

The Collaborative Role of the Technician in *...sofferte onde serene...*¹

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Abstract: The music of the late 20th and early 21st centuries presents a challenge to traditional music theory through the adoption of a musical language containing sonic elements that previously fell outside the scope of accepted musical categories (primarily those of pitch and rhythm). Experiences gained by performing the electronics in a transitional work (*.....sofferte onde serene...*) by a pivotal figure (Luigi Nono) in this development are explored as a potential inspiration for new notational and analytical models of sound-based composition. Spectrograms and other technologically derived visualizations of sound are proposed as potential aids to both the performance and analysis of music from this period. The importance of *.....sofferte onde serene...* is emphasized not only in the context of these analytical developments, but also within the oeuvre of Nono as a whole, with its revolutionary shift towards pure sound as a primary compositional material.

Keywords: Luigi Nono, Performance, Notation, *.....sofferte onde serene...*, Tape Music.

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At present the aesthetic landscape of contemporary western art music encompasses a previously unknown richness, variety, and above all *divergence* of compositional approaches. Regardless of the fact that certain stylistic trends seem to assume and relinquish positions of relative dominance from time to time, a general acceptance of aesthetic multiplicity is more or less presupposed and accepted by all³. Within this extremely open-ended and multi-faceted practice, it becomes difficult to discern any sort of unifying principle linking individual composers. Though such commonalities are quite rare, one very clear example can be found in the increasing emphasis ascribed to pure sound over traditionally acceptable musical categories (most obviously rhythm and pitch)⁴.

1. Sound as Music

Although proto-sonic composers such as Wagner, Debussy, Mahler, Varèse, and Schoenberg – with their focus on orchestration and tone colour – anticipated (and/or precipitated) this shift, it was not until the conceptual works (both textual and musical) of John Cage that composers began to develop entirely sound-based practices. Through an explicit articulation of pure sound as the most important compositional element, and his role as teacher to the hyper-influential Helmut Lachenmann, it is clear that Luigi Nono occupies a pivotal position at this juncture in the history of 20th century western art music. Especially in his late works does evidence of this stature become clear, where the compositional development of pure sound expands beyond its conceptual liberation under Cage. How then did this extremely influential late style come into being, and how does the analyst deal with a music for which existing theoretical frameworks have been rendered largely irrelevant? Although the answers to both of these questions lie beyond the scope of traditional music notation, clues may be found within the pages of Nono's great transitional work for piano and tape: *.....sofferte onde serene...*(1976). Because of the inherent limitations of traditional notation and analytic models, the following investigation will rely heavily on both first-hand experience gained through the performance of the work, and several tools that may initially appear to be more technological than musical in nature.

³ As a particularly extreme illustration of this tendency, one might consider the 2008 Darmstadt Summer Courses for New Music. Though arguably the birthplace of aesthetic hegemony in 20th century music, 2008 saw Darmstadt play host to joint concerts and friendly panel discussions by both Brian Ferneyhough and Wolfgang Rihm. Though these two figures occupy roles in public consciousness as the key representatives of the fundamentally opposed “new complexity” and “new simplicity” schools (respectively), an obvious mutual respect existed between the two during all events and discussions. Furthermore, the masterclasses offered by both composers were filled with the discussion, analysis, and appreciation of student compositions in styles ranging from neo-classical to musique concrète instrumentale.

⁴ Tristan Murail sums up the compositional shift from traditional musical elements to purely sonic entities that occurred in the 20th century: “The true musical revolution of the 20th century lies here, in the fluctuation between abstract concept and aural perception that permits access into the depth of sounds, that allows us truly to sculpt sonic material, rather than piling up bricks or layers.” (Murail, Tristan. “The Revolution of Complex Sounds” trans. Joshua Cody, in *Contemporary Music Review* Vol. 24, No. 2/3, April/June 2005, p. 123)

2. The Collaborative Origin ofsofferte onde serene...

In all respects, the story ofsofferte onde serene... is one of union and co-operation. Most notably, the 1976 work was composed in a collaborative manner with the help of Nono's close friend Maurizio Pollini. The dedication to Maurizio and Marilisa Pollini found in the score⁵ tells only a portion of the story however, in that the music itself was created for, and in the case of the tape part created from, a performance by Pollini himself. Although these two elements: Pollini on tape and Pollini (or any other pianist) performing live, constitute the two *active* orchestrational forces ofsofferte onde serene..., the piece also involves several other passive (yet equally important) elements of instrumentation such as speaker placement and room size (among others).

