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Understanding the Limping Meters: from Brass Band to Ligeti

It is a matter of learning that there exists a categorical distinction between simple meters like 2/4, which do specify a number of counting units in a measure – two beats, each expressed as a quarter note – and compound meters, like 6/8 (also a duple meter), that do not. A time signature of 6/8 usually does not represent a six-beat measure, rather it expresses a type of subdivision of the main beat (that is, two beats are each divided into three pulse units, rather than two). Beat hierarchy in these two different types of duple meters is summarized in Example 1.

Misunderstanding of the notation and reading of beat patterns in compound and composite meters is frequent. This paper is devoted to the interpretation of beat-groups in meters that shun predictable metric environments and the extension of principles applied to compound meters into the realm of composite metric patterns.

I will refer to the beat hierarchy of composite meters on five beat levels; see Example 2.[1] The main counting unit is identified as *Tactus*, avoiding the more general term beat. The grouping of counting units into a higher-level beat is designated as *Supra-Tactus*, which can, but does not have to correspond to a notated bar. The subdivision of tactus is termed *Pulse*, while the subdivision of pulse is a *Sub-Pulse* unit. In the presence of multiple beat levels, either can potentially represent the *chronos protos* level, which represents the smallest common denominator between metric units.[2]

The highest level of the beat hierarchy is indicated as a *meta-measure*. This level of beat hierarchy pertains to repertoire based on composite meters since meta-measures organize beats and beat groups into middleground periodicities that avoid traditional metric interpretations.

I define meta-measures as recursive composite metric patterns that can be represented with a composite time signature. My last example, drawn from György Ligeti's *Capriccio No. 2* (1947), will extend the discussion of beat patterns of compound meters into composite metric patterns and demonstrate how *meta-measures* can represent a significant structural force in twentieth-century metric music.

Returning to the tactus-beat patterns (Example 3), note that meters of 3/4 and 6/8 are frequently equated from the bottom up since each metric unit contains the same number of pulses. This represents a *quantitative* approach to beat patterns. However, the two are not metrically equivalent top-down, since 3/4 implies triple meter and 6/8 implies duple meter. These two meters are *qualitatively* different.

Example 1. Beat hierarchy in two different duple meters

Time signature	2/4	6/8
Supra-tactus	𝅗𝅥	𝅗𝅥.
Tactus beats	𝅘𝅥 𝅘𝅥	𝅘𝅥. 𝅘𝅥.
Pulses	𝅘𝅥𝅮𝅘𝅥𝅮 𝅘𝅥𝅮𝅘𝅥𝅮	𝅘𝅥𝅮𝅘𝅥𝅮𝅘𝅥𝅮 𝅘𝅥𝅮𝅘𝅥𝅮𝅘𝅥𝅮

Example 2. Five levels of beat hierarchy for composite metric patterns

5. Meta-Measure
4. Supra-Tactus
3. Tactus (main counting unit)
2. Pulse
1. Sub-Pulse

Example 3. The same number of pulses does not signify the same number of tactus beats

Time signature	3/4	6/8
Supra-tactus	𝅗𝅥.	𝅗𝅥.
Tactus beats	𝅘𝅥 𝅘𝅥 𝅘𝅥	𝅘𝅥. 𝅘𝅥.
Pulses	𝅘𝅥𝅮𝅘𝅥𝅮 𝅘𝅥𝅮𝅘𝅥𝅮 𝅘𝅥𝅮𝅘𝅥𝅮	𝅘𝅥𝅮𝅘𝅥𝅮𝅘𝅥𝅮 𝅘𝅥𝅮𝅘𝅥𝅮𝅘𝅥𝅮

Understanding the beat hierarchy in compound meters facilitates the analysis and interpretation of less traditional time signatures such as those involving prime numbers, like 5/8 and 7/8. Since the time signature of 6/8 requires that we look for a beat level higher than the one specified in the denominator (a beat longer than an eighth note), the same course can be applied to the 7/8 meter.

