

What is musical meter?

Mats Johansson

Abstract

This article discusses the concept of musical meter, its most common definitions and their implications for musical analysis. It is shown that the concept has been notoriously difficult to define and that the core of the problem is the fluid relationship between sounding musical events and the framework (meter?) by which these events are structured. To illustrate how this problem relates to music perception and performance, four different, more or less overlapping, perspectives on meter are discussed: 1) Meter as a measuring device, specifying the temporal relationships between rhythmic units and levels (beats per measure etc.). 2) Meter as an imposed or inferred accentuation pattern (strong-weak-weak etc.). 3) Meter as an emerging property of the listener's engagement with the unfolding music, implying that there is no pre-existing neutral grid in relation to which musical sounds are rhythmically structured. 4) A formulaic conception of meter: a stylistically coded (i.e. culture-specific) notion of sameness resulting from a continuously ongoing process of trying out different, but metrically equivalent, rhythmic designs.

The title of this article, "What is musical meter?", indicates a huge topic that I will do my best to distill within the following pages. It might be useful to start by pointing out that the term meter is considered to be imported to the domain of music from the domain of poetry. In poetry, meter refers to a recurring pattern of accented and unaccented syllables. For instance, the meter in Homer's famous epic poem *The Odyssey* is a so called *dactylic hexameter*. This meter contains six rhythmic units, each with

one accented syllable followed by two unaccented syllables. The pattern may be illustrated as in figure 1:

1	2	3	4	5	6
dum-diddy	dum-diddy	dum-diddy	dum-diddy	dum-diddy	dum-dum

Figure 1. Dactylic hexameter.

The whole pattern is then repeated to form a recurring cycle. One important point here is that the meter does not specify what the exact content should be. Thus, to decide which words to use is up to the writer. We might then imagine different ways that this metric pattern can translate into the musical domain. One way is to let the accented syllables translate into long notes in the music, while the unaccented syllables translate into short notes, as in the examples in figure 2:

1	2	3	4	5	6
dum-diddy	dum-diddy	dum-diddy	dum-diddy	dum-diddy	dum-dum

↓

Figure 2. Dactylic hexameter translated into a pattern of long and short notes.

The next step could be to add a melody to this metric pattern. We may then get the following (figure 3):



Figure 3. Dactylic hexameter translated into a melodic pattern of long and short notes. The bold line in the middle indicates a motif boundary corresponding to the repetition of the hexameter cycle.

In figure 3, the rhythmic units are clustered into groups of three (i.e. triple meter) and six (motif boundary). And again, the meter does not define which notes to use in the melody, only that they should follow the dum-diddy-dum-diddy-pattern. In this case, the meter could be seen as a container of musical events, as a mould waiting to be filled with content.

This example illustrates quite well some essential features of the meter concept. However, contrary to this apparent simplicity, the academic history of the concept of meter shows that it has been notoriously difficult to define, at least in a way with which a broad community of scholars can agree. I will present some of the leading definitions of musical meter and briefly discuss their implications, but before that I will provide a general working definition, which will be used as a reference in the following presentation and discussion. In this way, I am also making sure to have at least provided some sort of answer to the question initially posed.

Musical meter is related to the organization of musical sound as it unfolds in time, both in the sense of how listeners perceive and how musicians perform music. More precisely, meter involves *some* form of *perceived* regularity or periodicity in the patterning of musical sounds. I stress the word *perceived* here, and the reason for this is that perceiving music as being organized in regularly occurring cycles does not mean that the musical sounds need to be distributed in regular intervals. In this sense, meter is as much an *attentional state* as it is a characteristic of the music. More on this later. The general point is that meter represents an inferred or imposed organization rather than the pattern of physical sounds. The easiest way to illustrate this is to refer to the fact that one and the same sequence of sounds can be perceived in different meters, in other words *as* being organized in different ways. The metrically neutral sequence 1 in figure 4 (next page) can be interpreted in at least the following ways (2-4).