3. Fixed Media vs. Live Electronics

In any tape piece the nature of the tape part⁶ is completely fixed. What was recorded and prepared in advance is played back exactly as it was mixed in the studio. If live instrumentalists are involved, the tape obviously has no awareness of them, and is unable to adjust to subtle nuances of interpretation and timing by these players. Although one may adopt various strategies in coping with this situation, the essential difficulty remains: live instrumentalists may interact with tape parts in a purely responsive way. Nothing done by the pianist over the course of a performance ofsofferte onde serene... for example, can ever affect the content of the tape.

The “one sided” nature of performer-tape interactions has led many composers and listeners to regard the medium as sterile and fruitless. In fact, by the time thatsofferte onde serene... was composed, many works already existed within the more flexible medium of live electronics. Stockhausen for example had composed both of his landmark works in this medium: *Mixtur*⁷ for orchestra and live electronics, and *Mantra*⁸ for two pianos and live electronics, when Nono was only just beginning to explore the interaction between live instruments and pre-recorded electronics. The historical delay separating works involving live electronics in the oeuvres of both composers should not imply any sort of value hierarchy however. For as ground-breaking as *Mixtur* and *Mantra* were, the conception of their live electronics retained a firm rooting within the compositional regime of pitch and rhythm.

Stockhausen's primary electronic resources were sine-wave oscillators and ring modulators, and though both are used to great timbral effect in the works mentioned above, the fact remains that these

⁵ Luigi Nono,sofferte onde serene... : *per pianoforte e nastro magnetico* (1976). Milan: Ricordi, 1992.

⁶ Although the current term for pre-recorded concert materials is generally “fixed media”, and Ricordi has already been publishing a CD withsofferte onde serene... for quite some time, the term “tape part” will continue to appear in this paper due to the presence of the word “tape” both throughout the score, and also the title of the work.

⁷ Karlheinz Stockhausen, *Mixtur für Orchester, Sinuageneratoren und Ringmodulatoren* (1964). London: Universal Editions, 1966.

⁸ Karlheinz Stockhausen, *Mantra für 2 Pianisten* (1970). Kürten: Stockhausen-Verlag, 1975.

tools employ only a single dimension of control: frequency. The connection to pitch is obvious, while the relationship between frequency and rhythm is famously explained by Stockhausen in two highly influential discussions (his 1957 article “...How Time Passes...”⁹, and his 1971 lecture “Four Criteria of Electronic Music”¹⁰). Though Nono's work with live electronics occurred well after the medium had matured in the 1980s, his language encompasses a great number of techniques that are arguably more organically derived from acoustics and sound itself than the traditional frequency (pitch and rhythm) based approach of earlier composers. The late Nono emphasis on sonic characteristics such as refraction, distortion, prolongation, and especially resonance is the defining quality these works, and can be traced back to their nascent appearances in*sofferte onde serene....* This achievement occurs not only in spite of the inflexible instrumental forces (the unresponsiveness of the tape; and the fixed attack, tuning, and decay characteristics of a piano) but perhaps even as a result of them. Nono describes his compositional process and the overall effect as follows:

“Pollini's piano 'live' is enlarged by Pollini's piano elaborated and composed on tape. Not in opposition, nor in counterpoint... From this there result two acoustic planes, often mingling, frequently nullifying the alien mechanical nature of the tape. Relationships in sound-formation between these two were studied”¹¹

4. Traditional Musical Categories in*sofferte onde serene...*

As a gateway to the exploration of such new sonic materials in*sofferte onde serene...* it is instructive to first consider the more traditional musical categories of form, pitch content, and motive. In addition to describing the work in a very general way, such investigations reveal the necessity for new analytic methods rooted in pure sound. At the largest level (that of form), the contents of both the tape and the piano parts coincide. The form can be described as a clear and continuous arch, with an increase in dynamic and rhythmic activity characterizing the peak of the arch. The waveform of a performance by Pollini¹² is shown in Fig. 1, where the increased levels of dynamic and rhythmic activity are clearly visible close to the middle of the piece.



Fig. 1 – Waveform of a Performance by Pollini

⁹ Karlheinz Stockhausen, "... How Time Passes ...". Trans. Cornelius Cardew from the english ed. of *Die Reihe 3* (1959).

