

G rard Grisey: time and process

Nicola Davico

Conservatorio Statale di Musica "G. Verdi" – Torino, Italy
n.davico@libero.it

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Abstract: Since 1950, the role of time in music has been a key concern for many composers, who looked at it from different perspectives. Some authors, like Stockhausen, tried in their works to investigate the connections between frequencies and durations (*Zeitmasse*) or redefine the perception of time, expanding single moments (*Momente*). Some, like Donatoni in *Strophes*, tried to annihilate time replacing the old conception of development with sequences of panels. Some others, like Ligeti in *Atmosph res*, petrified time creating a *continuum* built on endless micro transformations.

G rard Grisey, co-founder of the group called *Itin raire* in the 1970s and "father" of the *Musique spectrale*, is another composer that, though not as celebrated as the ones mentioned above, considered the speculations about time and its perception the heart of his production.

This paper focuses on Grisey's theories and works, on how he explored the acoustical nature of the sound itself – also thanks to the possibility offered by electronics to decompose a single sound into a complex spectrum –, used these results as a starting point for composing and tried to examine how physical processes that constitute sounds can influence the perception of time by the listener.

By analyzing Grisey's conception of time and process in the scenery of the avant-gardes, the paper aims at shedding light on a musician whose ideas still offer alternative insights into the act of composing.

At the beginning of the 20th Century, the theory of relativity appears and plays havoc with the world of Physics. Some years after, it undermines also the notion of time.

In chapter 8 of his *Relativity: The Special and General Theory*, Albert Einstein relates on the idea of time in physics. Here we can read: «Lightning has struck the rails on our railway embankment at two places *A* and *B* far distant from each other. I make the additional assertion that these two lightning flashes occurred simultaneously. [...] After thinking the matter over for some time you then offer the following suggestion with which to test simultaneity. By measuring along the rails, the connecting line *AB* should be measured up and an observer placed at the mid-point *M* of the distance *AB*. This observer should be supplied with an arrangement (e.g. two mirrors inclined at 90 ) which allows him visually to observe both places *A* and *B* at the same time. If the observer perceives the two flashes of lightning at the same time, then they are simultaneous.»¹

What could be simpler? And, in fact, the problems are just lurking beyond the corner: Einstein is going to bring some more variables into play. And, in the next chapter, the perspective becomes suddenly more complicated than expected: «Up to now our considerations have been referred to a particular body of reference, which we have styled a "railway embankment." We suppose a very long train travelling along the rails with the constant velocity *v* and in the direction indicated in Fig. 1. People travelling in this train will with advantage use the train as a rigid reference-body (co-ordinate system); they regard all events in reference to the train. Then every event which takes place along the line also takes place at a particular point of the train. Also the definition of simultaneity can be given relative to the train in exactly the same way as with respect to the embankment. As a natural consequence, however, the following question arises: Are two events (e.g. the two strokes of lightning *A* and *B*) which are simultaneous *with reference to the railway embankment* also simultaneous *relatively to the train?*»²

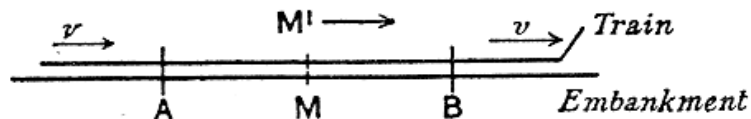


Figure 1.

The situation has been modified by a very simple thing: the point of view has changed. The events are the same, but the result of this shift in perspective is, as we will verify, fraught with problematic consequences. A storm is approaching.