A related point is that the presence of meter implies that musical events unfolding in time are organized in very wide categories or classes. This is apparent on at least two levels. First of all in the sense that all repeated cycles in a piece of music may be seen as metrically equivalent. Second, in the sense that several pieces of music inferred to have the same meter are metrically equivalent. In other words, meter establishes a relationship of sameness between otherwise different musical manifestations. An example:



Figure 4. Different metrical organizations of the same sequence of sounds.

Let's assume that waltz is a meter. Let's also assume, without including this in the proposed definition, that we recognize the waltz meter by the repeated pattern **One**-two-three, **One**-two-three and so on. In this example, all **One**-two-three cycles have the same metrical status or function. For instance, if the music is used for dancing, we may start the dance from any of these **One**'s. Moreover, although there are an infinite number of waltz melodies, each performed in a number of different ways by different musicians, all these realizations of the waltz meter are in principle metrically equivalent. That is, they are all recognizable by the inferred recurring **One**-two-three cycle, and we may start our dance in the middle of any of them.

This leads me to two concluding points. The first is that meter is a *general* framework of *some* sort: the concept does not relate primarily to the specifics of individual musical realizations. To underscore this point, I refer to the fact that meter rarely, if ever, is used in evaluative statements. There are no such things as good or bad meters. There are only different meters. The second point is that meter is in some way related to *how* we organize the unfolding of musical events, as opposed to *what* is being organized.

Now, many scholars, although far from all, would probably agree with this definition, while at the same time complaining that it is too general. This lack of detail is partly the result of my ambition to start with a definition that is as general as possible without violating the basic

assumptions on which many theories of meter are based. According to my reasoning, to achieve this it is necessary to avoid terms that *appear* to have a precise meaning, while in fact they are highly ambiguous. For that reason, I have intentionally excluded terms such as accent and pulse to avoid making the definition dependent on *particular* uses of terminology. So far, I have not even mentioned the word rhythm, and there is a good reason for this as well. In fact, the main challenge in defining musical meter seems to be to separate the concept of meter from the concept of rhythm. More precisely, due to the inconsistent historical use of the terms rhythm and meter there is a striking convergence between these two concepts. As Stephen Handel (1998) puts it, “meter is what most people think of as rhythm.” Considering this, it is problematic to include the word rhythm in a general definition of meter. I will return to this issue shortly. Let me first point out some of the issues that are intrinsically related to the question “what is musical meter?”:

One of these questions is of course “how is meter perceived?” This immediately suggests another question, namely “how is meter constructed or produced?”, if it is at all relevant to speak of the production of meter.

“How does meter function?” Or more precisely, how does it affect and organize our experience of music? Or even more precisely, how does meter structure the way we experience time in music?

Since meter involves *some* form of temporal regularity, we might ask: what are the limits of variability in different musical contexts?

Where is meter located? Is it to be found in the musical sounds themselves or in the mind and/or body of the listener and performer? To the extent that meter in some way may be traced in the musical sound, then how is it expressed and articulated by the musician? A related question that has received relatively little attention is how meter perception is learned.

The more fundamental issue behind these questions is whether meter is generative in the sense of shaping the music, both as perceived and as produced, or if meter is generated in and by the sounding music. In both these scenarios we might also ask; which musical parameters are shaped by the meter? Or, alternatively, which musical parameters are shaping the meter? Durational and accentual properties are often mentioned, but are there others?

Another fundamental question, which may seem as, but is not, a repetition of the former, is: does meter exist independently from the performed music? Moreover, does meter provide the points of reference for performed musical gestures, or is meter, the referential framework, a product of the very performed gestures?

Is meter a subjective or a culturally shared concept? And if we assume that meter is collective, how is this conceptual sharing achieved?

Is it possible to define a general concept of meter relevant to all forms of music, or do we need to adjust the concept in accordance with different musical characteristics and culturally specific musical sensitivities?

