Carl Erik Kühl

Metrical Energy - Outline of a Theory

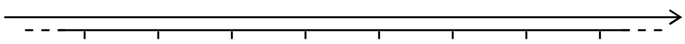
Preface

Metrical time is a primordial phenomenon in music. Metre gives birth to musical time as an *energetic* phenomenon characterised by a constant pulsating between tension and resolution. A *melodic*-energetic phenomenon (i.e. upward movement as intensification, downward movement as resolution) presupposes that the note in question - "*this* note heard now" - at least appears in a melodic context: perhaps as a peak note, a note filling out an interval of a third, marked by a leap, or something similar. Likewise, a *harmonic*-energetic phenomenon, such as a dominant triad's tension relative to a tonal centre, takes for granted a tonal context in which to sound. A *metrical*-energetic phenomenon, though, does not presuppose any actual sounding at all! It is constituted by the very fact that the time we are dealing with is a *musical* time. As such, it also stands above the Law of Conservation of Energy. Melody and harmony draw on this, to enable what would otherwise be quite impossible: a harmonic progression beginning with a tonic chord, for instance, can nevertheless set itself in motion 'on its own', thanks to the fact that the tonic itself comes on a weak beat. To take another example, an upwards melodic leap can be an organically occurring phenomenon, in that it sets out from a weak beat. It is the metrical-energetic phenomenon, that is the subject of this article, the aim being to develop a conceptual framework for use in uncovering and describing concrete metrical structures in music.

1. Basic Concepts of the Metrical Theory

First, we provide definitions for a series of schematic concepts that are to be employed in the forthcoming analysis. These are “purely” schematic in that they do not in themselves presuppose anything already audible, but rather constitute something that sounds can subsequently be heard *in*. In short, the schemes schematise sound, even though so far there is nothing to schematise.

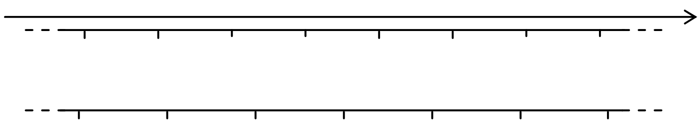
SIMPLE METRICAL SCHEME *(def.)*:[1]
By a simple metrical scheme (also referred to hereon as a ‘simple metrical time’) Ma we shall understand a(n) (in principle infinite) series of points of time, the same distance apart (… s_{n-1}, s_n, s_{n+1} ...).

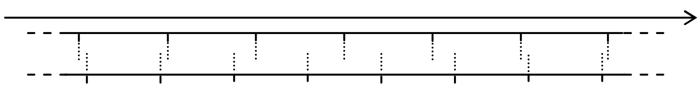
Ma


Ex.1

POLYMETRIC SCHEME *(def.)*:
By a polymetric scheme (or ‘polymetric time’) Mabc…n we shall understand the unity of the simple metres Ma, Mb, Mc ... Mn. The unity consists in the integration of the concurrently schematising metres with one another.

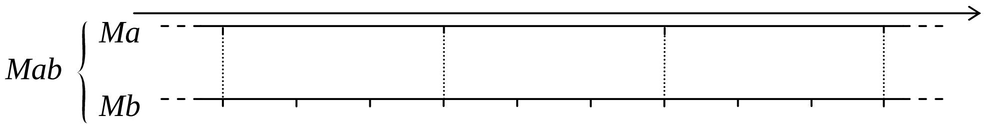
Ex.2a shows two simple metrical schemes, *Ma* and *Mb*. Ex.2b integrates these to form the polymetric scheme (or ‘polymetric time’) *Mab*. We may then say that *Ma* and *Mb* are *constituent metres* of *Mab*.

Ex.2a *Ma* *Mb*


Ex.2b *Mab*


ISOMETRIC SCHEME. SPECIAL CASE *(def.)*:
By an isometric scheme Mab we shall understand a polymetric scheme formed of the simple metres Ma and Mb, for which it is the case either that every point in Ma is also a point in Mb, or that the converse holds.

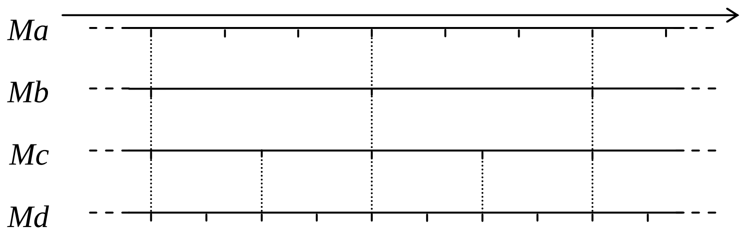
In the polymetric scheme *Mab* in Ex.3, every point in *Ma* is also a point in *Mb*. Thus *Mab* forms an isometric scheme.



Ex.3

If every point in *Ma* is also a point in *Mb*, *Ma* can be said to be a *subordinate time* to *Mb,* just as *Mb* can be said to be a *superordinate time* to *Ma*.

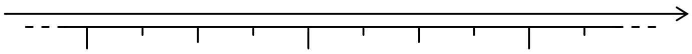
ISOMETRIC SCHEME. GENERAL CASE *(def.)*:
By an isometric scheme Mabc…n we mean a polymetric time composed of the simple metres Ma, Mb, Mc,… Mn, where every dual set of constituent metres, Mx and My, forms an isometric scheme in accordance with the specific definition of an isometric scheme.



Ex.4

For example, in Ex.4, *Mb*, *Mc* and *Md* make out an isometric scheme, just as *Ma* and *Mb* do. But *Ma*, *Mb* and *Mc* do not. That is, all the constituent metres in the isometric scheme *Mabc…n* are linked transitively, so that if M_k is subordinate to M_l, and M_l is subordinate to M_n, then M_k is also subordinate to M_n. So every point in the superordinate metre is a point in the subordinate metre, and this allows us to notate the isometric scheme along a single axis: the greater the number of subordinate times at a particular point, the longer the vertical stroke used to mark that point. For example:

Mbcd



Ex.5

In Ex.5, the isometric scheme *Mbcd* - formed by *Mb*, *Mc* and *Md* in Ex.4 - is notated on one axis. The simple metrical scheme can be seen as a limit case of the isometric scheme, and as such, in the following, we can let *Mn* stand for any isometric scheme we choose, without necessarily specifying how many constituent metres it has, or how it is composed.

Any point in an isometric scheme *Mn* - e.g. *Mbcd* in Ex.5 - can be said to have a *metrical strength*, and the greater the number of constituent metres coming at that particular point, the *stronger* it will be. We will now turn to a consideration of what the implications of this might be.

2. Metrical Strength.

We have not heard any sound yet, and the study of metrical structures need not in principle involve any specific requirement for sounds, only a general requirement for impulses. An impulse is something which takes place and is perceived in an instant – the closing of a door, a light going off, a gunshot, etc. So sound can be included - that is, not *the* sound, but the *onset* of the sound. How long it sounds is less important. The impulses used in our examples are sound-onsets from pieces of music.

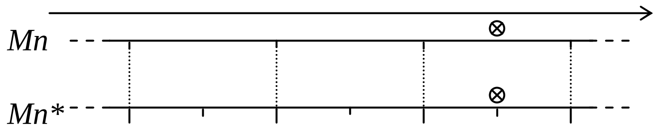
An impulse instantiated in a metrical scheme is called a *metrical impulse*. Schematising can take place in two different ways:

> SIMPLE UNSTRESSED METRICAL IMPULSE *(def.)*:
> *A metrical impulse p is said to produce a simple (unstressed) metrical impulse in the metrical scheme Mn, if and only if it specifically occurs at a point in at least one of the constituent metres.*
>
> STRESSED METRICAL IMPULSE:
> *A metrical impulse p is said to produce a stressed metrical impulse in the metrical scheme Mn, if and only if it specifically occurs* after *or* before *(i.e. "too late" or "too early" in relation to) a point in at least one of the constituent metres.*

A few comments are needed here. Clearly, every impulse will occur either at the same time as, or before, or after a certain point in an arbitrary metre *Mn*. But that certainly does not mean that every impulse is a metrical impulse, whether unstressed or stressed in *Mn*. If I bang the front door at the same time as a conductor in New York signals the first beat of Beethoven's *Symphony No. 3*, the banging of the door is obviously not an impulse in the metrical time of the symphony, even if I happen to be watching and listening to the concert on television. Only if the banging of the door were to somehow become inserted into the phenomenon of the symphony itself - such that the unfolding of the latter had somehow been "re-composed" as a result of the insertion of the door-banging - would the impulse have become a metrical impulse.

Secondly, whether an impulse *p* forms a stressed or unstressed metrical impulse in *Mn* is not a question of "objective" simultaneity. Even if the impulse appears one thirtieth of a second later than the metrical point, it forms a simple (unstressed) metrical impulse, as long as it expressly occurs at the metrical point. Isn't this to contradict oneself? Not at all. When we say that something "occurs one thirtieth of a second later than the metrical point", we are not properly speaking of the delay as a musical phenomenon, nor of the impulse as a metrical impulse (whether stressed or unstressed) in the music.

