

SCULPTING SOUND: THE ECSTATIC-MATERIALIST PERSPECTIVE
A Shared Cross-Genre Perspective Found in Today's Experimental
Music Practices

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SCULPTING SOUND: THE ECSTATIC-MATERIALIST PERSPECTIVE
A Shared Cross-Genre Perspective Found in Today's Experimental Music
Practices

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Tese apresentada para cumprimento dos requisitos necessários à obtenção do
grau de Doutor em Ciências Musicais, realizada sob a orientação científica de

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DECLARAÇÕES

Declaro que esta Tese é o resultado da minha investigação pessoal e independente. O seu conteúdo é original e todas as fontes consultadas estão devidamente mencionadas no texto, nas notas e na bibliografia.

O candidato,



Lisboa, 21 de Março de 2018

Declaro que esta Tese de Doutoramento se encontra em condições de ser apreciado pelo júri a designar.

A orientadora,



Lisboa, 19 de Abril de 2018

to Emilio

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Resumo

Esta tese examina um conjunto de práticas musicais de vários géneros da música experimental contemporânea. A partir da constatação de convergências e semelhanças entre peças de compositores contemporâneos e artistas de música eletrônica independentes, e partindo do pressuposto de que estas semelhanças se devem à presença de uma compreensão do som como uma entidade material complexa, esta investigação desenvolve uma abordagem multifacetada na análise e sistematização destas correspondências.

O som como conceito central na música do século vinte é o ponto de partida para esta pesquisa e a presença desta focalização, durante o último século em diferentes géneros e contextos musicais, reflete-se na natureza transcultural deste estudo. O estudo baseia-se na conceção do som como uma entidade complexa, tal como foi proposto por Giacinto Scelsi e os espectralistas, para definir uma série de características essenciais que podem ser encontradas em obras de compositores oriundos de diferentes contextos, tais como a exploração do espectro sonoro, uma ideia alargada da harmonia e temporalidade musical e um uso específico da repetição. Estes autores abordam o som como se este fosse um material físico, evitando certas estruturas baseadas em notas no sentido tradicional e em construções abstratas, para se concentrarem na exploração do timbre, criando um material sonoro rico. As obras que constroem o *corpus* principal deste estudo – de Georg Friedrich Haas, Bernhard Lang, Giovanni Verrando, Riccardo Nova, Pan Sonic, Ryoji Ikeda e Raime – provêm de diferentes géneros, como o pós-espectralismo, minimalismo, eletroacústica, eletrônica-*glitch* e *dubstep*. A partir destes

casos de estudo, a investigação orienta-se tanto para o objeto (artístico) como para o sujeito (criador e recetor) incluindo uma análise das obras seleccionadas (baseada numa análise auditiva, espectral e da partitura) das obras seleccionadas e duas pesquisas empíricas: uma construída a partir de inquéritos de escuta a ouvintes e outra a partir de entrevistas aos compositores e intérpretes.

Os resultados obtidos incluem dados analíticos – correspondentes à descrição de nove atributos musicais comuns – resultados dos inquéritos de escuta com a identificação de três modos de escuta e uma definição das intenções poéticas dos compositores que, apesar de serem distintas, apresentam várias convergências. Estes resultados pretendem fundamentar uma perspetiva de cruzamento entre géneros musicais diferentes, à qual chamamos multi-género. Esta perspetiva sobre o som será definida como “extático-materialista”. Esta visão baseia-se numa conceção partilhada de som, envolve uma compreensão específica do tempo e do espaço na criação e perceção musical, e – longe de ser um conceito auto-reflexivo – inclui componentes da experiência cultural e da prática de compositores, artistas e ouvintes. O som, na perspetiva extático-materialista, é o território comum entre criador e o recetor; onde ambos os participantes captam elementos materiais do som e a partir daí constroem os caminhos subjetivos na sua escuta (emotivos, analíticos, culturais).

Este modelo extático-materialista é examinado no âmbito da música contemporânea experimental, incluindo os aspetos mais problemáticos, como a sua natureza elitista e autorreferencial, para propor possíveis aplicações práticas. Os compositores e os ouvintes que representam a perspetiva extático-materialista participam na comunicação musical de forma contextual e inter-relacionada, motivados por uma espécie de ética que os desafia a fazer escolhas, agindo, afetando e sendo afetados pelo som.

Por fim, esta investigação ilustra a forma como a visão multi-género pode ser aplicada a diferentes formas do conhecimento musical (didático, artístico e curatorial) através do uso de uma abordagem multimodal (sensorial-perceptiva, teórica, abstrata e histórica), com o objetivo de aproximar as práticas musicais experimentais de um público mais vasto.

Palavras chaves

música experimental, contemporânea, electrónica, *glitch*, percepção, estudos multi-género e comparativos

Abstract

This doctoral research examines a cross-genre set of practices within today's experimental music scene. Starting from the observation that there are convergences and similarities between pieces by contemporary composers and those by independent electronic performers, and proposing that these commonalities are due to the presence of a shared understanding of sound as being a complex and material entity, this study develops a multifaceted approach to explore and give shape to these correspondences.

The centrality of sound in the music of the 20th century is the starting point for this research, and the presence of this radical reappraisal during last century in several different genres and contexts is reflected in the cross-cultural aspects of this study. The research elaborates on the conception of sound as a complex entity –postulated by Giacinto Scelsi and the spectralists– in order to define a series of key characteristics (including exploration of the sonic spectrum, an extended conception of harmony and temporality, and a particular use of repetition) which can be found in the pieces of composers working in very different contexts. These figures approach sound as a physical material, avoiding certain tone-based structures and abstract construction techniques in favour of focusing on creating a sonic material rich in timbral exploration. Selected pieces (*i.e.* compositions by Georg Friedrich Haas, Bernhard Lang, Giovanni Verrando, Riccardo Nova, Pan Sonic, Ryoji Ikeda, and Raime) coming from different genres (*i.e.* post-spectralism, minimalism, electroacoustic, glitch electronica, and dubstep) serve as the main body of research for both an object- and a subject-oriented investigation. In order to give shape to this shared perspective on sound, this study includes an analysis of these pieces (*i.e.* based on aural, spectral, and score examinations) and two empirical surveys, one targeting listeners (*i.e.* the listening

questionnaires) and the other composers and interpreters (*i.e.* the interviews and other correspondence).

The collected results subsequently encompass: analytic data and the description of nine shared musical attributes; perceptual examinations and the identification of three listening modes used in finding key elements within the selected pieces; and a clear definition of similar yet distinct poietic intentions among the different composers. These results serve to justify the proposed cross-genre perspective on sound that I define as the *ecstatic-materialist* perspective. This shared vision is grounded in a similar conception of sound, it involves a specific understanding of time and space in musical creation and perception, and –far from being a self-reflexive concept– it implicates components from the cultural and practical experience of composers, performers, and listeners equally. Sound in the ecstatic-materialist perspective is the common territory between creator and recipient; both participants locate material elements of sound and follow subjective paths in listening (*e.g.* affective, source-based, socio-cultural).

The proposed ecstatic-materialist model is examined in relation to the current world of experimental contemporary music, including the more problematic aspects such as its elitist and auto-referential nature, in order to explore the practical applications of the outlook. Composers and listeners exemplifying the ecstatic-materialist perspective are involved in musical communication in a contextual, inter-related fashion, motivated by a kind of ethic that empowers them to make choices, take action, affect and be affected by sound in the wider context in which it is experienced.

Finally, this study illustrates how the cross-genre ecstatic-materialist view can be applied to the different ways in which musical knowledge is communicated (didactic, artistic, and curatorial) by using a multimodal approach (sensorial-perceptive, theoretical, abstract, and historical) in order to reduce the gap between experimental music practices and a wider audience.

Keywords

Experimental and contemporary music, electronica, glitch, sound-in-itself, sonic materialism, cross-genre and comparative studies.

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Abbreviations

ADSR	Attack, Decay, Sustain, Release
CEMAMu	Centre de Mathématique et Automatique Musicales (Iannis Xenakis)
CNS	Central Nervous System
DNA	DeoxyriboNucleic Acid
DJ	Disc Jockey
DW	Differenz / Wiederholung
E-M	Ecstatic-Materialist
FM	Frequency Modulation
fMRI	Functional Magnetic Resonance Imaging
Hz	Herz
IDM	Intelligent Dance Music
INA-GRM	Institut National de l'Audiovisuel – Groupe de Recherche Musicale
IRCAM	Institut de Recherche et Coordination Acoustique/Musique
MDC	Multidimensional Scaling
MSP	Max Signal Processing
MIM	Laboratoire Musique et Informatique de Marseille
PE	Perceptual Evaluation
SD	Semantic Differential
SS	Sound Sensory System
SVD	Spontaneous Verbal Description
TIAALS	Tools for Interactive Aural Analysis (originally tIAAls)
TS	Touch Sensory System

UPIC	Unité Polyagogique Informatique du CEMAMu (Iannis Xenakis)
UST	Unité Sémiotique Temporelle (MIM)
VAME	Verbal Attribute Magnitude Estimation
VARR	Verbal Attribute Ranking Rating
VS	Visual Sensory System
WDR	Westdeutschen Rundfunks
WWII	Second World War

*“La matière est matière parce qu’elle recèle une
propriété positive qui lui permet d’être modelée”*

*(Gilbert Simondon, L’individuation. À la lumière des
notions de forme et d’information)*

*“vous ne vous attendiez pas à tant de perfection! [...] Il
y a tant de profondeur sur cette toile, l’air y est si vrai,
que vous ne pouvez plus le distinguer de l’air qui nous
environne. Où est l’art? perdu, disparu!”*

(Honoré de Balzac, Le chef-d’oeuvre inconnu)

*“No cultural object can retain its power when there are
no longer new eyes to see it”*

(Mark Fisher, Capitalist Realism)

Introduction

At the heart of this research lies a simple and personal observation: in listening to a wide range of new music, I noticed an affinity between certain works that went beyond some superficial set of stylistic similarities and which –in the absence of an appropriate existing vocabulary– I defined simply as being a certain fundamental understanding of and approach to *sound* shared by these particular composers and artists. Which figures elicited this thought? My listening covered: pieces from the contemporary repertoire by composers such as Giacinto Scelsi, György Ligeti, and Gerard Grisey, and figures from the following generation such as Georg Friedrich Haas, Fausto Romitelli, and Bernhard Lang; works by avant-garde figures such as Alvin Lucier, Jacob Ullman, and Phill Niblock; and audio tracks from electronic performers such as Pan Sonic, Oren Ambarchi, Deathprod, and Kevin Drumm.

1. Hypothesis

This study addresses the music of today, focusing on genres within the field of experimental music,¹ and is built on the belief that there is a particular perspective on sound present within several unrelated genres. This shared attitude inhabits genres that belong to different musical and cultural contexts; it involves different sound sources (acoustic, electronic, and electroacoustic) and compositional modes (written and semi-improvised pieces), and it spans a large variety of music employing many different kinds of material.

This conception of sound can be seen to have gradually emerged during the 20th century and it has its seed in those approaches to music which flourished in the 1960s and 1970s (*e.g.* Scelsi, Grisey, spectralism, electronic music, minimalism, and electroacoustic music). Today, this perspective is found embedded and transfigured

¹ In this dissertation, I generally use the term “experimental music” in a broad sense. I do not intend to limit the discourse to the American movement (Nyman 1999), rather I use the term “experimental” as it relates to musical practices to indicate those actions which imply an exploration beyond the ordinary limits and conventions and which are based on ideas not yet established (see section 5 of this Introduction).

within surprising cultural milieux and fields of music (*e.g.* post-spectralism, mixed-media, electronica's offshoots including glitch, minimal techno, and dubstep).

What seems evident is that profound musical affinities exist across very different styles of music, and when these affinities are considered specifically in relation to the use of sound, certain common musical aspects, such as the broader understanding of harmony and the significant extension of the timbric range, the creative use of new technologies and the plastic approach to sound, appear as fertile grounds from which to develop a research project (Cascella 2005, 15; Solomos 2013).

This cross-genre perspective encompasses a wide range of aspects: from the conception of a musical idea to its composition and performance, historical and aesthetic domains, diverse techniques, and the perception and experience of music within very different contexts (*e.g.* concert hall, club).

In undertaking research into this perspective it is crucial to consider:

- the cross-cultural area of contemporary experimental music, addressing its current diversity and tracing its origins to the music of the 20th century;
- the particular relation between institutional and underground musical contexts;
- the characteristics of music exemplifying this supposed cross-genre perspective;
- the modalities related to the perception of this type of music;
- the different creative practices involved in these musical styles.

2. Objectives

The main aim of this study is to give shape to this cross-genre perspective through (i) theoretical and aesthetic reflections, (ii) practical musical examples, and (iii) a range of data coming from empirical surveys.

Parallels between several genres of experimental music have been recognized (Holmes 2008; Demers 2010; Solomos 2013) but continue to be underrated. In reflecting on these musical similarities across dissimilar contexts, this work carries out a musicological research based on various sets of evidence (*e.g.* artistic collaborations,

aesthetic and performative similarities) (E. Clarke and Cook 2004, 4). What is missing from existing studies looking at these similarities is an overarching and inclusive outlook able to recognize analogous models in compositions coming from different genres and fields of music.

This study proposes that a comparative approach can reveal new ways to approach the field of experimental music, a field that is still perceived as complex, exclusive, and inaccessible. Once these correspondences have been more coherently and thoroughly delineated, they might serve not only to reduce the separations within this musical field by discovering hitherto unrecognised convergences, but also to show that the often elitist character of experimental music, something that separates communities in terms of audience, performance, and education, could be to some extent surpassed. Consequently, this work draws on an alternative, relational framework found in current historical musicology to set the foundation for an innovative understanding of part of today's musical panorama and to create the conditions (didactic, cultural, performative) to put new publics in contact with diverse styles of experimental music.

