. The complete verse* (with a Foreword by M.M. Kaye), London: Kyle Cathie Limited 1990, p. 338.

(31) I am sick o' wastin' leather on these gritty pavin'-stones,
    An' the blasted Henglish drizzle wakes the fever in my bones;
    Tho' I walks with fifty 'ousemaids outer Chelsea to the Strand,
    An' they talks a lot o' lovin', but wot do they understand?

In the alignment depicted below in (32), the metrical grid is that implied by Stewart's (1924) analysis of this poem. Strong positions are numbered for perspicuity. The grid reflects the fact that the even-numbered strong positions give readers the impression of being more prominent than the odd-numbered ones. Let us call them respectively primary and secondary ictuses.

(32)

```
1        2        3        4         5         6         7        8
         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    am  sick of  was- tin'  lea-  ther on  these grit- ty  pav-in' stones
An'  the blas-ted Hen- glish driz- zle  wakes the  fev- er  in  my  bones
Tho' I   walks with fif- ty   'ouse maids out- er  Chel-sea to  the Strand
An'  they talks a  lot  o'    lov-  in'  but  wot  do  they un- der-stand
```

The lines of Kipling's poem can all be mapped to a grid with an alternation between primary and secondary ictuses, as in (32). Stewart (1924) found a statistical counterpart for that alternation. To state it roughly, syllables that belong to lexical words as opposed to function words are more frequent under primary ictuses than under secondary ones. The distinction between the two types of strong positions becomes even sharper if instead of tallying the syllables of the poem in terms of grammatical membership, as Stewart did, one tallies degrees of stress: main stresses of PhPs are more frequent under primary ictuses.

In (32) the primary-secondary contrast is represented in the two top rows of the grid, just like the strong-weak contrast is represented in the two bottom rows, but there is one important difference between them: while conformity to the conditions that refer to the strong-weak contrast is all-or-nothing, dipodism is a gradient property. Take rule (21), which is based on the distinction between weak and strong positions. This rule is strictly enforced in *Mandalay* and similar poems. It does not seem possible to find analogous rules that would rely on the distinc-

tion between primary and secondary ictuses and would be rigidly adhered to in poems that give a strong impression of dipodism. Poems form a continuum when they are ranked according to their tendency toward dipodism and *Mandalay* sits at the higher end of this continuum. Because dipodism is a gradient property, we agree with Fabb (2002: 96–97) that it falls outside the purview of categorical filters that draw the line between metrical and unmetrical strings.[39] This eliminates it as a potential counterexample to the BMP thesis.

We now turn to the other prima facie counterexample to the BMP thesis that we have found. A ternary opposition in metrical prominence is made use of in the account of the meter of Dante's *Commedia* that Marina Nespor and Irene Vogel (henceforth N&V) present in Chapter 10 of their book *Prosodic Phonology*. We argue that this account is too sketchy to provide compelling evidence against the BMP thesis.[40] To save space and to maintain consistency with the rest of this essay we have reformulated various aspects of N&V's account, but we trust that our reformulations do not distort the authors' intent. We have also simplified their analysis on one point: we have ignored the fact that it takes account of secondary stresses inside words. This simplification does not affect the validity of our appraisal of their account. In the following discussion, "PhP stress" refers to the main stress within a PhP.

N&V posit three underlying metrical patterns to account for the meter of Dante's hendecasyllables. A linguistic string must fulfill one of these patterns in order to count as a metrical line. These patterns are constituent-structure trees whose terminal nodes are metrical positions. Metrical positions are grouped into feet and feet are grouped into colons. At each level of the hierarchy, the rightmost node is labeled *s* and the others are labeled *w*. All three underlying patterns have iambic feet. One of them is represented below in (33).[41] (Positions are numbered for ease of reference.)

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39 On the gradient nature of dipodism, see also Stewart (1924, 1925) and Attridge (1982).

40 It may seem beside the point to appraise N&V's work from a purely metrical point of view, since the book's main concern is the structure of language, not that of poetic meter. The authors warn the readers in several places (pp. 285 and 289) that they do not intend to give a complete account of the system that underlies Dante's hendecasyllables; their goal is rather to use metrical verse as a source of evidence to buttress their views about prosodic structure, in the spirit of Hayes (1989). Nonetheless, it is appropriate to examine N&V's analysis in purely metrical terms, for even though the arguments they present in Chapter 10 concern the nature of prosodic structure and its relation to syntactic structure, the force of these arguments depends crucially on the validity of their metrical analysis of Dante's verse.