I will of course not be able to answer all these questions, and this is not the purpose of listing them. The point is only to illustrate *some* of the complexities of the subject, and to direct the attention to certain pressing issues. It should also be clear that, in order to make this subject comprehensible, simplification is unavoidable. By simplification I mean reducing the number of potentially relevant issues related to the topic, focusing on a few general problems with defining musical meter. Let me take an example to illustrate what I mean. Terms and concepts used to describe rhythmic phenomena include onset, attack, stress, accent, dynamics, intensity, pulse, beat, groove, phase, tempo, grouping, phrasing, timing and so on and so on. None of these terms have an unambiguous meaning. Partly because there is no general agreement on how to understand and explain musical rhythm. Partly because different scholars have meant completely different things by the same term. To review these different uses and conceptions of analytical terms is an enormous task in itself, which would obstruct any attempt to present a coherent account of the phenomenon called musical meter. I will instead concentrate on *one* main terminological challenge, namely the difficult distinction between meter and rhythm.

Why not continue, then, with a brief review of the use of the term rhythm or rhythmic. Starting with one of the classic books in the field, Curt Sachs' (1953) *Rhythm and Tempo*, the issue of distinguishing between meter and rhythm immediately becomes apparent. According to Sachs, the all-comprehensive concept of which other related concepts are mere parts or facets is *rhythm*. As Sachs puts it, "in every language, the equivalent of rhythm

has a character more general than any other term. We can, and do, discuss the rhythm of a building, a statue, or a painting; but we cannot discuss their meter or *Takt*.” (Sachs 1953:10). Sachs certainly has a point; there are good reasons to define rhythm as a more general concept than meter. At the same time, meter is often regarded as a general framework, while rhythm refers to the specific arrangement of musical sound unfolding in time that makes each piece or segment of music unique. This makes me wonder how Sachs defines rhythm in music. Referring to the etymological origin of the word rhythm, the Greek verb for flowing, Sachs acknowledges that rhythm is flow. However, as he adds, I quote, “this flowing is not [...] a smooth, inert, continuous movement without articulation. It is, rather, a fluency due to some active, organizing principle, to ever renewed impulses whose very orderliness at once gives life and ease to the flow.” (Sachs 1953:12).

I find it tempting to term this organizing principle meter and be done with it, but the terminological confusion is not that easily solved. Sachs himself, for instance, attributes this organizing capacity to rhythm, referring to Plato and his definition of rhythm as the “order of movement,” and he is not alone. Ingmar Bengtsson (1980) states that “for rhythm experience and rhythm behavior to occur, some kind of temporal structuring involving grouping and difference in accentuation seems to be necessary. The ‘well-ordering’ thus achieved seems moreover to be dependent on some kind of experienced or perceived regularity [in the sense of a return of the similar].” (Bengtsson 1980)

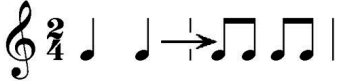
Alf Gabrielsson (1993) refers to rhythm as the grammar «that establishes a regular pulse, in relation to which the musical events develop in ever-changing combinations.” (Gabrielsson 1993:95). Here we might ask: if rhythm is what establishes the reference in relation to which ever-changing combinations of musical events occur, what term should we use to describe these ever-changing combinations? We certainly cannot use the term meter.

In his doctoral dissertation, Carl Haakon Waadeland (2000) reviews a range of different definitions of rhythm, most of which could easily be taken to be definitions of meter. For example, rhythm is referred to as “regular units of time or pulses;” “a patterned cycle of events;” “some sort of recurring and within limits, predictable event” and “the subjective grouping of objectively separate events”.

The problem is quite simply that other scholars see these features as characteristic of meter rather than rhythm. To get further into this mess, we shall take a closer look at the last of these points, on the subjective grouping of events. Experiments have shown that when presented with a sequence of uniformly spaced clicks or beats sounding exactly alike, listeners tend to add accent or weight to some of the clicks, thereby experiencing the events in groups of two, three, or four (Fraisse 1982; Elliot 1986). This is known as *subjective rhythmization* and is considered to be highly important in conditioning our rhythmic experience. However, again there is the problem of terminology. As Justin London (2006) puts it, subjective *metrization* would be a better term if we want to avoid confusion.

