

## ***Time, Music, Curvatures, Turbulences. A Contemporary Exploration of Musical Time***

by LORENZO PAGLIEI

### **Abstract**

This text contains the second part of a much longer article devoted to musical time published on the printed version of *La Deleuziana* n. 10/2019 *Rhythm, Chaos and Nonpulsed Man*. The first part of the printed version of the article provides a perspective for reflection about Time in music. It starts with a short introduction to Time and Sound, then it examines some common terms and current themes related to time in music on levels of increasing complexity. In this process, the text refers to the music of various provenance and traditions and also to the scientific and artistic thought. The second part of the article is devoted to my approach to Time, the ideas pushing me and the techniques I am developing in my music. More specifically, I introduce the idea of a curved time and make some examples of its realization. I show some synchronization techniques with varying degrees of flexibility and reactivity. Finally, I discuss the function of the musician in my music and give some cues to future developments. To fully understand the global perspective of this reflection and exploration of musical time from a contemporary perspective, we recommend reading the full printed version of the article.

### **Premise**

My musical researches of the last years focus mainly on Time, how it's conceived, how it is perceived, how it flows and bends. Today, we are used to be submerged by music. Genres of music proliferate. Their musical content and temporal flux belong to a specific language or are generally conventional. Therefore, we are less accustomed to listening to different temporal conceptions. Conventions in music essentially have three functions: insert a piece in a specific genre or language, involve listeners in a particular emotional state and communicate content. But, apart from language, a piece of music stands out from others mainly for its temporal structuring and the *feeling of time* it causes.

Music of popular, or cultivated, traditions from all over the world nourishes the feeling of time with several interesting conceptions. Today, we have easy access to this wonderful repertoire; we can study it and we can play with musicians of other cultures. The boundaries have fallen apart, and the different conceptions of music can talk to each other on a higher level accepting frictions and contradictions.

Western written music is a special case because, over the centuries, it has renewed its language, the techniques and the materials to such an extent that today's music is completely different from that of 1000 years ago. The essence of Western music is the continuous development and extension of territories acquired to music; a constant displacement of the boundaries further ahead. In this sense, it is similar to science and philosophy. Western contemporary music today is marginal (if ever it was different), nevertheless it continues proposing new and particular visions of time. The hot topics about time in contemporary music are the synchronization, the quality of temporal flow, the superposition of different times, the temporal possibilities given by technology (among others, the automatic incorporeal reproduction, the management of chaotic or massive processes, the micro-time) and the notation of non-standard situations.

Of course, this is only a structural point of view. Musical languages have many roots, motivations, meanings and functions. Music can be spiritual, a ritual, a dance; it can express a wide range of feelings, represent a culture, an idea, tell a story; it can be like a natural phenomenon to contemplate or a metaphor of the universe or it can be just Sound, organized or not. Moreover, the *feeling of time* is a complex and subjective topic, surely not mono-dimensional. Fortunately, music is more mysterious and profound than its structure. In other words, music is complex as well as a human being.

## **My Musical Researches**

### ***Reference Points***

At the beginning of my composer activity, I was fascinated by the multi-layered temporal and spatial conception of Stockhausen music (as well as his visionary nature). Ligeti's continuums of the sixties have introduced me to a different order of times, in a fascinating auratic dimension, using essential and simple material. I was working with electronic music and figuring out how to apply my ideas to acoustic instruments and later I discovered that my approach was close to Grisey. It was natural and unconscious because, at that moment, I had only vague information on his music and didn't know yet his article *Tempus ex Machina*. I was also influenced by the psychological quality of Sciarrino's music. He has a great ability to use persistence, create attention and, thanks to his mounting techniques, realize a virtual polyphonic texture of musical figures suspended in time. The quality of Joyce's writing in *Ulysses* and *Dedalus* was likewise important to me; there is a clever way to realize rhythmically intermittent polyphonic layers full of surprises with a *monophonic* medium.

Improvisation also was essential for at least three reasons. Firstly, it's a compositional tool. Secondly, since the creative process is carried out *here and now*, the listener can clearly feel a sort of *freshness* and *truth of the present*. "Here and now" means something

fundamental: the improviser operates sensing and feeling the actual space and moment, therefore she/he plays something that is somehow *necessary* for the specific situation. The composition is the opposite process: it *forces* the space and the moment with a pre-constituted story and structure. Composition recreates an idealized and abstract here and now; improvisation utilises the here and now like an instrument to create an experience. Of course, both processes *create an experience* and performing a score is a flexible practice, but an interpreter cannot change to a great extent a written score. Finally, in improvisation, one can play things that are impossible to write and very difficult to read. This is an important problem if we want to handle chaotic or random processes. I have always been jealous of the characteristic musical *presence* of improvisation and of what you can do with it. Nevertheless, with improvisation alone, you cannot go that far: you need a precise vision, a musical intention and a suitable structure (even full of frictions) to accomplish it.

### **Purposes**

I intend to create music providing further development to our conception of musical time. For this reason, I'm particularly curious about different approaches to time structuring in all kinds of music (experimental, traditional, popular, improvisational, electronic, etc.) and of other artistic experiences. There are many areas of musical time to explore: the curved time, the thickness of the present, chaotic and fluid approach to synchronization, poly-temporality, flexible relations between musicians, fuzzy processes, handling of sound masses, temporal scales, a different engagement of the musicians in the creative process, etc.

I am interested in a conception of time closer to the contemporary understanding of the universe and natural phenomena. As natural phenomena, musical elements and sound textures can be continuous, discontinuous, constant, pseudo-constant, curved, undulatory, turbulent, chaotic, random, granular, constituted by particles, etc. I don't want to just use these elements, nor do they represent a new *Eldorado* behind which to hide a weak musical conception or the absence of musical ideas. I want to include them in the very conception of music, exploring them, opening new possibilities and creating organic music, structured accordingly. But there is a problem: this kind of phenomena should be managed statistically, not deterministically, and Western music notation is not completely suitable for that. To solve this problem, we must rethink notation, the role of the performers and their mutual relationships so that their contribution becomes more creative and flexible. Various 20th-century composers have notated chaotic or pseudo-chaotic processes giving the performers a deterministic score – that is, the chaotic process was accomplished in the compositional phase, while the score was annotated traditionally.