¹⁰ Karlheinz Stockhausen, “Four Criteria of Electronic Music” (1971) from *Stockhausen on Music*. New York: M. Boyars, 1989.

¹¹ Luigi Nono sleeve note from Deutsche Grammophon 2531 004 as cited by: Stephen Davismoon 'Marking time', 1999, *Contemporary Music Review*, 18: 1, 81 — 98

¹² Luigi Nono,*sofferte onde serene...* Deutsche Grammophon 2531 004

Further emphasizing the broad outlines of this simple form is the return of material from the start of the piece immediately following the climactic middle section:

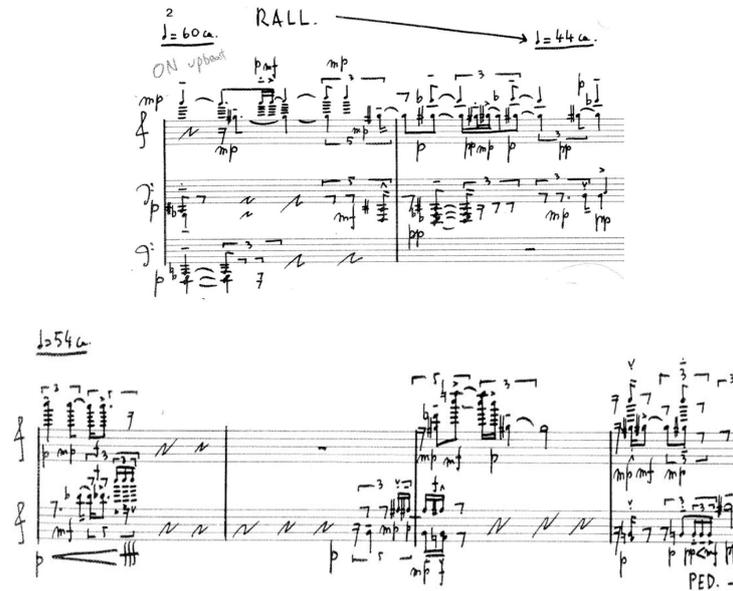


Fig. 2 – Comparison of 0:00 and ~9:20¹³

In both excerpts, the alternating A6 and G#5 are clearly presented by the piano (as well as in the tape part). The effect is one of simple recapitulation, and is particularly effective after the climax, at which point there is a return to earlier levels of dynamic and rhythmic energy. Before leaving these two examples however, it is also worthwhile to take notice of their pitch content and motivic characteristics (two factors that are very closely linked in this work).

Note repetition is utilized throughout the piece, in both the piano and tape parts. Both excerpts in Fig.2 highlight this tendency, and reveal the lack of traditional melodic goal-orientation characteristic of *sofferte*. Throughout the piece note repetitions and unisons are omnipresent (see Fig. 3 from the climax of the piece) within both individual parts, and also as a result of their combination.



Fig. 3 – Note Repetitions During Part of the Climax at ~7:10

¹³ Because measure numbers do not appear in the score, timings are supplied which correspond to both the Pollini recording cited above, as well as the Sound Projectionist's Score of Appendix A

The abundance of interval class 0 (the unison) in a “melodic” context, is especially intriguing when one realizes that the next most prominent interval class within the work is interval class 1. Though presented more or less melodically in the excerpts of Fig. 2, many vertical examples can be found in various registers and points throughout the work as seen in Fig. 4 and Fig. 5

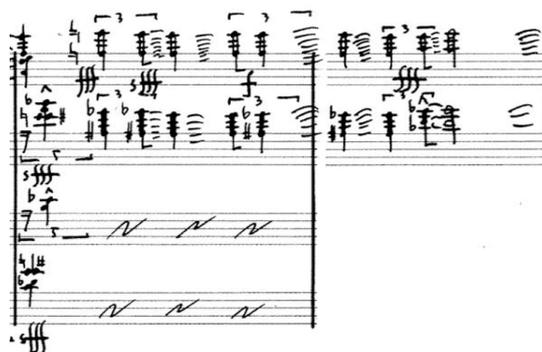


Fig. 4 – Stack of Minor Seconds in the Upper Register at ~6:26

Fig. 5 – Stack of Minor Seconds in the Lower Register at ~5:32

5. New Theoretical Frameworks

Thus, in terms of form, motivic content, and pitch*sofferte onde serene...* is a relatively simple work to analyze on paper. The extended techniques found in Nono's later works are absent, leaving any interested theorist with more than enough clearly articulated and tempered pitches to formulate a traditional analysis. It is important to note however that the dramatic reductions of complexity in terms of motive, pitch, and form in*sofferte onde serene...* suggest an emphasis on musical experiences outside of these realms. The tightened focus that Nono places on pure sound therefor requires a new theoretical framework, one organized according to the same priorities.