Further adding to the confusion are the concepts divisive and additive rhythm (see Sachs 1953; London 2001). In divisive rhythm, the whole period or measure is divided into smaller rhythmic units. For instance, a 2/4 rhythm is understood as consisting of two 2/8 elements. In additive rhythm, there is in principle no preexisting period or measure which then is divided into smaller parts. Instead, the period is constructed bottom-up by smaller rhythmic units being added together (see figure 5 below). And again, as Tellef Kvifte (2007) argues, what is implied here is really meter rather than rhythm. Both Kvifte and Sachs also point out that the same rhythm may be perceived additively *or* divisively. This would suggest that if the rhythm is heard additively, it is an additive meter. And if the rhythm is heard divisively, the meter is divisive.

Divisive rhythm:



Additive rhythm:




Figure 5. Divisive and additive rhythm (meter)

Now, why is this so difficult? Why can't we agree that meter is the organizing principle, in other words *how* we organize musical sounds into a perceivable

pattern, while rhythm refers to the actual sounding events, in other words *what* we are attempting to make sense of? Well, this is not as unproblematic as I may seem. Above all, such a definition runs counter to everyday, intuitive understandings of the concept of rhythm and the sensation of things being rhythmical, as opposed to being non-rhythmical. A non-rhythmical sequence is sounding events without any perceivable order. Then it follows that rhythmical implies that the sounding events are arranged in a perceivable order. As Cooper and Meyer (1960) puts it: “To experience rhythm is to group separate sounds into structured patterns.” (Cooper and Meyer 1960:29). This is the root of the terminological problem, and one of the reasons why it is problematic to refer to rhythm in its unordered state as rhythm, while referring to the ordering of the rhythm as meter. This point is convincingly argued by, among others, Jan-Petter Blom (1993).

Another problem is that there are forms of music in which there is no regular or otherwise identifiable meter, while there certainly is rhythm in the sense of sounds being arranged in a perceivable order (Cooper & Meyer 1960; Cohen 2004). One example is the traditional soloistic ballad and *stev* singing in Norway, in which the rhythm clearly is structured in some way, although many would hesitate to call this music metric.¹

One solution here is to extend the concept of meter. For instance, the meter in a Norwegian *stev* performance could be described as a stylistically idiosyncratic formulaic pattern that structures the music in a way that makes it recognizable as a certain type or class of rhythm. This formulaic pattern could also be seen as the organizing principle by which accentual and durational relationships between the different parts of a melodic-rhythmic sequence are regulated. I will return to this idea later.

Another solution, to which most scholars have turned, is to equate metric music with measured music (see Sachs 1953; Gabrielsson 1993; Cooper & Meyer 1960). In simple terms, meter in this context is what is specified by the time signature in standard notation. This means that duple meter should have two beats per measure; triple meter should have three beats per measure. We are also told what type of note that represents one beat. For instance, in a $3/4$ meter, each measure should contain durational values equal that of three quarter notes. As we see in figure 6, there are several ways in which this could be achieved.



Figure 6. Different rhythms in triple meter.

Now, how does rhythm get into the picture? First of all, the four measures in figure 6 all contain different rhythms, while still being in the same meter. Moreover, many scholars agree that rhythm is about *grouping*, which means that we experience rhythm as patterns rather than as isolated events (Gabrielsson 1993). And as Cooper & Meyer (1960) point out, rhythmic grouping is a mental construction rather than something that exists in the music. At the same time, the experience of grouping is affected by the durational, melodic and harmonic organization of the music. Also, the repetition of a segment tends to mark a boundary for the group.

Let's take an example that illustrates how duration, melody and repetition may affect the impression of grouping. In the sequence shown in figure 6, there is no one particular grouping suggesting itself. Now we do the following: 1) We add a melody to the last two measures. 2) In the played version, we change the durational relationship between the beats subdivided into two to a triplet subdivision (♩^3 instead of ♩^2), a more musically relevant division. 3) We let these measures repeat (see figure 7).



Figure 7. Illustration of how duration, melody and repetition may affect grouping.