Other composers (for example Stockhausen, Berio, Cage, Feldman, Xenakis) have experimented different writing techniques making the performers decide some aspects of the music with various degrees of freedom. Finding the right balance between these two approaches is very delicate, firstly because interpreters are not so used to invent music (there isn't a well-founded ethic in this regard), then every composer has a specific style and a personal way to think flexibility. Moreover, there is an objective limit in describing particular playing techniques with words. Luckily, today we can use audio and video recordings. There are a lot of areas still to be explored in written music using flexible techniques. Depending on the musical idea, we can write the process, fixing some details, and leave the "surface" of the music to the performer. To accomplish chaotic or elastic processes, we need of the musical intelligence of performers. I would like the performer to become an integral part of the creative process, almost like a jazz musician. The technical question is how to write these processes, at which level of detail.

Moreover, I want to create music perceived as organic and physiological. This is a central problem if one doesn't make direct reference to a specific language. In this case, music should stand alone without explanations and be auto-evident. My goal is to create a process allowing the listener to enter an ecological soundscape, making an experience first of all-natural then cultural. Therefore, I can only refer to perception, physiology and organicity, creating a credible and involving universe.

### **Questions**

These ideas require a particular approach to music and bring to some exciting musical questions:

- How to create music using flexible principles?
- How to realize micro-chaotic or fuzzy textures with human performers?
- How to give the feeling of a curved time?
- Which is the maximum degree of flexibility in a process before destroying it leading to free improvisation?
- How to synchronize and orientate performers in a curved time?
- What possibilities can we imagine between playing synchronized and playing completely independent?
- How many situations of mutual interactions and reactivity can we invent between performers?
- How to write this kind of processes in a score in the simplest and most functional way?

To develop these ideas and answer these questions, I will show some solutions adopted in my music, particularly in the project *SpazioTempo*.

### ***SpazioTempo***

*SpazioTempo* is a cycle of pieces for percussion instruments (yet in progress) with an increasing number of players, from one soloist to an orchestra. This architecture allows me to explore my temporal ideas at different depths, scales, spaces and masses. The single pieces can be performed separately or as a unique large form, without interruptions, lasting about two hours. Each composition begins seamlessly at the end of the previous one, partially overlapping with it. In the first three pieces, *Matter* (solo), *Gravity* (duo) and *Polaris* (trio), I've investigated the aforementioned concepts on small scales developing particular composition techniques. In *SpazioTempo*, the musical texture is often based on flows of sound particles continuously oscillating, deviating or chaotically perturbed. Rhythmic streams react mutually in several ways, following their viscosity and inertia, and create original temporal states. To realize these processes, musicians use particular techniques of synchronization and vary the musical surface with different degrees of flexibility. The number of instruments and the sound matter is intentionally limited. This allows me to explore the temporal ideas in-depth and, at the same time, it gives the feeling to enter a universe unveiling small and large scales.

### ***Curved Time***

In the past, bending time, basically, meant the continuous variation of the global speed (accelerando, ritardando), a suspension of time or a sudden change in metronomic tempo. Curved time can be realized at a lower level too. Olivier Messiaen used to vary a rhythm adding or subtracting a short duration to some notes. Applying this technique to a regular pulsation generates limped or curved rhythms. Some spectral composers have utilised rhythms containing slight variations of a constant pulsation. This creates a nuanced regularity, something similar to a biological rhythm. Fuzzy regularities are an open field of research and can be explored further in several directions. We can realize limping, undulating, pseudo-regular rhythms (like biological ones) or compose the mutual reactivity between rhythms or temporal layers. In other words, curved time can become a more structural and less episodic element of music. The composer ability consists in giving the feeling that time is curved. To do this, we have to think of music as a tissue, a fabric and the elements as perturbations of the tissue. The persistence and the *Principle of good continuation* are important; otherwise, the texture becomes completely unpredictable.

Let's examine some principles and practical realizations at a lower level. Curved time can be realized in several ways, linearly or chaotically, in measured or unmeasured form, individually or polyphonically.

**In a measured way:** a single musician can play a pattern constituted by durations or accents oscillating or limping around a value. For example, a repeated pattern like: 2 1, 2 2 1, 2 2 2 1, 2 2 2 2 1, 2 2 2 1, 2 2 1 (where 1 represents a short duration); or: 8 7, 8 6, 8 5, 8 4, 8 3, 8 4, 8 5, 8 6; or else: 4 3 4 5 4 3 2 3 4 5 6 5, etc. I compose patterns of this kind because they are easier to play and memorize. I never write down patterns generated randomly, because the musicians should study and play them as deterministic music. Rather, I ask performers to play randomly following some rules. Indeed, if the musicians understand the process underway, they play more convincingly and actively like in jazz. Furthermore, these patterns carry a perceptible undulatory quality and a metric consistency. They can be generated, repeated or further developed in a particular direction.

**In an unmeasured way:** a musician establishes a fast regular pulsation, a stream of sound particles, then inserts some impurities in the flux of time; for example, slowly oscillating around the pulsation or perturbing it with a linear or a chaotic process. The perturbations can be composed and articulated choosing a speed, an amplitude and a *degree of variation* (*Veränderungsgrad*). Alternatively, perturbations can follow a profile. This quality of curved time is very interesting because it can lead to unforeseen metric situations that musicians can stabilize for a while and then leave moving forward.