41 This pattern is not diagrammed alongside the two others on p. 276–277, but verses that instantiate it are cited in (13) on p. 282. (Page numbers refer to the 2007 edition of N&V's book.)

(33)
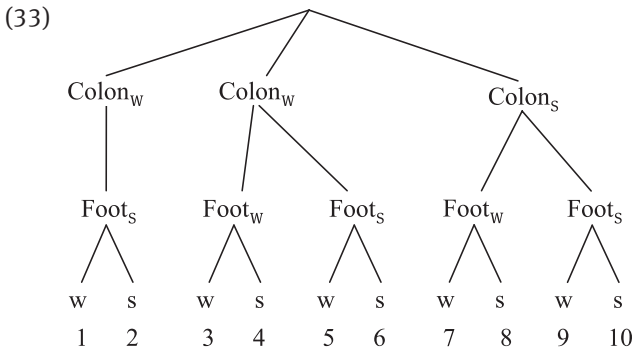
The three underlying patterns differ from one another in the way feet are grouped into colons. If "F" stands for a foot and if colon edges are represented by brackets, the metrical pattern displayed in (33) is of the form [F][FF][FF].

The other two underlying patterns posited by the authors only have two colons. They are of the form [FFF][FF] and [FF][FFF].[42]

Each metrical pattern has an associated metrical grid made up of three rows. Here is how grids are derived from trees. Every metrical position is represented by a mark on the lowest row, every metrical position labeled *s* gets a mark on the second row and every one of these that belongs to a foot labeled *s* gets a mark on the third row. The metrical grid derived from (33) is represented below in (34).

(34)

```
      x              x              x        colon
      x       x      x      x       x        foot
  x   x   x   x   x   x   x   x   x   x       position

  1   2   3   4   5   6   7   8   9   10
```

As shown in (34), N&V's analysis employs a three-way distinction in metrical prominence. Strong positions fall into two categories that correspond to the middle row and the top row of the grid; let us call them strong and extra-strong. N&V also posit a three-way distinction for prominence in prosodic structure, for they distinguish between two degrees of stress, namely word stress and PhP stress.

For a linguistic sequence to be metrical, it must be possible to align it with a metrical pattern in such a way that the following condition is met:

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42 See (3a) and (3b) on pp. 276–277.

(35) Proper Alignment:
  a. A *w* position may not be occupied by the main stress in a PhP or in a polysyllabic word.
  b. There is a one-to-one correspondence between extra-strong positions and PhP stresses.

Proper Alignment (our label) is only a necessary condition, not a sufficient one, but it will suffice for the present discussion. The display in (36) below shows a line that can be properly aligned with the metrical pattern in (33)–(34).[43]

```
(36)        x                    x                  x         colon
            x         x          x         x        x         foot
   x        x    x    x    x     x    x    x    x    x         position
   1        2    3    4    5     6    7    8    9    10

 [Nel    méz-  zo]  [del  cam-  mín]  [di  nós-  tra  ví-  ta][44]

   •       •    •    •    •     •    •    •    •    •          syllable
           •                    •         •        •          word
           •                    •                  •          PhP
```

Proper Alignment has the following implications. By condition (35a), the stresses of polysyllabic words should occur only in even-numbered metrical positions, since in the underlying metrical patterns all feet are iambs. As for condition (35b), it implies that the distribution of PhP stresses in a line must respect the division into colons of one of the three underlying metrical patterns. If a linguistic string is to fit the pattern [F][FF][FF] (i.e., (33)–(34)), positions 2, 6, and 10, and only these, must be filled by PhP stresses; for the pattern [FFF][FF] the same holds for positions 6 and 10, and for the pattern [FF][FFF] the same holds for positions 4 and 10. A string with PhP stresses in positions 4, 6 and 10, for instance, would be unmetrical because it does not fit one of these patterns.

Not all lines in the *Commedia* meet these expectations. To remedy this situation, the authors posit rules that optionally readjust metrical structure or prosodic structure; it is the output of these rules that is checked for conformity with Proper Alignment (35). Let us illustrate this point with N&V's example (21) (p. 287), which is displayed below in (37) with its syllables aligned with the terminal nodes of a metrical pattern.[45]

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43 *Nel mezzo del cammin di nostra vita* 'Midway in the journey of our life', *Inferno* I, 1.
44 The last (eleventh) syllable of hendecasyllable lines is extrametrical.
45 *E li parenti miei furon lombardi* 'And my parents were Lombards', *Inferno* I, 68.