How many beats are there in a bar of 7/8 and of what kind? Unlike the pulse units (eighth notes) the beats customarily are not of the same duration, since seven can not be evenly divided by either two of three. Most often, in a measure of 7/8 we will find three non-isochronous *tactus* beats, two equivalent to a quarter note and one longer beat, equivalent to a dotted quarter note.[3]

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Meters that contain beats of different length, comprising two and three isochronous pulse units are also known as *aksak* meters.[4] Aksak is a Turkish word for limping, lopsided, or even lame. In one of ethnomusicologist Simha Arom's recent classification, aksak meters fall into three categories:

a) in authentic aksak meters the number of pulsations is a prime number, as in a three-beat 7/8 meter, since 7 is a prime number;

b) in *quasi*-aksak meters the number of pulsations is an odd, but not a prime number, as in a four-beat meter notated with 9/8; and

c) *pseudo*-aksak meters have an even number of pulsation – such as 8/8 divided comprising three beats, as is the case in *tresillo* and *clave* beat patterns.[5]

Musical examples in this paper will illustrate each of Arom's three categories. In authentic aksak meters, tactus beats are non-isochronous, since prime numbers can not be evenly divided by two or three. Additionally aksak meters, such as a notated 7/8 comprising three tactus beats, are exemplified by multiple distinct types of beat patterns depending on the placement of the longer beat in relation to shorter beats. This variation bestows the rhythmic foreground with potential for additional variety; there are three 7/8 variants in Example 4.[6]

Example 4. Three distinct types of 7/8 bars with a different long-beat placement

a) < ♩. ♩ ♩ >
   < L, S, S >

b) < ♩ ♩. ♩ >
   < S, L, S >

c) < ♩ ♩ ♩. >
   < S, S, L >   *L = long beat & S = short beat

In *quasi*-aksak and *pseudo*-aksak meters the sum of pulse units, like 9/8 or 8/8, can also represent isochronous beats, four and three respectively. Many of the folk dances in quasi- and pseudo-aksak meters juxtapose isochronous and non-isochronous variants of possible series of tactus beats.

A *Čoček* dance from Serbia is based on this type of metric juxtaposition. Example 5a contains a transcription of the introduction.[7] In the first three bars of the introduction the 9/8 is first heard as a three-beat meter, followed by one bar of four-beat meter. In the song itself, the four-beat meter is predominant (Example 5b), but it occasionally switches into the triple meter (Example 5c).[8]

Example 5a. Serbian *Čoček* Dance: three- and four-beat 9/8 meter in the inroduction

Example 5b. Serbian *Čoček* Dance: four-beat aksak meter

Example 5c. Serbian *Čoček* Dance: alternating three- and four-beat meter

The brass band example exemplifies a *pseudo*-aksak meter, notated in 9/8 with one longer beat; here, consistently the last in the group of four. Similar examples are also frequently encountered in the music of Bela Bartók who often draws on the folk traditions of the extended Balkan region. One of the Bulgarian Dances from *Microkosmos* is very similar to the brass band example in its treatment a four-beat meter with one longer beat; see Example 6. The last beat in each bar is consistently the long one – each is circled in the example. The time signature is expressed as a composite of <2+2+2+3> eighth notes, for a total of nine, reflecting Bartók's understanding of a bar comprising four non-isochronous tactus beats.

Example 6. B. Bartók, *Microkosmos* No. 152: a four-beat, *quasi*-aksak 9/8 meter

Another four-beat pattern with one longer beat, represented with a composite time signature of <5/8, 4/8>, is the metric foundation for Ruth Crawford's Prelude No. 6 from 1941; see Example 7. There are three distinct textural layers in the prelude: a) an *ostinato* in the uppermost part that contains mostly contiguous eighth notes, b) a sustained chordal bass that is always arpeggiated, and c) a mid-range line that gradually assumes a melodic character.

The first beat of the composite metric pattern is also the long beat in the overall group of four (circled in Ex. 7). The longer duration of the downbeat lends it greater metric weight, which is subsequently reinforced by the *arpeggio* that leads into it. The *arpeggios* that terminate on the downbeat, rather than just before it, are boxed in the example and the arrows point to the "strong" beats they precede.

The composite metric pattern is always followed by a spin-off in <4/8, 4/8> where the middle layer becomes more active than during the <5/8, 4/8> pattern. Otherwise, the two patterns are comparable, since both represent groups of four beats and are both preceded by the arpeggiated bass.

The metric elongation of the first beat in Crawford's Prelude works well with the natural elongation that takes place in the presence of widely-spaced broken chords in the bass line. When the chords are spaced particularly broadly in the 4/8+ 4/8 meter, as in bar 8 (the last bar in Ex. 7), the *ostinato* line

Example 7. Crawford, *Prelude*: 9/8 and 8/8 as two four-beat variants (notated as composite metric patterns)

starts with a rest. While the reason for this may be primarily technical, that is the pianist's right hand is occupied by the *arpeggio*, the effect is also of an elongation and emphasis on the downbeat, now provided by the middle layer.