These two kinds of curved times can be carried out monophonically or polyphonically – superposed to similar ones played by other musicians. This produces a complex micro-chaotic *polyrhythmic compound*. Let's consider the polyphonic case: imagine various performers playing a measured curved pattern, synchronizing themselves to the shortest duration. The pattern superimposition doesn't need to be fixed once and for all. In other words, musicians can start to play their curved patterns in every moment, interlocking them each time differently. The global rhythmic texture will always be similar but each time different. This little freedom makes the interpreters listen and play with a completely different attitude and attention. As a result, the music acquires the freshness (and the fragility) of improvisation. In addition, each musician can react to others with certain rules. These rules can be deterministic or nuanced. The composer defines the type and the degree of reaction of performers in relation to a *Leader*. In this way, the overall texture, even chaotic, maintains *lines* of coherence and acquires organicity. These techniques allow flexible control over local chaotic elements and rigorous management of the global outcomes of a musical passage.

Imperfections become a structural element of the system. The music accepts flexibility. It sounds always different and fresh but the global structure is well determined. In other words, it's a method to realize fuzzy structures.

With these techniques alone, there are many possibilities to explore micro-chaos and realize rhythmical situations full of surprises. Since the patterns are easy to play and memorize, the performers are not distracted by complex rhythms to read. They listen to

the other musicians. They focus on the mutual relations and on the musical passage to realize.

### ***Examples of curved time***

Let's examine in detail two examples from *Polaris* (2015)<sup>1</sup>, for percussion trio, the third piece of the cycle *SpazioTempo*.

#### **Example 1**

On page 13 (figure 1), the second percussionist, *Leader* of the passage, has almost finished generating a measured oscillatory pattern (while the two other percussionists continue to play a previous process). At P2, the pattern is finally generated: 8 7, 8 6, 8 7, 8 9, 8 10, 8 9 and will be repeated. As you can see, the pattern consists of oscillations around a metric of 8 sixteenth notes; the effect is a limping metric. Once reached this pattern, the second percussionist gives a cue to the first percussionist who, becoming the *Leader*, starts to generate a new measured oscillatory pattern (we can see the generation process). At P1, the new pattern is completed and the first percussionist passes the *Leader* baton to the third one who, in turn, starts to generate another measured oscillatory pattern completed at P3 (page 14, figure 2). Once the three percussionists have all reached their oscillatory patterns, they simply play them throughout, enjoying the continuously shifting metric. All the patterns are composed so that a central metric of 8 is established and continuously varied undulating. They are also very easy to read, play and memorize. In addition, patterns last 96, 88 and 120 sixteenth notes, so the complete superposition of their cycles lasts a very long time (5280 sixteenth notes or 1320 quarter notes).

The percussionists have to play in Precise Time [TP], linked to the shortest value. However, they can choose when starting to play [ind. link]. In fact, as we already stated, it's absolutely irrelevant if one starts to play the pattern some beats before or after. The result is a rigorous but flexible rhythmic network in which the listener perceives a coherent metrics (something familiar) with measured deviations (local surprises).

Writing this rhythmic network in a traditional way would have meant to accept only one particular combination of the three patterns. Traditional notation with a global time signature would have made the writing of this situation extremely complicated. Furthermore, it would have required an absurd effort by the performers.

A last remark on reactivity between performers: at the beginning of the example, the second percussionist changes the general speed. Even though the first and the third percussionists continue to play their previous process, they must adequate their speed

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<sup>1</sup> Lorenzo Pagliei, *Polaris*, for three percussionists (2015) © Casa Ricordi. <https://www.musicshopeurope.com/product/nr%2014150900/polaris.aspx>.

smoothly to the second percussionist, reacting to the novelty. This makes the texture organic because the musical fabric reacts to the temporal perturbation.

### **Example 2**

On page 9 (figure 3), the three percussionists, with a wooden stick, play a flux of fast synchronous impulses on the metal circle of the snare drum. This produces a very sharp attack in the high register. Each percussionist plays synchronously with both hands, so the timbre density is 6 *sound particles* for every strike. At a certain moment, the third percussionist inserts an *impurity* into the constant stream: the left-hand slows down gradually until it reaches a different pattern (last pattern of the first system). During this process, the right-hand continues to play on time with the other musicians who don't change their speed. Probably, this will lead to some small imprecisions in the attacks; but they fit well in this granular context. On the following system, the left-hand of the third percussionist accelerates and gradually comes back on time. From now on, this oscillating perturbation circulates and proliferates amongst the percussionists. Since the sound used is in the register of maximum ear sensitivity and has a sharp attack, one can clearly hear the *impurities* introduced in the mechanical texture. To make the curvature of time really effective, at first, I had to establish a long-lasting rhythmic flow of sound particles, making it a perceptively persistent element. The regular flux is established about 3'-40" before the beginning of the perturbation. It is played at first with the fingers on the snare drum membrane, then with the wooden stick on the metal circle. In this way, when the perturbation arrives, it is perceived as a great novelty. Musicians play linked to the common pulse and are free to decide the exact moment in which to play the prescribed sequence, as in the previous example. This doesn't mean that the music is vague, but the percussionists have to wait for a certain event or the completion of a process to move forward. The musicians exchange musical cues to indicate the others the arrival at a particular point in the score. They don't play traditionally *on time* but apply a different ethic to be *on time*.

In this music, the duration and the continuity of transformations, as well as the precise moment to start playing, is a very delicate matter. If musicians perform the processes too fast, too slow or discontinuously, the tension falls and the music becomes a simple summary of *accelerando* and *ritardando*.

### ***Working With The Thickness Of Present***

What we call *the Present* is not a point on a line and is not absolute. Theory of Relativity states that time is curved by mass and that two observers moving at different relative speeds may disagree on the simultaneity of events. Neuroscience discovered that our mind needs of about 300-500 milliseconds to build a unified conscious perception from all the stimuli received; a very long time! This means that our basic reaction processes to



the external world are pre-conscious and automatic. We are always late in relation to the *Now* and our conscious present is delayed compared to the received stimuli.

