

## Sound Material as Moulding of Musical Time Material sonoro como modelagem do tempo musical

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**Resumo:** o texto apresenta e critica alguns dos mais importantes conceitos sobre tempo musical que foram desenvolvidos por compositores europeus na segunda metade do século XX. Ele também evidencia as interrelações poliestratificadas entre o conceito de tempo e cultura em termos gerais.

**Palavras-chave:** tempo musical, material sonoro, Grisey, Schaeffer, Stockhausen.

**Abstract:** the text presents and reviews some of the most important concepts of musical time which were developed by European composers in the second half of the 20th century. It also points the multi-layered interrelations of the concept of time with culture in general terms.

**Keywords:** musical time, sound material, Grisey, Schaeffer, Stockhausen.

Some of the most important contributions to the discussion about sound material and musical time in the second half of the 20th century were conceived by a few composers who either reflected on specific compositional outcomes or came to general conceptualizations about these subjects. But the diverse points of view reflect the polysemy of the term time itself: "In any discourse about time, it is sensible to bear in mind that time can function as an umbrella concept that subsumes a large set of temporal properties, ideas, concepts, definitions and theories" (Reiner, 2000: 5). Having in mind this characteristic of the term, the following discussion doesn't take aim at a conclusive affirmation, if it is even possible, rather tries approaching the different contributions from a critical angle, making way for further questions and reflections.

The terms perception and cognition refer in this article "to the physiological gathering and physiological processing of external information" and "to the internal mental processing of this information" (idem: 184) respectively.

### I.

Sound events are not simply projected in chronometrical time, they create a specific time for themselves within a multi-layered interrelation between compositional procedures and musical cognition, without forgetting the broader cultural context in which the music itself is composed, performed and heard. The composer have to find out the adequate time

for the sound events which he conceived, something that is called timing. Thus it can be understood, why the *Sechs Bagatellen für Streichquartett* op. 9 by Anton Webern last about four minutes whereas the *String Quartet II* by Morton Feldman lasts five and half hours: for the composers these were the more suitable chronometrical durations for their sound events respectively forms. The specific way how the sound events of a piece are displayed one after the other and how their changes follow one another is called “experiential time” (*Erlebniszeit*) by Karlheinz Stockhausen, a term on which he comments: “we experience the course of time in the intervals between changes [...] In all perceptions we deal always only with different changes of certain structures, and we experience these different time structures qualitative in the different conceptions” (Stockhausen, 1955: 69, our translation). Still about the multi-layered interrelations between the course of sound events and the human cognition he writes:

The experiential time is [...] independent from measured tempo [...] and from the velocity of the events which follow one another: in this way the experiential time can run very slowly if very fast events, which hardly or not at all change, follow each other (for instance by regular periodic events), and, vice versa, the experiential time can run very fast by slow tempo or slow sequence of events through their high degree of change.

A high, effective degree of change and with it as well a great surprise element also require always that we have experienced for some time a certain consistency of the course because of which we begin to experience in advance, to expect something (idem: 69–70).

These ideas by Stockhausen met response two years later in the comment by Bernd Alois Zimmermann about the concept of interval (*Intervall*):

One of the more remarkable phenomenons of hearing consists of that we are able to experience the distance between different tones: the *interval*. With its help come into being with one blow a comprehensive relationships system which brings the world of tones to a first order. In it, above all, lie the interval importance. This one we know in two timewise different from another appearance forms: in succession of a tones series or in simultaneousness of a combination of several tones, whereas [...] the tone, in [...] acoustic sense, is again a combination (overtones, combination tones, and others) (Zimmermann, 1957: p. 11, our translation).

His conclusion betrays an almost naive belief in Kant’s conception of time subjectivization:

Interval and time don’t appear as something that hangs on the tones as objective determination. Rather are interval and time, using Kant’s conception, an a priori form of view of the subject, and in fact of his inner sense. Through them sensuousness’ substance, so of hearing, is brought to a first order, and, like this, experience, in strict sense musical experience, is made possible (idem: 13).