«When we say that the lightning strokes *A* and *B* are simultaneous with respect to the embankment, we mean: the rays of light emitted at the places *A* and *B*, where the lightning occurs, meet each other at the mid-point *M* of the length *A* → *B* of the embankment. But the events *A* and *B* also correspond to positions *A* and *B* on the train. Let *M'* be the mid-point of the distance *A* → *B* on the travelling train. Just when the flashes of lightning occur - as judged from the embankment - this point *M'* naturally coincides with the point *M*, but it moves towards the right in the diagram with the velocity *v* of the train. If an observer sitting in the position *M'* in the train did not possess this velocity, then he would remain permanently at *M*, and the light rays emitted by the flashes of lightning *A* and *B* would reach him simultaneously, *i.e.* they would meet just where he is situated. Now in reality (considered with reference to the railway embankment) he is hastening towards the beam of light coming from *B*, whilst he is riding on ahead of the beam of light coming from *A*. Hence the observer will see the beam of light emitted from *B* earlier than he will see that emitted from *A*. Observers who take the railway train as their reference-body must therefore come to the conclusion that the lightning flash *B* took place earlier than the lightning flash *A*. We thus arrive at the important result: Events which are simultaneous with reference to the embankment are not simultaneous with respect to the train, and *vice versa* (relativity of simultaneity). *Every reference-body (coordinate system) has its own particular time; unless we are told the reference-body to which the statement of time refers, there is no meaning in a statement of the time of an event*»³ (my italics).

This closing assertion is somehow shocking, because it clearly conveys the idea that the simultaneity we were trying to prove is not the simultaneity we had in mind (*i.e.* a *simultaneity of events*), but a *simultaneity of times*. And, as a fact, it is not measurable.

The possibility to refer to a *single* time, resting on the assumption of its objectivity, is openly in contradiction with the notion of time itself. This isn't a recent discovery. Saint Augustine himself (dating back to the 4th Century A.C.), in one of his "confessions", must admit the existence of different kinds of times: «it might be properly said, "there be three times; a present of things past, a present of things present, and a present of things future." [...] present of things past, memory; present of things present, sight; present of things future, expectation. If thus we be permitted to speak, I see three times, and I confess there are three»⁴. But the novelty of the idea of simultaneity in Einstein lies in the "reference-body to which the statement of time refers", as he says. This means that the reality of time must be sought taking into account all the relations between the objects involved in a particular situation: it must be sought *in between*.

Gérard Grisey is always remembered and mentioned when a musical conversation hits by chance the word "spectral", since he is considered the father of the *musique spectrale*. Nevertheless, in all his interviews he never gives up underlining that the term "spectral composer" is «just a sticker that we got at a certain period». He explains that «the departure point of spectralism was [...] the fascination for extended time and continuity. [...] What language does that extended time imply? That is really the starting point of the spectralism and not the writing of spectrum or whatever.»⁵ In his mind, «spectralism is not a system. [...]

It's an attitude. It considers sounds, not as dead objects that you can easily and arbitrarily permutate in all directions, but as being like living objects with a birth, lifetime and death.»⁶

The idea of time is, as a matter of fact, the kernel of Grisey's musical thought. If you consider his works since 1969 (the year of his first piece, *Charme*), you can observe that time is one of the main parameters of most of his ambitious projects: *Dérives* (1973-1974), *Les Espaces Acoustiques* (1974-1983), *Jour, contre-jour* (1979), *Tempus ex machina* (1979), *Les Chants de l'amour* (1982-1984), *Talea* (1986), *Le Temps et l'écume* (1988-1989), *L'Îcône paradoxale* (1992-1994), *Vortex temporum* (1994-1996) are all works revolving around an imaginary axe built on time. And if you want to spend some time scanning his writings, you will notice that the entry "time" occurs almost everywhere.

We can definitely say that very few composers in the history of music have been so fanatical about time. Time is his starting point, the cornerstone of his conception of music. In fact, «if the sounds have living bodies, the time is both their space and their atmosphere.» So that «[t]o treat sounds outside of the time, outside of the air they breathe, would be as much as to dissect a body.»⁷ This view of time as the air the sounds must have to breathe springs from a very precise vision of music. In one of the early essay, *Devenir du son*, written in 1978, he clearly declares his aesthetic: «*The difference or the lack of difference qualifies the perception as a whole. [...] a sound exists on the grounds of its individuality, and this individuality reveals itself only in a context that enlightens it, and that gives it sense. I think it is essential for the composer to play not any more with the material, but with the gap, with the distance separating a sound from another.*»⁸ The same perspective is easily traceable also in another essay published some years after, where Grisey, philosopher and scientist at the same time, writes: «What happens between a sound A and a sound B? The essential. In the hollow of this difference lies the "Tempus ex machina", the non-chronometric time, but the phenomenological and musical time.»⁹