3. Methods

3.1 A comparative research

The range of music under consideration covers very different styles, contexts, and practices, and for this reason a comparative approach was adopted to address the diversity of topics.

To begin with, there are many different roles present in today's musical environment, all contributing in various ways to the diverse musical contexts, and these must somehow be taken into account; composers, performers, improvisers, critics, researchers, and audiences all help to constitute what music is. Furthermore, there has been an enlargement of the sphere of influence of composers: where figures of the first avant-garde movement, such as Luigi Russolo, Edgar Varèse, and Harry Partch, inspired future composers, composers of the next generation (*e.g.* Morton Feldman, John Cage, Iannis Xenakis) influenced contemporary artists in other domains beyond music. Both

groups of composers have had a multifaceted impact on various different areas within music, including at the boundaries of what might be considered music.

Related to this is the question of addressing several different contexts of musical activity. Certain studies have accounted for the peculiar relationship between the academic and independent contexts (Cox and Warner 2004; Ross 2007), but there is still an inherent difficulty in carrying out research that encompasses both of these contexts equally and in depth. Studies on today's experimental music tend to focus on specific areas in detail, often avoiding searching for aesthetic values shared by different fields of music (Toop 1995; Kahn 1999; LaBelle 2006; Hegarty 2007). It is still rare to encounter works that look outside the perimeter of a particular musical community without falling into encyclopedic lists and general anthologies (Nattiez 2001; Hiekel and Utz 2016; Rutherford-Johnson 2017).

Turning to the music itself, there is today such a diversity of musical expression that many possible trends and explanatory narratives can be asserted with validity, even if they lack the potential for application beyond a restricted area. For example, to demonstrate the return of a new complexity in music, one may cite the works of Aaron Cassidy and Franklin Cox; conversely, one may choose the music of Judd Greenstein and Kate Moore to highlight a return to a new simplicity. From the re-emergence of new tonality up to the latest abstractions and the revival of obsolete technologies, it is relatively straightforward to suggest the rise of a new tendency by listing tens of examples from the last few decades. However, these observations do not look beyond a particular genre and so cannot propose wider, more general trends across different styles of new music that bring to the surface more fundamental and inclusive paradigms. In addition to looking at a range of genres, this study takes the approach of finding validation at several different levels (*e.g.* theoretical, historical) in order to avoid a superficial justification of the hypothesis of a shared perspective by looking only at the stylistic level. Taking a multifaceted approach is also a good way to handle the diverse range of genres and contexts involved in this research.

Though this proposed perspective includes many different genres, it is important to note that it is not an all-encompassing viewpoint. It is almost impossible to put

forward a single, coherent viewpoint covering the entire range of musical activity for the period in which one is living. It is only recently that researchers have started to find a suitable perspective on post-WWII movements capable of coherently understanding the richness of this panorama (P. Griffiths 2010). Extensive analyses attempting to cover all of today's music can seem too much like catalogues of examples rather than explanatory studies (Gottschalk 2016).

Rather than address all current style of music, there is a restriction on the range of works looked at by this study provided by the proposed perspective itself, even if this perspective still has a fairly general and inclusive nature; the research is cross-genre and cross-cultural, looking at a general but specifically defined perspective, it is not pan-genre or pan-cultural. Such an overarching but particular viewpoint is crucial to this study, even if it is somewhat against the grain of certain current trends in academic research. There is a post-modernist idea that, in seeking to underline plurality, misleadingly emphasises the idea that meta-narratives and generalisations should be avoided. In going against this, I explore a single perspective capable of encompassing a wide area according to a particular aesthetic outlook, seeking associations and connections between seemingly distant contexts. This strategy leads, initially, to quite general results, but the idea that generalisations are intrinsically constraining and superficial is incorrect: comparative studies using such general observations can lead to innovative points of view and arrive at unprecedented findings, and can be subsequently given greater detail (Grauer [2011] 2015, 41).

3.2 Structure of research: a multifaceted approach

This study tackles a very heterogeneous body of research. As mentioned above, a convenient strategy to deal with a such diverse subject is the application of a multifaceted approach that considers different levels, namely: (i) historic, (ii) theoretical, (iii) analytic, (iv) perceptual, (v) poietic, and (vi) cultural.

The typical scientific approach to a composite subject is to isolate the variables and examine them separately. However, this method, from particular to general, considering the constitutive parts of a complex matter separately and in turn, is ill-suited

here since it may not allow a researcher to find direct connections given the complexity of the subject and so would make it harder to infer meaningful outcomes (Delalande 2013, 215–16). Thus, in addition to using a multi-faceted approach, I followed Delalande’s example² and decided to develop the exploration of certain levels concurrently and in parallel with the others (2013, 224–28) (Figure 1). Therefore, even if this dissertation is presented as a linear succession of tasks separated into chapters, the actual realization of certain sections underwent a progressive refinement following the continuous impact of results emerging from the other tasks that were in progress at the same time (Figure 1, Chapters II-IV, *Particular-to-general*).

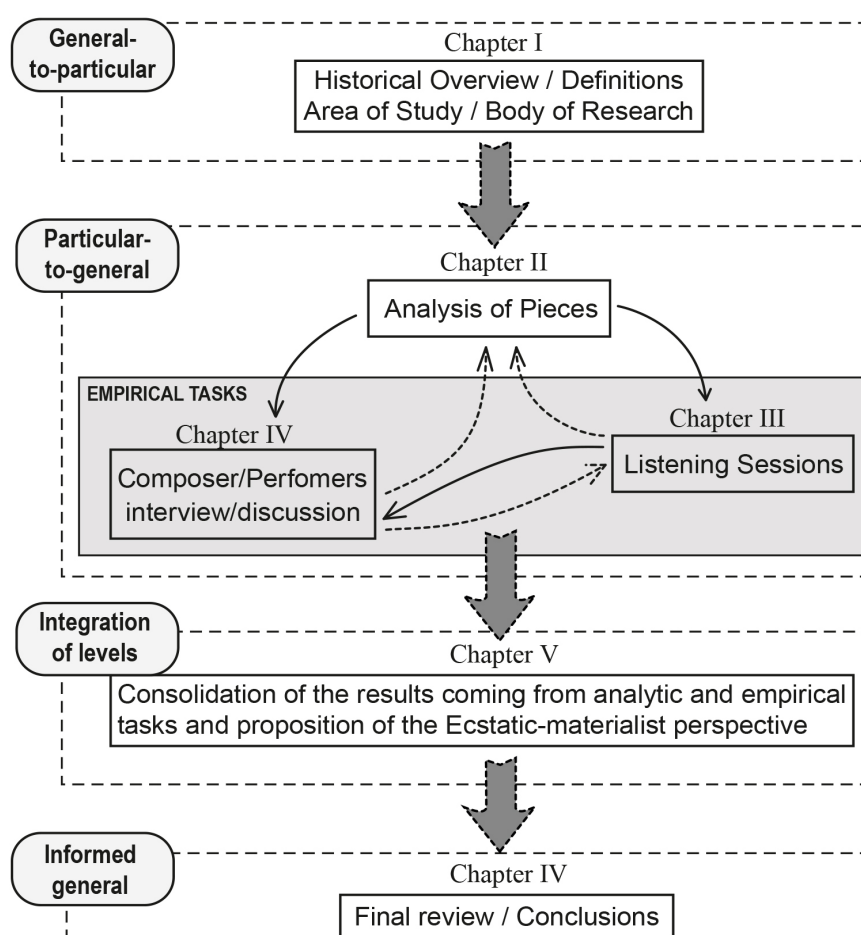


Figure 1 General representation of the structure of the thesis.

² Delalande, in discussing Arom’s approach (Arom 1985), defines internal and external elements of a field of research within a concentric representation distinctive in its having a central corpus, external elements, and socio-cultural aspects (Delalande 2013, 188).

- *Historical context and the set of work*

The first chapter, “Sound in 20th Century Music”, sets the musicological framework from a historical point of view. First, I briefly examine the evolution of the notion of sound in 20th century music, accounting for its cardinal elements as well as looking at more recent musical manifestations from the 1980s onward that embody this concept within both institutional and underground musical scenes. I then establish the initial points of the investigation: (i) the definition of the concept of sound that I propose exists in common among different genres; (ii) the primary musical elements that characterize this notion of sound; (iii) the description of the area of research and the selection of the research sample (*i.e.* the pieces and composers, Figure 1 *general-to-particular*).

- *Analytic Task*

Chapter II, “Analysis of Musical Works”, examines the selected pieces which embody different styles, *i.e.* post-spectralism, minimalism, mixed-source compositions, glitch, and dupstep. I suggest that, due to the highly specialized nature of current methods of analysis, the application of these standard approaches on a cross-genre selection of pieces would not provide useful results. Consequently, a more flexible and comparative method of analysis is presented. The central part of the chapter summarises the analysis³ of compositions and discusses the results. The analysis allows for a definition of nine common attributes that consist of musical elements and practices, detailing the shared tendency in how sound is treated within different musical genres. These attributes function as the backbone for the constitution of the perceptual survey (Chapter III).

Analysis of aural, spectral, and score material provides the foundation for a preliminary definition of this cross-genre perspective using the nine attributes alluded to above. At the same time, the analysis demonstrates how diverse and complex the

³ In order to facilitate the reading, I decided to only include, in the main text of the chapter, the principal arguments of the analysis which appears in its complete form in Appendix A.

research sample is, revealing the importance of extending the investigation beyond the analytic level to the empirical level (even if the analysis involved an aural approach to the works) through a consideration of perception within a broader outlook. Perception is a theme that takes on a great relevance within today's exploratory music for both listeners and composers. The idea of examining the points of view of listeners, composers, and interpreters led to the delineation of two distinct empirical investigations, one at the perceptual level and one at the poietic level.

- *Empirical Tasks*

Chapter III, "Perceptual Studies", introduces the problems that emerge when considering perception in contemporary experimental music. The chapter references recent studies in perceptual and cognitive sciences and includes a specific discussion about emotional and neurological aspects that appear relevant when listeners approach experimental music. These reflections helped to design a survey on perception (*i.e.* the listening questionnaire) that was carried out as part of the research. The central part of the chapter concerns the details of this survey (*i.e.* listening sessions and questionnaires administered to trained and untrained listeners) that in part implements the results of the analytic step (Chapter II). The collected results are discussed in order to extrapolate general conclusions on listening modes engaged when approaching today's experimental music (*i.e.* *Particular-to-general*, Figure 1).

Chapter IV, "Composers and Performers", examines the data coming from a series of interviews and exchanges (in person and via email) with composers and performers that concerned the same pieces considered in the previous chapters (Chapters II and III). The questions and themes developed in these discussions were chosen to relate to those that emerged from the analyses and perceptual surveys, the aim being to explore the poietic aspect of these same topics. These included a composer's intentions in relation to sonic conception, composers' perceptual purposes, their cross-cultural influences, and composers' perspectives on today's experimental music panorama. In describing these contributions separately, the chapter intends to portray the particularity of each author in connection with the main theme of the study. The chapter then goes on to develop a parallel overview that takes into consideration the

final results coming from the other tasks, providing an examination of possible convergences among these artists. What emerges are a series of common threads that relate to: (i) sound conception; (ii) time (and temporality) in music; (iii) compositional practices and attitudes; (iv) musical contexts and genres; and (v) perception and the space of listening.

- *The Ecstatic-Materialist perspective*

Chapter V is titled “The Ecstatic-Materialist Perspective” and represents the central core of this study. It follows on from Chapters II, III, and IV in presenting an integration of the data collected at the particular level leading towards a general outlook (Figure 1, *Integration of levels*). In fact, these levels –mimicking, in a way, Nattiez’s tripartite approach– tackle the subject using both object-oriented (Chapter II) and subject-oriented (Chapters III and IV) perspectives. The consolidation of these two approaches with a diverse set of ideas coming from theoretical and aesthetic reflections allows me to postulate the presence of an *ecstatic-materialist* perspective within very different practices of today’s experimental music. This thesis is presented, justified, and discussed by examining certain crucial areas already touched upon in previous chapters: the conception of sound, time in music, the notion of space, and poietic and perceptual aspects together with cultural factors. Expanding on these areas, the arguments in this chapter are also illustrated using a number of examples taken from a larger body of works than presented in Chapter I in order to widen the perspective and find correspondences at a more comprehensive level. This allows the proposed ecstatic-materialist perspective to reach and describe a more fundamental and conceptual musical stance in which the particular idea of sound central to the whole thesis finds its final and most complete characterization.

Sound in the ecstatic-materialist perspective, as anticipated in the reflections on Scelsi (Chapter I) and analytically characterized in Chapter II, is a complex nexus of ideas. Sound is considered as something posed and left to develop; it incorporates both material (consistency, acoustic pressure, density) and ecstatic (transitory and ephemeral) elements; it involves intentions and dramaturgical impulses that issue from the experience of the composer, the performer, and the listener as well. Sound is the

common territory between composer, performer, and listener. The embodied experience of all three participants allows for musical communication. This level of involvement, engaging each person's personal, intimate, and embodied experience, forms a sonic encounter that has a certain materiality and that is equally able to explore cultural as well as corporeal facets.