Zimmermann's and especially Stockhausen's ideas obtained great recognition to the pure structural approach of music by attempting to integrate elements of the information theory, cognition psychology and time philosophy into the musical analysis.

## II.

A similar aspiration can be noticed in the writings by Dieter Schnebel of the same time. He suggests another term in order to define the cognitive effect of sound events:

The time of the moment [...] can't be measured. Thus the events shape *fields* [*Felder*] in physical-abstract time course. As if the event, after it had gone by long ago or had gone over to existing, still still further auralike radiated. Such radiation strength coins itself from the fields magnitude. This is calculated according to the fields number and direction. The fields intensity is defined through space scattering of the sound sources as well through their own intensity (loudness) (Schnebel, 1956–57: 220, our translation).

The term field, as Schnebel explains it, can be understood and intuitive recognized, the attaching of these fields, however, is no simple practicable task. An analysis, which is carried out with the help of this concept, can either get into a simple enumeration of loud sound events, for instance climaxes, or into a subjective list of sound events which have no logical reason. The argumentation in favour of this concept have to be, as usual by careful musical analysis, explained and developed consistently. The concept of field also stimulated other composers like Pierre Boulez, although his view is rather "objective" structural: "I can just [...] conceive the musical universe from the aspect of more or less restricted fields; [...] consider [...] a defined object as the limit case of a field. So the musical thought will know to move in an universe which will develop from existing objects to sets of likely objects" (Boulez, 1963: 42, our translation). A similar conception to Schnebel's can be found by a composer of a younger generation: "I suppose [...] that we experience the time of a musical work from another time which is the rhythm of our life. Consequently it must exist something like a perspective, a vanishing line, which deforms the sounds according to the way they imprint themselves on our memory" (Grisey, 1978: 78, our translation). The comments on this topic betray a vague nature because it is, as already mentioned, no simple task to assess the effect of sound events on the human musical cognition respectively human memory. Since here individual characteristics and subjective preferences play an important part, an analysis under these circumstances must restrict itself to a structural cognitive average.

## III.

Pierre Schaeffer tried, with the help of ideas from psychoacoustics and information theory, to establish a consistent foundation in this context. First his general remark: "[...] the objects duration is linked to its shape in a structured perception. [...] It [the ear] takes no

impartial notice of sounds because it is never passive: it acquaints nothing at all that subdues itself under metre or second, rather several events which are proposed to it” (Schaeffer, 1966: 257–258, our translation).

Although he lays great stress on attack transient (“[the ear] take interest just in the prologue, and this information dominates the whole duration” [idem: 258]), his considerations still retain in part their validity. The independence from metre and chronometrical time, which certain sound events that are charged with varied information degree show, is emphasized by him:

If, instead of similar [sound] objects, made above all to mark location, we assemble or compare objects that are differently charged with information, the metric time is fade away [...] in advantage of a perception of the durations in obvious relationship to the objects content. One could forecast this phenomenon, but more arduously its extent: [...] it makes vain, in music, the recourse to metric time since the objects are vigorously “shaped” or get organized in highly differentiated temporal structures (idem: 246).

The conclusion of this remark warns about the limited nature of the applied technical terms:

*The musical duration is direct function of the information density.*

We point out that we neither can nor want to define these last terms with some precision. [...] We are satisfied with the analogical sense of “information density” which simply suggests a more or less high relative quantity of energetic events differentiated (and differentiable) in a given phase of a given musical object (idem: 248–249).

The high information degree isn’t fetishized here like in several texts by serial composers of the 1950s. Since the second half of this decade emerges gradually again a lighter perceptible redundance, so a “lower” information degree, even in pieces of such composers. After the considerations about the sound object Schaeffer suggests that the hearing time could have three aspects which, on their part, interact with the sound objects:

[...] the “hearing time” presents itself under three characteristic aspects [...] One consists of following the object in its duration without losing the perception of the passing time, like a mobile in movement whose position is assessed all the time. The other consists of perceiving a general form of the object without a temporal screen of optimal memorization. The third consists of transferring this shape to the initial instant through a qualified perception of the attack.