The notation of 4/8 + 4/8 is clearly meant as a parallel to the 5/8 + 4/8 composite meter, even though it was possible to sign the former as either 8/8 or 4/4. Crawford is probably considering <5/8, 4/8> as a variant of 4/4 with an elongated first beat. The consistency in her notation emphasizes the kinship between the measures with isochronous and those with non-isochronous tactus beats (that is 4/8 and 5/8).

A similar metric pattern occurs in the second movement of Bartók's *Music for Strings Percussion and Celesta* (see Example 8), and is notated as a <2/4, 5/8> in a kind of a retrograde of Crawford's beat grouping. Bartók's pattern is built upon two duple measures, with one longer beat in the second measure.

Unlike Crawford, who notationally equates 4/8 and 5/8 meters from the bottom up, from the level of the eighth-note pulse, Bartók's notation suggests an understanding of the composite metric pattern <2/4, 5/8> as fundamentally of two duple meters, but without a notational equivalent that would allow consistent notation accounting for the tactus beats qualitatively, from the top down.

As was made evident in the brass band example, metric interpretation of tactus beats in compound meters, such as presented in the analysis of the 7/8 and 9/8 meters is a common feature in much folk music of the Balkan Peninsula. A traditional song from Serbia, arranged by a renowned Yugoslav composer Josip Slavenski (1896–1955) and reproduced in Example 9, is based on a <9/8, 8/8> metric pattern. This pattern is bracketed above the score and the time signature is circled each time it changes.[9]

Example 8. B. Bartók, *Music for Strings*, II: <2/4, 5/8> four-beat groups in bb. 266–70 ff

Tactus: 1 2 3 4* 1 2 3 *4 1 2 ... →

Example 9. A four-beat 9/8 meter in the Serbian folk song *Dilber Tuta*

Tactus: 1 2* 3 4   1 2 3 4   1 2* 3 4

Again, the time signature of 9/8 does not signify a triple meter. Rather, there are four beats in the 9/8 bar with the second beat longer than the other three. While the sixteenth notes in bars 7 and 9 elaborate the tactus in a way that may appear uncertain, bar 13 presents the tactus beats unambiguously. The dotted quarter-note tactus on the second beat is clearly the longer one in the group of four (marked with an asterisk). In the second metric unit (8/8 bars that follow) the last two beats are consistently syncopated, providing for an even greater variety in four-beat groups. *Dilber Tuta* song treats the <9/8, 8/8> metric pattern as a flexible cycle whereby the number of 8/8 bars in a composite meter varies from one to three. As a result, the sense of hypermetric groupings is lacking.

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Each of my previous examples is based in a non-isochronous four-beat meter. While Crawford's Prelude and Bartók *Music for Strings* entail composite metric patterns that are equivalent to the notated 9/8 quasi-aksak meter in the Bulgarian dance from *Mikrokosmos*, the Serbian folk song *Dilber Tuta* contains the four-beat 9/8 meter as part of the composite time signature pattern. Periodicity of the <9/8, 8/8> composite metric pattern is varied by virtue of a different number of 8/8 units. Despite this variation, each phrase is characterized by the return to the non-isochronous beat complement of the 9/8 unit and represents a meta-measure pattern.

My next example explores the types of periodic entities composite meters, such the one from *Dilber Tuta*, engender. Ligeti's *Capriccio* No. 2 (1947) illustrates an aksak-like metric pattern that represents a recurring thematic element (Example 10). I will summarize the form of *Capriccio* via a graphic representation called the *time signature map*. Time signature map is a visual account of form from the standpoint of the underlying meta-measure structure. The map provides an overview of a work's temporal shaping in the formal middleground and points to structurally important or form-generating elements.