- *Conclusions*

In the final chapter, "Conclusion: From Sound to Music", I draw on the definition of the ecstatic-materialist perspective presented in Chapter V to expand the point of view towards the wider context of current exploratory musical practices, addressing the importance of the role (and the responsibility) of artists, teachers, curators, and the public in contemporary art music. The protagonists of this ecstatic-materialist perspective are grounded in reality, in a continuous exchange between subject and environment. In this sense, I advance the idea of a renovated aesthetic capable of bringing together the poietic action, the embodied experience (*i.e.* subject/context), and the materiality of sound, thus going beyond the purely sensorial paradigm. This aesthetic outlook might allow a new reading of certain recent manifestations in experimental music which benefit from past explorations into purely sonic matters and, going further, integrate innovative cultural and multimedia facets as well as political and social statements, re-elaborating purely aural experimentations into music rooted in practical contexts. This study demonstrates that new tools and guides for interpretation and recognition, and new ways of approaching exploratory music, might empower us with a new awareness of art music, a new ethic of sound. In its final part, the chapter includes an attempt to provide a series of concrete applications of this study at different levels (*i.e.* didactic, performative, creative, perceptual).

The appendices contain the unabridged analyses, questionnaires, discussions, and interviews that together all serve to support and detail correspondences among the selected pieces and authors.

4. Intended outcomes

In proposing the presence of an aesthetic shared by very different musical

genres, this study offers us, as listeners, musicians, and scholars, new tools (*e.g.* aesthetic, didactic, theoretical) for discovering innovative relations in and for providing a more detailed description of today's diverse musical panorama. As explored in the concluding chapter of the thesis, this work provides the grounds for future research into the following potential applications:

- new perceptual approaches to other experimental genres;
- the construction of new didactic methods to experimental music;
- the enhancement of artistic connections between different musical contexts;
- the proposition of a new strategy for a comparative study in musicology;
- the contribution to a larger discussion about music distribution and disclosure.

Finally, I hope this study –in presenting this transversal outlook and developing new musical tools and models of interpretation– may be seen as an effort to find new ways to impact on the reality of today's music, specifically the existence of a significant gap between experimental music and a wider public. As the music critic Alex Ross states: “[t]o build the audience of the future, classical institutions should make more of unexpected bridges between genres” (Ross 2010).

5. Notes and limitations

This study touches on a wide range of themes that cannot all be developed and addressed in full here. The research could open up any number of points to include a wider consideration of different visions (*e.g.* aesthetic, theoretical, historical), subjects (*e.g.* the diversity of audiences, performances, contexts), and disciplines (*e.g.* musicology, philosophy, psychology, sociology, anthropology). Though all of these areas deserve pursuing, it is not within the scope of this thesis to fully and properly explore them.

Furthermore, it is necessary to articulate the following limitations of this research project:

- the notion of sound on which this study expands (*i.e.* Scelsi's idea of a three-

dimensional and spherical sound) is a just one of the various conceptions of sound developed during the last century. Others include, for instance, the idea of a composed sound (initiated with the idea of composing the resonance and expanded by electroacoustic music and Xenakis), the expansion of the notion of timbre (with the emergence of concepts of *chord-timbre*, *melody-timbre*, e.g. *Klangfarbenmelodien*, and the *composed-timbre*), the integration of noises and real-world sounds in compositions (following the imaginary pathway that ties together figures such Russolo, Varèse, and Pierre Schaeffer), the exploration of the concept of sound within physical spaces (*i.e.* the experiences of Varèse, Schaeffer, Pierre Boulez, Luigi Nono, Xenakis, and Lucier), and the understanding of sound in relation to the environment (*i.e.* the pioneering work of R. Murray Schafer, Barry Truax and Hildegard Westerkamp, Figure I.1). These “views of sound” tend to be intermeshed and some are more articulated than others. This study develops and discusses certain aspects of these views (Chapter I), though Scelsi’s notion represent its starting point.

- The empirical study on audience perception (Chapter III) does not fully examine the diversity of the listeners involved and does not discuss the origins of this diversity which can lead to distinct listening modalities. This point could be investigated by, for instance, carrying out direct questionnaires with the audience after concerts and performances. Moreover, even if the questionnaire used in this thesis specifically included short audio excerpts (*ca.* 1 min), the possibility of using longer extracts and other perceptual modalities would provide additional variables able to better describe a listeners’ apprehension of various experimental music practices.
- The fieldwork involving interviews and exchanges has been carried out with a very restricted set of subjects discussing a limited set of topics. An effort to widen this group was made but was unsuccessful. A more extended research, e.g. involving figures outside the perspective examined, would possibly reveal crucial differences between composers and clarify the characteristics of the object of study.

For the purposes of clarity, I have made a distinction in this study between institutional or academic contexts and independent or underground ones. This is an artificial distinction to some degree as it is impossible to clearly and definitively characterise these contexts or identify a composer as belonging without question to one or the other. As clarified in Chapter I and in the Glossary (Appendix D), the use of these labels, together with other characterising terms such as *contemporary*, *experimental*, *conventional* (and *unconventional*), *alternative*, and *exploratory*, is always open to debate. For example, John Cage's biographical background might lead one to consider him somewhat an outsider to academic contexts, however his influence has been strongly felt in the institutional domain.⁴ In my study, I compare works and figures from several genres, many of whom are rarely presented or examined within academic institutions even if they are prominent figures in their own contexts (for example, artists such Alva Noto and Scanner are famous and widely acknowledged within non-academic domains as musicians exploring new sonic terrains, but are seldom considered within academic contexts and are only rarely participants in institutional festivals).

A complication to this distinction is that the institutional world is rapidly changing to include figures who were previously considered far outside its bounds. Alvin Lucier, once at the periphery of what music was considered core within academic institutions, has risen to a prominence in academic contexts to fellow Karlheinz Stockhausen, a figure central to modern institutional art music. The diversity and mixing of contexts that characterises the current musical world undermines all general categories, not just the separation into institutional or underground scenes.⁵ Universal labels able to properly distinguish between minimalists like Tony Conrad and James Tenney or to designate the differences between figures such Giovanni Verrando, Philip

⁴ Though he didn't have a conventional academic musical education, he ended up studying with Schoenberg and being affiliated with several universities. "[H]is approach [...] was to bring the non-musical into the concert hall: to turn radios into members of the orchestra [...]. It was far less common for Cage to locate his activities outside the circuits of serious music. The Western compositional tradition was, after all, his target" (Kim-Cohen 2009, 19). In a certain way, he was certainly connected to the institutional music of his time but he distinguished himself within avant-garde movement.

⁵ Radio France / GRM, for instance, holds festivals that often include figures of independent scenes. A distinction between academic institutions and more broadly defined institutions might be also discussed.

Jeck, and Francisco Lopez are difficult to identify.⁶ Today's musical panorama is fluid. A composer like Alexander Schubert could hardly be classified as clearly within one genre or context,⁷ and this kind of difficulty has led some critics to declare the collapse of traditional music classification and the crisis of the relevance of genre (Drott 2013) while others have proposed the begin of a new theory of genres as a kind of networks (Haworth 2015). Nevertheless, academic researchers continue to use these epithets despite their fragilities (*e.g.* (Landy 2013; Brackett 2016)) as a way to decipher and interpret our diverse and dynamic musical world. In the interests of comprehensibility, it is sometimes necessarily to use somewhat problematic designations to allow for a more immediate understanding that can then be refined, so long as no assumptions or deductions are made on the basis solely of the labels used. The labels provide a quick way to establish starting points that can then be given detail and nuance.

Thus, despite the difficulties and criticisms, these labels still have a use within a study such as this. They serve to designate different cultural domains and appear especially useful in clarifying which general tendencies are currently examined and acknowledged (or not) within educational institutions. Following this, in this study, the terms institutional and underground should be considered more as indications of an acknowledged influence rather than definitive classifications. In this sense, I discuss the 1960s American avant-garde (including Cage) as being institutional given that it is very much present and accepted within current educational and didactic contexts. In contrast, artists using popular practices (*e.g.* techno, noise) in experimental ways who are not fully acknowledged by or present within institutional contexts (even if they are sometimes well-known by certain young communities within those contexts) are considered as underground.

I decided to organize the thesis according to how the practical research itself advanced, which means that the central idea (*i.e.* the ecstatic-materialist perspective)

⁶ While Verrando is based within an academic context, aside from his collaboration with underground performers, Philip Jeck has only occasionally worked in contact with academic institutions, and Francisco Lopez has operated in between these two domains.

⁷ He “studied bioinformatics [...] and Multimedia Composition [and] he has worked as a musician and composer in a variety of different environments. [...] [His] interest explores cross-genre interfaces between acoustic and electronic music” (Schubert 2017).

does not appear until Chapter V. Even though I anticipate certain concepts in earlier chapters, the aim of this arrangement is to emphasize that the ecstatic-materialist perspective is the result of an articulated reflection that progressively formed during examination of the raw data during the theoretical, analytic, and empirical steps (Chapters I-IV). For this reason, it seemed logical to begin with simple and general considerations that are gradually refined to reach the more original and specific definitions. For instance, the notion of sound as complex and material presented in Chapter I, Section I.2.1 has a generic and indistinct nature and yet served as the basis to select the set of compositions included in this study. As the work progressed, it became clear that this collection included pieces that do not completely fit within the perspective being developed (*e.g.* some pieces by Lang and Ikeda) but whose presence nevertheless allowed for a more efficient identification of the aspects that makeup ecstatic-materialism. Hence, the progressive structure of this dissertation has as its motive the attempt to clarify the reasons behind certain choices (*e.g.* the selection of pieces) that might otherwise appear illogical.

In this dissertation, certain terms are used frequently and at times several of their different possible meanings are invoked in the same paragraph or sentence. Thus it is worth preparing the reader by specifying the usages of these terms and the distinctions I make.

- The research is centred on sound and I make repeated use of this term (i) to designate a generic acoustic event (within a piece, I might refer to “the sound of strings” or to “a musical episode containing high-pitched sounds”); (ii) to refer to a more complex notion: the resulting combination of several aural events perceived together (*e.g.* “the sound of this composition/episode is...”); in this case, the term is always singular, as if it were an indivisible matter; and (iii) to denote a more extended sense that encompasses theoretical and philosophical aspects (*e.g.* “the sound of Scelsi is...”).
- I try to minimize the use of the word “object” to define a sound in order to avoid confusion with the Schaefferian meaning (*i.e.* *object sonore*, sonic/sound object). Except where specifically indicated, this term is used to emphasize the character

of a sound when it is detached, easily perceivable as a single entity separated from other sounds, but without intending to invoke any other aspects related to the Schaefferian concept.

- Except where explicitly indicated, I have used the term “experimental” in a broad sense, being easily substituted by its synonym “exploratory”. In this way, when I refer to “experimental music” in the general sense, I do not intend to limit the discourse to the American movement (Nyman 1999) nor do I mean to indicate only those musical practices which seek unknown outcomes (Cage 1961, 13). Rather, I use the term “experimental” to describe those actions which imply an exploration beyond ordinary limits and that are based on ideas not yet established.
- The label “academic” is used to identify a musical context that has a particular relevance and specificity in relation to current experimental music. This term has to be understood exclusively as meaning “belonging or with connections to an academical domain or institution” and does not have any negative or prejudicial meaning.
- The cross-cultural nature of this study implies the frequent use of terms such as “genre”, “style”, “subgenres”, and “offshoots” as related to music. In trying to maintain consistency in the text, I follow the most accepted designations (Demers 2010; Emmerson and Landy 2012; Landy et al. 2017). For clarity, I included a glossary (Appendix D) for specific terminology.

Concerning bibliography and citations: I have decided to refer to the text I consulted directly (even if it was a translated version of the original). However, in order to avoid confusing references such as “(Adorno 2002)” I have also included the date of the original publication together with the date of publication of the consulted source, so “(Adorno [1949] 2002)”. Finally, to make for a more fluid reading, citations not originally in English are presented in translation in the text with a corresponding footnote with the original version.

I Sound in 20th Century Music

I.1 Historical introduction

I.1.1 Different readings of 20th century music

There are many narratives one could adopt to explain the evolution of 20th and 21st century music. It is possible to focus on cultural and political traits (Lanza 1980), highlight technological progress (Holmes 2008), give prominence to musical diversity (P. Griffiths 2010), or prioritise philosophical and aesthetic aspects (Adorno [1949] 2002; Goehr 1992). What appears indisputable is that music during the last century undergoes a rich and diversified development. In describing the music of our recent past, Nattiez talks about a non-linear evolution that embraces technological, political, and social transformations (2001, XLIII).

Today, the multi-faceted panorama of exploratory music extends over a vast range of artistic practices and in order to make sense of this convoluted scene, historical musicologists propose different readings of 20th century music. Several studies, for instance, suggest correspondences between specific current styles of experimental music and past styles (*e.g.* today's glitch and sound art performers with 1960s electronic experimentalists), highlighting the origins of these recent movements (Kahn 1999; Cox and Warner 2004; Demers 2010). It is noteworthy that some researches propose common origins to quite contrasting aesthetic outlooks. For instance, Born indicates Varèse as a sort of common *father* of both serialists (Boulez, Stockhausen) and American experimentalists (Cage, Christian Wolff) in the 1950s: he is the composer who first embodies both the interest in technology as a source of new sounds and the need for constant exploration and research (1995, 59). Provost, on the other hand, depicts the collapse of the tonal system by describing a dual course of events beginning in France and Germany at the begin of last century, examining the dialectic relationship between the structural development of the *series* (Arnold Schoenberg, Anton Webern) and the evolution of timbre (Claude Debussy, Varèse, Olivier Messiaen). This dual

reading extends until the second half of 20th century where these two conceptions of early modernism receive renovated identities: total serialism and French spectralism (Provost 2001). This panorama is complex and articulated and could hardly be described from a single point of view.