The "obsession" with time is the consequence of the idea of "spotting the differences" between sounds, and – we would like to say – the idea of considering a sound as an object in space, as Varèse used to teach to Morton Feldman – two of Grisey's favourite composers, by the way. And in Grisey's mind, "space" means obviously time.

First of all, the sound must be de-structured and re-composed, in order to discover the whole amazing complexity of the "sound reality". A reality that is «an incredible tissue of correlations, inductions and interactions»¹⁰. The sound, in its smallness, is a universe of implications: it is burdened with connections in relation to external objects, but it contains connections already in itself. The problem lies in having the opportunity to discover this universe lurking under its surface. Only technology – computer and electronics – can enable us to unfold it, if we are interested in making it scientifically visible. This is the one and only reason for Grisey to deal with technology: not to compose music, but to fathom a sound. Many composers used or still use technology as a fundamental part of the composing process. He – and this sounds paradoxical – doesn't like technology very much. He is, as he confesses, «not very talented in the use of computers and digital electronics», he doesn't feel comfortable sitting on technology: «electronics have to be revised constantly because of the change of technology. [...] every other year, the whole system changes» and a composer is forced to go on «running, literally running after new technology that's going to be better in a few years. [...] You can't go like that.»¹¹ So he doesn't want to be enslaved by electronics, he prefers to "handle it with care", using it as a tool in order to plumb the depths of sounds.

The result is the scientific analysis of the timbre of sound and of its spectrum, its inner life, and the employment of it. This means that in a "spectral" composition you should be ready to begin a tour into the sound, visiting all the caves it possesses: not a suitable tour for claustrophobics (I mean people who, when listening to music, need now and then to get some fresh air, or technically speaking, people who need music to be firstly melodic), but an incredible experience for all others, since you will visit caverns rich in strange rock formations

and magnificent minerals (musically speaking, unexpected harmonies built on extremely dissonant spectra, built using also the upper - and obviously "untuned" - harmonics of a fundamental).

An example of these "guided tours" is the work *L'Esprit des dunes* (1993-1994) by Tristan Murail, one of the co-founder with Grisey, Levinas, Dufour and Tessier of the group called *Itinéraire*, born in 1973 explicitly to spread the "applied" discoveries of the "spectralists" (and their compositions). In *L'Esprit des dunes*, we find, among many sources which form the basis of the whole composition, the sound of the Tibet trumpet *dungchen* and that of the Mongol diphonic song *khöömi*. These two sources have been anatomized thanks to electronic devices, de-structured and re-composed, as we said before, so as to create a new incredibly organic tissue, just to let us make a sort of «journey through the Gobi desert»¹².

We cannot help mentioning the well-known *Les Espaces Acoustiques*, undoubtedly the most impressive work by Grisey. But in this case, the situation is getting more complicated. This work could be considered a study on one note, or better said, on one sound¹³, to be precise, the sound of a E (41.2 Hz) played by a trombone. The analysis of the spectrum of this E in all its meanders is the starting point of this huge plan, that hits more or less a hundred minutes and keeps Grisey busy for more or less ten years (from 1974 to 1985). The six compositions that constitute *Les Espaces Acoustiques* (*Prologue, Périodes, Partiels, Modulations, Transitoires* and *Epilogue*) are, so to speak, single "studies" demanding a more and more swelling orchestra - from a viola alone to 4 horns and a huge orchestra -, whose aim is to investigate the different "physical" features of the chosen E.

But this work, as much as many others that have been composed in this decade and beyond, underlines how spectra and time are deeply connected.