This delay is a sort of *physiological thickness of the present*. The *time arrow pointer* in our mind is blurred, perturbed, chaotic, it oscillates and vibrates randomly. Therefore, the perception of the *Now* is a fuzzy zone. In this micro-duration, many things can happen, even chaotically. If we want to create organic music, behaving like a natural phenomenon, we can explore this thickness developing various techniques of synchronization and reactivity.

### ***Synchronization Techniques***

The musical notation of polyrhythm can be problematic. Although the modern Western notation is rhythmically precise, it is not completely suitable to write polyrhythm. Polytemporality is even more difficult to notate because the different rhythms don't interlock precisely together. Therefore, every composer has to find solutions fitting her/his particular temporal conception.

A solution to these problems could be to focus more on the process than on the notation details. If the process is well formalized, we can write it down finding alternative methods to traditional notation. For many chaotic processes, flexibility and nuance are not a problem, but a resource to accept, explore and use.

I'm experimenting with different degrees of flexibility, synchronization and interdependence between performers. There is still much to be explored in this area. If the piece doesn't have a conductor, in passages with flexible synchronization, a musician can take the role of *Leader*. The *Leader* is the reference point concerning the speed, the global duration of an episode or the triggering of particular events.

Here's a list of the degrees and methods of synchronization (with the indications used in my scores):

1. Perfectly synchronized [link] or [sync]: musicians are precisely synchronized to a common pulse in the traditional way.
2. Synchronized ahead/behind [ahead] [behind]: the musician plays, respectively, slightly before or after the implicit or explicit pulse. Additional indications, like [ahead+] or [behind+] mean playing exaggeratedly before or after the pulse.
3. Independent linked [ind. link]: the musician is linked to the common pulse but can choose when to start playing the musical passage. The actual moment to play can be free, indicated by the context or by a specific event. The music allows this degree of flexibility.
4. Dependent linked [dep. link]: the musician follows the tempo (the speed) of the *Leader* with a specified measured delay. This indication is used both when the

*Leader* performs a specific musical passage and when he/she has instructions for improvising in a more or less flexible way.

5. Dependent flexible [dep.~]: the musician follows the tempo (the speed) of the *Leader* with a physiological unmeasured delay. This synchronization degree is similar to the previous one, except that it exploits the physiological delay between performers. The physiological delay, of course, is relative to the speed variation of the passage.
6. Independent procedural [ind.->]: the musician is rhythmically independent of the others but participates in the realization of the same process following a *Leader*.
7. Independent unlinked [ind.] or [ind. unlink]: the musician is completely independent of the others regarding speed and synchronization. After a passage played independently and unlinked, musicians re-synchronize by means of implicit or explicit musical cues.

Some types of synchronization have blurred boundaries and can also be applied to the single hands of performers.

### ***Examples of synchronization techniques***

#### **Example 3**

To illustrate how complicated is writing different types of synchronization, curved times and poly-temporality in traditional notation, I show the sketches from one of my pieces for orchestra, *Infiniti relativi*<sup>2</sup> (figure 4). Here, the problem is how to write four independent layers of measured curved times for an orchestra. The layers are precisely synchronized without any flexibility. The Acc line indicates the chord number (encircled) of a long chordal process. The Ta and Tb lines represent the rhythmical/metrical structure of two tenuto chord layers (the main layers perceived). The Pa and Pb lines represent the duration structure of two secondary layers of staccato chords. In the line labelled *Misure*, we can see the struggle in choosing the less invasive time signature changes throughout the section. Of course, I had to mediate between the needs and the reading comfort of the two layers. However, playing and reading such a passage can be uncomfortable for musicians because one of the curved metrics is alternatively incoherent with the time signature.

#### **Example 4**

In chamber music, we can go further. Figure 5 shows an excerpt from *Sussurrando* (2018). Here, each of the six instruments has a different time signature and is synchronized to the eighth note. If the passage is long, delays of one or more units of time may

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<sup>2</sup> Lorenzo Pagliei, *Infiniti relativi*, for orchestra (2013) © Casa Ricordi.

occur and musicians feel uncomfortable to play in such a situation. Therefore, it would be better to allow some flexibility in layer superposition. For this reason, in *SpazioTempo*, I've developed more flexible methods of synchronization.

### Example 5

*Gravity* (2019), the second piece of *SpazioTempo*, explores several synchronization techniques between two percussionists. Each percussionist uses 5 membranophones; thus, the sound world is uniform. The piece is entirely based on patterns varied through infinitesimal temporal shifts, i.e. anticipations or delays, in one hand or one performer in relation to the other. The tiny temporal shifts must be performed gradually and generate new patterns of different metrics throughout the piece. Figure 6 and 7 (page 7 and 8 of the score), show different techniques to generate new patterns, bend time, synchronize musicians and enlarge the thickness of the present. In the beginning, Percussionist 2 realizes an *anticipation shift* with the left hand, reaching three different metrics. At the second half of the first system, the musician continuously varies the speed of right hand oscillating. Then, both hands vary the speed oscillating but independently. The goal is to let the rhythmical process generate different patterns and metrics, repeating them for a while, then move on. After the entrance of Percussionist 1, both musicians smoothly synchronize themselves on a two notes pattern. The density attains four sound particles per pulsation. From now on, two successive processes of "thickening of the present" are carried out. Percussionist 2 realizes an *anticipation shift* in relation to Percussionist 1 and the thickness increases. When the shift is halfway between the notes of Percussionist 1 (end of figure 6), both musicians start to play two strikes at every attack (beginning of figure 7). The thickness increases again and the density attains four bouncing particles per pulsation. Then, Percussionist 2 continues the *anticipation shift*, gradually coming back in phase with Percussionist 1 at number 28 of the score. Here, a new thickening process starts but, this time, musicians shift their hands separately: thickness increases and sound density becomes eight sound particles per pulsation (one bar before 30). On the following page (not in the figure), both percussionists gradually come back playing in phase. These pages show clearly the granular conception of the musical fabric and the focus on the simple sound matter.