How does one go about creating an analytical method rooted in sound rather than pitch¹⁴? If the

¹⁴ The writings of Denis Smalley, Trevor Wishart, Pierre Schaeffer, and many others constitute a vast multiplicity of

parameter of interest (pure sound) is beyond the scope of present notational practice, and half of the piece itself (the tape part) is not even included in the score, where does one begin? Not surprisingly, the solution to these problems have originated not from music theorists, who's domain is written music; but from sound engineers, who's domain is sound itself.

6. The Collaborative Role of the Technician insofferte onde serene...

As mentioned at the outset of this discussion, tape parts have an inherently static nature. If they are too slow, they can not speed themselves up to match the tempo of a live performer. If they are too loud, they can not turn themselves down to match the dynamic level of a live performer. In order to make such adjustments in a live setting (particularly adjustments of volume) a sound technician is required. The importance of this role is described by Nono in the performance instructions forsofferte onde serene...:

“The person operating the tape player, *preferably a musician*, continually adjusts the volume levels of the machine and the distribution of the sound among the speakers in ensemble with the performance of the pianist”¹⁵ [emphasis mine]

For a successful performance of this work, the importance of the word “continually” in the above quotation can not be overstated. Though fixed in the sense of having frozen proportions of loud and soft, the tape part is far from static in terms of the average dynamic level from moment to moment. Long sections of the tape part consist of nothing but a low, quiet, rumble. Others involve huge percussive attacks. Such dynamic extremes are not navigated gradually, but rather emerge from one another without any warning. As such, if a technician were to allow the tape to play without ever adjusting the initial volume level, the resulting performance would prove disastrous, no matter how well the pianist performed.

As mentioned earlier, the score forsofferte onde serene... contains no indications regarding the contents of the tape part. In order to maintain a desirable balance between live and recorded materials, a sound engineer is either required to memorize the tape part or to devise some sort of notational

approaches to this issue. The resulting diversity of approach has been embraced as a guiding principle by the group OREMA, who have compiled an online toolkit for the analysis of sound at http://www.orema.dmu.ac.uk/?q=analytical_toolbox (accessed April 29th, 2014). Their mission statement emphasizes the importance of such diversity: “The Online Repository for Electroacoustic Music Analysis (OREMA) project is a community-based forum where analysts of electroacoustic music can post their analyses of electroacoustic music compositions. It allows people with different ideas of analysis a space to discuss why they choose to analyse a piece in a certain way. The aim of the project is to gauge whether a community initiative can aid an analyst's understanding of a work, whilst helping them conduct an analysis themselves.” OREMA, About. <http://www.orema.dmu.ac.uk/?q=content/about-orema> (accessed April 29th, 2014).

¹⁵ Nono,sofferte onde serene... : *per pianoforte e nastro magnetico*

solution. During a scene from the TDK documentary *A trail on the water: Abbado, Nono, Pollini*¹⁶, the clipboard of sound engineer Alvise Vidolin¹⁷ is visible during a rehearsal with Pollini. On the clipboard are several waveforms with precise timings indicated above them. This printout provides Vidolin with sufficient information in order to avoid undesirably loud peaks or undesirably quiet valleys during his playback of the tape part.

7. Qualitative vs. Quantitative Notation

Though Vidolin's strategy of notating the *quantity* of sound is likely sufficient for a successful performance, it provides the technician with no information about the *quality* of sound present on the tape. Incorporating qualitative information about the taped sounds allows for an added level of control during playback. It is a well documented fact that even with identical amplitudes, two sounds of differing timbral and pitch makeup will be perceived as unequally loud by human ears¹⁸. Given that a good deal of the tape material in *.....sofferte onde serene...* is inharmonic in nature, the addition of qualitative information can be extremely useful to an engineer.

To this end, I prepared a special performance score for my role as a technician in pianist Luciane Cardassi's Banff Centre recording of *.....sofferte onde serene....* Not only are the waveforms present (indicating quantity of sound) but so too are spectrograms (indicating quality of sound).