We obviously know that time is the mean through which music unfolds itself. What Grisey is trying to tell us is that a sound, the least particle of music, is already a microcosm which already owns a time. *Its* time. A time we normally aren't able to grasp, because too different in size compared to *our* time. Here we get back to Einstein's relativity of the simultaneity. «The sound object, in its complexity and dynamism, incites us to open it, to enlarge it immeasurably, so as to create a formal process. In return, *the sound object is nothing but a contracted process*. To these two organisms breathing at different heights correspond two atmospheres - to put it another way, two different times»¹⁴ (my italics).

That is to say: every single sound hides in itself a world which we cannot unveil unless we slow down *our* time, modifying our perception of the sound. That's why, in Grisey's mind, sounds, process, spectra and perception are so closely related: if a composer was able to "enlarge" a sound, slowing down the course of the listener's perceived time, he could show the process lying at the bottom of this sound, he could be able to show the core hidden under miles of crust. He could prove that what we perceive of a sound is only appearance, the blinding - or maybe deafening - atmosphere covering a planet we wouldn't have imagined. Husserl would say it better: «Every perceptual flow permits, essentially, a broadening that finally transforms what is perceived into something not perceived.»¹⁵

The quotation from Husserl's capital essay *On the Phenomenology of the consciousness of internal time* is not meant to be accidental. Many philosophical topics debated in this dissertation fit perfectly with Grisey's issues, and most of Husserl's assertions - so as many belonging to his coetaneous colleague, Bergson - seem to match Grisey's perspectives on music.

It's quite stunning to discover that no trace of the two philosophers can be found in Grisey's writings, in particular when we run into excerpts like the following one, where Bergson seems to anticipate some of Grisey's claims mentioned above: «May we not conceive, for instance, that the irreducibility of two perceived colours is due mainly to the narrow duration into which are contracted the billions of vibrations which they execute in one of our moments? *If we*

could stretch out this duration, that is to say, live it at a slower rhythm, should we not, as the rhythm slowed down, see these colours pale and lengthen into successive impressions, still coloured, no doubt, but nearer and nearer to coincidence with pure vibrations?»¹⁶ (My italics)

Husserl is one of the philosophers who uses many musical examples in order to explain philosophical concepts. In the work aforesaid, music seems to be his reference point, and many sections of this essay could illuminate Grisey's way of dealing with sound. Mostly significant are the passages in which Husserl dissertates on unity and multiplicity. «What matters to me here is only to lift the veil a little from this world of time-consciousness, so rich in mystery, that up to now has been hidden from us. And I want to emphasize particularly the new sense of *unity as opposed to multiplicity*, with which a number of senses of the perception, and even of *representation* of something itself, are connected.»¹⁷

This sense of "unity as opposed to multiplicity" brings directly to the assertion that everything is perceived, everything given in itself as individual object is given as unity of a multiplicity not given.¹⁸ That is to say, everything we perceive as "thing-unity" is not revealing to us its real itself, because we cannot see the multiplicity it contains. We can only state the unity of its being, which, if confirmed, implies continuity in a lapse of time. «Now this *continuity* [...] is the thing's duration or change, the concretely filled time itself throughout which the thing, as that which is identical in all phases, is extended, or in which it *lies* in its own way from whose givenness it must evidently be drawn. On this side, obviously, lies what we call the *unity of the process*»¹⁹.

This last statement could be the summary of Grisey's lifetime concern. Now we are running again into the *simultaneity of times* we mentioned while speaking about Einstein, the simultaneity of events related to different times.

If you take into consideration his writings and his compositions, Grisey often speaks about layers of time. The stratification of different processes which can be made visible through the enlargement of a sound is only a matter of perception: «Think of whales, men and birds. When you hear the song of the whales, they are so spaced out that what sounds like a gigantic, drown-out and endless moan is perhaps only one consonant to them. This means that is impossible to perceive their speech with our constant time. Similarly, when we hear a bird sing, our impression is that it sounds very high-pitched and agitated, for its constant of time is much shorter than ours. It is difficult for us to perceive its subtle variations of timbre, while it may perceive us, perhaps, as we perceive the whales.»²⁰

This is the reason why it's so important for him to use all means that allow to obtain acceleration and deceleration in music: because they can alter the listener's perception of a "single continuity" of music. The essay *Tempus ex Machina – Reflections of a composer on musical time* (1980), the theoretical alter-ego of the composition carrying the same name and written the year before, is of great significance.