The picture is now different, and from my point of view, the grouping indicated by the braces stands out. That is, the repetition of the whole phrase marks a group boundary or motivic boundary. And the larger group is in turn asymmetrically subdivided into two smaller groups. On both levels, the grouping ignores the barlines, and we may turn the previous question around and ask: how does meter get into the picture here?

First of all, the meter still serves the function of measuring the rhythmic elements in relation to the measure. We cannot add an extra beat to one of these measures without changing meter. Second, and more complicated, more often than not meter is defined as a cyclically recurring pattern of *accents*, or, alternatively, as a periodic alternation of strong and weak beats (Cooper & Meyer 1960; Lerdahl & Jackendoff 1983; Hannon & Trehub 2005; Dowling & Harwood 1986). Let's assume that the meter in the melody in figure 7 is a strong-weak-weak pattern. Then this pattern will theoretically persist throughout the whole piece, regardless of rhythmic grouping (see figure 8 below). As David Epstein (1995) contends: the *accidental* patterns of motifs are generally determined by the metrical framework in which they appear. Or, as Cooper & Meyer (1960: 6) puts it: rhythm is independent of meter in the sense that a variety of rhythmic groupings can occur in any type of metric organization. But they also emphasize that rhythm is influenced by metric organization and that some rhythmic groupings are more difficult to realize in a given meter than others. My example illustrates this last point. To many listeners it is probably not that intuitive to hear this grouping while at the same time maintaining a strong-weak-weak accentuation pattern. At the same time, the observation that the rhythmic grouping seems to contradict meter brings out the general point even more clearly. That is, the metric accentuation pattern is not found in the music. Rather, this pattern is imposed on the music by the listener. Thus, it is more correct to conclude that meter *gives rise* to the perception of alternating strong and weak beats.



Figure 8. Illustration of meter as a periodic alternation of strong and weak beats (imposed by the listener).

In this context, it also seems relevant to mention another common conception in meter theory, namely that metrical structure is hierarchical.

The basic idea is that the organizing pattern is mirrored on increasingly higher levels in the musical structure (Sachs 1953; Cooper & Meyer 1960; Klapuri 2003). If we say that the pattern 1 in figure 9 below consists of the two phases strong and weak, this alteration could be said to reoccur in different ways on different hierarchical levels. If the same musical pattern is represented like in 2, it is seen that the repetition of the strong-weak pattern forms a larger pattern of four accents in which the one-two group is stronger than the three-four group. On the next level (version 3), the first part of the melodic-rhythmic motif (one-two-three-four) is stronger than the second part of the motif (five-six-seven-eight). Extending this principle to a larger motif (version 4), we might say that the A-part of the motif is stronger than the B-part. And so on. Many scholars have argued, however, that at structural levels that exceed the capacity of direct perception, listeners perceive form rather than rhythm or meter (Clarke 1999).

1

2

1

2

1

2

1

2

Down-beat Strong Up-beat Weak Down-beat Strong Up-beat Weak etc.

2

1

2

3

4

1

2

3

4

Strong Weak Strong Weak Strong Weak Strong Weak

3

1

2

3

4

5

6

7

8

Strong Weak Strong Weak Strong Weak Strong Weak Strong Weak Strong Weak

Motif Aa Motif Ab

4

Strong Weak

Figure 9. Meter as hierarchically structured.

A different way of approaching meter is represented by Justin London (2004) in his book *Hearing in time*. As with many other scholars, he maintains that meter is the presence of a regular pattern of beats, and that meter is in the listener rather than in the music, although not in the sense that the meter is independent from the sounding music. London draws on the psychological concept of entrainment, which refers to the synchronization of some aspect of our biological activity with regularly recurring events in the environment (see Clayton et al. 2004). Meter, then, is a musically particular form of entrainment. Listeners entrain or attune to periodicities occurring between musical events, meaning that their attention is guided toward the most salient temporal locations for future events. In other words, meter involves temporal expectations arising from the process of entraining to the regularities in the music. According to London, it follows that our sense of beat is a by-product of entrainment. As he puts it, when we are entrained to a rhythmic process, peaks of expectation are generated. Subjectively, these are experienced as beats, something which is especially noticeable when phenomenal articulations are absent in the music.