After the second world war (WWII), modernism renovated itself through a growing concentration on structure and, for some composers (*e.g.* Boulez, Stockhausen), this meant a tireless search for new systems (Calinescu 1987; Nattiez [1983] 2004, 19; De La Fuente 2011). The period of twenty years from 1950 to 1970 was certainly a time of innovation and creativity, and yet the multidisciplinary enthusiasm originating from new technologies (*e.g.* electronic instruments, multi-channel formats, computational theories for compositions) led in some cases to radicalisations in the form of extreme abstraction and austere idioms (Babbitt 1969; Nicolas 1989). When some forms of expression reach their limits or become imposed as universal systems, they start to fossilize and exist only as academic practices and, more simply, they prompt the emergence of new expressive means (Provost 2001, 516).

The second half of the last century well represents this process of multiple renovations: in Europe, *musique concrète* and spectralism emerged as alternatives to the institutionalized traditions; in United States, minimalist composers found space between academic serialism and emerging avant-garde indeterminacy (Schwarz 1996). Composers coming from an academic background proposed new models (*e.g.* Grisey); others having no specific musical training opened up radically new directions (*e.g.* Schaeffer). Technology starts to assume an indispensable role for composers and performers (*e.g.* *Elektronische Musik* at the WDR in Köln, *Groupe de recherches musicales* (GRM) studio in Paris, and the *Instituto di Fonologia* in Milan), and music research starts to extend from conservatories towards new spaces for performance and experimentation (*e.g.* exhibitions, installations, laboratories). In parallel and partially related to this technological revolution, popular music starts to assume new explorative attitudes by developing new roles (*i.e.* sound engineers and producers) and removing formal barriers (*e.g.* free-jazz, krautrock) (Holmes 2008, 407–16).

There is not one single reading of this history of genres, communities, social

issues, and technology. This project lead me to choose a specific vantage point that crosses through all these aspects and whose focus may be outlined as “the process of evolution of sound in the music practices of the 20th century”.

1.1.2 From music to sound

In recent years, the increasing heterogeneity of current musical practices has led to a greater interest in tracing the origins of these musical languages by identifying turning points and important events that may help to elucidate connections between these many different styles. Key moments, such as the first performance of Stravinsky’s *Le Sacre du Printemps* in 1913 or the emergence of Schoenberg’s twelve-notes technique inaugurated with the *Suite für Klavier* Op.25, have been taken as symbolic of the breakdown of the tonal system and the opening up to musical modernism (Morgan 1991; Subotnik 1991; Albèra 2001; Baroni 2001b; McHard 2001; Ross 2007). But when the focus is shifted to the evolution of the concept of sound in music, one may find that it is not the collapse of tonality but the dissipation of the twelve-tone equal temperament system that liberates *sound* in the music of the last century (Wishart 1996, 31). The dissolution of the equal temperament system, of which the ultimate expression has been *serialism*, occurs gradually and simultaneously in different musical contexts.

Throughout the 20th century, certain currents within experimental music can be seen as moving progressively towards a more explicit interest in the intrinsic properties of sound (Solomos 2013); as Bériachvili puts it, “from the emancipation of timbre to the exploration of sound”.⁸ During the last century

[...] harmony starts to liberate itself from functional musical syntax by valuing pure phonic aspects of sonic complexes. [...] The expansion of the sonic palette and the integration of noises are then accompanied by the fusion of categories: timbre, harmony and texture converge towards a new musical essence – “sound”.⁸

Bonnet talks about a gradual passage from music as a *constituted* element (“*élément constitué*”), with a given function, to music as *constituent* element (“*élément*

⁸ “de l’émancipation du timbre vers l’exploration du son”; “[...] l’harmonie commence à s’affranchir de la syntaxe musicale fonctionnelle en valorisant les aspects purement phoniques des complexes sonores. [...] L’élargissement de la palette sonore et l’intégration des bruits s’accompagnent alors de la fusion des catégories: timbre, harmonie et texture convergent vers une nouvelle essence musicale – le ‘son’ ” (Bériachvili 2008, 201) my translation).

constituant”), autonomised in such a way that we may define it not through its usage but through its nature (2012, 130).

Solomos identifies a change: “from a musical culture centred on the tone to a culture of sound”,⁹ and he recognises that this change occurs in many different contexts. In fact –as mentioned before– this peculiar standpoint intersects several aspects of our musical world and cuts through genres, their mutual influences, the impact of technology, different compositional practices, the aesthetic and philosophic aspects of sound, and perception and the involvement of listeners.

Looking at the emergence of sound in the music of 20th century, one may be inclined to bring out the thread that unifies figures such as Debussy, Varèse, Messiaen, Scelsi, Ligeti, and which arrives at French spectralism, discussing the evolution of timbre, the expansion of music temporality, the first use of microtonality up until the deep exploration of sound spectrum. However, the sources for a more complex notion of musical sound come from different contexts and historical precedents, namely:

(i) the research of a first generation of experimentalists, such as Russolo and Partch, that opened up the integration of noise into musical pieces, the discovery of new musical systems, and the invention of non-conventional lutheries.

(ii) The examples of Schaeffer and Cage who presented original perspectives in music making and listening: in particular, the active role of listener and the contribution to *Gestalt* theory. Music perception becomes part of the whole musical process: a compositional parameter, a factor of research and analysis, and a participatory activity of listeners.

(iii) The contributions of composers and scientists, such as Varèse, Morton Subotnick, John Chowning (*i.e.* FM synthesis), Vladimir Ussachevsky (*i.e.* ADSR envelope), and Hugh Le Caine (*i.e.* VC synthesizers), in the application of electronic technology to music composition. These precedents have had a broad impact on almost all musical fields within exploratory music after WWII and prompted a massive change in compositional approaches.

⁹ “d’une culture musicale centrée sur le ton à une culture du son” (Solomos 2013, 491) my translation).

Several authors acknowledge (Cox and Warner 2004; Holmes 2008) that certain genres today that belong to underground and independent contexts (*e.g.* glitch, dubstep, ambient) have expanded upon two main characteristics of early minimalism: the static perspective (Young) and the polyrhythmic approach (Reich) (Schwarz 1996; Nyman 1999). Alongside this, certain contemporary electroacoustic languages have explored the central concepts of other recent musical vocabularies, such as the spectral and spatial ideas of sound (Varèse, Grisey, Xenakis) (Morgan 1991; Kahn 1999; Fineberg 1999). Within this frame of reference, one can identify that, starting from the mid-twentieth century, certain concepts such as the non-teleological and acousmatic perspectives, Eastern influences, the fusion of electronic, acoustic and concrete sounds, and the extended use of sonic spectra were simultaneously developed and established as the cardinal principles of artistic practices across vastly different genres of music (Solomos 2013).

On the one hand, minimalists found an appreciable success due to the re-introduction of repetition (together with the presence of a beat), a cardinal element of recognition in music, into the abstract complexity of an aleatoric approach. Corbett (2000) distinguishes between structuralist (Steve Reich, Philip Glass) and materialist (La Monte Young, Tony Conrad) minimalists: the former work typically with linear units (*e.g.* group of notes) continuously reiterated, exploring profiles more than textures; in contrast, materialist minimalists make use of sustained sounds exploiting frequency interactions and superimpositions (Figure I.1). They achieved a greater degree of accessibility through the use of popular and non-Western musical techniques, such as the African polyrhythm and Eastern temporalities: “their works freely blend elements of high and popular culture, asserting that accessibility and expressivity are not incommensurate” (Holmes 2008, 104).

On the other hand, the emergence of the spectral movement made clear the shift in focus to the inner characteristics of sound, breaking the well-established tradition of *serialism* (Figure I.1). They started to decompose sonic spectrum, rebuilding the sound through complex aggregates of tones, which exist within the *liminal* equilibrium

between the sonic components of an orchestral chord and parts of a unique instrumental timbre (*i.e.* Grisey's synthetic spectrum, (2008, 100–103)). Spectralists' interests revolve around (i) exploring unstable musical forms, such as binaural effects, aural transients, tone's attacks and other acoustic phenomena that up until then were largely underdeveloped, (ii) concentrating on the perceptual aspects of music, and (iii) embracing a sort of organicism of the sonic phenomenon (Solomos 2013, 272).

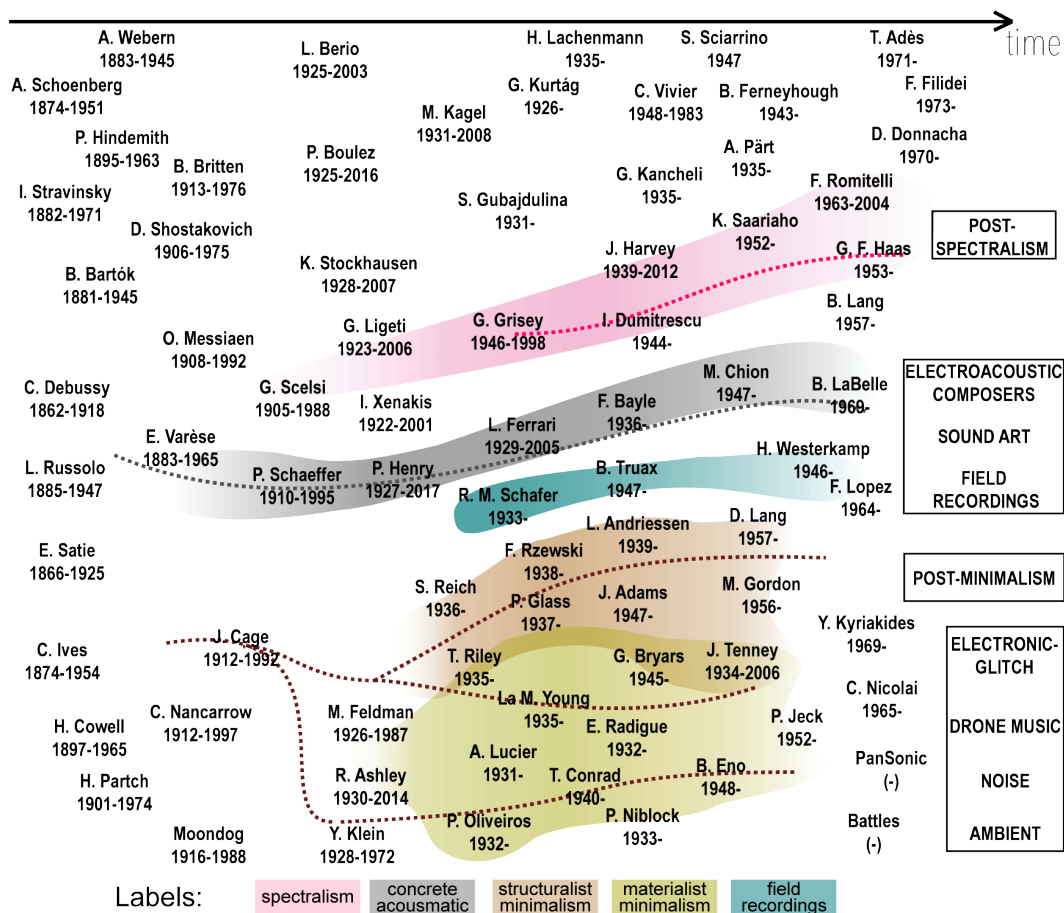


Figure I.1 Schematic representation of composers of 20th century music.

Hence, after (or against) total serialism, these two currents (*i.e.* minimalism and spectralism) have independently proposed new ways of reinstating a temporal continuity (Imberty 2001, 537). They have moved from structure (form) to substance (material), focusing more on sonic and perceptual characteristics of music. They have

explored nuances of sound as well as non-teleological approaches to music, engaging in new musical forms through continuous and progressive transformations of sound, the design of musical textures and surfaces, and the handling of sonic masses (Fineberg 1999; Cox and Warner 2004; Solomos 2013, 365–73).

At the same time, the parallel experiments of American avant-gardists, such as Cage, Lucier and the members of Sonic Arts Union, and the French team of the *Groupe de recherches musicales* (GRM), with composers such Schaeffer, Luc Ferrari, François-Bernard Mâche, François Bayle, and Xenakis, reformulated some of these themes by expanding on an innovative notion of physical space in order to develop new theories on listening, performing, and composing music (Cage 1961; Schaeffer 1966) (Figure I.1). These examples indicate that *sound* was a flexible concept that included the environmental sonorities contained within everyday silence, approaches to indeterminacy, and the diffusion and perception of sound in physical spaces.

From here, the shared interest in sound undergoes an intricate evolution where similar practices emerge in cultural scenes that are very different and apparently unrelated (*e.g.* the non-teleological approach in certain instances of acousmatic and drone music) or opposing visions appear within the same community (*e.g.* the emergence of the new simplicity and complexity within the contemporary classical context). Distinct connections are formed among composers, performers, and improvisers, as well as between critics, scholars, and audiences: some musical pioneers have inspired members of following generations (*e.g.* Morton Feldman is frequently cited as a source of inspiration within certain sound art communities); other avant-gardists and composers appear to have had an impact on many musical contexts quite different from their own (*e.g.* Schaeffer). Cross-genre influences increase dramatically and several studies have looked at this complex panorama focusing on the variety of styles and developments. Tim Rutherford-Johnson has pointed to the fall of communism as a key juncture for the global development of Western art music (2017). In analysing the world of electronic and electroacoustic music, Demers locates 1980 as a crucial turning point, claiming as justification the ambiguity of the separation between high and

popular electronic and electroacoustic music (2010, 9).¹⁰

1.1.3 From the 1980s onward: the current panorama

This study does not seek to provide a comprehensive account of recent musical development.¹¹ Rather, drawing on existing studies of this period, it proposes a synthetic paradigm to understand many of these developments and highlights a few specific cases which support this perspective.

Separating this discussion between underground and institutional contexts raises several difficulties but these are outweighed by the benefits to the legibility of and orientation within this heterogeneous panorama.