8. The Analytical Potential of Qualitative Visualizations

Though this augmented score is certainly helpful to sound technicians, it should also be of interest to theorists concerned with new analytical models for examining the qualities and quantities of sound that fall outside the scope of traditional western notation. Though it is well beyond the scope of this paper to offer a complete sonic analysis of *.....sofferte onde serene...* or even the tape part in isolation, general guidelines for such an analysis can be presented alongside a few isolated examples from the piece. These examples will not only suggest directions for a potentially new method of analysis, but will also serve to illustrate the historical significance of the work itself.

A first step in analysis of any type might be the identification and categorization of the constituent elements and processes at play in a work. In dealing with the tape part of *.....sofferte onde serene...* one might therefore begin with the most easily recognizable elements from previously familiar music. The very opening of the piece offers ideal conditions for such an approach, in that some of the

¹⁶ Bettina Ehrhardt, dir. *A trail on the water: Abbado, Nono, Pollini*. Stuttgart: TDK, 2006.

¹⁷ It was also Vidolin who digitally remastered the tape part of *.....sofferte onde serene...* for the CD included with the current edition of the Ricordi score.

¹⁸ Fletcher, H. and Munson, W.A. "Loudness, its definition, measurement and calculation", *Journal of the Acoustic Society of America* 5, 82-108 (1933).

very first sounds on the tape are strongly pitched and clearly pianistic in origin.

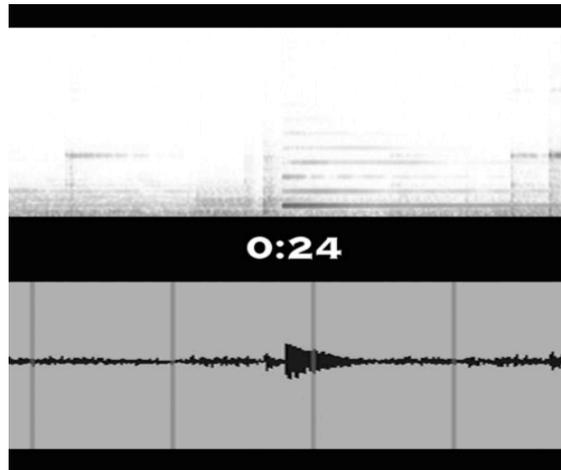


Fig. 6 – Clearly Pitched Piano Notes in the Tape Part at ~0:24

By simply looking at the waveform below the timeline, it is impossible to know what kind of a sound this is. When consulting the spectrogram above the timeline however, one notices the evenly spaced harmonics and strong fundamental frequency indicative of a clearly pitched attack. Though it is helpful to recognize these indications on sight, it is by no means a necessary skill for the analyst, who should have access to recordings of both the tape part, and a full performance. Though a trained theorist may be capable of analysing traditional music on paper alone (inadvisable though this may be) the act of listening is inseparable from the act of sonic analysis. A comparison of Fig. 6 and Fig. 7 provides an excellent illustration of the vital role held by listening, in that the following line of the piano part also features the pitch identified in figure 6 (G4) in a very prominent way.

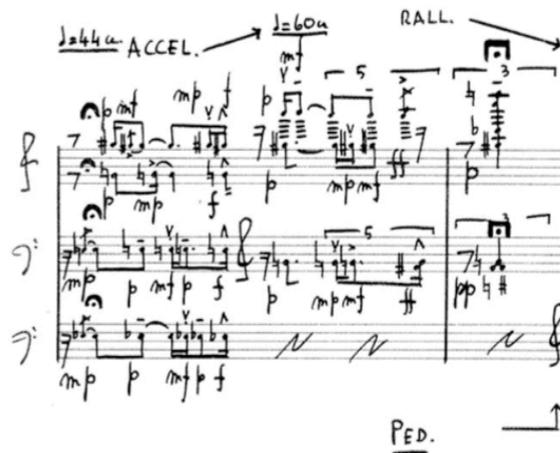


Fig. 7 – The Appearance of the Previously Foreshadowed G4 in the Piano Part at ~0:34

Here the initial analytical step of identifying an element from the tape part (in this case a clearly

recognizable G4 played on a piano) has been followed by the identification of its role within the larger context of the work. It is also worth noting that this use of foreshadowing or “echo” is also of particular historical interest, given that Nono would go on to use long delays as the basis for nearly all of his late live electronic works.

Another element clearly identified and quantized by the spectrograms of Appendix A is the low rumbling reverberations found throughout the piece.