### Reactivity

Reactivity is the tendency to react to a stimulus. That is, how someone or something (a sound, a texture) reacts to a perturbation. It indicates also the degree and the quality of the reaction. It's a sort of inertia. Reactivity can be applied to a sound texture or to the behaviour of a musician in relation to another. It is an important aspect to put musical elements in relation and make the musical texture behave like a natural phenomenon.

## Examples of reactivity

### Example 6

Figure 8 shows another excerpt from *Gravity*. Here, Percussionist 1 is the *Leader* and Percussionist 2 follows him/her with a measured delay of one-sixteenth note. The part of Percussionist 1 is full of flexible processes: she/he has to choose how many repetitions to play and is asked to make various *accelerando* and *ritardando*. Percussionist 2 must try to follow Percussionist 1 with a measured delay. This is feasible but cannot be so accurate because the speed varies all the time. Since the two percussionists are positioned apart on stage (facing each other), a further physiological micro-delay adds up. Percussionist 1 performs also some *fortissimo sound-marks*, helping Percussion 2 to follow the path, interrupting the music and adding an element of interest (rupture of the Principle of good continuation).

### Example 7

In figure 9, is shown another example of physiological reactivity, taken from *Gravity*. Here the *Leader*, Percussionist 2, plays a three-note ostinato and has some freedom in deciding the amount of rhythmical shift. Percussionist 1 must try to be as synchronous as possible but, of course, it's impossible; there always will be micro-delays and *de-phasing*. The use of an ostinato allows Percussionist 1 to predict the gesture of the *Leader* and easily follow him/her. At various points, the score precisely defines the metrics of the ostinato. However, the achievement of these points will always be blurred, because the transformations are smooth and the gesture similar. So, the different metrics emerge gradually, and the global phrasing is loose.

## The Function Of The Musician

Western music has been preserved over the centuries largely thanks to notation and some theoretical treatises. But, as we have already said, the notation cannot write everything, especially the interpretative and improvisational practices that have come to us through indirect testimonies and oral tradition. To understand the problem, imagine having to transmit jazz music with notation alone. Impossible! Since the last century, audio-video recording and temporal proximity have helped us to communicate and transmit practices that cannot be written. This has changed our relationship with traditions, musical genres and non-standard practices. Today, we can develop a musical practice in which improvisation and writing finally integrate. Audio-video recording can help us in this process. Of course, the role of the musician must change, and the working method should be

similar to that of a dance company or a rock band. Performers must be aware of the process they are carrying out. Luckily, this working practice is spreading more and more, even in the world of written music too. However, it's almost impossible to realise with an orchestra.

During my researches at Ircam, I conceived a family of electroacoustic instruments called the *Geecos* (Gesture Control Surfaces)<sup>3</sup>. The hardware of the *Geecos* is constituted by a wooden surface designed by a luthier with specific dimensions, shape and ergonomics. Under the surface is fixed a contact microphone. The sound of hand gestures on the wooden surface of the *Geecos* is finely analyzed; the result is used to modulate the parameters of sound synthesis in real-time.

The particular technique of sound production (modal synthesis) is based on the simulation of real objects (strings, plates, membranes, tubes, etc.), thus the sound of the *Geecos* does not seem electronic but acoustic. The analysis allows to recognize certain gestures and to continuously vary the intonation, the material, the global resonance and the feedback with the hall. As the *Geecos* are brand new instruments, the instrumental practice was developed during the research in the studio and the working sessions with musicians. The most interesting results came from the exploration of the synthesis artefacts. I spent hours improvising alone or with instrumentalists, obtaining interesting situations that I didn't know how to write in the score.

Therefore, I had to imagine a working method based on improvisation that, on the one hand, would allow the performer to explore the sound possibilities and, on the other, would produce the music I had in mind. Eventually, I developed a system of notation, both rigorous and flexible. In practice, the performer utilizes well-defined gestures and decides the surface detail, certain quantities and the duration of low-level elements. Essentially, the performers play the music I want with a surface decided by them: the gestures are fixed and the score is full of cues and precise appointments. During the rehearsals of *Voir-Toucher* (2013)<sup>4</sup>, for 3 *Geecos* and Kinect, I had the pleasure to observe a different behaviour by the musicians. They gave discreet cues, showed understanding and complicity, corrected each other, became responsible for the piece in another way. They were into the music like a jazz musician or a rock band. They didn't look anxiously at the score but played with a fresh attitude; I just had to follow and correct them. We worked like a rock band making everyone responsible for the sound production and satisfied in the realization of the piece.

Actually, I'm composing a cycle of pieces for two or more pianos devoted to birdsong entitled *La Selva* (2018). Various composers have used birdsong in their music. They, generally, recreated it in a measured way, forcing it into precise durations and asking the musician to interpret it with some flexibility. Bird vocalization is incredibly rich material,

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<sup>3</sup> *Geecos* (Gesture Control Surfaces): <https://youtu.be/6Si2Y9Sm4AE>.

<sup>4</sup> *Voir-Toucher* (2013), for three *Geecos*, Kinect and electronics: <https://youtu.be/xCHppDtL3g4>.

full of fuzzy patterns and amazing improvisation. In *La Selva*, I've conceived various musical situations in which the performers can choose when to *sing* (following some rules), just like a bird does. The cycle allows various arrangements and orders of performance. In one of the pieces, *Canto 1*, Pianist 2 plays a rigorous texture made up of three independent layers. The first contains cyclic harmonic blocks returning at regular durations; the second some distant bird calls; the third a curved, delicate harmonic process. This poly-temporal texture represents a delicate background soundscape. The other pianist has a separate score made up of 10 "Figures for improvisation" taken from an actual blackbird song (Figure 10). The Figures are constituted of "Gestures" to play in a fixed order and instructions for variations and cancellations. The pianist is free to decide which Figure to play and how long are the silences between Figures. Various musical parameters must be chosen within a specified range. Pianist 2 plays his background soundscape from beginning to end regardless of Pianist 1. The latter starts to play the improvised Figures after about 1'-50" from the beginning. Pianist 1, then, behaves just like a bird singing into the wild. The piece ends when Pianist 2 finished playing his/her part.