The ear presents itself then like an apparatus integrating the time in three different ways, around this duration of optimal memorization which of course depends to a great extent on the object shape itself, on the nature of the information which it carries, and on the ear conditioning (idem: 255).

It is regrettable that Schaeffer fixes his attention on the perception of the isolated sound object and makes no one remarkable comment on the importance of the

relationships among the sound objects for the musical perception. So he falls back on the acoustician strategy by isolating the phenomenon, the sound object, in order to investigate and classify it, and arrange it into a certain scale whose steps are considered also isolated.

#### IV.

Also French Gérard Grisey introduces, more than 20 years after Schaeffer, his considerations on this subject. He suggests a complexity scale for classifying durations in which psychological perception aspects are always emphasized:

For the arbitrary and generally dualistic categories through which we tried to classify the durations: brief-long, ternary-binary, rational-irrational values, symmetry-asymmetry, I substitute a complexity scale, no doubt as well arbitrary, but that deserves credit for referring to the phenomenons of musical time such as they are perceived and let foresee a continuity.

[...]

<b>a) Periodic</b>	maximum predictability	ORDER ↓ DISORDER
<b>b) Dynamic-continuous</b> – continuous acceleration – continuous deceleration	medium predictability	
<b>c) Dynamic-discontinuous</b> – acceleration or deceleration by platform or by elision – acceleration or statistical deceleration	weak predictability	
<b>d) Static</b> totally unpredictable distribution of durations maximum discontinuity	predictability nil	
<b>e) Smooth</b> rhythmic silence		

(Grisey, 1989: 89, our translation)

The table begins with the periodicity which shapes the simplest and more predictable phenomenon, but Grisey doesn't disqualify the periodicity: "Periodicity is irreplaceable; it allows the stop of the musical discourse, the point of time suspension, the necessary rest, and sometimes a redundancy useful to comprehension. When the musical structure demands, we use it for its intrinsic qualities, avoiding both rejection and obsession (idem: 91). Of course the expression "time suspension" (*suspension du temps*) must be taken metaphorically: the periodicity in music or a repetitive music can set human beings in a particular and temporary time experience, but time and its passing are always components of human music perception – including of a repetitive music. One can't also forget that a sound event is a superstructure, so it is a sum of components, and these can show different qualities simultaneously, for instance, the intervallic structure can be repetitive, but not the rhythmic one. Such a procedure relativizes Grisey's classification. His comment refers after all to sound events whose outlines are undoubtedly periodic, therefore to the simplest

sound events. This procedure, which restricts itself to the simplest cases, is the more appropriate aid to a pure polar argumentation. Furthermore Grisey explains each point of his scale. In point *dynamic-continuous* one can recognize the heritage from Olivier Messiaen: “to go from periodicity [...] to acceleration or deceleration is enough to add to or take away from a given value a factor (arithmetical progression [...]) or to multiply or divide this value by a factor (geometrical progression [...])” (idem: 92). The psychological comment on it, despite other vocabulary, doesn't wander from that of Stockhausen's text which was mentioned above:

Psychologically, acceleration of values reinforces the progressive blurring of sounds which occurs in our memory: the longest memorized events are as well the earliest. Through acceleration, the present get more dense, point of heating of the time arrow, and the listener is literally propelled towards something that he doesn't yet know. The arrow of his biological time and that of musical time, by adding themselves, make him lose all memory.

On the contrary, deceleration of values contradicts the blurring of sounds: the shortest memorized events are the earliest. The slowing down provokes a kind of expectation in present's emptiness. It happens here something like a balance of the forgetting, the more pregnant densities being the earliest. Through deceleration, the listener is drawn back because the arrow of musical time is reversed in a way. But, since our listener perceives as well that the arrow of his own biological time isn't reversed, he will oscillate indefinitely between these two times of opposite, but concomitant directions, in a sort of state of temporal suspension (idem: 92/96).