In London's terms, meter perception is not a passive process, but an *active* mode of perception. In line with this, he claims that metric listening is a *habit* of attending, a skilled behavior that we develop through musical enculturation. Robert Gjerdingen (1989) expresses the same idea when claiming that meter is "a mode of attending." Similar ideas are also found in Large & Jones (1999) paper *The Dynamics of Attending*.²

Regarding the question of *how* we entrain to a meter, Tellef Kvifte (2007) has some interesting reflections. Above all, he proposes the possibility that the process of entraining to a meter is a pattern-recognition task rather than a computational task. The fact that people identify a range of *different* rhythmic realizations as having the same meter, then, is not explained in terms of the ability to apply certain general perceptual rules to bring order to the sensory data. Instead, meter entrainment is a matter of learning to recognize and discriminate a large number of musical patterns. A certain meter, then, could be described as the conditions through which a range of different rhythmic performances are recognized as being the same in some sense.

A related perspective on meter entrainment concerns how the body serves as an interpreter of musical rhythm. Jan-Petter Blom, a representative of this view, claims that “the experience of metrical groupings, and the differentiations between accents, are kinesthetic experiences by nature and related to particular qualities in the oscillations or periodicity of moving body parts.” (Blom & Kvifte 1986:502). According to Blom, it follows that our concepts of rhythm and meter are mirrored by the way in which we move our body in synchrony with music. This general idea has been extensively elaborated by Hans Thorvald Zeiner-Henriksen (2010).

For Blom, a shared dance culture is what ensures conceptual sharing, in other words what guarantees that people entrain to the meter in the same way. This view is particularly illuminating in light of the music with which Blom has been working. That is, the asymmetrical springar styles in Norwegian folk music. Here, no levels in the metrical hierarchy are isochronous. Yet, dancers mutually entrain to these rhythms in a consistent way. Accordingly, the common view that we have to be able to “measure” the rhythm by means of counting isochronous pulses to perceive meter is not universally valid.

Yet another approach, which represents an even further departure from traditional conceptions of meter, is presented in Christopher Hasty’s (1997) book *Meter as rhythm*. Hasty argues against the conventional view that rhythm is the actually sounding durations of music, while meter is an abstract, contextually neutral grid against which rhythm is produced and perceived. Instead, he defines meter as a generative process of actively becoming. For Hasty, the essence of meter is the process of projection. In highly simplified terms, this could be explained as follows: As an event becomes, its duration accumulates projective potential, in other words it forms our expectations about the duration of future events. Thus, the ground against which expectations, and thereby our sense of meter, are experienced is in no way external to the sounding music. Hasty’s theory is much too complex and compounded to be fully accounted for here, but the main point for the present discussion is that he sees meter as an emerging property of our engagement with the unfolding music, rather than as a neutral, pre-established grid by which the music is structured. Also, the fact that Hasty resists the notion of metric types raises the question of how to

account for stylistic categories that are defined with reference to a meter. As mentioned earlier, two waltz melodies may be experienced as being categorically the same in some respect with reference to some sort of structuring having to do with rhythm. And if we do not invoke the concept of meter in this context, what other concepts should we use?

Hasty's original account of meter also reminds us of the important issue of choosing a relevant reference in relation to which performed rhythms are understood. If meter is in a continual state of becoming, and more or less inseparable from rhythm, it is difficult to see how it can function as a recognizable frame of reference within which rhythmic events and patterns are made sense of. If, on the other hand, meter is seen as a pattern of non-sounding, duration-less points in time, it is easier to imagine how it may function as a reference grid for the actual rhythmic onsets in the music.³ Anne Danielsen (2006) has some interesting thoughts in this regard. Drawing on Deleuze's notion of virtuality, she conceives of rhythm as an interaction of something sounding and something that is not. What is interesting is that even though the structures of reference at play are not actual sounds, they are not seen as abstract or external to the music. Instead, rhythm is seen as happening in the span of the actual sound and non-sounding virtual structures of reference existing outside of time. In Danielsen's terminology, this process is defined as an interaction between figure and gesture.