In *Polaris*, right after the passage with limping rhythms we already showed (Figures 1 and 2), begins a long section in which the musicians perform cycles of "nested rallentando" (Figure 11).

The *Leader* (first percussionist) slows down gradually and almost imperceptibly. The third percussionist follows the tempo as precisely as possible (with some blurring), while the second percussionist continues playing a tempo. At a certain point, the *Leader* is so slow to have enough room to play the pattern at twice the speed. After this speed doubling, the rallentando continues. Then, the third percussionist starts to play at twice the speed too. Both musicians, continuing to slow down, finally reach the speed of the second percussionist and the texture come back to a unique synchronic pulsation. This has a great effect because the three percussionists have not played a completely synchronous pattern for several minutes. The second percussionist becomes the *Leader*, and a similar rallentando process starts again leading to another speed doubling.

This kind of situations can be written in a score only describing in detail the various stages of the process, and they can be achieved by relying on the performers' musicality and intelligence.

## What's Next

In the first part of *SpazioTempo*, I worked with simple means, materials and processes to establish the basis of new temporal writing (for me at least) and go deeper into the ideas prompting me. I will continue focusing on ever-larger and differentiated ensembles to verify the effectiveness of the techniques developed so far and explore new possibilities

on different scales. The main themes of investigation are the control of large sound masses, poly-temporality, *multi-dimensional time* and formal dramaturgy.

### **Developing the polyphony of times**

In the last century, poly-temporality has taken the first steps. The challenge, now, is to create a polyphony of times as effective as the counterpoint. In counterpoint, each voice is autonomous and has an individual meaning; at the same time, it contributes to creating a global texture that is harmonically complete and meaningful on another level. Now, we have to integrate turbulence and chaos into poly-temporality, create effective relations between times, explore their mutual reactivity, accept and utilise their intrinsic frictions. We also need to find methods to handle large masses of sound, assimilating chaotic elements and instabilities.

### ***Multi-dimensional time and form***

The central research, however, remains the feeling of time, particularly what I call the *multi-dimensional time* and the form. The two concepts are related. Let me explain: musical forms have guaranteed a framework that has oriented composers as well as listeners. Today, composers can refer to pre-constituted forms or invent new ones. To invent new forms, composers are never completely alone: they always refer to something (ways of forming, typologies of processes, musical habits, tastes, etc.). Probably, the most important factor is considering time as a mental experience and a multi-dimensional phenomenon. We already talked about the *physiological thickness of the present* but the present has also a particular *feeling*. While we hear a piece, we experience the *feeling of the Now*. This feeling is conditioned by the quality of what we hear, by what we just heard and creates an expectation of the immediate future. So, we can tell that the Now has a *density* and a *significance*. As time goes by, our memory activates and start to create cross-references. If the content of the present is very intense or suddenly different (its density is high), we forgot the past and the future because we are distracted by the febrile activity of the current situation. There is a “sound-emergency” and, as in real life, our attention focuses completely on what is happening now. Instead, if the Now has a low density, the feeling of the present starts to be coloured by memories and expectations. On larger scales, these dynamics lead to a dramaturgy of the form that the composer has to direct. In this regard, the position of the Argentine playwright Rafael Spregelburd is very interesting. His fundamental idea is to accept the intrinsic chaos of the world, integrating it in the dramaturgical writing and going beyond the traditional finalism of Western forms.

The reality is not finalistic. Sometimes, lines of coherence arise becoming emergent properties that are easy to follow. But these lines are intricate and intertwine in a labyrinth. Thus, the reality has no univocal meaning; it is an interweaving of many meanings whose global signification we can not catch. This position is not far from the literary labyrinths of Joyce and the music of Cage and Berio.

As we have seen, physics suggests that time doesn't "exist" (still the well-known question of existence on which Western philosophy has always debated). Despite this, musicians turn to humankind and, since the perception of time is an inalienable human experience, they have to provide and express a conception of time.

### **Music, musical and *non-place***

Apart from the various historical threads, constituted by musical genres, conventions and stylistic features, in every epoch, musicians modify and reinvent what is considered music. For example, in the 20th Century, noise, atonal harmony, electronic sounds and chaotic processes have been integrated into the music. As a listener, I'm not interested in the particular genre of music but to feel myself in a situation that I perceive as *musical*. Defining what is *musical* is difficult, and no doubt it's a relative and subjective concept, but I try. The *musical* means to make the time special, to transform the flow of time, bringing it to another dimension, another place, a *non-place* where the contours of time and space are lost. When we are in a musical situation we forgot the boundaries. We don't even wonder if we are in a theatre, listening to a Lied, walking in a forest, seeing a film or a choreography. We find ourselves in a different place, a non-place of perception in which the Here and Now are transcended. In this space, genres and technique disappear and everything seems authentic and aligned. We are so caught up in the feeling of the present that we realize we went through a duration only at the end of a piece. In other words, in the non-place, we forget space-time and even who we are.

In my opinion, the main occupation of a musician should be to reinvent constantly what is music and what is musical. Musicians should unveil new places and methods, and what they discover must be self-evident and self-explanatory. It must stand by itself without safety net and introductions. This is a real challenge. Musicians should not be completely satisfied with the musical genre they belong to but test it, carry it forward and betray it (in the Latin sense of the term). In Latin, the words "tradition" and "betray" come from the common root *tradere*, which means "to give through", to deliver. You can deliver someone to the enemy (betrayal) or deliver something to the future (tradition). Of course, those who carry on a tradition (a practice, a story, a myth) modify it according to their sensitivity. Thus, every tradition involves betrayal, without which the object of tradition cannot be carried forward.



## Deepening

Let's think about the origins of electronic music in a few specialized studios and what we can do at home today with a personal computer. New instruments and forms have arisen, and so many people can express themselves. The perspective has radically changed, and that's good.