Example 10. Ligeti, *Capriccio*: beat duplication in the opening *meta-measures* (bb. 1–17)

The time signature map of Ligeti's *Capriccio*, produced in Example 11, summarizes the sequence of bar lengths in the entire work (except the b section). In this map, repeated metric units are indicated successively within a meta-measure pattern and are separated by barlines.[10] The map shows a repeating <5/8, 5/8, 7/8, 8/8> metric pattern, which exemplifies a meta-measure.[11]

Example 11. Ligeti, *Capriccio*: an annotated *time signature map*

a1 <5/8 | | 7/8 | 8/8 | > <5/8 | | 7/8 | 8/8 | > 5/8 | | | | 3/8 <5/8 | | 5/8 | 2/8 | 8/8 | | | >

    meta-measure   meta-measure   spin-off   ' hidden' meta-measure (5/8 + 2/8 = 7/8)

a2 <5/8 | | 7/8 | 8/8 | ><5/8 | | 7/8 | >   5/8 7/8 5/8 | | 4/8 5/8 | | 2/8 5/8 |

    meta-measure   meta-measure without 8/8   spin-off

b map not provided

a1 <5/8 | | 7/8 | 8/8 | > <5/8 | | 7/8 | 8/8 | >   5/8 | | 7/8 5/8 | | 8/8 | | 5/8 | | 3/8   5/8 *[x7 bars]*

    meta-measure 1   meta-measure 2   spin-off

Coda   5/8 *[x15 bars]*

In addition to the repeating meta-measures, the map also makes apparent the preponderance of 5/8 meter in the "spin-off" section, as well as the Coda. This emphasis on 5/8 meter points to another important rhythmic process unfolding in *Capriccio*.

The opening 5/8 motive is expanded in 7/8 with the repetition of the first figure – the first beat of 5/8 is *duplicated* in the 7/8 bar (see the score in Example 10). The term *duplication* refers to a process of pattern – variation: subsequent groups of any kind are based on the repetition of one or more constituent units of the basic group I call the *core pattern*. In this instance, the core pattern of the entire meta-measure and all its subsequent variations is the 5/8 aksak meter. Often, the core pattern is presented alone and this is the case in the *Capriccio* as well, particularly in the Coda and immediately preceding the Coda.

The 8/8 bar represents a spin-off on the second figure in 5/8, the one containing contiguous eighth notes, and it duplicates the long beat of the 5/8 bar. Meta-measure is stated twice before being subjected to further development of the initial 5/8 figure. Duplicated beats have an effect of a motivic prefix and are underlined in Example 12, which summarizes the beat pattern in the opening meta-measure.

Example 12. Ligeti, *Capriccio*: beat duplication in the opening *meta-measures*

< ♩ ♩. | ♩ ♩. | ♩ ♩ ♩. | ♩. ♩ ♩ >

Since the tempo marking indicates a very fast eighth-note pulse unit (MM = 200), it is reasonable to hear *tactus* at the next level up – that of a quarter and a dotted quarter note. This corresponds to the tactus pattern in my reduction (Ex. 12).

The main meta-measure pattern fairly closely resembles a dance in *aksak* meter – the beats are underscored by the left hand, with a quarter note (including the rest) corresponding to the short beat and a dotted quarter note (including the rest) to the long beat, while the right hand elaborates the off beats. The last bar in the pattern (8/8) has only one articulation in the bass, revealing its concluding role as a gesture of rhythmic cadence. The difference between meters in *Capriccio* and aksak meters previously surveyed is that the composite metric pattern in Ligeti's work comprises three different aksak meters: 5/8, 7/8, and a three-beat 8/8 meter.

Interestingly, the repetition of the meta-measure pattern undergoes a slight internal rearrangement; see Example 13.

Example 13. Ligeti, *Capriccio*: internal rearrangement of the beat pattern in two *meta-measures*

MM1 < ♩ ♩. | ♩ ♩. | ♩ ♩ ♩. | ♩. ♩ ♩. > →

      <S,L > SSL

MM2 < ♩ ♩. | ♩ ♩. | ♩ ♩. | ♩. ♩ ♩. >

      <L,S> SLS

The long beat, equivalent to a dotted quarter note, is no longer the last in each unit, rather it becomes the first beat in the second 5/8 bar and the middle beat in the 7/8 bar (marker "L" in the reduction in Ex. 13, as well as the score in Ex. 10). The longer beats, subject to this rearrangement or a shift forward in the sequence of beats, are underlined.

Internal variation between the two opening meta-measures allows for some flexibility and playfulness within a rather unyielding adherence to the meta-measure pattern in all the a sections. However, regardless of this internal variation, the number of beats in each measure and the sequence of complete metric units remain unchanged.