The meaning of labels such *underground* and *institutional* (or *academic*) is not always precise. In considering the world of experimental music (in the sense defined in the Introduction of this dissertation) these designations concern, in both cases, a restricted circle of musical activities frequently ignored by mainstream currents of music. The main criterion I used to trace this demarcation between underground and institutional within the experimental context is based on institutional recognition: in this way, the underground scene encompasses those musical practices that –within the larger umbrella of exploratory music– take places in independent, self-funded, and alternative contexts. For instance, I have opted to talk about the 1960s movement of American avant-gardists and electronic experimentalists within institutional contexts also including the academic electroacoustic community. Even though some figures belonging to these genres may be considered as having moved within alternative and non-academic contexts (*e.g.* Subotnick, Eliane Radigue), they are today widely acknowledged within institutional contexts. On the other hand, certain genres or macro-categories like *microsound* can be seen to encompass artists coming both from underground and institutional contexts (Demers 2010, 72; Roads 2004). Due to the

¹⁰ Even if the connections between high and popular cultures became stronger and more intense, there was still a strong pressure to keep this division firm (Born 1995).

¹¹ There are already many books of different kind that cover this period and expand upon specific themes and perspectives (Holmes 2008; Demers 2010; P. Griffiths 2010; Solomos 2013; Rutherford-Johnson 2017).

immense variety of styles and labels, it is hard to say, for instance, where sound art ends and acousmatic music begins, or even which genres may be included under the label “electroacoustic music”.¹² However, I have tried to include in the sub-chapter dedicated to underground scenes those artists using popular practices (*e.g.* techno, house) in experimental ways who are unknown in academic contexts.

I.1.3.1 Underground scenes

During the 1980s and 1990s, there was an on-going process of constant and discrete refinement within many genres of popular music towards more advanced and sophisticated forms. In this period, electronic practices became more dominant within popular music, with a greater reliance on synthesizers and the adoption of programmable drum machines. During the late 1980s, a music phenomenon called *Intelligent Dance Music* (abbreviated as IDM and often substituted by the more general term *electronica*) emerged. It was inspired in part by 1970s and 1980s experiences of alternative rock (*i.e.* new wave, krautrock) and of figures such as Brian Eno and Kraftwerk. Pioneers of this multi-genre movement were British groups such The Orb and The KLF who demarcated a style called *ambient house*, joining together the rhythmic structures typical of acid house with the dilated atmosphere of ambient music (Collins, Schedel, and Wilson 2013, 136–39).

In the early ‘90s, the record label Warp released a collective album including artists such as Aphex Twin (Richard David James) and Autechre (Rob Brown and Sean Booth). These artists started to include elements of Detroit techno and New York electronic music in their work but they integrated these rhythmic patterns within complex articulations, detaching themselves from the typical aesthetic of techno (see Appendix D, (Reynolds 2013)). From 1990 to the present day these genres of music undergo an immense expansion and development. Starting from the so-called “intelligent techno”,¹³ they evolved and absorbed cross-genre influences leading to distinct offshoots such as glitch-electronica (Kim Cascone, Carsten Nicolai a.k.a. Alva

¹² The term *electroacoustic* is a flexible designation that covers an immense range of musical styles: EARS (<http://www.ears.dmu.ac.uk/>), for instance, lists 81 genres and categories of electroacoustic music (see Appendix D).

¹³ The series on Warp was called “Artificial Intelligence”.

Noto, Pan Sonic), minimal and dub techno (Pole, Basic Channel, Miles Whittaker, Powell), dubstep and turntablism (Christian Marclay, DJ Olive, DJ Spooky, Marina Rosenfeld, Philip Jeck).

Following unpredictable pathways, these new trends in exploratory music take inspiration from a variegated musical backdrop of movements comprising electronic music from the sixties (*e.g.* Morton Subotnick), industrial and noise rock (Faust, Popol Vuh), *musique concrète* (*e.g.* Michel Chion), American minimalism (*e.g.* Terry Riley) and the avant-garde (*e.g.* Alvin Lucier). The materialization of styles and subgenres such as hip-hop sampling, drone music, sound installation, micro-house, or folktronica is due in part to these influences. Names such Robert Ashley, John Cage, Luc Ferrari, or La Monte Young are often mentioned as sources of inspiration by this new generation of artists who intend to draw from this patrimony and reinvent it through new technologies and aesthetics.

Besides musical influences, philosophers and theorists have also been taken as models for the consolidation these communities. I would mention here only two examples which give rise to significant repercussions:

- *Soundscape and Sound Installation*

The recent practices of soundscape composition and sound installation are mainly grounded in two crucial aspects of the environmental space. On the one hand, these genres are based on an ecological approach to music, inspired by Guattari and the *Gestalt* theory of perception, and are deeply indebted to the pioneering work of R. Murray Schafer (Guattari [1989] 2000; Schafer 1977). On the other hand, following the tradition of acousmatic, electroacoustic music, and sound art, this new generation of composers –from the early 1990s– start to deal again with the diffusion of sound in a physical space, multi-channel setups, the problem of the listening experience, and the reconstruction of virtual realities from a new perspective. Artists belonging to these fields of music expand on several philosophical fields (*e.g.* semiotics, phenomenology, epistemology) as well as on the relationships between music and architecture, and perceptual and information theories. Consequently, figures as M. Merleau-Ponty, J. Derrida, A. Moles, and Le Corbusier are frequently encountered as references and

influences.

It is worth noting that these musical contexts of art music are cases where academic and underground communities blend together: sound artists and composers, such as Brandon La Belle, Francisco Lopez, Hildegard Westerkamp, Michael J. Schumacher, or Agostino Di Scipio, move through similar socio-cultural backgrounds, alternating improvised happenings and institutionalized performances.

- *Glitch-Electronic and Deleuze's Philosophy*

Besides the philosophical debates about the aesthetic of failure and mechanical flaw (Cascone 2000; Krapp 2011), it is around the record labels Mille Plateaux, SubRosa, and Touch that glitch-electronic music established itself and started to delineate its relationships with the philosophy of Gilles Deleuze.

The recent rediscovery of Deleuze by certain contemporary music communities (Prieto 2005; Hulse and Nesbitt 2010; Campbell 2013; Hall and Zukic 2013)¹⁴ reveals that several aspects of his thought have been influential to musical practices and theories. The peculiar connection between the French philosopher and the 1990s generation of electronic musicians takes on specific traits. Philosopher Christoph Cox, for instance, insists on the fact that the new examples of glitch-electronica *detrterritorialize* musical forms and materials: music is no longer arranged in phrases and *arborescent* structures but throbs simultaneously within a sonic stream made of multiple sonic cells (Cox 2003b, 2003a).

In this regard, the influence of minimalist aesthetic on these new genres of electronic music merges well with this vision: music is no longer seen to proceed linearly and hierarchically but develops in a sort of atemporal space (*i.e.* rhizome¹⁵) (Quinz 2006, 30). This opposition between linear and vertical temporalities (Kramer 1988) has been seen to correspond to Deleuze's dichotomy between what he calls *Aeon*

¹⁴ During the 1980s, several connections between Deleuze and experimental music were already developed (Solomos, Soulez, and Vaggione 2003), but more recently a series of conferences focusing the relation between art and Deleuze's thought start to emerge (*e.g.* DARE – International Conference On Deleuze & Artistic Research, Orpheus Institute, Ghent Belgium).

¹⁵ The rhizome is a philosophical concept developed by Deleuze and Guattari in *Mille Plateaux* ([1980] 2014).

(non-pulsed time) and *Chronos* (pulsed time). The latter is “the time of narrative development” arranged in episodes and sections, “allowing the listener to know where s/he is and where s/he is going” (Cox 2003a, 8). In contrast, non-pulsed time “places composer, performer and listener on a wave of becoming that flows, shifts, and changes, but extremely gradually so that one loses any clear sense of chronological time and instead is immersed in a floating, indefinite time, a pure stationary process” (Cox 2003a, 8) (cf. Meyer’s simultaneous and successive deviations, (1956, 233)). It is evident how parts of Deleuze’s thought may find ready correspondence both with minimalism (e.g. the concept of repetition and difference, (Deleuze [1968] 1997)) and spectralism, for which related reflections of figures such Ernst Kurth and Henry Bergson about time in music were meaningful as well. In fact, these studies on music temporality were, and still are, central in many genres of experimental music.

Coming back to a more general overview of today’s underground scene, the formation of a significant group of artists, performers, and philosophers within these communities started to become impossible to ignore. They themselves became sources of artistic influence both in pop and rock music (e.g. Radiohead, Björk) (Collins, Schedel, and Wilson 2013, 87, 139) and contemporary styles of classical music (e.g. Bernhard Lang, Fausto Romitelli¹⁶ (Polaschegg 2013)). These experimental contexts started to attract academics and a general interest towards independent and underground *musics* progressively grew. In 2008, the British journal *Organised Sound* included articles on several types of sound art and electronica,¹⁷ focusing on work not supported by the academic economy. Articles addressed works by artists such as Alva Noto, Björk, and Merzbow.

More recently, some British composers and scholars, in suggesting the presence of a sort of *post-acousmatic* generation of artists who come from non-academic contexts, go further and focus precisely on this dual scenario: both institutional and

¹⁶ Both have incorporated improvised electronics in their compositions and they have directly collaborated with electronic performers (Lang with turntablists such Marina Rosenfeld and Philip Jeck, and Romitelli with Pan Sonic).

¹⁷ Especially in volume thirteen, the first issue.

independent (Adkins, Scott, and Tremblay 2016). They claim that some composers within academic electroacoustic contexts have gradually become less interested in the social and cultural aspects and have instead been focused more and more on “self-referential pieces of music” which “has potentially impoverished the aesthetic development of the genre” (Waters 2000, 56). At the same time, for almost twenty years “there has been a flowering and proliferation of electronic art music in many guises much of which displays a strong post-acousmatic sensibility ranging from the sample based rhythmic works of Giuseppe Ielasi and Matthew Herbert to the UPIC¹⁸ works of Florian Hecker and Russell Haswell” (Adkins, Scott, and Tremblay 2016, 107).

These new modes of expression exhibit extremely complex rhythmic structures, timbres, spatial diffusion, and dynamics, combining an elaborate variety of sounds (Neill 2004; LaBelle 2006; Ratcliffe 2011). This process of sophistication, often accompanied by more specialised though smaller audiences, led to a shift of perspective: from music as entertainment and distraction to being something deserving contemplative home listening focused on the sonic experience, thus arriving at a situation similar to that of so-called high art (Landy 2007, 23; Demers 2010, 8–9; Solomos 2013, 166). But this new generation of musicians who exemplify these new expressions of sonic exploration come to “electronic art music having been brought up on super-produced pop music, hyperreal film sound effects and soundtracks, hacked electronics and noise music, rather than a classical heritage of Schoenberg, Stockhausen and Subotnick” (Adkins, Scott, and Tremblay 2016, 107).

The sources who influence these young performers are more diverse and less rigidly canonical, combining tradition with innovation from the most recent aesthetic theories. The last two decades have been in fact characterized by the need of some artists within sound art, electroacoustic music, and IDM to go beyond the *purity* of digital culture (Attali [1977] 1985, 106; Negroponte 1998) and move in opposition “to the unconditional and uncritical use of digital” (Pisano 2015). Nowadays, under the “post-digital” epithet, we find a miscellaneous collection of theories from hyperrealism

¹⁸ UPIC (Unité Polyagogique Informatique CEMAMu) is a computerised musical composition tool, devised by Iannis Xenakis.

(mainly centred in video art) or speculative realism (Harman 2010; Meillassoux 2016) to accelerationism and post-capitalism (Mackay and Avanessian 2014; Fisher 2009), from glitch's aesthetic to hauntology (Krapp 2011; Fisher 2013).

Artists who go beyond the digital unravel the failure of technology, “reassess[ing] the definitions of admissible and inadmissible sound in the musical work” (Demers 2010, 73). During the last few years, we have witnessed the return to fashion of analogue synthesizers (*i.e.* Oneohtrix Point Never) and obsolete technologies (cassettes, vinyl) (*e.g.* Philip Jeck) (Reynolds 2011), the emphasis on recording noises and the materiality of the medium itself (*e.g.* Burial, William Basinski), the use of computer music to craft new languages with voices (*e.g.* Holly Herndon), and the employment digital ringtones within a lo-fi aesthetic (*e.g.* James Ferraro). What appears evident is that artists of the 2010s move between unconventional musical practices and theoretical academic contexts, and they can demonstrate a highly scientific knowledge (*e.g.* computer sciences, electronic) together with an unorthodox approach to theory and performance.

I.1.3.2 Institutional scenes

During the 1970s and 1980s, the tumultuous panorama of exploratory music experienced a constant tension between tradition and innovation. While the most prevalent institutional thread was still grounded in *serialism*, technological progress and the impact of currents such as the American avant-garde, spectralism, and electroacoustic music acted as a sort of springboard for the development of new musical approaches. Inside the universities, music laboratories, and conservatories, the impulse towards innovative musical forms occurred in different ways (Born 1995; Holmes 2008; P. Griffiths 2010).

On the one hand, certain composers within instrumental traditions refined and transfigured the doctrines of serialism of the 1950s and 1960s, creating personal languages and techniques, developing timbric and sonic research while preserving a still fairly conventional musical discourse and arrangement (*e.g.* Magnus Lindberg, Helmut Lachenmann, Thomas Larcher). For other composers, this evolution passed through an explicit negation of the conventional approach and led to the foundation of new

compositional paradigms such as the spectral movement of Gérard Grisey and Tristan Murail. Even if musical teaching remained for years based on creating music for a certain stylised idea of the 20th century chamber ensemble, the interest in aural aspects grew among composers of different generations and resulted in new techniques for traditional instruments (e.g. Salvatore Sciarrino), new lutheries (e.g. Verrando, Marco Momi), software, spatialisation, the combination of acoustic and electronic forces (e.g. Stockhausen, Xenakis), and even the opening up to cross-genre influences (e.g. Romitelli, A. Schubert).