Here Grisey shows three different ways of analyzing musical time and, acting above board, many possible tricks which could be useful for "distorting" (or better said, "deforming") the perception of time: "dodges" as for example to operate on acceleration and deceleration, to change the predictability of the events, or to play with immediate and cognitive memory.²¹

All these opportunities lead to the conclusion (or maybe works on the assumption) that the «real musical time is nothing else but the point of intersection of an infinite number of times».²² And that's why he says «it is essential for the composer to play not any more with the material, but with the gap, with the distance separating a sound from another»²³, because the space dividing two sounds *is* for a composer the possibility to decide how to connect two completely different worlds (sound spectra) altering also time perception.

In this sense, *L'icône paradoxale (Hommage à Piero della Francesca)* and *Vortex temporum* are pivotal works. The first one is an example of how a piece of music can be realized having

in mind the structure of a painting (in this case the *Madonna del parto*) with its vanishing point transformed here in a section – the central one – in which four (similar, but opposite) processes converge, occupying the whole duration of the piece. These processes move at four different superposed times. On the other hand, in *Vortex temporum*, a sort of concerto for piano and ensemble whose material is based on a musical cell extracted from Ravel's *Daphnis et Chloé*, the three times "of men, whales and insects" build the structure of the composition: the first part presents at its very beginning the original Ravel's cell, while in the second and in the third section the same cell is "enlarged" unboundedly (each one of the 8 original semiquavers is transformed into a crotchet repeated 43 times) and "reduced" to the point of becoming nearly noise. "Enlarged" or "reduced" (or maybe "shrunken").

...«What size do you want to be?»²⁴...

The link with Alice not succeeding in reaching her "right" height (the caterpillar would be disapprovingly shaking its head) is inevitable. Grisey, in a text remained unpublished until 2008 and entitled *Leçons de choses – Le silence*, is once more speaking about time. I would like here to report the whole text, because I think it's worth the *time*.

«Be a melody.

If we perceive the pitches of a melody instead of a mess of frequencies laid on the whole audible zone, this is partly due to our "constance du temps". This time, which is our time, the time of our breathing, of our beating heart and of our flinching, influences our way of listening or not listening.

Imagine for a moment to swallow a pill which, exactly as in *Alice in Wonderland*, makes us shrink into the instant.

What remains of our original melody, now endless and beyond the possibility of our cognitive and memory capacities?

What sensation will replace our melody? Some spectra covering our audible zone, where the fundamentals (the pitches of the melody) are still perceivable and stretch out for a very long duration.

Since we are very curious, we swallow another pill. This time it's out of question to have the possibility of listening to a succession of spectra and fundamentals. Only very complex sounds are emerging, which are interpenetrating without making us understand a global sense in this "chaos". The thickness of the components is so impressive that we are able to perceive the inner evolution of the sound (beats, side bands, vibration, and so on). The listening is compulsorily microphonic. No articulation can attract our attention, because it is beyond the field of our memory.

As we are more and more curious, we cannot resist the temptation of taking the next pill.

Surprise! Our auditory field does not allow more than two or three components of the spectrum, since the thickness, the density and the complexity of each component have become considerable. Another pill would be fatal for us. Our auditory field has become too narrow in front of the phenomenon. We have reached the silence, or maybe the silence has reached us, because it's the sound we cannot be able to perceive.»²⁵

It's a new version of Well's *Time Machine*, a real Vernian *Journey to the Centre of Sound*, where all we can identify as "sound unity" is actually «the result of a temporal imagination (the time of the inspiration and of the waking), realized in an effective time (the time of the composition and of the realization) and fixed in a virtual time (the time codified in the score)». ²⁶ Therefore, a three-layer-unity, at least.