Thirdly, *if* an impulse comes "halfway between" two points in *Mn* (see Ex.6), it doesn't form a metrical impulse in *Mn* at all. But, occurring there (i.e. equidistant from t_n and t_{n+1}), it could possibly make a metrical impulse in the derived isometric time, *Mn**.



Ex.6

The importance of the metrical accent is well known, for example in Jazz. It is hardly less important, albeit less widely recognised, in western European classical music. It is not implausible that the ability of the musical ear to distinguish between, and classify, a wide variety of dances with the same metre and tempo - even different conductors' ways of, for example, conducting a Viennese waltz - could prove to be a manifestation of a sensibility to microscopic nuances of timing that is linked to the phenomenon of 'metrical accent'. A certain 'note-fetishism' has probably been a contributory factor for the tendency of analysts and pedagogues to push the metrical accent into the background.[2]

The phenomenon of simple (i.e. unstressed) metrical impulses can be analysed without any reference to the phenomenon of stressed metrical impulses, but not the other way around. Accordingly, the study of metrical time begins with the study of simple metrical impulses. And so, when in the following we use the term 'metrical impulse' or just 'impulse', we are referring to a 'simple metrical impulse'. Moreover, we will only concern ourselves with polymetric times insofar as these may be said to be isometric as well.

3. Metrical Tension

Now energy enters the scene. The scheme will do more than just fix points of time. A metrical scheme, a metre, becomes a dynamo, providing the impulses that are schematised with a tension to be released by a subsequent impulse. The simplest example is the phenomenon of the "upbeat": a note heard on the 4th beat in 4/4-time will have a tension in relation to the following 1st-beat. It demands that something happen - typically the continuation of a melody - on the 1st-beat.

We may give the following definition:

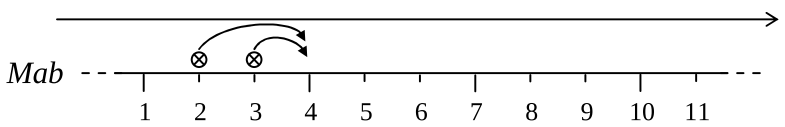
METRICAL TENSION *(def.)*:
A metrical impulse p at a point t_k has metrical tension in relation to a point t_m, if and only if an impulse at t_m resolves that tension.[3]

We can now state the following theses:

TENSION THESIS I:
Any metrical impulse at a point t_k has metrical tension in relation to the succeeding stronger point t_m.

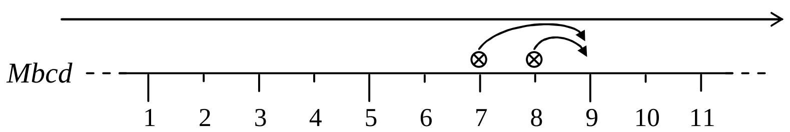
TENSION THESIS II:
The greater the difference in strength between t_k and t_m, the greater the tension, and the greater the energy released in the resolution.

Ex.7 shows the isometric time *Mab*, that we have already seen in Ex.3. The points 1-4-7- ... are strong points, in that they contain both *Ma* and *Mb*. The points 2-3-5-6-8-9- ... are (relatively) weak points, in that they only contain *Mb*. We find that the impulses at points 2 and 3 both have tension in relation to 4, since 4 is the nearest succeeding stronger point.



Ex.7

In Ex.8 we again have *Mbcd* from Ex.5. The impulses at points 7 and 8 have tension in relation to 9. The tension 7→9 is, however, less than the tension 8→9, since the difference in strength between 7 and 9 is less than the difference between 8 and 9.



Ex.8

4. Metrical Perspectivity

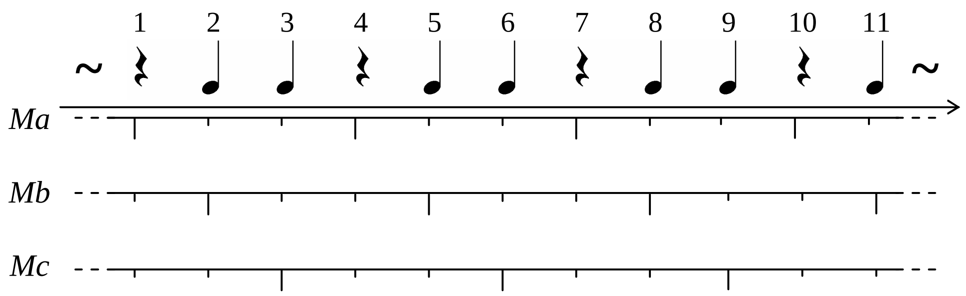
We noted at the start that the metrical structures of time - i.e. metre itself - are schemes, i.e. they don't *sound* in their own right in the course of the music.[4] Metrical time is, in a way, like a pair of glasses: we take no notice of the glasses, but only of what we see through them.

As we have seen, there are many ways to structure time metrically, in principle any number of ways. But the individual musical moment – here understood as the individual sequence of impulses – is born into a certain *place* in a certain *space*, in the sense that some metres are more *salient* than others.[5] That a certain metre is salient for a certain sequence of impulses, means that it is salient for the individual impulses to take place in that metre. Whether the listener seeks the near or the distant is his own concern. But if he experiences the music in a merely receptive way, he will, all things being equal, encounter the near, and only the distant insofar as he seeks beyond the near. The *perspective* remains. What metres are salient to which sequence of impulses? What are the principles according to which the above-mentioned *nearness* is constituted? This is the next question to be addressed.

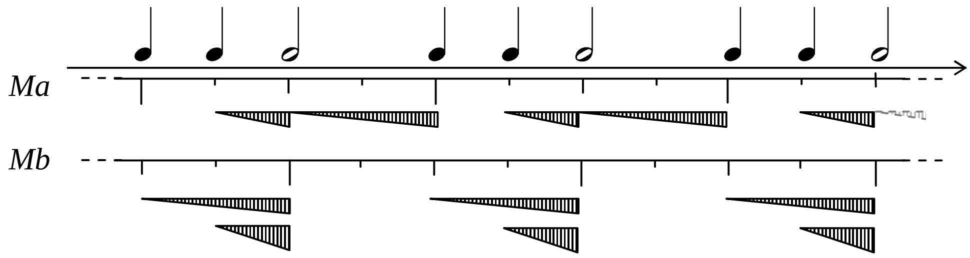
We may now state the

PRINCIPLE OF ENERGY:
The more the energy that a sequence of impulses F is able to realise in a metrical scheme Mn, the more salient it is for F to appear in Mn.
The less the energy realised, the less salient it is for F to appear in Mn.

In Ex.9 a sequence of impulses is assigned to three isometric schemes *Ma*, *Mb* and *Mc*. If we allow the impulses (the crotchets - or to be precise, the onset of the crotchets) to occur in *Ma*, we see that they all, in accordance with the thesis of tension, become charged with tension, but none of them become resolved. If we allow the impulses to take place in *Mb* – i.e. if we hear the sequence as schematised in *Mb* – then 3-6-9-… are charged with tension and that is dissolved at 5-8-11-… If the impulses take place in *Mc*, then 2-5-8-... are charged with tension that is dissolved at 3-6-9-... The Principle of Energy allows us to conclude that it is more salient for the sequence to take place in *Mb* and *Mc* than in *Ma*.

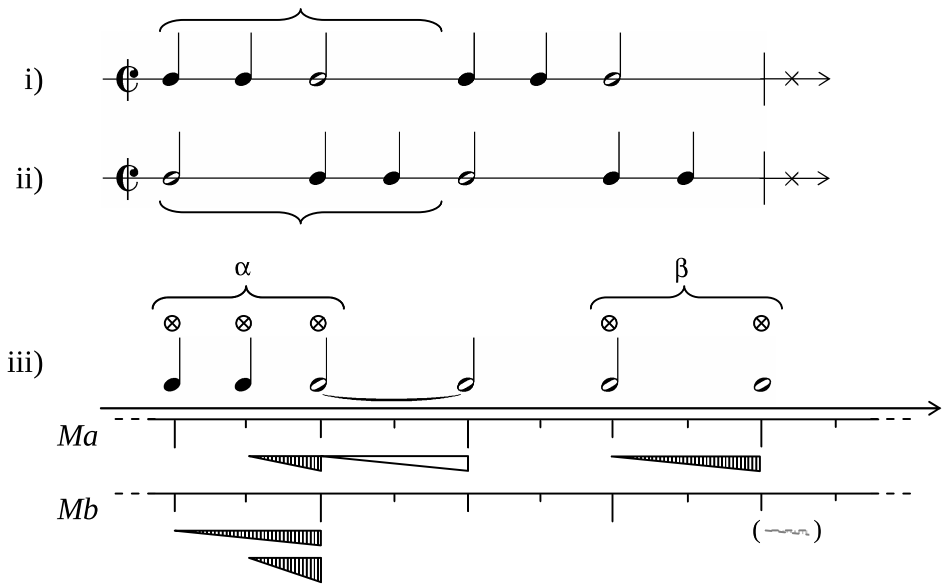


Ex.9



Ex.10

In Ex.10 a sequence of impulses is assigned to two isometric schemes, *Ma* and *Mb*. The triangles underneath show something of the tensions involved, in two respects: in terms of horizontal extension they indicate how long it takes before the tension-charged impulses come to a resolution; in terms of vertical extension, they show how much energy is realised in the dissolution. We see that all the energy is realised in both *Ma* and *Mb*, and we see that every second tension-charged impulse occurs one crotchet unit and every other two crotchet units respectively, before dissolution in *Ma* or *Mb*. Both schemes operate with three strengths: 1 (weak), 2 (moderately strong) and 3 (strong). However, whereas the tension of those impulses occurring a crotchet before the dissolution in *Ma* issues from relations between points with a strength of 1 and points with a strength of 2, the tension of the comparable impulses in *Mb* issues from relations between points with a strength of 1 and points with a strength of 3. Thus the sequence realises more energy when schematised in *Mb* than in *Ma*. Hence, according to the Principle of Energy, it is more salient for the sequence of impulses to appear in *Mb* than in *Ma*.