Nevertheless, the widespread availability of means has led to two consequences: a certain banalization of contents and the consumption of good ideas in a short time. As a result, the artist's attention today easily fades out and quickly shifts to something else. Also, the continuous experimentation on new materials and technologies sometimes seems to prevent the deepening of artistic ideas. But materials or technologies are really new only if they allow a new way of thinking and making music. So, we urgently need to deepen our research without the blinkers of the technological thrill. This febrile approach to artistic production is a sign of our times and perhaps will produce new beauty in the future.

Musicians must continue to create *ephemeral air sculptures propagating in space at the speed of sound* to be perceived by human beings. When these sculptures lose energy, air molecules come back to their chaotic low-energy movement, carrying no information. This minimal swarming sound curtain under the threshold of our perception is the Silence: the real "sound potential" from which everything starts. This is our fragile and ephemeral material held up only by the will to transmit it over time to humankind and, eventually, the universe.

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1. When you receive the cue from II, transform your gesture in the one indicated (if necessary repeat 2 times), then follow.  
 2. When you receive the cue from I, transform your gesture in the one indicated, then follow.  
 3. All these strikes on the skin (at the border).

Figure-01-Ricordi

1. Keeping the stick well pushed on the membrane with l.h., causes a micro-glisando and also a pitch variation when the r.h. strikes the skin. Accentuate this effect pushing and shifting the l.h. in two well separated zones (a and b). The r.h. strikes the skin in Ordinary position or toward the border.  
 2. After the first repetition, the percussion point of the r.h. can be changed and varied. The strike on the membrane can be substituted by a strike at the circle or membrane and circle can be struck together (see above).  
 3. All these strikes on the skin (at the border).

Figure-02-Ricordi

The musical score is divided into two sections:

- ca. 24-28"**: This section features three parts:
  - I**: Sn. dr. (snare drum) and pur. man. (pauze man. - muffled tom-tom).
  - II**: Sn. dr. (snare drum) and pur. man. (pauze man. - muffled tom-tom).
  - III**: tip. han. (tip drum - hand), Sn. dr. (snare drum), and tip. han. (tip drum - hand).
- ca. 26-30"**: This section continues with the same three parts, adding more complex rhythmic patterns and techniques like 'TP (ind. link)', 'rall', and 'acc'.

Footnotes at the bottom of the score provide performance instructions:

1. Rallentando as gradual as possible with 1h, keeping r.h. at  $\bullet = 84$ . Reach the indicated gesture very gradually, then follow.
2. When III plays the *fff* continue the previous gesture reaching the half of the stick. Then follow.
3. During this section, some strikes can be replaced with pauses to make one hand rest, while the other hand continues to play. Never make pauses with two hands together.

Figure-03-Ricordi

**IV-V Pieghe/Adagio/Berceuse**

The image displays a handwritten musical score on a grid background, titled "IV-V Pieghe/Adagio/Berceuse". The score is organized into two main systems, each with five staves. The first system includes staves for Accordion (Acc), Trumpet (T), Trombone (Tb), Mizzone (Mizzone), and Percussion (P). The second system includes staves for Accordion (Acc), Trumpet (T), Trombone (Tb), Mizzone (Mizzone), and Percussion (P). The notation is highly complex, featuring numerous rhythmic markings, including time signatures such as 3/4, 4/4, 5/4, 7/4, 9/4, and 11/4. It also includes various musical symbols like notes, rests, and dynamic markings. A large number "1" is prominently displayed in the center of the page, likely indicating a specific measure or section. The overall style is that of a detailed musical manuscript.

Figure-04

**E1**

16  $\downarrow$  (Follow Vc.)

Ott.

Cl. 7  $\downarrow$  21  $\downarrow$  linked *p*

Sn. dr. 15  $\downarrow$  14  $\downarrow$  15  $\downarrow$  16  $\downarrow$  *mp*

Perc. Gong Bass drum

Gong B. dr.

VI. 27  $\downarrow$  linked *legato p*

Va. 6  $\downarrow$  14  $\downarrow$  linked *p*

Vc. 16  $\downarrow$  linked *p*

**E2**

Ott. 15  $\downarrow$  linked *mp*

Cl.

Sn. dr. 15  $\downarrow$  14  $\downarrow$  15  $\downarrow$  16  $\downarrow$

Perc.

Gong B. dr.

VI. 85  $\downarrow$

Va.

Vc.

Figure-05

The musical score is divided into two main sections, I and II. Section I consists of two staves, I and II, with various rhythmic notations and dynamic markings. Section II also consists of two staves, I and II, with similar notations and includes specific performance instructions. The score includes dynamic markings such as *f*, *mf*, *acc*, and *rall*, as well as performance directions like 'Compa 1', 'Bongo 1', 'Bongo 2', and 'Snare drum'. The score is annotated with circled numbers 26 and 27, and various rhythmic patterns and durations are indicated throughout.

1. Continuously and gradually accelerating and ritardando the pattern in the right hand around the metronome speed (left hand remains tempo). The performer, varying the speed, must create and stabilize for short durations (3-4 repetitions) elastic patterns that are impossible to write in a measured notation. These patterns result from different rhythmical relations between the two hands. All transformations must be gradual.

2. Same process as before but varying the speed in both hands.  
 3. Wait until II plays with synchronous hands and count ca 6 repetitions of II pattern, then follow.  
 4. Repeat until II arrives to 27 then follow.

Figure-06

8

1. Repeat until the arrow sign then follow.

Figure-07

13

1. In this section, the two performers play a 3 notes "ostinato", each hand plays on three membranes, clockwise and in parallel motion. The ostinato is declined in different rhytmical patterns, shifts, global or local (independent hands) accelerando and rallentando. II is the Leader and decides the global and local speed, how transform patterns and when pass to the next one. I is dependent from II and tries to be linked to it as much as possible with slight local elasticity. This adds rhytmical thickness to all the passage. II mostly makes continuous variations so that I can easily follow. Globally, the rhytmical patterns plays with 3/2, or 3/4 ambiguity. The word [shift] placed on top of two adjacent patterns separated by a thick barline, indicates that the performer must play one pattern and freely shift one hand maximum within the duration indicated in the second pattern. As in previous pages, the shift must be continuous, increasing or decreasing at each repetition. At E, sometimes II substitute one measure with a measure of pause (i.e.: bar g can substitute one of the two previous bars). II continues to play. This causes some holes and stereo effect in the texture.