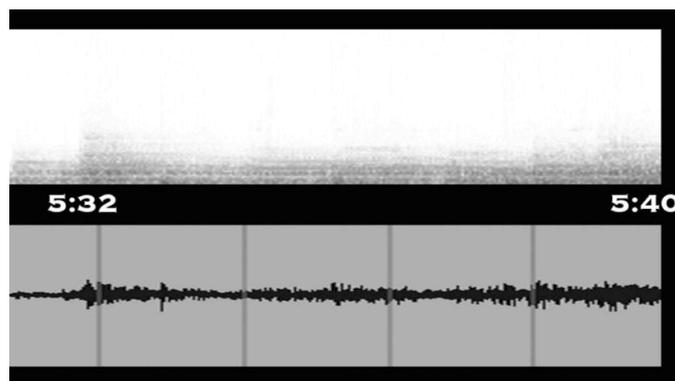


Fig. 8 – Low Reverberation at ~5:36

When consulting only waveforms, a low rumble is indistinguishable from any other sustained sound (for example the gentle sustain of a piercingly high C8 played by a piccolo). The spectrogram of Fig. 8 on the other hand, clearly conveys the quality of this low rumble through a dense concentration at the bottom of the window. Likely produced through the use of low pass filters and an artificial reverb unit, this sound is quite significant both within the context of *.....sofferte onde serene...* and Nono's output as a whole. In terms of this piece specifically, the low rumble is obviously an extension of the piano's naturally resonant character. The purely sonic qualities of the instrument being used have influenced the content of the tape part and in turn the form of the piece. One must also consider the fact that the low rumble is being fed back into the piano through speakers beneath the instrument, which is itself reverberating and sending the selectively reinforced sound back out into a large room. This exploration of acoustic space involves many levels, and is another defining characteristic of the late Nono works for live electronics.

It is hoped that these two isolated examples might serve as a model for further (complete) analyses along these lines. By adopting a notation tailor-made to the realities of Nono's late work, and by relying on listening above all else, it is possible to analyse works which might at first seem beyond the scope of traditional music theory. By definition music theory has always been a response to the actions of composers. With an overwhelming majority of composers from a wide variety of aesthetic positions following Nono's trajectory towards a notion of composition that is based explicitly on the primacy of sound, the immediate need for new theoretical frameworks is urgent. Just as the roots of

late Nono can be traced back to*sofferte onde serene...*, so too is it hoped that contemporary music theorists might establish the roots a new sound-based practice within the rich soil of such a significant work and the musical consequences of its sonic landscape.

REFERENCES

- EHRHARDT, Bettina (director) *A trail on the water: Abbado, Nono, Pollini*. Stuttgart: TDK, 2006.
- FLETCHER, H.; MUNSON, W.A. "Loudness, its definition, measurement and calculation", in *Journal of the Acoustic Society of America* 5, 82-108 (1933).
- MURAIL, Tristan. "The Revolution of Complex Sounds" trans. Joshua Cody, in *Contemporary Music Review* Vol. 24, No. 2/3, April/June 2005, p. 123.
- NONO, Luigi. *sleeve note* from Deutsche Grammophon 2531 004 as cited by: Stephen Davismoon 'Marking time', 1999, *Contemporary Music Review*, 18: 1, 81 — 98
- _____. *...sofferte onde serene...* Deutsche Grammophon 2531 004
- _____. *...sofferte onde serene... : per pianoforte e nastro magnetico* Milan: Ricordi, 1992.
- OREMA/About. <http://www.orema.dmu.ac.uk/?q=content/about-orema> (accessed April 29th, 2014).
- OREMA/Analytical Toolbox. http://www.orema.dmu.ac.uk/?q=analytical_toolbox (accessed April 29th, 2014).
- SMALLEY, Denis "Spectromorphology: explaining sound-shapes", in *Organised Sound: an International Journal of Music Technology*, Vol. 2 Issue 2, 08/01/1997, p. 107-126.
- STOCKHAUSEN, Karlheinz. "Four Criteria of Electronic Music" (1971) from *Stockhausen on Music*. New York: M. Boyars, 1989.
- _____. ... How Time Passes ... Trans. Cornelius Cardew from the English ed. of *Die Reihe* 3 (1959).
- _____. *Mantra für 2 Pianisten* (1970). Kürten: Stockhausen-Verlag, 1975.
- _____. *Mixtur für Orchester, Sinuageneratoren und Ringmodulatoren*. London: Universal Editions, 1966.