The relationship between acceleration of duration and the gradual blurring (*estompage*) of memory is more or less clear. However, to link deceleration of duration with a supposed turning back of time course is a speculation without any musical and cognitive consistency. Whether something in music pull the listener backwards, it must be some kind of retaking of already heard sound material and not some procedure only with tone values without direct relationship with a recapitulation of sound material or event. In the case of a retaking, the listener is given the impression that he is set in the past, because his memory ties to something already gone. But even this would be of course no turning back of time course, rather a experience conditioned by memory or/and sound material.

About the point *dynamic-discontinuous* Grisey writes: “Accelerations and decelerations by platform [...] elide entire sections for immediately introducing the state of the sound such as it was forecasted in a subsequent step [...] Such a phenomenon will be perceived either as a simple discontinuity or as a compression of the acceleration process (idem: 97). In the case of accelerations and decelerations can momentary surprises turn up, but these are absorbed by a paramount process. An excess of discontinuity or information “focalizes our attention to the present instant, prevent us each recoil and put a sock in our memory (ibidem). About *static* he says: “Real white noise of durations [...], the equiprobable distribution of a vast scale of durations doesn't leave us any forecast possibility. Disorder stage is at the most. Absolute discontinuity will catch our attention just for a very limited time (ibidem). And still about *smooth*:

To this portrayal we can add the (no-)rhythm, the smooth or absence of every temporal segmentation.

This “smooth”, this absence of durations, can be either just perceptible, being the rhythms only operative, or perceptible *and* conceptual, rarer case of total absence of every event: single sound or rhythmic silence (idem: 99).

The explanation for “smooth” has a clear connection to the term of “smooth time” (*temps lisse*) coined by Pierre Boulez (Boulez, 1963: 100), although the term wasn’t as negative interpreted by Boulez as by Grisey (“absence of every temporal segmentation”). The final comment by Grisey summarizes the discussed and proposes two types of compositional and musical perception:

We can then imagine stages of sound presence leading progressively from the present (minimum extension of perception, time constant) to the thickness of this same present where the immediate memory grafts itself [...], at last to the past more or less immediate where the actual memory, sometimes called cognitive, makes itself felt.

Likewise, it seems that we could distinguish two approaches to the composing manner and to perceive time: the one privileging the instant and the listener’s immediate memory, the other trusting in the listener’s cognitive memory, who will be able to gather, compare and hierarchize the elements of a musical discourse staggered over a very long time period.

That we weren’t mistaken! The one and the other processes can be structural, but in the first case the whole – let’s say the large form – is an emanation, an irradiation of the instant while in the second the whole is posed *a priori*, the instant just catching the attention as consequence of the whole. It doesn’t follow at all that the perception would automatically follow the composer’s intention in the one and the other manner of thinking and composing his music (idem: 114–115).

Grisey also emphasizes that the moulding of time, which the composer creates, is also anew moulded, after all, by the listener:

Yes, it is the listener who selects, it is him who creates the moving perception angle which will continually remodel, complete, sometimes destroy the musical form such as the composer has dreamed of.

Finally, on its side, the time of this listener is in correlation with the multiple times of his mother tongue, his social group, his culture and his civilization (idem: 118).

The article by Grisey, despite a few conceptual inaccuracies, is an important achievement in the discussion on musical time, especially because he stresses the listener as a social, cultural and cognitive conditioned being. The discussion in the field of musical cognition has got wider in the last decades, especially thanks to neuropsychological researches, a subject which exceeds the limits of this article.

Also Brian Ferneyhough links time cognition and time moulding with information degree, rather in the tradition of the serial writings of the 1950s. The high information degree is still praised as aesthetic more distinguished and triggers off a perceptive impression of rapid, compressed time. To him there is a challenge in this context:

The challenge, of course, is to specify objects which suggest such a high degree of internal coherence that the listening ear is necessarily twisted at an angle towards a structured awareness of the *insufficiency* built into the dimensions of the time-space within which the object is located. As a result, the time frame itself becomes rather 'gluey'; it stands apart and offers relentless resistance to linear energies (Ferneyhough, 1988: 44–45).