Ex.11

Ex.10 may be associated with the rules for melodic composition, for example, in the style of Palestrina. With reference to Ex.11: according to standard textbooks, (i) is less acceptable than (ii). In (i) the sequence of impulses is "inorganically" related to the underlying metre (i.e. the metre of the movement), in that this metre is not identical to the metre obviously most salient for the sequence itself. If the figure from (i) is used, the minim should - so the textbooks say - be preferably tied over further to produce a syncopation as in (iii).

We could also say something more about this last rule. The metrical scheme, *Ma*, the metre of the movement, is given. When the sequence of impulses α appears, the conflict mentioned earlier arises, between *Ma* and the more salient metre for the sequence *Mb*.[6] With the syncopation and upbeat structure of figure β as created by the syncopation, however, the balance is restored. *Ma* now becomes the *established* metre and the most *salient* metre for the current musical gestalt. For only by appearing in *Ma* - not in *Mb* - does the β-figure realise energy.

The following principle demands yet another concept, that of the

> WAIT OF THE TENSION-CHARGED IMPULSE:
> *We say that a tension-charged impulse "*waits *for its dissolution" at all the points in the scheme not having impulses which (i), are found between the point of tension and the point of resolution and (ii), have the same strength as the point of tension itself.*

This leads to a formulation of the

> PRINCIPLE OF DURATION:
> *The fewer the points over which, and the less the energy with which the tension-charged impulses in a sequence of impulses F must wait for their resolution in a metrical scheme Mn, the more salient it is for F to appear in Mn.*

Looking back at Ex.9, we saw that every second impulse is charged with tension, and finds its resolution, both when the sequence of impulses appears in *Mb*, and when it appears in *Mc*. However, the impulses in *Mb* must wait for one point to occur before their resolution. Thus, according to the Principle of Duration, it is more salient for the sequence to take place in *Mc* than in *Mb*.

In the case of the third principle to be addressed, the impulses are not just something that "occurs" or "does not occur": unlike with the Principles of Energy and Duration, the impulses here are characterised relative to musical parametres.

An isometric time has three main characteristics: A) every point in an isometric time constitutes a specific position in a pattern which resumes and repeats itself; B) every point in an isometric time possesses the same quality (i.e. strength) to a greater or lesser degree; and C) every point in an isometric time is a possible site of metrical tension and/or release. But these structural conditions are clearly not reserved for metre alone. As far as (A) is concerned: a note can have a specific position in a pattern that repeats itself. In the case of (B): concepts such as 'strength', 'intensity', 'significance', etc.,[7] may be applied anywhere in a piece of music in a number senses (of which metrical strength is just one), and indeed may also in a given context be heard to correlate with metrical strength itself. Concerning (C): a chord in functional harmony, for instance, may possess harmonic tension and/or it may constitute a dissolution of such tension.

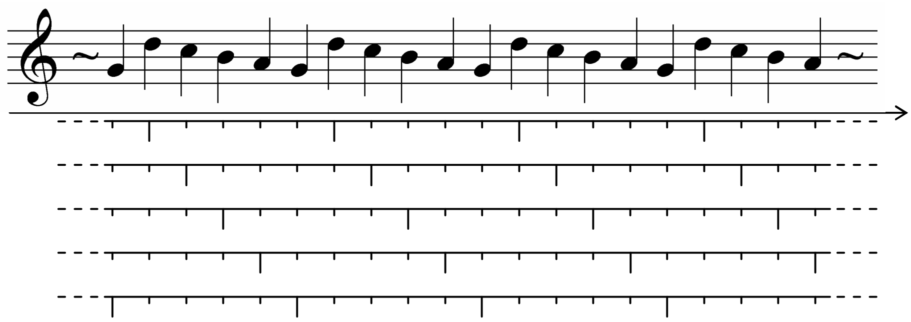
Thus it becomes possible to ask whether and in what manner a particular musical sequence *corresponds* to a specific metre.

This brings us to the

PRINCIPLE OF CORRESPONDENCE:
The more ways in which a musical sequence F corresponds with the metrical scheme Mn, the more salient it is for F to take place in Mn.

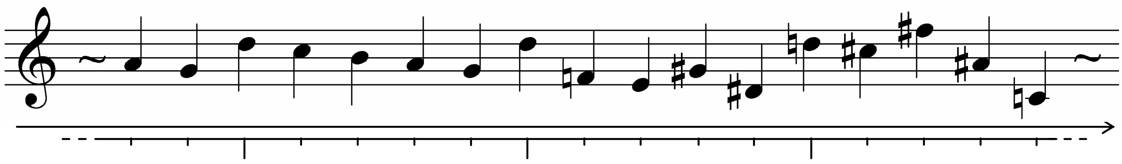
We shall now offer examples to illustrate this principle in terms of the above-mentioned structural designations A, B and C.

First, let us consider the A-variant (see Ex.12). The melody repeats and repeats itself after every fifth crotchet. As such it may be brought into correspondence with a 5/4-metre. So this metre, in this case, is more salient than, for instance, a 2/4- or a 3/4-metre. (The question is, whether one of the five possible 5/4-metres has primacy. Presumably, for reasons we will not go into here, no.1 (from D) or no.5 (from G) are more salient than the other three.)



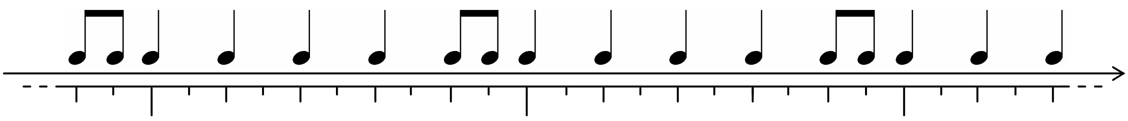
Ex.12

In Ex.13 too, a *recapitulation* of the melody takes place with every fifth crotchet. In this case the repetition is established, but not carried through with respect to anything else beyond rhythm itself. Consequently the correspondence with the 5/4-metre becomes somewhat weaker than in Ex.12. On the other hand, in Ex.13 it is clear that one of the five possible 5/4-metres has primacy: the five 5/4-metres we are dealing with here, are, of course, composed of two constituent metres. *One of these* resumes – and at the same time carries out - *qua* simple metrical time - the repetition of itself with every crotchet, while the *second* does so with every fifth crotchet. So the strongest point in the 5/4-metre becomes the point where the metre as such sets out to repeat itself. (And in general: the heaviest point in an isometric time also becomes the place where the metre as such resumes itself.) And so, in Ex.13 the 5/4-metre having strong points at those places where the melody sets out to repeat itself is given primacy.



Ex.13

In Ex.14, according to the Principle of Correspondence (A-variant), a 5/4-metre is the most salient. The Principle of Energy determines the position of the strong beat.

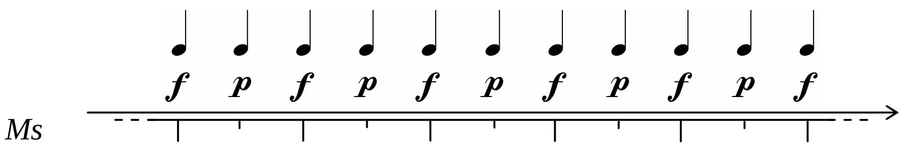


Ex.14

In sum, we have the

> PRINCIPLE OF CORRESPONDENCE. A-VARIANT:
> *The more clearly and the more the ways in which the duration of the parts of a musical sequence F correspond with the distance between the points in a metrical scheme Mn, the more salient it is for F to take place in Mn.*

Next, we turn to the B-variant (see Ex.15). According to the A-variant of the Principle of Correspondence, a 2/4-metre is the most salient. But how are the heavy and light beats placed? There are, of course, two possibilities. Here, the movement of the music between ***f*** and ***p*** is a movement between *higher* and *lower* volume. As such, it may correspond with a metre's movement between strong and weak beats, i.e. between *more* and *less* metrical strength. In the metre *Ms*, this type of correspondence is realised, so this metre is the most salient one.