(37) (w s) (w   s) (w   s) (w   s) (w   s)

     1 2   3   4   5   6   7   8   9   10

    [e li   pa- rén-   ti miei] [fú- ron   lom- bár-   di]

The line cannot align properly with a metrical pattern because the *w* position of the penultimate foot is occupied by the stressed syllable of a polysyllabic word, in violation of (35a). To account for such cases N&V posit a rule of Inversion that optionally inverts the weak and strong nodes in a metrical foot, provided that this foot is located at the beginning of a PhP. Since in (37) the penultimate foot meets this condition, the rule can turn it into (*s w*), resulting in a metrical pattern that can be properly aligned with the text.

The line in (37) contains adjacent stresses in positions 6 and 7 (*miei* bears a PhP stress). In an iambic pattern every other position is weak, and consequently any line that contains adjacent stresses must fail to meet condition (35a). Lines with adjacent stresses are not a rare occurrence in the *Commedia*. N&V posit rules that modify metrical patterns or prosodic structure to mitigate stress clashes or suppress them. These rules specify various acceptable ways of reciting lines of the *Commedia* that contain adjacent stresses. Their operation may result in pronunciations that violate the canons of ordinary spoken language, as happens when the Stress Postposing rule shifts the main stress of a polysyllabic word one syllable over to the right so that it matches a strong position in the metrical pattern. However, these rules are not formulated with enough precision to make definite predictions about the distinction between metrical lines and unmetrical ones.[46]

There are other issues left outstanding in N&V's presentation. In their discussion of the adjustments needed to meet the Proper Alignment condition, N&V only deal with lines that contain adjacent stresses, but these are not the only ones that fail to meet Proper Alignment. Consider the following line:[47]

(38) (w   s) (w   s) (w   s) (w   s) (w   s)

     1   2   3 4   5   6   7   8   9   10

    [per me] [si va] [ne l'et-   tér- no   do- ló-   re]

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46 The general condition (25) on p. 290, which makes reference to extra-strong metrical positions, seems to provide evidence for the need for a three-way distinction in metrical prominence. However, this condition would work just as well if it were made to refer to PhP stresses instead of extra-strong positions.

47 *Per me si va ne l'etterno dolore* 'Through me you enter into eternal pain', *Inferno* III, 2.

This line exemplifies two problems that are not discussed by N&V. Firstly, the weak position 7 is occupied by a stressed syllable. Inversion cannot change the foot into (*s w*) because it does not sit at the beginning of a PhP, and none of the prosodic rules posited by N&V is applicable, because the stress in position 7 is not adjacent to another stress. Secondly, this line has PhP stresses on syllables 2, 4 and 10, a distribution which does not match with any one of the three underlying metrical patterns.

In conclusion: N&V's account of Dante's hendecasyllables in the *Commedia* is useful as a concrete exemplification of how a three-way distinction in metrical strength could operate in Italian literary verse, but this account has too many loose ends to be more than suggestive.[48]

Appendix B: The songs in our corpus

We have examined a total number of 112 songs: 37 nursery rhymes from the two-CD set *Filastrocche, canzoncine e ninne nanne*,[49] and 75 other songs from various sources, most of them from Fulgoni (2003).[50] In the following list, each song title is preceded by a number sequence *a-b*. If *a* is 1 or 2, it represents one of the two CDs and *b* is a track number on that CD. If *a* is 3, it stands for Fulgoni (2003) and *b* is a page number in that book. If *a* is 4, the song is not drawn from any of these sources, *b* is an arbitrary index. An asterisk before the title indicates a song included in the CD *Bella ciao. chansons du peuple en Italie. Il nuovo canzoniere italiano*. Harmonia Mundi HMA 195734; otherwise the source is indicated immediately after the title. All the websites cited below were accessed on April 30, 2012.

1–1 Al canto del cucù. 1–2 Madama Dorè. 1–3 Serafìn aveva un sifolo. 1–4 Fra' Martino. 1–5 Lucciola lucciola. 1–6 Il merlo ha perso il becco. 1–7 La bella lavanderina. 1–8 Papaveri e papere. 1–9 O che bel castello. 1–10 Ninna Nanna fiorentina. 1–11 La capra bruca i rami. 1–12 In mezzo al mare. 1–13 Tre oche. 1–14 La cornacchia

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48 Our critique of N&V's analysis partially overlaps with Hanson's (1996). Whereas in N&V's account prominence matching is constrained at two levels of metrical structure, the foot (see (35a)) and the colon (see (35b)), Hanson's alternate account only constrains it at the colon level: the strongest position in a colon must match a PhP stress; the distribution of other word stresses is left unconstrained. It is worth noting that PhP stress does not play any role in Piera's discussion of the Italian hendecasyllable in Fabb & Halle (2008). Piera's account constrains the distribution of word stresses without taking into account their location in PhPs. Clearly, further study is needed.