“Each” different time you choose to take into consideration (or rather each time you decide to apply to the chosen material) will allow you to discover a different feature of a sound, operating as a zoom lens on the material (bringing you eventually to silence...).

If we were able to grasp Grisey’s lesson on time and on the meaning of composing music in relation with phenomenological time, than we would agree with the Hatter saying to Alice: «If you knew Time as well as I do, [...] you wouldn’t talk about [...] *it*. It’s *him*.»²⁷ Because time is nothing else than objectivity *subjectively* “bent”²⁸.

Acknowledgments

I would like to dedicate this essay to Don Pio Gaia, a teacher I didn’t unfortunately have in studying philosophy, and to Enzo Restagno, a teacher I fortunately had in studying music.

References

- Baillet, Jérôme. *Gérard Grisey – Fondement d’une écriture*, Paris: L’Harmattan, 2000.
- Barrière, Jean-Baptiste (ed.). *Le timbre – Métaphore pour la composition*, Paris: Christian Bourgeois Éditeur, I.R.C.A.M., 1991
- Barthelmes, Barbara. “Spektrale Musik”. In *Geschichte der Musik im 20. Jahrhundert:1975-2000*, ed. Helga de la Motte-Haber, 207-246. Laaber Verlag, 2000.
- Bergson, Henri. *Matter and Memory*. Trans. Nancy Margaret Paul and W. Scott Palmer. London: George Allen and Unwin, 1911.
- Bündler, David, *Interview with Gérard Grisey*.
<http://angelfire.com/music2/davidbundler/grisey.html>.
- Carroll, Lewis. *Alice’s Adventures in Wonderland & Through the Looking-Glass*, London: Collector’s Library, 2004
- Cohen-Levinas, Danielle (ed.). *Le temps de l’écoute*, Paris: L’Harmattan, 2004.
- Dufourt, Hugues. *Mathesis et subjectivité – Des conditions historiques de possibilité de la musique occidentale*, Paris: Éditions MF, 2007
- Dufourt, Hugues. *Principe de la musique*, Paris: Éditions MF, 2008.
- Dufourt, Hugues. *De l’espace sonore à la musique spectrale*, Paris: Éditions MF, 2007.
- Einstein, Alfred. *Relativity*, Padstow: Routledge Classics, 2003.
- Grisey, Gérard. *Écrits ou l’invention de la musique spectrale*, Paris: Éditions MF, 2008.
- Grisey, Gérard. “Conjectures and Ideas in two paragraphs”. Booklet of Gérard Grisey’s *Solo pour deux, Anubis-Nout, Stèle, Charme, Tempus ex machina*. Kairos, 2005.
- Hervé, Jean-Luc. *Dans le vertige de la durée*, Paris: L’Harmattan, 2001.
- Husserl, Edmund. *On the Phenomenology of the consciousness of internal time*, trans. John Burnett Brough. Kluwer Academic Publishers, 1991
- Imberty, Michel. “Continuità e discontinuità”. In *Enciclopedia della musica – Il Novecento*, trans. Anna Rita Addessi, 526-547. Torino: Einaudi, 2001.
- Mathieu, Vittorio. *Bergson. Il suo profondo e la sua espressione*, Torino: Edizioni di “filosofia”, 1954.
- Solomos, Makis (ed.). *Iannis Xenakis, Gérard Grisey. La métaphore lumineuse*, Paris: L’Harmattan, 2003
- St. Augustine, *The Confessions*, trans. Edward B. Pusey. Christian Classics Ethereal Library, 1999. <http://ccel.org/ccel/augustine/confess.html>.
- Szendy, Peter (ed.). *Tristan Murail*, Paris: L’Harmattan, 2002.
- Wilson, Peter Niklas. Vers une écologie des sons, *Partiels* de G. Grisey et l’esthétique du groupe de l’Itinéraire. *Entretemps n. 8*, 1989: 55-83.