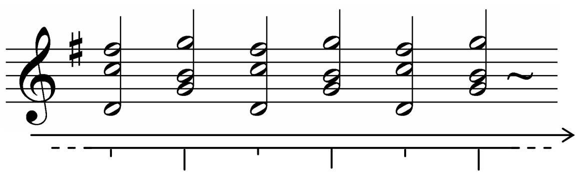


Ex.15

Generalising from this we get:

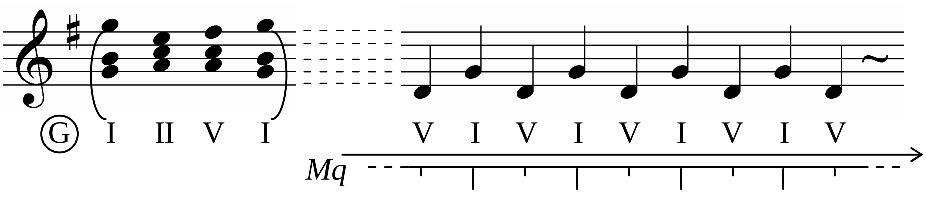
PRINCIPLE OF CORRESPONDENCE. B-VARIANT:
The more clearly, and the more the ways in which non-metrical structures of intensity (loudness, volume, etc.) in a musical sequence F correspond with the pattern of metrical strengths in a metrical scheme Mn, the more salient it is for F to appear in Mn.

Finally, we come to the C-variant (see Ex.16). According to the A-variant of the Principle of Correspondence, a 2/2-metre is the most salient. At the same time, the musical development is constantly alternating between (harmonic) tension and resolution. When this development takes place in a metre, so that the harmonic tension is attached to a weak beat, while the resolution is attached to a strong beat, the metre will correspond with the harmonic development, for the weak beat is the site of metrical tension, just as strong beat is the strong point for the release of metrical tension. The 2/2-metre, which specifically allows the V^7-chord to occur on a weak point and the I-chord on a strong point, is therefore the most salient metre.



Ex.16

Ex.17 illustrates how the correspondence may be constituted harmonically - even when the chords themselves are absent! The opening cadence has established a tonality according to which the following “unharmonised” crotchets arrange themselves as V and I. The 2/4-metre is already given by the A-variant. But it is the functional-harmonic interpretation of the crotchets that establishes the strong and weak points in the metre *Mq*.



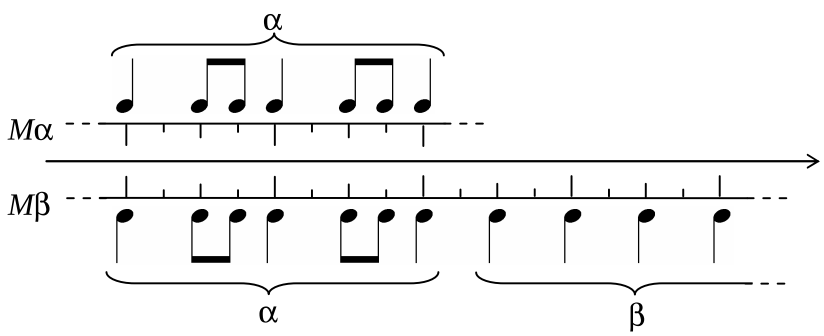
Ex.17

Generalising from the above furnishes us with the

PRINCIPLE OF CORRESPONDENCE. C-VARIANT:
The more clearly and the more ways in which the non-metrical tensions and resolutions in a musical sequence F correspond with the metrical tensions and resolutions in a metrical scheme Mn, the more salient it is for F to take place in Mn.

5. Temporality: The Present, Future and Past

So far, we have only studied the metrical perspective, in so far as it is established "all at once" - of the moment - by the music itself. It has merely been a question of how, in the individual moment, this or that metrical scheme is more or less salient by reason simply of what is there to be schematised, i.e. what is going on musically - the particular structure of the current sequence of impulses. In most sequences, one metrical scheme will be more salient than any other. We shall call this the sequence's '*eigen*-scheme'.[8] That is, we have so far disregarded the sequence's context, its future and past - or, to be more precise, its structural conditions of *futurity* and *pastness*.



Ex.18

In Ex.18 we have (i) first determined the *eigen*-scheme of the sequence α. It is clearly the 2/4 metre with the strongest beat on the crotchet. We call this metre *M*α. We notate the entire complex "the sequence of impulses α in the metre *M*α" as *M*α/α. (ii) Next the example becomes elaborated, prolonged with yet another series of crotchets called β. β's *eigen*-scheme *M*β is not isometric: it is a simple crotchet metre. *M*β is a partial metre in *M*α. But when β is heard in and as a continuation of α, *M*α (with all three of its values of strength) remains quiet salient. The metre is, so to speak, "inherited" from α.

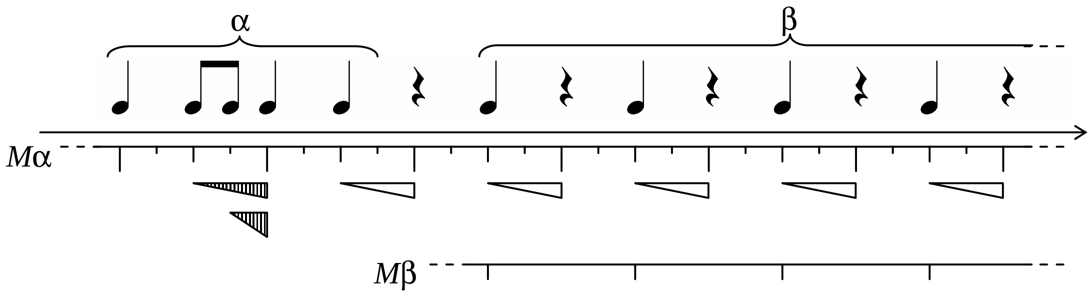
That a metre "keeps going" is, in a way, a result of the definition of the metrical scheme as "an open-ended series"; but this is not enough to explain why the metre retains its saliency - remains present - when it is no longer an *eigen*-scheme.

It is precisely at this juncture that we need to introduce the concept of *projecting*. The term may be used in a broad sense: an invitation to a party entails (in this sense) “projecting” the party. Any leading note “projects” its own dissolution. And any current metre “projects” its own being retained as a kind of presence. It is the sequence α that establishes the metre *M*α in Ex.18. But it is the metre itself that projects its own continued status as a scheme in which it is salient for the music to be heard.

Whether listeners actually *hear* it this way may, for that matter, vary. It may be that you “didn’t catch the beginning”, “jump off”, “forget” what you have just heard, but that is only because there *is* something to forget. The point is, that *as long as* we hear β as a continuation of α, we *also* hear α’s *eigen*-scheme as the most salient metre for β.

Every moment is met, so to speak, by projections from what has already occurred. We can say that the projections are “taken over” (*übergenommen*). The note coming after a leading note is related to the previous note precisely in the latter’s capacity *as* a leading note, whether it resolves it or not: it “takes over” the leading note (or better: it takes over the phenomenon of tension constituted by the leading note). Likewise, an invitation remains an invitation whether it is taken up or not. In Ex.18, the *taking over* was positive, the invitation was *taken up*, the projection was fulfilled: β fulfils *M*α’s projection of its own retained presence.

It is not that simple in Ex.19.



Ex.19

The first five impulses α still have *M*α as their *eigen*-scheme, and *M*α projects its own continued presence. The succeeding series of impulses, β, relates to this - i.e. it takes over the projection - but refuses to fulfil it. The fifth impulse is charged with tension, but isn’t dissolved. The sixth impulse takes over the existing conditions, but does not restore the balance with a subsequent resolution. Nor do the seventh, eighth … etc. impulses realise their energy. But if we can speak of energy that is not realised at all, it means that the first five impulses’ *eigen*-scheme is still present. This, however, cannot be caused by β itself, which, according to the Principle of Energy makes *M*α less salient than *M*β. It is more likely - still adhering to the Principle of Energy - that as the sequence β grows longer and longer, so does the amount of unrealised energy, and hence the less salient it becomes for β to be schematised in *M*α. (As listeners, we have all been involved with structures of this kind. If we follow the impulses in Ex.19, we must concentrate, perhaps even create our own impulses ourselves: tapping our feet, nodding or humming, in order not to “fall off” the scheme *M*α. And if there is no special reason not to, sooner or later we leave

$M\alpha$, and pick up $M\beta$ with a feeling of relief: it *is* the most salient, the most "natural"!) Every sequence of impulses takes over the previous metrical scheme insofar as it - in a manner and to a degree that depends on the sequence's own structure, including its *eigen*-scheme - carries on that scheme. In a generalised form, we have the

PRINCIPLE OF TAKING OVER:
The more salient a certain metre Mn is for the sequence of impulses φ as a present *metre, the more salient the same metre will be for φ as a* "taken-over" *metre.*

Along with the Principles of Energy, Duration and Correspondence, we have found in the Principle of Taking-over yet another principle for how a metre becomes salient for a sequence of impulses. It is just this principle that in Ex.19 conflicts with the Principle of Energy. That is how the tension of syncopation arises. As there are more and more β-impulses, more and more unrealised energy is introduced, and the $M\alpha$ metre becomes less salient.[9]