The a2 section begins as a restatement of a1, but the pitches are repeated only in the first measure. Subsequent repetition is rhythmic and not melodic and it affirms our hearing of the composite metric pattern as the primary vehicle of structural coherence. In support of the thematic character espoused by the main meta-measure pattern, the 8/8 cadential bar is omitted in the second phrase of a2 as the process of liquidation and fragmentation intensifies in preparation for the further development taking place in the middle section, marked b in the time signature map.[12]

In this paper I investigated implicit reading and hearing of metric patterns whose time signatures do not specify the number of counting units, or tactus beats. Initially, the compound meters were seen to specify the number of pulse units, counting from the bottom up. Certain compound meters like 9/8 can also signify aksak meters, which contain beats of different length. I presented different examples of four-beat "9/8" meters in support of this claim – there were four different notational patterns for a four-beat group containing one beat longer than the other three.

Serbian folk song *Dilber Tuta*, based on a composite meter <9/8, 8/8> provided a transition into the analysis of beat groups in Ligeti's *Capriccio*, which was based on composite metric pattern of <5/8, 7/8, 8/8> that I termed a meta-measure.[13] The analysis of Ligeti's *Capriccio* also completed the discussion of beat hierarchy on five levels, as it illustrated the concept of meta-measures.

In addition to the middleground stability provided for by the meta-measure patterns which comprise four notated bars, rhythmic motives in *Capriccio* are generated through the process of beat duplication in the foreground, with the main aksak meter of 5/8, spawning additional metric groups of 7/8 and 8/8. The combined effect of the two main rhythmic processes taking place in *Capriccio* projects a sense of continuity in the domain of rhythm that includes elements of structuring and variation both.

All of the notational variants explored in this paper stand as incomplete reflections of musical events they symbolize. This paper aimed to provide a small contribution towards a better understanding of challenges associated with our system of musical notation as well as our tendency to simplify rhythmic impulses *quantitatively* (like the bottom up models), rather than *qualitatively*.

References

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Notes

[1] While beat levels 1–4 in Example 2 apply to any instance of metric hierarchy, level 5 (meta-measure) is applicable only to composite metric patterns that cohere into formal units at the level of phrase.

[2] The term *chronos protos*, used here to identify the level of beat that is smallest common denominator between various metric units, was used by Aristoxenus in *Elements of Rhythm* and *Elements of Harmony*, 4th cent. B. C. The surviving work has been translated and edited by Andrew Barker in *Greek Musical Writings Vol. II: Harmonic and Acoustic Theory* (New York, Cambridge University Press, 1990): 119–208.

[3] *Isochronous*, from Greek *iso-chronos* (same time), refers to evenly spaced events or beats.

[4] For a recent discussion and classification of aksak meters see Simha Arom's "L'aksak: Principes et typologie", *Cahiers de Musiqes Traditionnelles*, Vol. 17 (2004): 12–48. The earliest discussion of aksak meters is attributed to Constantin Brăiloiu; see "Le rythme aksak", *Revue de musicologie* 33 (1952): 71–108.

[5] Latin *clave* patterns are based on two metric groups sometimes equivalent to 2 notated bars. One of these metric units is a non-isochronous *tresillo* pattern, which often entails a series of beats equivalent to 3+3+2 eighth notes.

[6] The long beat can occur as first, middle or last among three beats, hence the three variants in my example.

[7] In this simplified transcription (Ex. 5a), the trumpet line is in rhythmic unison with the entire brass section, whereas the bass drum is included because of it's locally syncopated beat pattern. The transcription approximates durations to the nearest eighth note and is based on a performance by an American "Balkan" Brass Band *Zlatne Uste* The ensemble themselves refers to this dance in asymmetrical 9/8 meter. The recording is on the album *Zlatne Uste,* "No Strings Attached" (Cambridge: Rounder Records, 1993).

[8] Examples *5b* and *5c* contain only the transcription of the melodic line.

[9] The first bar of the composite pattern corresponds to the *quasi*-aksak meter, defined by a number of pulsations (9) that are an odd, but not a prime number.

[10] If the number of repetitions is excessive enough to cause clutter on the graph, a number indicating repetitions of a metric unit follows the time signature in parentheses (i.e. *5/8 [x15 bars]*).

[11] Here, it is important to remember that time signatures of 5/8 and 7/8 represent bars of two or three non-isochronous beats; 5/8 is of duple and 7/8 of triple meter with one beat longer than the others in each case.