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- ¹ Einstein, Alfred. *Relativity* (Padstow: Routledge Classics, 2003), 23-24.
- ² Einstein, Alfred. *Relativity* (Padstow: Routledge Classics, 2003), 27.
- ³ Einstein, Alfred. *Relativity* (Padstow: Routledge Classics, 2003), 28.
- ⁴ St. Augustine, *The Confessions* (Christian Classics Ethereal Library, 1999), 169.
- ⁵ Bündler, David, *Interview with Gérard Grisey*, 2.
- ⁶ Bündler, David, *Interview with Gérard Grisey*, 1.
- ⁷ Grisey, Gérard. *Écrits ou l'invention de la musique spectrale* (Paris: Éditions MF, 2008), 41. (My translation)
- ⁸ Grisey, Gérard. *Écrits ou l'invention de la musique spectrale* (Paris: Éditions MF, 2008), 29. (My translation)
- ⁹ Grisey, Gérard. *Écrits ou l'invention de la musique spectrale* (Paris: Éditions MF, 2008), 48. (My translation)
- ¹⁰ Grisey, Gérard. *Écrits ou l'invention de la musique spectrale* (Paris: Éditions MF, 2008), 49. (My translation)
- ¹¹ Bündler, David, *Interview with Gérard Grisey*, 3.
- ¹² Szendy, Peter (ed.). *Tristan Murail* (Paris: L'Harmattan, 2002), 69.
- ¹³ We must here remember the solitary path of Giacinto Scelsi, a composer still underestimated and too simplistically represented by the often mentioned *Quattro pezzi su una sola nota*, a figure who played an important role in the "creation" of the *Spectral Music*.
- ¹⁴ Grisey, Gérard. *Écrits ou l'invention de la musique spectrale* (Paris: Éditions MF, 2008), 53. (My translation)
- ¹⁵ Husserl, Edmund. *On the Phenomenology of the consciousness of internal time* (Kluwer Academic Publishers, 1991), 127.
- ¹⁶ Bergson, Henri. *Matter and Memory* (London: George Allen and Unwin, 1911), 268-269..
- ¹⁷ Husserl, Edmund. *On the Phenomenology of the consciousness of internal time* (Kluwer Academic Publishers, 1991), 286.
- ¹⁸ See Husserl, Edmund. *On the Phenomenology of the consciousness of internal time* (Kluwer Academic Publishers, 1991), 296.
- ¹⁹ Husserl, Edmund. *On the Phenomenology of the consciousness of internal time* (Kluwer Academic Publishers, 1991), 280.
- ²⁰ Grisey, Gérard. "Conjectures and Ideas in two paragraphs" (Booklet of Gérard Grisey's *Solo pour deux, Anubis-Nout, Stèle, Charme, Tempus ex machina*. Kairos, 2005), 9.
- ²¹ Grisey, Gérard. *Écrits ou l'invention de la musique spectrale* (Paris: Éditions MF, 2008), 57-58. (My translation)
- ²² Grisey, Gérard. *Écrits ou l'invention de la musique spectrale* (Paris: Éditions MF, 2008), 88. (My translation)
- ²³ Grisey, Gérard. *Écrits ou l'invention de la musique spectrale* (Paris: Éditions MF, 2008), 29. (My translation)
- ²⁴ Carroll, Lewis. *Alice's Adventures in Wonderland & Through the Looking-Glass* (London: Collector's Library, 2004), 51.
- ²⁵ Grisey, Gérard. *Écrits ou l'invention de la musique spectrale* (Paris: Éditions MF, 2008), 187-188. (My translation)
- ²⁶ Grisey, Gérard. *Écrits ou l'invention de la musique spectrale* (Paris: Éditions MF, 2008), 179-180. (My translation)
- ²⁷ Carroll, Lewis. *Alice's Adventures in Wonderland & Through the Looking-Glass* (London: Collector's Library, 2004), 72.
- ²⁸ Mathieu, Vittorio. *Bergson. Il suo profondo e la sua espressione* (Torino: Edizioni di "filosofia", 1954), 198. (My translation)