49 1998 BMG Ricordi SpA, 74321631762(2).

50 Four songs from the CD set and 27 from Fulgoni's collection were not included because their lyrics are not in standard Italian.

del Canadà. 1–17 C'era una volta un piccolo naviglio. 1–19 È arrivato l'ambasciatore. 1–21 Il ballo del pinguino. 1–22 Alla fiera di mastro Andrè. 1–23 La formicuccia e il grillo. 1–24 Ninna-o. 1–25 Giro-girotondo. 2–1 Il ballo del qua qua. 2–2 La barchetta in mezzo al mare. 2–3 Ehi-Oh! Cantando lavoriam. 2–4 Stella stellina. 2–5 Io sono contadinella. 2–6 Filastrocca della lana. 2–7 Volta la carta. 2–8 Pancho vaniglia. 2–9 La mamma più bella del mondo. 2–10 Ci vuole un fiore. 2–11 Questo è l'occhio bello. 2–12 Fa' la nanna tesoretto. 2–13 La villanella. 2–14 La primula. 2–15 C'è un omino piccino piccino. 2–16 Dormi bambino. 3–7a A mezzanotte in punto. 3–7b Addio morettin ti lascio. 3–8 Allo spuntar degli alberi. 3–9 Amore mio non piangere. 3–10 Amor dammi quel fazzolettino. 3–11 Aprite le porte. 3–12 Aveva gli occhi neri. 3–13 Babbo non vuole (mamma nemmeno). 3–14 Bella ciao! (risaia). 3–16 Bugiardo amore. 3–18 Casetta fra i monti. 3–19 Chiesetta alpina. 3–20 Cielo incantato. 3–21 Cuore alpino. 3–22 Come porti i capelli bella bionda. 3–24 Contadinella. 3–26 Daghela ben biondina. 3–27 Dammi un riccio. 3–28 Di qua, di là del Piave. 3–29 Gli scariolanti. 3–32 E qui comando io. 3–34 Figli dei monti. 3–36 Il sirio. 3–38 La bella Gigogin. 3–39 Giovanotti che fate all'amore. 3–40 Il cacciator del bosco. 3–42 La bionda di Voghera. 3–43 La campagnola. 3–44 L'uva fogarina. 3–47 La Pinotta. 3–48 La bella la va al fosso. 3–50 La campana nella valle. 3–51 La domenica andando alla messa. 3–52 Lo zigo zago. 3–55 La mamma di Rosina. 3–56 Tutti mi chiamano bionda. 3–57 La Marianna (la va in campagna). 3–58 La Gigiotta. 3–60 Lo spazzacamino. 3–61 La monachella. 3–62a Là nella valle. 3–62b La smortina. 3–63 La Valsugana. 3–65 La mia mamma mi diceva. 3–68 Madonna del monte. 3–70 Le mie valli. 3–71 Maremma. 3–72 Mamma mia dammi 100 lire. 3–73 Morello l'asinello. 3–74 Meglio sarebbe. 3–77 O Angiolina, bell'Angiolina. 3–80a O morettino mio. 3–80b Picchia la porticella. 3–81 Romagna mia. 3–84 Piemontesina. 3–85 Quand'ero piccina, piccina. 3–86 Quel mazzolin di fiori. 3–87 Ricordati della Bruna. 3–88 Reginella campagnola. 3–89 Ricordi Giulietta. 3–90 Rosabella del Molise. 3–91 Tempi duri. 3–93 Sul cappello. 3–94 Seta nera. 3–96 Sull'Appennino. 3–97 Ta pum. 3–98 Vecchio paese. 3–99 Vien morettina, vien. 3–100 Sul ponte di Bassano. 4-1 *Addio a Lugano. 4-2 *Bella ciao. 4-3 Tu scendi dalle stelle (http://www.youtube.com/watch?v=THoF5snnSvE). 4-4 Il maggio delle ragazze (http://www.youtube.com/watch?v=UnJgw_Xj5nw& feature=related). 4-5 C'era una casa (http://www.youtube.com/watch?v=diEt-W_ Pv38). 4-6 Ninna Nanna oh (oral source). 4-7 L'Internazionale (http://www. youtube.com/watch?v=1jjBwz-mg3A).