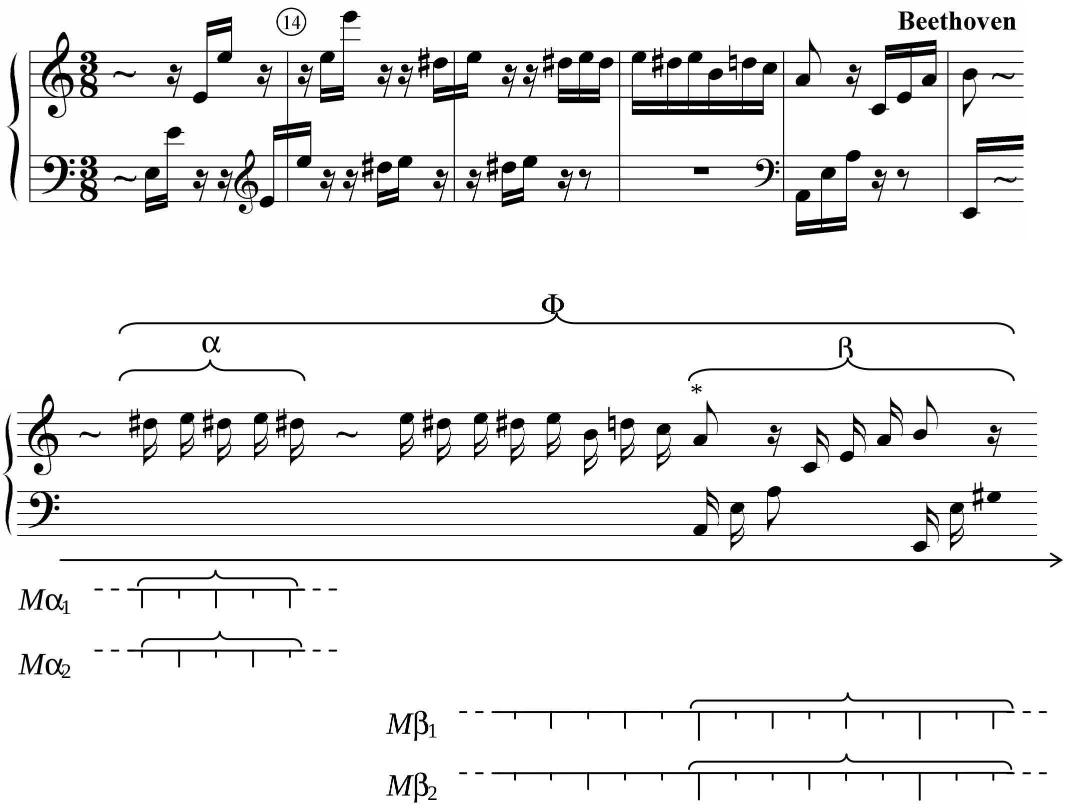
Again, one might ask if "the same thing" couldn't be said more briefly and more simply in psychological terms: "we hear the dominant seventh, the leading note, or, as here, the upbeat, and imagine or expect a dissolution of tension. A little later, we still remember the V^7, the leading note, the upbeat, and we hear the tonic, the keynote, the impulse on the strong beat, as a resolution of the respective tensions, etc." No. This only seems to be simpler, and it is only briefer because the psychological view implicitly uses the structures that we are making the objects of study, and which are precisely a prerequisite for descriptions such as the one quoted. So what is claimed to be "the same thing" is not in fact "the same" after all.

As far as the Principles of Energy, Duration and Correspondence are concerned, it is the present sequence of impulses that establishes the metrical perspective and defines a single metrical scheme as its *eigen*-scheme. The scheme is *a momentary presence* in the absence of any further context. As regards the Principle of Taking-over, the sequence of impulses picks up the metre "from without": it takes over the previous metre and configures it with its *eigen*-scheme in a *synthetic presence*. In Ex.19, $M\beta$ is *momentarily present*, and $M\alpha$ is *synthetically present*, while β is sounding.

Every present structure "begins" in a way as synthetically present. The five impulses α only establish an own-scheme when they are synthesised and become one moment. This leads to further considerations, based on Ex.20. In this case, the first few semiquavers α have a 2/16-metre as their *eigen*-scheme. But it is unclear where we have the strong and where the weak points. If we hear β alone, two metres, $M\beta_1$ and $M\beta_2$, are about equally salient. Both group six semiquavers at a time as 3/8 and 6/16 respectively, and with the same positioning for the strongest beat. ($M\beta_2$ may be a little more salient than $M\beta_1$, according to the A-variant of the Principle of Correspondence, in that $M\beta_2$ places the semiquaver E-A movement in right and left hands identically in relation to two of its constituent times. On the other hand, $M\beta_1$ places the two A's in the left hand in the same position in relation to two of its constituent metres.

But in any case, the β-section takes over the α-section's metres, $M\alpha_1$ and $M\alpha_2$, and $M\beta_1$ - being synthetically present - becomes, all in all, the most salient metre for β: $M\alpha_1$ does not integrate with either $M\alpha_2$, $M\beta_1$ or $M\beta_2$. $M\alpha_2$ is a partial metre of $M\beta_1$, but cannot integrate with $M\beta_2$. $M\beta_1$ and $M\beta_2$ are equally salient as *eigen*-schemes. The result is that $M\beta_1$ in its synthetic presence becomes the most salient metre for β.

So far, so good. $M\beta_1$ is the most salient metre for β. But this holds not just for β. The movement *as a whole* has $M\beta_1$ as its most salient metre. If I *hear* the movement as a whole, i.e. in one higher moment Φ (where Φ = α ...β), I hear a movement in A minor and in 3/8. How can that be? A metre, which like $M\beta_1$, is first established *later*, cannot be present *while* I hear α? But both the tonality and the grouping of the impulses into units of six semiquavers are things that α has picked up from β.



Ex.20

Say β sounds. While β sounds, $M\beta_1$ and $M\beta_2$ are possible *eigen*-schemes, just as β in principle takes over $M\alpha_1$ and $M\alpha_2$. β, being now present, gets the metre that α, now in the past, had as its present metre. But the other way round holds as well: α, being now past, has the metre that the *present* - the sounding - β has as its present metre. The sequence α, viewed *synthetically*, has had what β *momentarily* has. There is no question of taking over, since the synthesis does not consist of a connection with anything which is (i.e. which is sounding), but with something that was (i.e. has sounded). It is not taken over but we might say, for want of a better expression, that it is “reclaimed”.[10]

The point here is that what we see (hear) right now is not always the same as what later we *saw* (or *heard*). On 28 April 1914, a few hundred people in Sarajevo see a murder take place. It is the beginning of a world war. No one *sees* the beginning, but years later they may rightly say that they *saw* the beginning. The event *is* not the beginning of a war, but it *becomes* just that. When we commemorate, say, the 75th anniversary, we reclaim the event as the occasion when it all began: something it has become after it happened, but was not when it happened. The episode did not have the sense of “the beginning of …” *as* it happened; it *reclaims* it from that which happens *later*. In the same way, every sequence of impulses is reclaimed by the succeeding metrical scheme, in that it - in a manner and to a degree that depends on the sequence’s own structure, including its *eigen*-scheme - picks up this scheme as a *past* scheme.

Generalising from this, we get the

> PRINCIPLE OF RECLAMATION:
> *The more salient a certain metre Mn is for the sequence of impulses* φ *as a* present *metre, the more salient the same metre will be for* φ *as a* “reclaimed” *metre.*

The Principle of Reclamation is that counterpart to the Principle of Taking-over, which in Ex.20 means that α, too, in being synthetically present, picks up A minor as the most salient tonality, and $M\beta_1$ as the most salient metre. The symmetry seems complete, but it isn’t: the sounding music can, *as present*, take over something antecedent. But only *as past* can it reclaim something that follows on afterwards.[11]

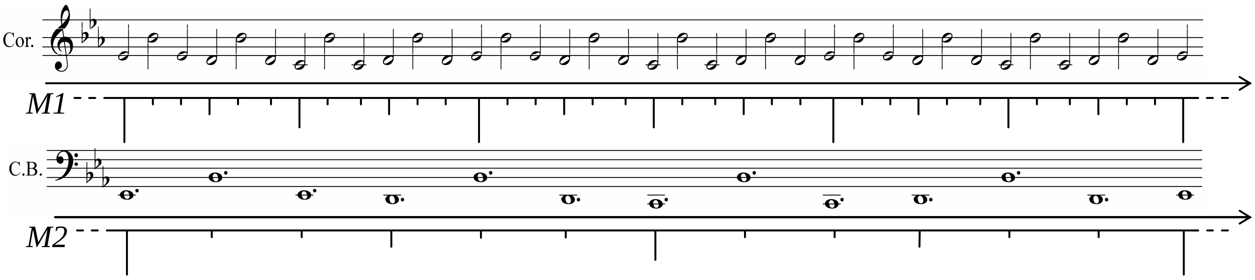
This is, as on several occasions in the above, a question of two sides of one and the same coin. But that does not mean that something is being said twice, when once would suffice. All the less so, when the very two-sidedness of the matter is here part and parcel of the matter itself.