On the other hand, within institutional electroacoustic and acousmatic music, the dominant *Schaefferian* heritage evolved away from the concept of *reduced listening* towards the inclusion of extra-sonic elements due to the contributions of figures such as Ferrari (i.e. anecdotal music)¹⁹, Bayle (i.e. image and the *i-son*), and Denis Smalley (i.e. spectromorphology)²⁰. Moreover, the explosion of 1980s and 1990s digital technologies (i.e. real-time software such Max/MSP, Pure Data, and Supercollider) stimulated innovative musical practices in which the application of these technologies served performative, didactic, and informative purposes.

Following a tendency in vogue in popular music, researchers and critics have recently begun to coin new labels to describe sub-genres emerging inside the so-called contemporary classical music community. This trend is in evidence in the appearance of several *post-* derivatives of various 1960s and 1970s genres (post-acousmatic, post-spectralism, post-minimalism) in articles and specialized magazines (Dunbar 2011, 295; Potter, Gann, and Syon 2013; Singleton 2016, 9–10, 44; Adkins, Scott, and Tremblay 2016; Hargreaves 2017, xx; Suckling 2017). These tags do not in fact always imply an explicit transcending of a genre's aesthetic –what would be expected by the use of such prefixes– but rather these labels are used to trace a composer's background and influences as well as his/her field of action. In this way, post-spectralists are defined as

¹⁹ Anecdotal music is a genre within electroacoustic music that uses recognizable sounds more for their *anecdotic* aspect than for their abstract potential. The first piece to be explicitly named in this way was *Hétérozygote* by Luc Ferrari, but this practice has been implicitly used by other composers (Caesar 1992, 61).

²⁰ Even if spectromorphology is a theory mainly based on Schaefferian's typomorphology, the novelty in Smalley's contribution lies in the introduction of extrinsic concepts such as *gestural surrogacy* (1997).

those younger generations of composers who, starting from the precepts of spectral music, develop their language within other elements (*e.g.* the tape and computer music) or integrate electronics creating mixed-media compositions (Marco Momi, Iancu Dumitrescu). In the case of post-minimalism, Potter and co-workers have already used this label for works recalling some aspects early minimalism while including practices and styles that go beyond the bases of the original movement (Gann 2013, 40–41; Potter, Gann, and Syon 2013). Following this usage, very different figures such as Michael Gordon, Arvo Pärt, or Alvin Lucier may fall, questionably, under the same designation. While original labels like *acousmatic*, *minimalism*, and *spectralism* designate movements which were emerging as responses to institutionalized structural and formal canons, the corresponding *post*-denominations refer to an indistinct group of composers from different backgrounds who freely employ practices of the preceding movements.²¹ These composers cannot easily be grouped under one label and often move between academic and underground contexts.

In fact, as Rutherford-Johnson highlights, financial crises and the wider crisis of capitalism have recently led to a reduction of funds for institutional art music, creating the conditions for a mutation of aesthetic and means: artists and communities have been forced (or inspired) to find alternative scenarios (2017, 56). New experiments with technology (video-art, samplers) and innovative approaches to performance (*e.g.* Michael van der Aa, Jennifer Walshe, Liza Lim) start to emerge together with the idea of a young composer –at times a sort of *cross-media* composer (*i.e.* Simon Steen-Andersen, Øyvind Torvund, Matthew Shlomowitz, Alexander Schubert)– as entrepreneur, publishing and promoting his/her own work through both institutional and independent activities (*e.g.* Edition Wandelweiser, Black Page Orchestra), moving “outside the core aesthetic of contemporary art music” (2017, 76).

Arriving at the observation that the boundaries between genres and cultural

²¹ Earlier designations were established years after the emergence of the corresponding movement, being the result of a retrospective evaluation. In the case of *spectralism*, the label did not satisfy either Grisey or Murail who both preferred the term *liminal* (Murail 2005, 149; Grisey 2008, 45).

milieus are today more flexible than in the past, and noting that the division between the academic and independent music appears –as clarified in the Introduction– more and more indistinct, it is now necessary to define the specific hypotheses of this study.

I.2 Hypotheses, arguments, and justifications

I.2.1 Scelsi and sound's definitions

The idea that there exist similar aural outlooks across very different genres of today's exploratory music suggests that there could be a single hypothetical perspective that would embody the various characteristics of sound common to all these outlooks. Among the many existing notions of sound, which are in some ways intermeshed and form the basis of a great variety of music in different contexts, Giacinto Scelsi's inspiring description of *spherical sound* will form our starting point.

Towards the end of 1950s, some years before spectralism would emerge, the Italian composer Giacinto Scelsi was one of the first to postulate sound as a dense, spherical, and three-dimensional entity constituted of a complex matter (Scelsi 1981; Castanet and Cisternino 1996).

Approaching the subject with a mystical attitude, Scelsi emphasises the “third dimension” of sound.

Sound is spherical, but while listening to it, it seems to us to possess only two dimensions: pitch and duration; the third, depth, we know that it exists, but in a certain sense it escapes us. The upper harmonics and sub-harmonics (less-audible) sometimes give us the impression of a vast and complex sound with properties other than that of pitch or duration, but it is difficult for us to perceive this complexity.²²

Scelsi's intuition has been later supported by several studies on music perception, psychoacoustics, and audiology which examine this complex area. How could sound or timbre be defined? What exactly does Scelsi mean by “depth” (*“profondeur”*)?

²² “Le son est sphérique, mais en l'écouter, il nous semble posséder seulement deux dimensions: hauteur et durée – la troisième, la profondeur, nous savons qu'elle existe, mais dans un certain sens, elle nous échappe. Les harmoniques supérieures et inférieures (qu'on entend moins) nous donnent parfois l'impression d'un son plus vaste et complexe autre que celui de la durée ou de la hauteur, mais il nous est difficile d'en percevoir la complexité” (Scelsi 1981, 126–27) (translation adjusted from (Elezovic 2008)).

The sound world of Scelsi's compositions has been often described as the “sound/*Klang*” in opposition to the “sound/*Ton*”, referring to the two possible translations of the word *sound* in German (Zenck 1983; Borio 1993; Montali 2013).²³ The term *Klang* touches on the substance of sound, the medium, the inner content and constitution; *Ton* refers more to a singular sound, its external qualities being those that exemplify its singularity, its relationships with other sounds. These distinctions may appear somewhat irrelevant or inconsequential, but the debate about these definitions and concepts is intense and pertinent (Bayle 1989; O’Callaghan 2010; Bonnet 2012).

The notion of timbre has also been (and still is) the subject of constant discussion and –as with sound– the German language possesses a peculiar term, *Klangfarbe* or sound colour,²⁴ which has itself initiated debates and led to new definitions. One definition of timbre might suggest that it is not primarily related to pitch and loudness,²⁵ being linked instead to several other auditory aspects such as “the spectrum of the stimulus, [...] the waveform, the sound pressure, the frequency location of the spectrum, and the temporal characteristics of the stimulus” (American National Standards Institute 1960). In this particular sense, timbre refers to a sort inner body of sound, a sonic matter (Piana 1991, 113). Following this description, there is the *atimbric* sound of pure tones which “produce identical timbre sensations (or have any timbre at all)” (Łętowski 1992, 23). The idea of timbre itself underwent a profound revolution during last century (Solomos 2013, 23–86) and, when talking about certain genres of 20th century music, we might in some cases misuse the term *timbre* as a synonym for *sound* (Verrando 2012, 52). It is increasingly clear that the emergence of new musical practices has put in a quandary every effort to set stable definitions (Łętowski 1992; Solomos 2013, 38–39). What makes Scelsi's definition interesting for

²³ Bériachvili, in contrast, in comparing the music of Xenakis, Ligeti and Scelsi, associates the Italian composer with the concept of sound-*ton* (Bériachvili 2008).

²⁴ German is not the only language with such a peculiar term: for instance, the word *timbre* in Japanese could acquire three different meanings depending on whether it refers more to tone colour (NE-IRO, 音色) sound quality (ONSYOKU, おんしつ) or more generally to sound (HIBIKI ひびき) (Mizuno 2015).

²⁵ I refer here to early definitions of timbre that state that timbre “is auditory sensation whereby a listener can judge that two sounds are dissimilar using any criteria other than pitch, loudness and duration” ((Pratt and Doak 1976); see also (Helmholtz [1877] 1954; Seashore 1938; American National Standards Institute 1960)). However, the debate about the independence of timbre from pitch and loudness leads to an expansion of the notion of timbre (Łętowski 1992).

this study given this context is exactly its *indefinite* nature which may provide more flexibility and nuance to more appropriately address these new musical practices.

The Italian composer expands on this concept, referring “[to] acoustic phenomena such as transients, binaural beats [and] the notion of critical bands”;²⁶ all these elements, from 1960 onward, become the focus of study and indeed the sonic matter itself for several genres within experimental music. The *depth* evoked by Scelsi is that dimension of sound that relates to partials and overtones: frequency interactions and minor interferences (*e.g.* attack, decay, resonances), noises and distortions, all the way to minor (psycho)acoustic phenomena.

Scelsi and the spectralists stress the fact that these aural traits take place within the internal spaciousness of sound. This notion prefigures a sort of compact space-matter (*i.e.* in French “*espace-matière*”) in which sound expresses its “colours, light effects, tactile sensations, all properties of a physical matter”.²⁷ This space-matter, as one of many notions of musical space (Vande Gorne 1988; Chouvel and Solomos 1998), is defined by Bériachvili as the extent to which sound possesses a quasi-objective presence and material nature: it is the place of palpable qualities of sound, its volume, its density and grain (2010, 32).

This is the intuition on which this study is grounded: that this idea of sound is (consciously or unconsciously) the prime interest of a range composers belonging to very different genres of music today. In trying to justify this hypothesis, it is necessary to give this definition of sound greater clarity and specificity by finding particular musical elements and insights that might be pertinent to this perspective.

1.2.2 Initial research stage

The initial stage in this research concerns the recognition of pieces where this idea is, in some way, developed. In order to do so, identifying a series of key elements derived from spectralism, minimalism, and electroacoustic music constitutes the first

²⁶ “des phénomènes acoustiques tels que les transitoires, les battements, la notion de largeur de bande critique, etc.” (Murail 2004, 82) (my translation).

²⁷ “des couleurs, des effets de lumière, des sensations tactiles, des propriétés des matières physique” (Bériachvili 2010, 12) (my translation).

step.

A first key characteristic is that compositions belonging to this perspective are primarily conceived of through their aural aspects; sound is explored through its inner qualities, musical phrases and melodic lines merge into a unique sonic matter in such a way that any component of harmony dissipates into timbre (Dufourt 1981). Spectralism “realizes the fusion form/material through the simulation of sound, an idea which was also found in Scelsi: the form of the piece is but the deployment of the structure of the sound – which [...] assumes a change of scale”.²⁸ The fascination with controlling the nuances of sound indeed implies observation on a micro-scale and naturally induces a dilation of time: as Grisey puts it, “[t]he more we dilate our auditory acuity to perceive the microphonic world, the more we shrink our temporal acuity to the point of needing quite long durations”.²⁹

The enlargement of the scale of musical temporality is an element common to both minimalism and spectralism. Melodic contour, musical phrases, and the linear organization of music are abandoned in favour of a verticality of time, sustained tones, and a non-teleological organization (Kramer 1988). Styles and composers that exemplify this perspective explore the concepts of repetition (i) as a perceptive event, (ii) as an experience of listening “in accumulation” (in opposition with the listening moment-to-moment, linearly and discursive), and at the same time considering (iii) repetition as the reiteration of a singularity, a minimal fact (Deleuze [1968] 1997; Fink 2005; Zurria 2008; Margulis 2014).

These elements are incorporated within musical compositions and correlate with a minute exploration of sonic elements. Even if repetition can be hypnotic, these effects are *ecstatic* and do not usually induce states of *trance* (Rouget [1980] 1990).³⁰ Even if

²⁸ “La musique spectral réalise la fusion forme/matériau par la simulation du son, idée que l’on trouvait aussi chez Scelsi: la forme de l’oeuvre n’est que le déploiement de la structure du son – ce qui [...] suppose un changement d’échelle”(Solomos 2013, 372) (my translation).

²⁹ “Plus nous dilatons notre acuité auditive pour percevoir le monde microphonique, plus nous rétrécissons notre acuité temporelle, au point d’avoir besoin de durées assez longues” (Grisey 1989) (my translation).

³⁰ *Ecstasy* is a state characterized by immobility, concentration, solitude, calm or loss of memory. *Trance* is, on the contrary, a state derived from listening in a group; it includes motion, noise, unconscious chaos, and it is followed by a state of amnesia (Rouget [1980] 1990).

IDM's offshoots commonly involve specific live listening conditions that provoke temporary states of trance and corporeal participation, the associated pieces can also be listened to at home through high quality systems in quiet and very attentive circumstances. These listening conditions do not necessitate movement and occur in solitude, through a conscious intense pleasure, *i.e.* ecstasy.

Other important elements to take into consideration come from electroacoustic practices. Sound manipulations on micro- and macro-scales, the design of specific sonic profiles, and the intention to create new aural textures, these are all important musical components to consider in this study: as Clarke evinces, “pitch and rhythm in their traditional sense may not be the main musical components. They may be secondary in structural importance to timbre, dynamics or spatial location” (2012, 349).