[12] Liquidation and fragmentation are used in Arnold Schoenberg's sense of the term. See Arnold Schoenberg, *Models for Beginners in Composition* (New York: Schirmer, 1943: 11).

[13] The composite metric pattern in *Dilber Tuta* (<9/8, 8/8>) also represents a meta-measure, although it exemplifies a flexible-cycle type of variation of the core metric pattern. For the sake of space and clarity, this type of meta-measure construction is not fully addressed here.

Santrauka

Netolygių metrų suvokimas: nuo varinių pučiamųjų orkestro iki G. Ligeti

Pranešime aptariamos problemos, su kuriomis susiduriama, kai sudėtiniai metrai yra skaitomi ir suvokiami „iš viršaus į apačią", o ne „iš apačios į viršų". Vienas iš būdų suprasti metrinių vienetų hierarchiją yra susijęs su viduramžiais naudotų terminų *tempus* ir *prolatio* koncepcija – suvokimu „iš viršaus į apačią". Ir *tempus*, ir *prolatio* atvejais viršesnis metrinis vienetas yra dalijamas į dvi arba tris dalis (tačiau negali būti dalijamas ir į dvi, ir į tris dalis tame pačiame lygmenyje). Alternatyviai – „iš apačios į viršų" – *chronos protos* (subritminiai ar ritminiai) vienetai grupuojami po du arba po tris. XX a. partitūrose dažnai pasitaiko dvigubų ir trigubų elementų naudojimo viename metrinių vienetų lygmenyje, ir ši priežastis generuoja netolygumo aukštesnio lygio metriniuose vienetuose atsiradimą. Tokie atvejai, kaip ir pulsiniais laikomi metrai, dažniausiai analizuojami „iš apačios į viršų".

Čia nagrinėjami sudėtiniai metrai, sudaryti iš neizochroninių metrinių vienetų, pvz., keturių metrinių dalių 9/8 metras, būdingas didelei daliai Balkanų tautų liaudies muzikos, kuri neretai randama XX a. partitūrose ir yra užrašoma labai įvairiai. Taip pat iliustruojamas ryšys tarp įprastinių liaudiškų idiomų ir šiuolaikinės muzikos, pateikiant pavyzdžius iš serbų muzikos varinių pučiamųjų orkestrui bei B. Bartóko, R. Crawfordo ir G. Ligeti partitūrų.

Metrinės grupės ženklo, kaip metrą ir metrinių dalių hierarchiją nusakančio rodiklio, tikslios prasmės klausimas yra labai įdomus. Metro ženklai, naudojami tradiciškai, ne visada yra intuityvūs ir nuoseklūs, nustatant pagrindinį matavimo vienetą (arba taktus) vyraujančioje metrinių vienetų hierarchijoje. Tiesiog reikia suvokti, kad egzistuoja kategorinis skirtumas tarp paprastųjų metrų, pvz., 4/4, kuris aiškiai nusako sudedamųjų dalių skaičių takte – keturios metrinės dalys ir kiekviena iš jų yra ketvirtinė, ir sudėtinių metrų, pvz., 6/8 (taip pat dviejų dalių metras), kuris to nenusako. 6/8 metro ženklas visai nereiškia, kad taktas būtinai susideda iš šešių metrinių dalių, o greičiau nurodo, kad pagrindinis metrinis vienetas skaidomas į smulkesnes dalis (t. y. kiekvienas iš dviejų metrinių vienetų yra dalijamas į tris, o ne dvi dalis).

Situacija tampa dar įdomesnė, kai susiduriame su neizochroniniais metriniais vienetais ar jų grupėmis, pvz., 7/8, 13/8 ir kt. metrai. Metrai, kurie negali būti dalijami į dviejų ar trijų vienodų metrinių vienetų grupes, dažnai vadinami „mišriaisiais" arba „netaisyklingais" ir nėra laikomi nei periodiškais, nei tarpiniais, giminingais hipertaktams. Vis dėlto sudėtiniai metrai dažnai suformuoja struktūriškai aiškius darinius, kurių periodiškumas ir struktūrinis reikšmingumas reikalauja didesnio dėmesio ir specifinių analitinių priemonių. Pranešime suformuluoti šiuos reikalavimus atitinkantys teoriniai pagrindai.