Summary

In summarizing this article, the different perspectives on musical meter may be classified in a few broad categories, some of which will more or less overlap. According to the first perspective, meter is a measuring device. Accordingly, music that cannot be measured is defined as unmeasured music. The second category concerns meter as an accentuation pattern, for example strong-weak-weak. In this case, accents may in principle be defined in a variety of ways, and there could also be great flexibility in the actual duration of rhythmic elements. In both these types of definitions, regularity, in the sense of a return of the similar, is central. It may also be generalized that meter in some way is independent of the performed music.

According to a third view, meter is an emerging property of the listener's engagement with the unfolding music, rather than a neutral grid. In this case, the precise nature of meter is impossible to account for, since it will vary from one piece of music or one musical experience to the next. An equally radical view would be what I earlier referred to as a formulaic conception of meter (see Johansson 2010). According to this perspective, the concept of meter denotes a dynamic organizational framework that exists only by virtue of its interaction with the diverse manifestations through which it is recognized. That is, it certainly may be a structuring framework, but not in the sense of an archetypical version from which alternative versions are modeled. Instead, metrical sameness is established in the process of trying out different rhythmic designs. Taken far enough, this line of thought introduces a new terminological challenge, since what is referred to would more correctly be termed groove or style. The formulaic model also highlights the need to take a more anthropological approach. In short, determining the extent to which different rhythmic performances conform to a common definitional framework requires the examination of cultural classifications. In other words, from this perspective, sameness concerns culturally negotiated boundaries and sensitivities which cannot easily be determined by measurements or experiments.

Finally, what all these different perspectives have in common is that meter may be seen as a frame of reference within which musical events are made sense of. The main differences concern the nature of this framework and *how* it is assumed to function in the perception and production of music.

References

- Bengtsson, Ingmar 1980. Rytme. In K. Michelsen (ed.), *Cappelen's musikkleksikon* 5., Oslo: Cappelen..
- Blom, Jan-Petter & Kvifte, Tellef 1986. On the problem of inferential ambivalence in musical meter. *Ethnomusicology* 30/3: 491–517.
- Blom, Jan-Petter 1993. Rytme og frasering – forholdet til dansen. In Aksdal, Bjørn & Nyhus, Sven (eds.), *Fanitullen. Innføring i norsk og*

- samisk folkemusikk*: 161–184. Oslo: Universitetsforlaget
- Clarke, Eric F. 1999. Rhythm and timing in music. In Deutsch, Diana (ed.), *The psychology of music*: 473–500. San Diego: Academic Press.
- Clayton, Martin; Sager, Rebecca & Will, Udo 2004. In time with the music: The concept of entrainment and its significance for ethnomusicology. *ESEM CounterPoint* 1: 1–81.
- Cooper, Grosvenor W. & Meyer, Leonard B. 1960. *The rhythmic structure of music*. Chicago: University of Chicago Press.
- Cohen, Dalia 2004. Perception And Responses To Schemata In Different Cultures: Western And Arab Music. *Music Therapy Today* (online) V/5. Available at <http://musictherapyworld.net>.
- Danielsen, Anne 2006. *Presence and pleasure: The funk grooves of James Brown and Parliament*. Middletown, Conn.: Wesleyan University Press.
- Dowling, Jay W. & Harwood Dane L. 1986. *Music Cognition*. San Diego: Academic Press.,
- Elliott, Charles A. 1986. Rhythmic Phenomena—Why the fascination? In Evans & Clynes (eds.), *Rhythm in Psychological, Linguistic and Musical Processes*: 3–12. Springfield, IL: Charles C. Thomas Publisher.
- Eronen, Antti J. & Klapuri, Anssi P. 2010. Music Tempo Estimation With *k*-NN Regression. *IEEE Transactions on Audio, Speech, and Language Processing* 18/1.
- Epstein, David 1995. *Shaping time. Music, the brain, and performance*. New York.: Schirmer Books.
- Fraisse, Paul 1982. Rhythm and tempo. In Deutsch, Diana (ed.), *The psychology of music*: 149–180. New York: Academic Press.,
- Furholt, Ragnhild 2001. *På Alle Strengjer* [music CD]. Lærdal Musikkproduksjon LMP101.
- Gabrielsson, Alf 1993. The complexities of rhythm. In: T.J. Tighe and W.J. Dowling (eds.), *Psychology and music: The understanding of melody and rhythm*: 93–120. Hillsdale, NJ.: Erlbaum.
- Gjerdingen, Robert 1989. Meter as a Mode of Attending: A Network Simulation of Attentional Rhythmicity in Music. *Integral* 3: 67–91.
- Handel, Stephen 1998. The Interplay between Metric and Figural Organization. *Journal of Experimental Psychology: Human Perception and Performance* 24/5: 1546–1561.