More generally, the conception of a complex idea of sound as the prime subject of a composer's research, to the detriment of approaches using multiple separate parameters, provides a possible reason why today many predefined musical components are reconsidered and their role altered. Composers of this kind conceive of music as starting from an elaborated notion of sound where pulses, noises, the exploration of sound spectrum, dynamics and temporal metre –which were once considered as tools, parameters, or barely used as connotative elements in recognising a particular genre– are now constituents of sound and become areas of direct investigation.

1.2.3 Specific area of research

Looking at the past century as a whole, it is interesting to notice how, corresponding with (or precisely by virtue of) an explosion in the number of genres, styles, musical contexts, and communities, there is a progressive expansion of the notion of musical sound (*i.e.* the sound contemplated as a part of a musical piece). These processes are correlated: the branching of musical activities towards new techniques (*e.g.* electronics, tape music, new lutheries, field recordings), experiments (*e.g.* music for film, installations), and applications (*e.g.* acoustic studies, architecture) has enlarged the variety of musical sounds to include noises and everyday sounds.

This study concentrates on a limited area within this large expanse: focusing on

the specific notion of sound outlined above a restricted number of styles and authors who make music starting from this particular understanding of sound as a complex substance will be examined and Figure I.2 represents a visual metaphor for this idea.

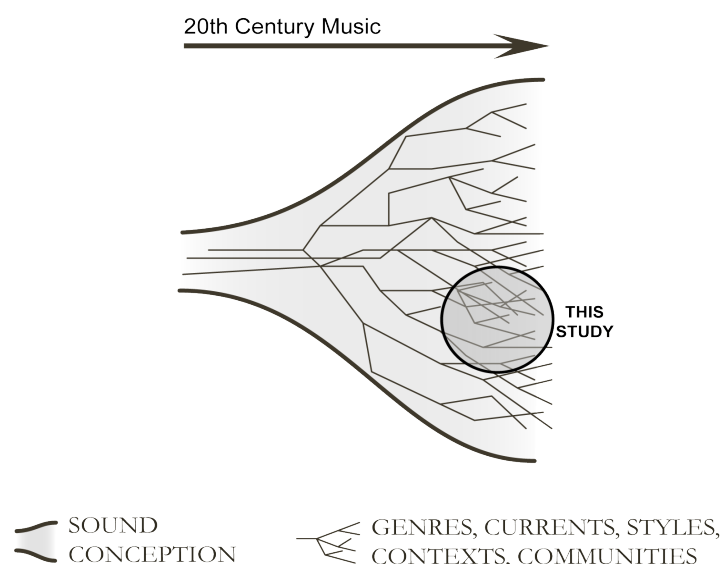


Figure I.2 Visual representation of the parallel between notion of sound and variety of musical contexts in relation with this study.

This notion is still admittedly fairly generic and vague: rather than setting limits and boundaries, it only expresses qualitative considerations and requires an evaluation of a sort of degree of affinity with this conception of sound. In spite of this, the generic character of this definition of sound enables going beyond genres and sound sources, allowing this study to then identify common approaches to sound irrespective of the medium used. Musical practices are considered whether they are electroacoustic, purely acoustic, or electronic, and this flexibility offers great potential.

Two main domains define the area of study more clearly:

On the one hand, contemporary composers such as Georg Friedrich Haas, Fausto Romitelli, and Bernhard Lang have advanced their artistic practice by exploring new possibilities within instrumental music, each according to his own method, considering sound as a dense matter. Even if some of them move within clear aesthetic domains which do not primarily involve a sonic research (*i.e.* Bernhard Lang), their

compositions show an implicit aural exploration consisting of an intense microtonality, a use of clusters of layered tones, a combination of harmonic and inharmonic sounds, among other characteristics. Another common trait that unifies these composers is their unconventional vision of time in music: through their particular use of repetition and their exploration of sound spectra, their music –even when going through fast evolutions– is distinctive in creating suspended aural episodes in which sound is treated as an almost atemporal object, periodic and cyclic (Solomos 2013, 60, 261).

On the other hand, composers, experimentalists, and electronic performers such as Alvin Lucier, Eliane Radigue, and Alva Noto have made free use of the musical theories of the “exploratory school” of Cage, Feldman, and Schaeffer, combining and absorbing these influences to create more instinctive works. In some cases, their methods combine noise and tonal melodies (Christian Fennesz), granular and digital processes (Ryoji Ikeda), hypnotic repetitive clusters (minimal techno and basic channel styles), immersive multi-channels soundscapes (Brandon Labelle), and exploratory sound resonances (Jacob Kirkegaard). These approaches maintain certain common features such as non-directional development and a particular focus on the perceptual aspects of music.

Indeed, both of these two broad musical fields have the shared desire “[to] create works that seek to engage the listener in a stimulating listening experience” (Weale 2005, 30). This listening experience is characterized by a new vision of time (*i.e.* atemporal, static, periodic...), space (*i.e.* multi-channel diffusion and sculptural musical design), musical evolution (*i.e.* non-narrative and extended), and repetition (*i.e.* generation of ecstatic effects and a listening in accumulation).

These two fields described above embody the notion of sound which forms the basis of this study. Taking this cross-genre area of musical practice as a whole, it is possible to go further and identify more nuanced attitudes held by the composers themselves who see *sound* as being either:

- a physiological or acoustic/psychoacoustic phenomenon (*e.g.* audio-acoustic experiments, sound installations, Alvin Lucier, Jacob Kirkegaard);

- an object (*e.g.* Pierre Schaeffer, Francisco Lopez, Matmos, Olivia Block);
- an entity (*e.g.* Giacinto Scelsi, Georg Friedrich Haas);
- a repeated and continuous sonic stream (*e.g.* Bernhard Lang)
- an image (*e.g.* François Bayle, Hildegard Westerkamp);
- a corporeal event (*e.g.* Phill Niblock, Pan Sonic);
- an absolute perception (*e.g.* Brandon LaBelle, Luc Ferrari, Jacob Ullman);
- or even an extreme result of an atomization process using technology (*e.g.* Alva Noto, Ryoji Ikeda, Horacio Vaggione).

This variety suggests the presence of a more fluid scenario in which the movements emerging from the 1950s to 1970s, such as minimalism, *musique concrète*, avant-garde, and spectralism (Rutherford-Johnson 2017, 262), might delimit a sort of *aesthetic field of sonic exploration* in which –following the premises of this study– several correspondences may be drawn between institutional and independent figures. In refining this aesthetic in order to delineate a more specific body of research, Figure I.3 represents some major and minor associations among a number of representative names. Some convergences correspond to a manifest musical proximity (*e.g.* Grisey, Xenakis, Scelsi, Ligeti; (Bériachvili 2008; Solomos 2003, 2012)), or result from biographical and aesthetic proximity (*e.g.* Schaeffer and Radigue, Cage and Lucier, B. Lang and Kim Cascone, Romitelli with the 1960s psychedelia or Verrando and Pan Sonic); others emerge from minor affinities due to specifically musical aspects (*e.g.* the association between Scelsi and Lucier relates to their common exploitation of interferences between neighbouring frequencies, or the association between Bernhard Lang and the structural minimalism of Reich and Andriessen relates to the linear repetition of clusters) (Figure I.3). Without claiming to be comprehensive, the superimposing of *high* and *popular* “musical maps” aims to show the intense series of mutual connections between artists that focus on sound exploration in different contexts.

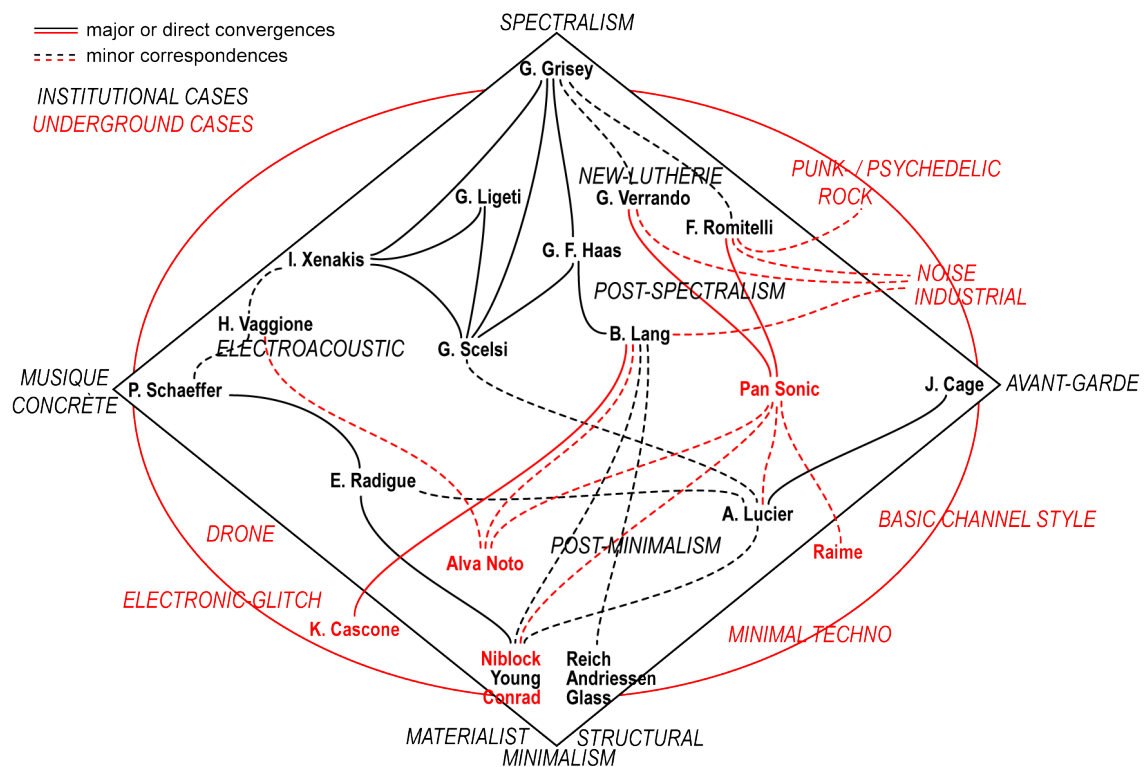


Figure I.3 Schematic representation of several connections between past and present composers within the perspective of this study.

How to render this dense network of connections from the perspective of a shared interest in the internal characteristics of sounds? For this study, I might have compared the aesthetics of each particular genre and discussed generic practices, but I chose instead to consider specific examples: composers and musical works. Global or general readings tend to lack detail and end up equating forms that might be more appropriately kept distinct. By analysing specific pieces by *particular* composers, these pieces may then be taken as general examples, revealing their *general* importance inasmuch as they represent a concrete (real) individuality. In adopting this approach, I aim to trace *real* connections (based on concrete analyses rather than on generic observations) and build solid frameworks: I aim to *extract* instances in order to *abstract* general conclusions (Ferraris 2016, 48–50).

I.3 Selected pieces

The idea of using a selection of pieces and composers as a research sample to

examine a common perspective on sound generates some difficulties. How diverse should the body of research be in order to provide significant results?

As Delalande claims (2013, 38–43), the researcher's choice holds a kind of legitimacy when:

(i) objectives are clearly defined, *i.e.* for this study, the identification of elements that help in the definition of a cross-genre perspective on sound despite very different styles of music;

(ii) the limitations are acknowledged, *i.e.* the series of disadvantages related to the problematic nature of a comparative study (see Introduction);

(iii) the organization of the research includes steps of verification (*e.g.* the idea to apply both general and particular approaches including theoretical and empirical examinations) and several strategies that allow the confirmation of the initial premises, *i.e.* the consideration of multiple outlooks: analytic, perceptual, and compositional.

On the one hand, composers whose background is grounded in spectralism, materialist minimalism, the avant-garde, and *musique concrète* are good candidates for this study as the fundamental aspects of these areas reflect the central elements of the cross-genre perspective. On the other hand, this perspective is shared with certain genres of popular and alternative music that exhibit a constant refinement towards more advanced and sophisticated musical forms. Electronic performers coming from these genres are suitable examples for this research as they exemplify a more instinctive approach to the same understanding of sound.

Given the many genres and authors included in this cross-genre panorama, I seek to reflect this variety whilst remaining true to the formulated perspective, namely identifying music primarily conceived from a particular vision of sound as a complex and tactile entity. The selection of works used for this study is made up of compositions by Georg Friedrich Haas, Bernhard Lang, Giovanni Verrando, Riccardo Nova, Pan Sonic, Raime, and Ryoji Ikeda. I will briefly justify the selection giving some examples of composers who may have fit perfectly within my study –and who will be frequently mentioned elsewhere in the dissertation– but have been kept out of the research sample

itself for various reasons.

The exclusion of certain pioneering electronic performers such as Autechre is illustrative of my approach to selection. Autechre are an excellent example of glitch-techno artists and their inclusion would certainly have supported the thesis about connections between underground and academic practices,³¹ but their presence in the study would not have added much new or interesting data to the examination given the prior inclusion of Pan Sonic. Furthermore, Autechre's general approach to electronic material is very inclusive: they frequently made use of a very large palette of sounds within a single track. Pan Sonic were preferred because –due in part to the difference in the electronic equipment used– their aesthetic is more focused on a restricted collection of sonic elements for each piece, and this approach is better attuned to the perspective on sound explored in this study.

Other composers such as Alvin Lucier, James Tenney, Jacob Ullman or Eliane Radigue –all composers whose central aesthetic is grounded in sustained and layered sounds interfering with one another and forming a continuous musical flow– would have fitted perfectly within the research sample and would have reinforced the coherence of the selected pieces. However, the aim here is not to show that pieces by different authors are simply similar in form and general conception. The differences in form, duration, conception, and instrumentation between a more diverse group of pieces naturally complicate the definition of a common perspective but crucially enrich the sample set for the examination of sound. Therefore, even if these authors feed the wider discussion, general comparisons, and particular analyses, for the main selection of works, I opted for composers whose respective characteristics are more varied in order to open up a richer set of outcomes.