6. Metrical Ambiguity

We have seen how this, rather than that, metre becomes salient for one musical sequence or another, or for one aspect or another of a musical sequence. There are few principles, but in all its variety, music lives in these structures, and to the degree that it lives by moving and changing, it also constantly shifts perspective. Thus it overcomes the incompatibility of successive present metres, as we saw in the previous section. It is, however, also possible, based on the momentary plurality of which music is capable, for various metres that are incompatible with each other to work all at once - i.e. at the same moment - without their incompatibility being liquidated. On the contrary, this incompatibility can persist as ambiguity, conflict, etc.

In Ex.21 we can, without further ado, attribute a momentary plurality to the music. It is polyphonic, in two parts. The upper voice has M_1, the lower M_2, as its *eigen*-scheme. And furthermore, M_1 can be said to be salient for the upper voice, *for the same reason that* M_2 is for the lower one: it is, of course, the same melody! So, then, for the movement as a whole M_1 and M_2 are all at once - i.e. momentarily - the most salient and not the most salient as far as metre is concerned, and the movement pulls in both directions with about the same force.

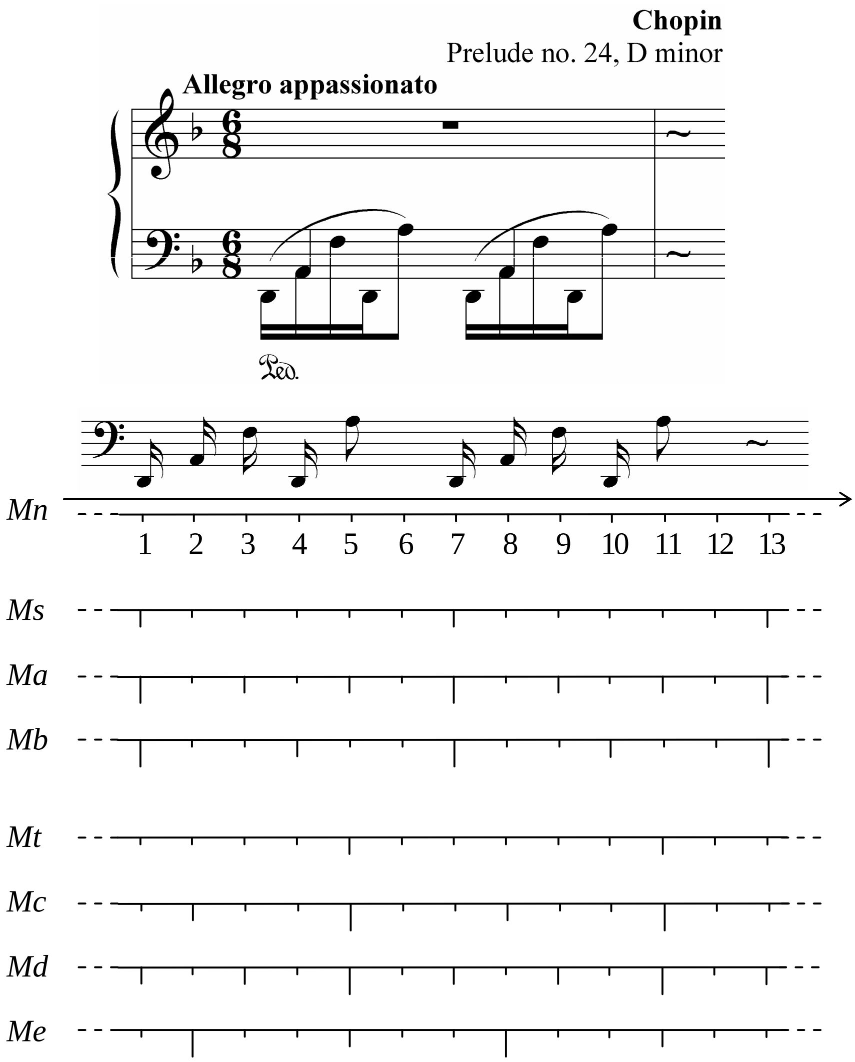
As a listener, one can react in two ways: 1) one can drop one of the metres in favour of the other, or 2) one can attempt to maintain both their presences throughout the experience of the tension inherent in the music. The latter approach is a demanding one, but Sibelius has given the listener an excellent point of departure, since it seems equally relevant to focus on either of the two layers on account of their melodic equality.



Ex.21

The momentary plurality that makes possible the metrical conflict in Example 21 is a direct product of the music's polyphonic nature. Thus the duality is maintained, independently of the metres. It is quite otherwise in Ex.22. Here, the one-bar sequence arranges itself with no trouble at all (following the Correspondence Principle's A-variant) in units of six semiquavers as the superordinate metre, and with the semiquaver series *Mn* as the smallest subordinate time. On account of the large intervals separating all the neighbouring notes in the sequence, it becomes salient to always hear the four different notes (D-A-f-a) in the same place in each 6/16-group, as four "layers". But the repetition could, in principle, start out anywhere, i.e. from any one of the five notes in the group.[12]

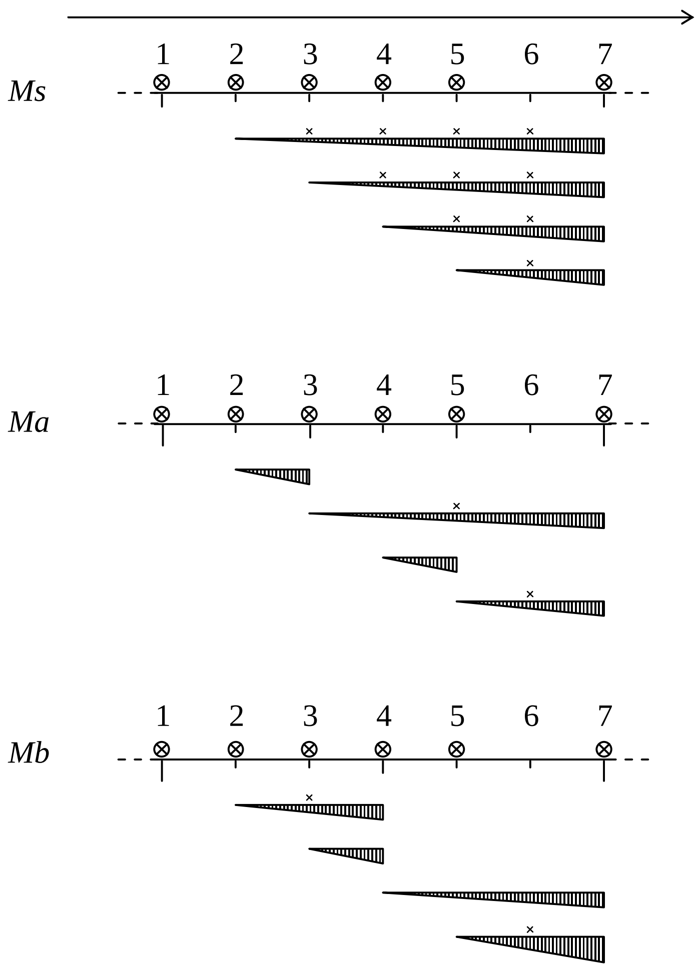
Now the phrasing - as prescribed by the composer - defines certain groups of notes as being more closely integrated than others, so that certain places in the sequence take on - to a greater degree than others - the character of being a place where a repetition begins. The Principle of Correspondence (again the A-variant) therefore defines the points 1,7,13... etc., as points for the superordinate metric scheme, and in this way *Ms* appears. According to the Principle of Duration, *Ms* as "pure" 6/16-metre is less salient than the derived metres, *Ma* and *Mb*. Ex.23 shows how the impulses in *Ms*, *Ma* and *Mb*, although they may realise more or less the same amount of energy, do so in such a way that there is a more considerable wait in the case of *Ms*. (The points of waiting are marked with an 'x'.) This leaves us with the question of which to prefer out of *Ma* and *Mb*.[13]



Ex.22

We can take two points of view. (1) In the first case, if we keep to Ex.23, we have *Ma* as more salient than *Mb*. The two metres may have equally many points of waiting, but there is more energy waiting to be realised in *Mb*; the difference in strength between points 5 and 7 is greater in *Mb* than in *Ma*. (2) On the second account, however, the A-variant of the Correspondence Principle allows *Mb* to take precedence: the same note, the low D, appears at points 1,4,7...etc.