In order to overcome this challenge he describes the compositional strategy of multi-layered sound events which he developed, and their correlation with time perception and so called time arrow:

The more the internal integrity of a musical event suggests its autonomy, the less the capacity of the 'time arrow' to traverse it with impunity; it is 'bent' by the contact. By the same token, however, the impact of the time vector 'damages' the event-object, thus forcing it to reveal its own generative history, the texturation of its successivity: its perceptual potential has been redefined by the collision. As the piece progresses we are continually stumbling across further stages in this catastrophic obstacle race. The energy accumulation and expenditure across and between these confrontational moments is perceived as a form of internalized metronome [...] (idem: 45).

Through decomposition into its parametric components, the constituents of sound material are filtered and amalgamated. Thus these filtration and amalgamation processes unveil, as Ferneyhough means, the generative history of material itself, and the texturization of its successivity. About the last term he underlines, that the time perception is conditioned, moulded, by sound events:

It's clear that, if we have several musical objects following-on from one another, we will perceive the flow of time differently according to whether (e.g.) these objects are obviously cross-related, whether they are connected by gradualistic transformations in one or more parameters, whether there exist codifiable consistencies in intervening 'buffer materials', and so on. If, for instance, we move through a piece entirely on the basis of quasi-instantaneous modulations ('film cuts') then the irregular weighting of the temporal dimensions is magnified by the parallel disposition of material identity and exclusivity of temporal container. Concomitantly, the tempo flow within any one of those same units becomes somewhat less constitutive. If, on the other hand, we postulate a music whose structural extremes, whilst equally powerful, are less obvious, relegated to a set of subsurface ordering mechanisms (like predicting the length of a measure in the density of impulses in the immediately preceding measure), then our ears naturally

adopt other assumptions of priority, of grouping in time, even where general density and stylistic ductus are directly comparable (idem: 46).

In the last decades of the 20th century the majority of composers treats the sound parameters again in a more conventional manner, the last being almost always parallel managed, so that sections are demarcated, and climaxes, in many respects alike the ones of tonal music, are achieved. In this context, it is due to Ferneyhough's writings that the decomposition of sound parameters still demonstrates its significance to the moulding of sound events in time. It is also important to say that his music, which by the way arouses much rejection, shows just an orthodox organizing form concerning the possibilities of parametric decomposition.

### **In place of a conclusion**

After the Second World War the new music and the reflection about music at all experienced a fundamental revival. The music foundations were assessed again and considered from new points of view. With regard to sound projection on time the more important topics were: the decomposition of sound parameters and the phase shifting, the last with reference especially to the articulation of musical form. Both strategies allow ambiguous form articulations which are not always easily comprehensible to the average listener. However, strictly speaking, these two strategies are not new. The decomposition of sound parameters and the phase shifting were put into practice already in the first half of the 20th century by Anton Webern and Charles Ives respectively.

In general, the musical time is just partially represented both by time measuring, for instance with a chronometer, and by notation of durations on a score. Time measuring and notation of durations are mere reference systems and reflect the relationship of a given culture with its time conception. As usual by time phenomena, also here comes into being a wide ramified connection between a given activity – music – and a concept – time: this is allowed by that to be experienced by the perceiver. At best one can analyse, through the score of a work – if it comes to it – and its recording, the relationships between the duration values and the way how the sound events are projected on time, and, with the aid of this analysis, speculate something over the specific time articulation of this one work. So one can't speak much about the nature of musical time as such, rather about specific sound events which have a ramified connection with it. In any case, the perception of these sound events causes a sometimes even gripping effect on human beings.

The musical time articulation is then a mirror both of the human cognition system and of a whole culture. But both aren't subdued, actually and fortunately, under no biological, religious nor political fundamentalism. It can even take long, but changes and comprehension of changes arrive inevitably.

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