- Hannon, Erin E. & Trehub, Sandra E. 2005. Metrical Categories in Infancy and Adulthood. *Psychological Science* 16/1: 48–55.
- Hasty, Christopher F. 1997. *Meter as rhythm*. Oxford: Oxford University Press.
- Hauptmann, Moritz 1888. The Nature of Harmony and Meter. Translated and edited by W. E. Heathcote. London: Swan Sonnenschein.
- Johansson, Mats 2010. *Rhythm into Style: Studying Asymmetrical Grooves in Norwegian Folk Music*. PhD thesis, University of Oslo.
- Klapuri, Anssi P. 2003. Musical Meter Estimation and Music Transcription. Conference paper, Cambridge Music Colloquium 2003. Cambridge University.
- Kvifte, Tellef 2007. Categories and timing: On the perception of meter. *Ethnomusicology* 51/1: 64–84.
- Large, Edward W. & Jones, Mari Riess 1999. The dynamics of attending: How people track time-varying events. *Psychological Review* 106/1: 119–159.
- Lerdahl, Fred & Jackendoff, Ray 1983. *A Generative Theory of Tonal Music*. Cambridge MA: MIT Press.
- London, Justin 2001. Rhythm. In Sadie, Stanley & Tyrrell, John (eds.), *The New Grove Dictionary of Music and Musicians*, second edition. London: Macmillan Publishers.
- London, Justin 2004. *Hearing in Time: Psychological Aspects of Musical Meter*. New York: Oxford University Press.
- London, Justin 2006. How to Talk About Musical Metre. UK Lectures Winter & Spring 2006.
- Read, Gardner 1980. *Modern rhythmic notation*. London: Gollancz.
- Sachs, Curt 1953. *Rhythm and Tempo: A Study in Music History*. New York: Norton.
- Various artists 1995. *Norsk folkemusikk* [10 music CD box set]. Grappa/NRK GRCD409910.
- Waadeland, Carl Haakon 2000. *Rhythmic movements and movable rhythms. Syntheses of expressive timing by means of rhythmic frequency modulation*. Doctoral dissertation. Department of Musicology. Norwegian University of Science and Technology, Trondheim.
- Zeiner-Henriksen, Hans T. 2010. *The “PoumTchak” Pattern: Correspondences Between Rhythm, Sound, and Movement in Electronic Dance Music*. PhD thesis, University of Oslo.

Noter

- 1 For examples, listen to Gustav Kåterud singing “Sjugel og Trollbrura” (Various artists 1995) and Ragnhild Furholt singing “Stev after Birgit Torkildsdotter Austad” (Furholt 2001).
- 2 “[...] by virtue of dynamic mimicry, the attender ‘participates’ in the rhythm of a remote event. Entrainment means that parts of an attender literally ‘match up’ with certain time spans in the remote event, and in this sense attending is participatory. The resulting synchrony with temporally structured events functions as a form of direct knowing.” (Large & Jones 1999:153)
- 3 For instance, syncopation presumes the existence of an underlying grid, a virtual point in time at which the note onset could have occurred but did not.