We reached *Ma* and *Mb*, through *Ms*, by way of a basic respect for the phrase markings given. The less phrasing is allowed to prevail, the more points 1,7,13...etc. give way to points 5,11,17...etc. as the most salient points for a superordinate metric scheme. The longest note at the strongest point: that follows both from the Principle of Energy and the Principle of Duration. *Mt* is, however, less salient than the derived metres *Mc* and *Md* (cf. the mention of *Ms* in relation to *Ma* and *Mb* above). These are, on the other hand, equally salient for the sequence of pure impulses. If we lend an ear to other musical parameters, we hear that the presence of the note A at points 2,5,8..., according to the A-variant of the Correspondence Principle, makes *Mc* even more salient.[14] But we can also hear that the notes F and A are linked to each other by being two *high* notes placed *close* to each other at a *great distance* from the other, low notes. As such, it is *Md*, which - according to the B-variant of the Correspondence Principle - becomes even more salient.

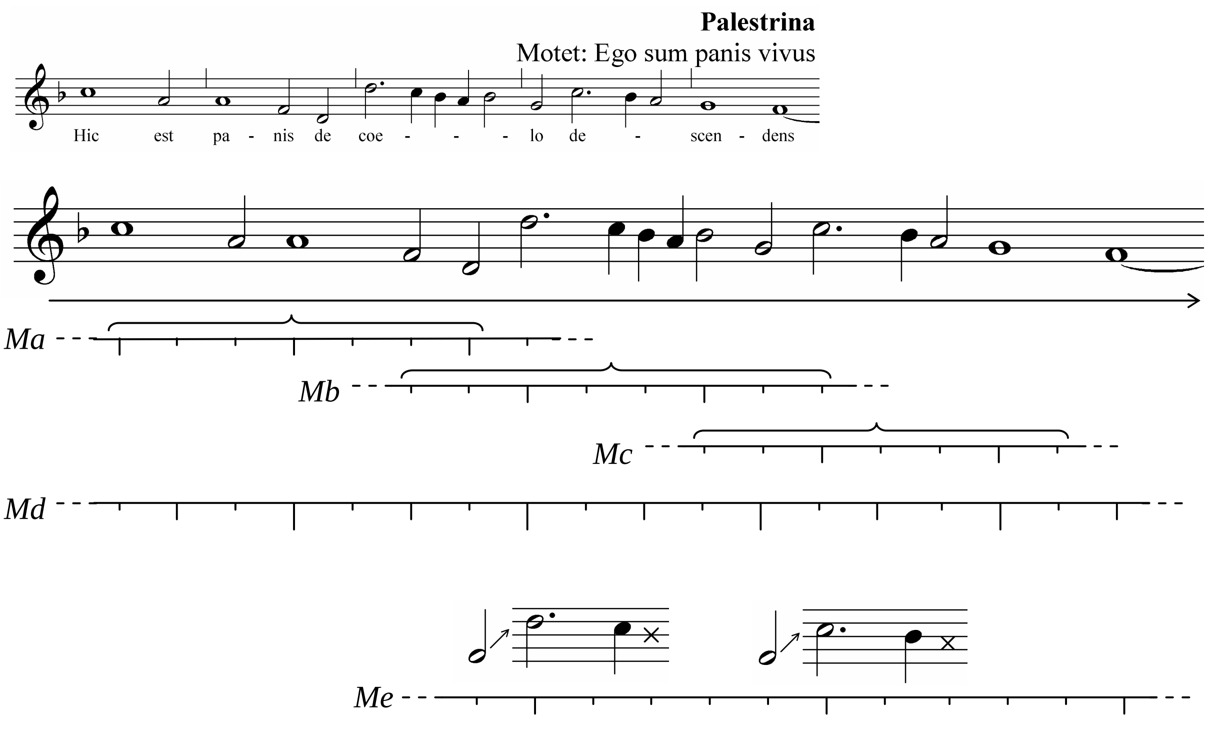


Ex.23

The four metres are all, in different ways, incompatible with each other. The plurality that is a prerequisite for any talk of incompatibility is really for the most part just a multiplicity of “aspects” of musical form. We are thus dealing with *ambiguity* rather than with actual *conflict*.[15]

Palestrina’s melodies are rich in ambiguities of this kind. Free of both harmonic rhythm and bar symmetries, they flow in free lines, constantly shifting the metrical perspective and thus, in effect, pushing the phenomenon of metrical energy into the background - all the while using metre’s own principles of perspective to do so.[16]

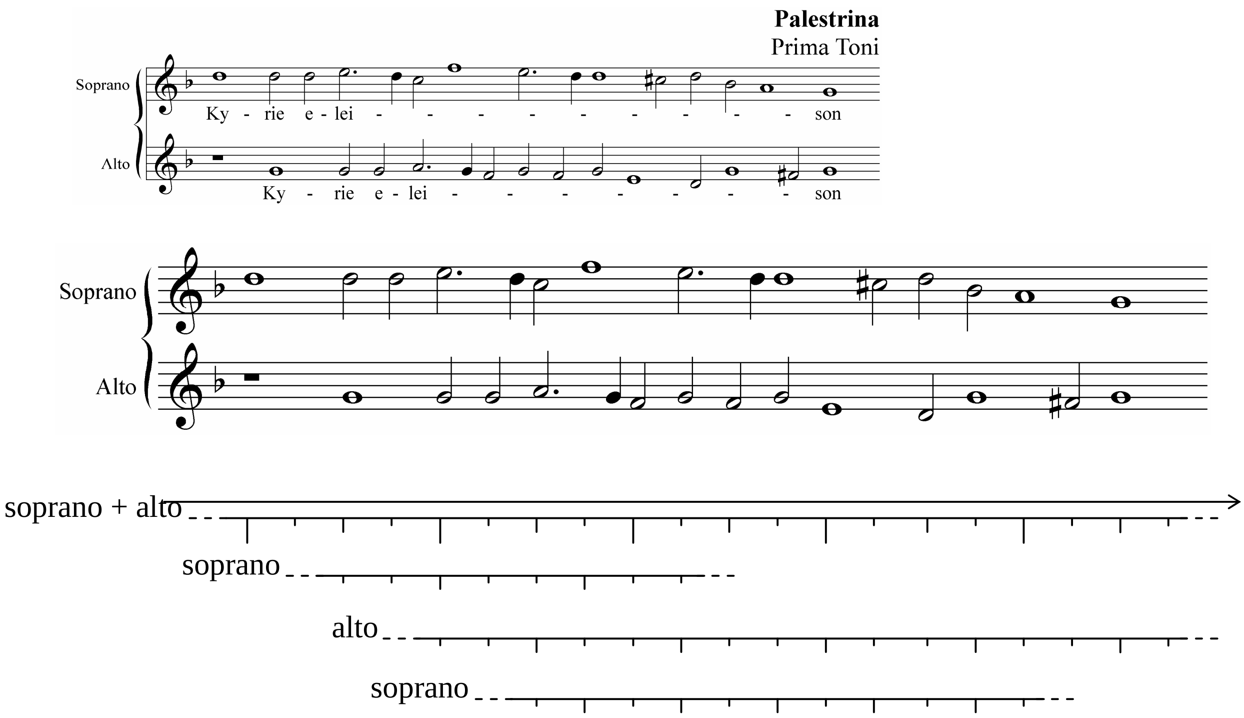
Ex.24 illustrates this. The three significant metrical formations, *Ma*, *Mb* and *Mc* are *eigen*-schemes for each of the three musical moments marked by horizontal brackets. Besides this, they are of course active in “taking-over” and “reclaiming”. The ambiguity is especially noticeable where the metres are already overlapping with each other as *eigen*-schemes. Yet another pair of metrical formations are relevant: *Md* is the movement’s basic 4/2-metre. (The movement’s metre is not just a postulate arising from the barline. For instance, the Palestrina style’s principles for treatment of harmony - especially the treatment of suspended dissonances - constantly throw the framework of *arsis* and *thesis* into relief). Finally, the 4/2-metre *Me* becomes - perhaps not a real *pulse*, but nevertheless at least a further complication to the picture - salient on the basis of the Correspondence Principle’s A-variant, because of the striking resemblance between the partial sequences referred to.



Ex.24

Clearly, with a polyphony of melodies such as those just mentioned - and especially with imitative polyphony - we arrive at a vast complexity of shifts in metrical perspective. No listener can follow all the shifts “at once”. On the other hand, the active, creative listener may still find new paths through the landscape on each hearing.

Ex.25 has been taken from the beginning of Palestrina’s “Prima Toni” Mass. Four *eigen*-schemes have been derived. They are only given for passages during which, in at least one of the voices, they are the appropriate *eigen*-schemes. Nevertheless both the Principle of Taking-Over and the Principle of Reclamation remain operative, making it extremely complicated.



Ex.25

Ex.26 is from the first subject of the first movement of the Second Symphony of Brahms.

Firstly, the harmonic rhythm (i.e. the lower parts) defines *Ma* as the most salient metre. But the melody line almost instantly constitutes *Mb* as its *eigen*-scheme.

The resolution of the dominant in bar 23 marks a strong beat, as well as the disappearance of the lower parts, after which identical (octave-transposed) six-note groups establish *Mc*. *Mb* and *Mc*, without further ado, join together in the 3/2-metre *Md*.