Figure-08

11

♩ = 130

acc. → = 144

acc. poco →

rall. → = 100

poco acc. ↘

ca. 60"

I  
 Bon. 1  
 Sn. dr.  
 Con. 2

II  
 Bon. 2  
 Sn. dr.  
 Con. 2

I  
 Bon. 1  
 Con. 1  
 Bon. 2  
 Con. 2

II  
 Bon. 1  
 Con. 1  
 Bon. 2  
 Con. 2

1. In this section, I is the Leader [I] and decides the duration of the different changes, the effective speed and variation of tempo. II try to follow and imitate I with some inertia: a delay of about 1 sixteenth note. II must try to preserve the delay of 1 sixteenth despite the tempo changes. The time is elastic, so it's impossible to play always perfectly on time with I. The number of repetitions of the patterns is only indicative, the goal is to establish a game between the actions of I and the reactions of II who tries to maintain its short rhythmic delay. The dynamics of all the section are in crescendo.

Figure-09



3

The figure displays four musical score examples, each consisting of a piano part (I) and a percussion part (r.h., M, l.h.).

- Example 5:** Piano part (I) includes dynamic markings *mf* and *f*. Percussion part (r.h., M, l.h.) includes markings *w* and *b*. Above the piano part, there are labels (a), (b), (c), (d) with a bracketed  $1 \leftrightarrow 2x$ , and (e) with a bracketed  $13 \leftrightarrow 28$ .
- Example 6:** Piano part (I) includes dynamic markings *mf*, *f*, *mf*, and *p*. Percussion part (r.h., M, l.h.) includes markings *w* and *b*. Above the piano part, there are labels (a), (b), (c), (d) with a bracketed  $2 \leftrightarrow 4x$ , (e) with a bracketed  $2 \leftrightarrow 3x$ , and (f) with a bracketed  $13 \leftrightarrow 28$ .
- Example 7:** Piano part (I) includes dynamic markings *mf* and *f*. Percussion part (r.h., M, l.h.) includes markings *w* and *b*. Above the piano part, there are labels (a), (b), (c), (d) with a bracketed  $1 \leftrightarrow 3x$ , and (e) with a bracketed  $13 \leftrightarrow 28$ .
- Example B:** Piano part (I) includes dynamic markings *f* and *mf*. Percussion part (r.h., M, l.h.) includes markings *w* and *b*. Above the piano part, there are labels (a), (b), (c) with a bracketed  $2 \leftrightarrow 4x$ , (d), (e) with a bracketed  $2 \leftrightarrow 3x$ , (f), and (g) with a bracketed  $13 \leftrightarrow 28$ .

Figure-10

The score consists of three staves (I, II, III) and six sections (a through g2). Each section has a duration of approximately 20-25 seconds. The tempo markings are as follows:

- Section a: Tempo = 200, *rall.* (non *rall.*)
- Section b1: Tempo = 140
- Section b2: Tempo = 140, *rall.*
- Section c1: Tempo = 120
- Section c2: Tempo = 120, *rall.*
- Section d1: Tempo = 200, *rall.*
- Section d2: Tempo = 200, *rall.*
- Section e1: Tempo = 140, *rall.*
- Section e2: Tempo = 140, *rall.*
- Section f1: Tempo = 120
- Section f2: Tempo = 120, *rall.*
- Section g1: Tempo = 100
- Section g2: Tempo = 100

Performance instructions include: "Ritardando gradually, almost unnoticed, so that the doubling of tempo (R) at it occurs as a surprise. If it's easier, play a pattern of 8 shortly before it.", "When the speed allows it, switch almost unnoticed to twice the speed. Make this transformation playing the first pattern and stabilize it on the second one.", "Come back to P1", "Start to play P1 Linked to III", "Come back to P1", "Link yourself to the speed of II (you can think your F made up of  $f$  at  $J=100$  or  $f$  at  $J=200$ ). Then follow II for the rallentando.", "Ritardando gradually, almost unnoticed, so that the doubling of tempo (R) at it occurs as a surprise. If it's easier, play a pattern of 8 shortly before it.", "Link yourself to the speed of II (you can think your F made up of  $f$  at  $J=100$  or  $f$  at  $J=200$ ). Then follow II for the rallentando.", "When I starts to insert  $f$  stop the rallentando following him/her. Keep the speed exactly the half of I and wait that I stabilizes his/her pattern for some cycles. Then take the role of Leader and start a gradual *rallentando*, almost *impercipibile*. If it's easier, play a pattern of 8 shortly before it.", "Switch almost unnoticed to twice the speed. Make this transformation playing the first pattern and stabilize it on the second one.", "Come back to P1", "Link yourself to the speed of II (you can think your F made up of  $f$  at  $J=100$  or  $f$  at  $J=200$ ). Then follow II for the rallentando.", "Ritardando gradually, almost unnoticed like before.", "Switch almost unnoticed to twice the speed. Make this transformation playing the first pattern and stabilize it on the second one.", "Come back to P1", "Short pause to change mallets.", "Play a little louder to sustain the pause of I.", "Play a little louder to sustain the pause of I."

1. Durations of the different parts of this section are merely indicative and must be considered as magnitudes: variations should not occur, but play listening to each other, focusing on transformations, synchronization and the achievement of the different states of rhythmic aggregation. It's extremely important that all rallentando take place as gradually as possible; they should be almost unnoticed, so that the speed doublings appear as a surprise.

2. Play between *f* and *ff*, mostly accompanying the speed doublings and reaching *ff* towards the end of the page.

Figure-11-Ricordi