From bar 26, the crotchets gather in groups of four, i.e. they establish a 4/4-metre. But the distribution of strong and weak beats is ambiguous: both Me_1 and Me_2 join with *Mb*, which is ongoing. As the only note which is consistently repeated in every group of four beats – and perhaps also because it is the lowest note – the A offers itself up as a starting point for the repetitions and thus as the strongest point in the 4/4-metre. That makes Me_3 salient. Me_2 is foregrounded on account of its corresponding to the rhythm of the underlying harmonic progression (in D-major: V-V^7-V^7-I).

In bar 32 all parameters pull the movement back momentarily to *Ma*. The effect is especially abrupt in relation to Me_1 and Me_2, since the parameters in question have the effect of locating the first beat of bar 32 as the point of least metrical strength.

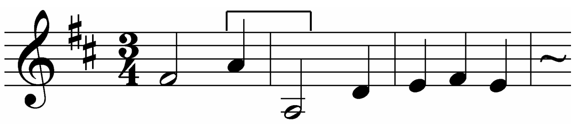

Brahms
Op. 37
2 Flöten
2 Hoboen
2 Klarinetten i A
2 Fagotte
3 Posaunen
und
Baßtuba
Pauken in D-A
Violine I
Bratsche
Violoncell u.
Kontrabaß
20
30
p dim.
p dolce
dim.
pp
Ma
Mb
Mc
Md = Mbc
Me1
Me2
Me3
Mf

ex.26

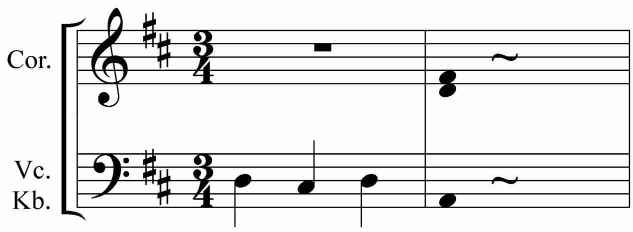
Yet another aspect of this should be mentioned: in the opening bars of the first subject, the *gestalt* of the falling octave A's marks a move from a weak to a strong point (see Ex.28). When Ex.26 – coming later on in the same subject – takes up this gestalt once again, *Mf* becomes salient and conflicts with *Mb*, as well as with *Md*, Me_1 and Me_2 of course, all of which have *Mb* as a constituent metre.

All in all, many metrical formations are competing against one another in this first subject. In a way, the enduring ambiguity between metrical schemes in 2/4 and 3/4 is foreshadowed in the first bar of the symphony (see Ex.29): the D-C#-D 'turning' figure has 2/4 as its *eigen*-scheme, whereas the movement's metre, 3/4, does not become the *eigen*-scheme of the movement until the beginning of the second bar.

Starting from bar 66 (see Ex.27) there is a stretto - now at the level of quavers - of various metrical interpretations of 'turning' figures and falling octaves similar to those just described. All in all, an example of extremely concentrated metrical ambiguity!



Ex.27



Ex.28

Ex.29

7. Some final remarks on the continued development of the theory

The analytical concepts and tools outlined here allow one to approach a number of musical phenomena quite closely. How close one can get, and how deep one may go is, however, as always, first of all a question of the analyst's own imagination and insight.

This article is only intended as an outline. The initial concepts do not spring from the very phenomenon of musical temporality itself, as the fundamental source of metrical phenomena in general. Moreover, the inadequacy of the arithmetical time-axis employed here becomes particularly conspicuous in the section on temporality, even as the opening sections show how tempting it is as a basis for developing a formal system.

It is not easy to say much about the direction a theory would have to go in that sought to move beyond a mere outline such as this. Moreover, it is conceivable that the phenomenological foundations of the theory that led us to where we now stand might also have to change direction, and, along with this, the requirements placed on any theoretical outline itself. But, on the basis of the foundations laid out here, the road ahead would probably lead first to the incorporation of non-isometric polymetres as a prerequisite for the analysis of irrational metres, and later, I suspect, to the treatment of stressed metrical impulses.

The polymetric aspect of irrational metres may not demand that much new thought. Ex.30 shows a differentiation between a rhythmically and a harmonically determined location of strong points (i.e. the superordinate metre) in 5/4 time. *Ma* and *Mb* cannot be integrated isometrically - neither being a constituent metre of the other - but we can easily hear them as the single metre

Mab: the strong points will then be quite explicitly of equal strength, although there is not the same distance between them. Differentiating *between* them in respect of strength, we get either *Mc* or *Md*. Taken harmonically, *Md* is the most salient (weak-strong corresponding to V-I). But the Principle of Duration emphasises *Mc*: as upbeats, the impulses 1,6,11 … etc. need only wait two crotchets before their resolution in *Md*. The reinforcing of the upbeat effect arising from the dotted figure in the melody also pulls in this direction (and incidentally contributes to the strange “waltz-like” effect of the movement).

Ex.30

The article was originally presented as part of a thesis in musicology at the University of Aarhus, in 1973. Having had occasion to work more closely with musical temporality in later years, I now feel able to suggest a better approach to this issue in the latter half of the article. Accordingly, I have edited the text slightly, believing that I have become a little wiser; on the other hand, some things are left unaltered, even though I believe I am slightly wiser, or, in some cases, because I am in fact none the wiser.

Notes

[1] The term ‘metrical scheme’ is reserved in normal usage for that which will subsequently be referred to in this text as an ‘isometric scheme’.

[2] The metrical accent cannot be notated - at least not with the apparatus available today. Syncopations can be notated, and one occasionally sees metrical accents notated as syncopations. But of course metrical accents are not at all the same as syncopations.

[3] The definition is of course - and has to be - circular, in so far as the phenomenon that should be defined first is the structure of tension and resolution taken as a whole.

[4] Nor do the impulses, strictly speaking: impulses are defined as the *onset* of that which sounds. See p.3.

[5] Compare the account given by Husserl of how a succession of experiences becomes an experience of succession.

[6] In the examples, shaded triangles mark released energy, unshaded triangles mark unreleased energy.

[7] Together with the possibility of predicating more or less of such qualities.

[8] Or ‘own-scheme’; the analogy being with the term ‘*eigen*-frequency’.

[9] As listeners, we do not experience this step-wise unrolling of the performance. We are either “joining in” or “not joining in” with *Ma*.

[10] The most *eloquent* term would be ‘recapitulation’, but in the word’s most literal sense as a ’re-taking-up’ or ‘re-sounding’, whether as in the “Gjentagelsen” of Kirkegaard (*Complete Works*, Vol.5, Gyldendal: 1962) or as in Heidegger’s “die Wiederholung”, as the designation of the structure of pastness in the proper mode of being (*Sein und Zeit*, §§ 68b, 74). But that is not how the word *sounds* today, and maybe especially not to musicians, amongst whom it means simply doing the same thing twice.

[11] In *Vorlesungen zur Phänomenologie des inneren Zeitbewusstseins* Husserl introduces the notion of projections into the past and the future on the part of consciousness: retention and protention. In *Sein und Zeit*, Heidegger inquires about the structures of temporality itself that

make such projections possible. The general tenor of the treatment of temporality here is more Heideggerean than Husserlian. That may make access more difficult, but not, I feel, more difficult than time in music actually is.

[12] The following bars illustrate the fact that this is the beginning of a four-part sequence. However the subtle metrical ambiguity is then quite overshadowed by the melody of the right hand.

[13] Here we are disregarding the fact that *Ma* is also the 6/8 time signature. This, of course, is by no means unproblematic. Barlines and time signatures are also implicit prescriptions for accentuation and dynamics - and were perhaps even more so in Chopin's era.

[14] Insofar as the crotchet notation of the low A involves an emphasis of this note, the "opposite" meter – the one with 2,8,14....etc. as strong points and 5,11,17....etc. as moderately strong points - also becomes salient. (Cf. The B-variant of the Correspondence Principle.)

[15] Whether Chopin "deliberately" composed in the light of this conflict or not is not relevant in this particular context. But Chopin is – next to Schubert and Sibelius – one of the composers whose works most often contain metrical tension and ambiguity. (The Prelude in G-sharp minor is quite unique in this regard.) The explicit crotchet notation of the low A in the accompanying figure (Ex.22), and the fact that the fourth semiquaver note restates the low D in the bass register (i.e. in the second octave below middle C) rather than repeating the A or moving to the D an octave higher - both of which would be more natural from the point of view of piano technique - is this prelude's own indication of the phenomena of metrical conflict at work in it. One could add that it is precisely the fact that the low D (coming as the fourth semiquaver) has to be "fetched" with the fifth finger, while also leading through to the high A, that causes the low note to receive an "emphasis" as an involuntary consequence of the nature of the movement required of the hand itself. One only has to sit down at the piano and play the figure to see this!

[16] In Palestrina's time, metrical structure was just emerging as a way in which metrical tension could be organised. Nevertheless, the melodic lines of vocal polyphony show an unmistakeable sensitivity to this tension in respect of their striving to *avoid* metrical consistency (and the powerful play of forces that comes with the latter) in order to give themselves over to "pure" melody. Indeed, it is surely worth wondering what would have become of suspended dissonances if the phenomenon of harmonic tension had not been explicitly linked in this more general way to that of metrical tension.