Figures such as Fausto Romitelli (*An Index of Metals*³²), Jonathan Harvey (*Mortuos Plango Vivos Voco*), Marco Momi (*Almost Nowhere*), Thomas Larcher

³¹ For instance, Autechre are known to apply algorithmic, FM and generative synthesis in their pieces, so making it easy to draw parallels with figures such as Stockhausen, Vaggione or Xenakis (Morley 2010; Muggs 2016).

³² This piece would represent a good example, since it has been written and recorded with a direct involvement of Pan Sonic; however in order to avoid straightforward conclusions it has been excluded from the selection.

(*Mumien*), Kaija Saariaho (*Petals*), Eliane Radigue (*Trilogie de la mort*), Alvin Lucier (*I am sitting in a room*, *Two circles*), and performers like Jacob Kierkegaard, Miles Whittaker (Demdike Stare), and Peder Mannerfeld were nevertheless taken into consideration for comparative reflections.

For the purposes of this study, compositions characterized by an absence of overt sociocultural references and containing only a small number of real-world sounds were opted for in selecting the central group of works. Musical works containing narrative voices or representational musical elements would have been ill-suited to the aesthetic examined by this study of starting with sound itself: extra-musical traits are more often related to social and cultural themes than to the sonic characteristics of a piece.³³ However, this does not mean that the musical context cannot be taken into account: the background and context for each piece should be examined (Emmerson and Landy 2012, 9), allowing the influence of a composer's poietic intention to be acknowledged (Chapter IV).

In this regards, Bodin –in considering the variety of electroacoustic music– propose an analysis that incorporates an “*aesthetic profile mapping*”, including considerations about musical intentions, concepts, conducts, genre-based pertinences, and even cultural or affective perspectives (Bodin 1997).³⁴ Similarly, Delalande suggests how a multi-layered analytic approach enabling correspondences to be made between the particular and the general (morphologic and *Gestalt* practices) and *vice-versa* (including overall perspectives, *pertinences*, and individual choices) might be important in illuminating unexplored similarities between pieces from very different contexts and genres (2013). In this sense, as described in the introduction, the intention to open the examination up to much wider and non-aural concerns led me to apply a diversified examination, that is theoretical, Chapter I; analytic, Chapter II; perceptual, Chapter III; and poietic, Chapter IV.

³³ Some of these elements are however present in Lang (*i.e.* singers), and Raime (*i.e.* voices and real-world sounds).

³⁴ Bodin proposes three main aesthetic categories: “concept and content”, “form and sounds”, “psychological issues”.

The following pieces form the core research sample:

- Georg Friedrich Haas – *String Quartet n°2* (1998) and *in vain* (2000) (Haas 1998b, 2000b);
- Bernhard Lang – selected pieces from *Differenz/Wiederholung* series: *Differenz/Wiederholung 2* (1999), *DW3* (2000), *DW7* (2002), *DW8* (2003), *DW9 “Puppe/Tulpe”* (2003), *DW14* (2004), *DW15 “Songs/Preludes”* (2003) and *DW17 “Doubles/Schatten II”* (2004) (Lang 2000, 2002, 2004, 2006, 2007);
- Riccardo Nova – *Eleven* (2005) (Nova 2005);
- Giovanni Verrando – *Dulle Griet* (2009-2010), *Triptych #2* (2008) (Verrando 2013);
- Pan Sonic – selected pieces from *Kesto* (2004): *Keskeisvoima*, *Lautturi*, *Etäisyys*, *Prospekt V*, *Ilmenemismuoto*, *Selittämätön*, *Ilma*, *Linjat*, *Säteily* (Vainio and Väisänen 2004);
- Ryoji Ikeda – *Headphonics* (1995) series and *+/-* (1996) series (Ikeda 1996a);
- Raime – *If Anywhere Was Here He Would Know Where We Are* (2010), *Told & Collapsed* (2011), *Passed Over Trail* (2012), *The Walker In Blast And Bottle* (2012) (Andrews and Halstead 2010, 2011, 2012a, 2012b).

This selection reflects a good variety of styles but with all pieces still displaying a common focus on the precise use of various spectral characteristics of sound. The range of styles represented allows this study to demonstrate that the common perspective that emerges goes beyond any specific instrumentation or genre as the pieces cover acoustic (*i.e.* Haas and Lang), electronic (*i.e.* Ikeda, Raime, Pan Sonic), electroacoustic, mixed, and real-world sounds (*i.e.* Nova, Verrando, Lang, and Pan Sonic), and span from so-called contemporary classical music, including genres such as post-spectralism, minimalism, and mixed-source styles (Haas, Lang, Verrando, and Nova), to underground music genres, such as glitch-electronic, dubstep, and minimal techno (Pan Sonic, Ikeda, and Raime).

The selection reveals a particular problem when considering authors from

diverse styles: Haas' *in vain* or Lang's *DW17* last more than forty-five minutes, while pieces by Pan Sonic and Ikeda last on average between eight and ten minutes. It is necessary to build up a more coherent account of each author including, for example, a larger selection of pieces by Pan Sonic in order to achieve a better balance within the selection as a whole and arrive at a more accurate description of each composer's practice. However, the selection is still not evenly distributed across all composers, being focused on a larger repertoire of works by Haas, Lang, and Pan Sonic.

Why this uneven distribution? On the one hand, in order to form a properly representative portrait of each artist considered in the study, a more in-depth examination is required given the comparative discussion carried out in a later chapter (Chapter IV). I opted then to include a combination of several works illustrating different facets for each of the key figures: *e.g.* both chamber and orchestral music for Haas or both rhythmic short tracks and dilated evolutions in the case of Pan Sonic.

On the other hand, in order to avoid limiting the study to an analysis of only two or three composers, the extension of the selection to a larger range of artists allows the consideration of different languages and opens the study up to the consideration of different techniques and approaches (including computer music, *i.e.* Ikeda, electroacoustic pieces and mixed-media compositions, *i.e.* Verrando, Nova) that may help to reveal any weaknesses in the thesis' premises.

The possibility of having a larger collection of composers (*e.g.* including a single piece for each of the figures mentioned above: Romitelli, Harvey, Momi, Larcher, Tenney, Ullman, Saariaho, Radigue, Lucier, Autechre, Kierkegaard...) was considered and would certainly have expanded the body of research, but this approach was discarded for several reasons:

- this study examines the selected pieces and authors from multiple perspectives: first analytic, then perceptual and poietic (see Introduction). In this regard, a limited research sample is simply more practicable.

- The inclusion of a single piece for each author would certainly be interesting but scarcely representative of each composer or well founded as a research methodology.

– Considering single works from many composers would likely lead to the extrapolation of a few superficial correspondences which would then be ill-suited as a reliable foundation for further research tasks.

– Considering many more composers would cause a duplication of data: for example, even though there are distinct differences between Autechre, Ikeda, Alva Noto, and Pan Sonic’s music, in comparison with a very different piece, say a string quartet, these differences between similar artists might be overlooked and simplistic equivalences made between them.

It is necessary then to strike a balance between the desire to enrich the research potential and the risk of establishing a perspective based on fragile assumptions. In view of this, I decided to proceed, as mentioned previously, in two stages: an initial stage looking at a restricted group of composers in depth (*i.e.* including analytic, perceptual and poietic perspectives, Chapters II-IV), and a second stage seeking to strengthen the study through the inclusion of a wider group of carefully chosen works, allowing for further comparisons beyond the scope of the initial restricted sample (Chapters V-VI).

What follows is a short description of each composer and a brief explanation of the reasons which lead to the selection of both them and their compositions.

- *Georg Friedrich Haas (b. 1953–)*

Georg Friedrich Haas is an Austrian composer commonly grouped within the lineage of spectralist and microtonal theories despite exploring a wider compositional practice using both well-tempered and just intonation systems as well as tonal and microtonal constructions (Haas 2007, 128; Irrgeher 2014; Varga 2011, 102). After a traditional training leading to a lasting fondness for Romantic figures such as Schubert, he was influenced by Ligeti and Scelsi as well as Murail (who Haas replaced as professor in composition at the Columbia University in fall 2013) and Grisey. However, “[c]ompared to French spectral composers like Grisey and Murail, Haas shows little inclination to explore real-world spectra that differ from the harmonic series, like the inharmonic spectra of bells or gongs” (Hasegawa 2015, 205).

With the aim of exploring *sound* in all its dimensions, Haas uses both tonal and microtonal intervals within repeated structures: being especially keen on microtonality, he uses this approach as a means to investigate sonic effect rather than treating the parameter as an end in itself in his pieces (Hiekel and Utz 2016, 104). His works after 2000 often include light/dark effects as integral components of composition (e.g. *String Quartet n°3 “in iij. Noct”* (2003), *in vain* (2000), *Hyperion* a concert for light and orchestra (2006)).

The two pieces selected for this study, *String Quartet n°2* (1998) and *in vain* (2000), are representative examples of contemporary instrumental music in that they explore various sonic characteristics through a minute exploration of instrumental spectra and a large use of microtonality. While the *String Quartet n°2* is a single-movement piece and lasts twenty minutes, *in vain* is written for twenty-four instruments and lasts around seventy minutes. Moreover, *in vain* contains lighting instructions for live performance, denoting shifts from darkness to full illumination, driving the audience’s attention towards the corresponding perceptual aspects of sound.

- *Bernhard Lang (b. 1957–)*

Bernhard Lang is an Austrian composer. He studied music, composition (he had Georg Friedrich Haas as teacher of microtonal compositional techniques), philosophy, jazz theory (including performing within jazz ensembles), electronic music, and computer-based composition systems. His approach to contemporary classical music is influenced by the 20th century American avant-garde and European classical traditions, jazz, rock, punk, techno, and electronica. His main project is the cycle *Differenz / Wiederholung* (difference / repetition) in which he explores the themes of repetition and the aesthetic of mechanical flaw within DJ cultures based on the philosophy of Gilles Deleuze. Related to this work, he has developed several collaborations, composing music for theatre, dance, film, and sound installation. His aesthetic contains a strong socio-cultural criticism of art music communities (e.g. *Das Theater der Wiederholungen*, the theatre of repetitions (2003) and *I hate Mozart* (2006)). Alongside *Differenz / Wiederholung* is another cycle, *Monadologie*, in which he implements the use of collage and sampling (arranged using self-programmed algorithms) of pre-

recorded material within traditional compositions.

Besides the use of traditional instruments, his pieces are good examples of the integration of electric instruments, real-time electronic manipulations and loop-generators, turntables and singers (both from classical and non-Western contexts).

Pieces included in this study come from the *Differenz / Wiederholung* cycle and are globally characterized by the exploration of repetitive musical elements and the development of *repetition* as either a means of self-representation and characterization of identity, or an indifferent mechanized process and its reproduction.³⁵ In these compositions, Lang takes inspirations from the writings of Gilles Deleuze, William Burroughs and Christian Loidl (for example in *Differenz / Wiederholung 2*), developing various understandings of the concept of repetition such as everyday boredom, death, the idea of the elemental unit, and repetition as a means of more profound investigation. Musically these concepts are often correlated with turntablist and glitch aesthetic (Cascone 2000): some of his compositions are written for live manipulation by glitch performers such as Marina Rosenfeld (*i.e. DW8* (2003)) or Philip Jeck. He also explores the physical spatialisation of sound when composing pieces for orchestra and loop-generators, as in the case of *DW8* (Hiekel and Utz 2016, 482). In this work, the simultaneous presence of both the original and manipulated orchestral sound (due to the presence of turntablists who perform a pre-recorded version of the piece in real-time) gives the sensation of a sonic material with a dual nature: music is repeated within a linear temporal dimension but also mirrored in each moment through a sort of giant lens.

By including Lang's pieces in this study, I intend to extend the scope of the examination. He does not explicitly conduct research centred on sound exploration; rather he creates innovative sonic forms that are then embedded within connotative musical languages such as songs, jazz improvisations, or hypnotic loops. Since he is not primarily focused on sound, and in order to have a greater variety within the selection of

³⁵ In this regard, a useful classification of different types of repetition in minimalist music is provided by Rebecca Leydon who distinguishes between *material*, *mantric*, *kinetic*, *aphasic*, *motoric* and *totalitarian* repetition (Leydon 2002).

pieces, I consider a larger set of pieces for Bernhard Lang compared with the other composers (e.g. Haas, Verrando), being conscious that the analysis of his compositions may result in a smaller number of suitable correspondences with the other pieces due to the exploration of connotative musical languages. The inclusion of Lang is expected to enrich the body of research: the detection of intrinsic and implicit sonic explorations embedded in diverse musical forms should fortify and make for a more flexible definition of a cross-genre perspective on sound, allowing listeners to then discern innovative sounds within familiar musical languages.

- *Giovanni Verrando (b. 1965–)*

Giovanni Verrando is an Italian composer. He pursued musical studies (composition, computer music) in France and Italy (Franco Donatoni, Murail), alongside studies in philosophy. He is, along with Riccardo Nova, Massimiliano Viel, and Fausto Romitelli, known for having developed different approaches within the Italian tradition of contemporary classical music (e.g. through the cultural association *Sincronie*). He is also a writer of musical essays and founder of young ensembles (e.g. *RepertorioZero*).

Verrando himself has characterised his musical production as being in two periods: during the first, his works “were developed mostly through harmonic fields”; then, from 2005, his musical research has been “focused on new lutherie (*Triptych*, *Krummholz*, *Dulle Griet*, *Multiplicity*)” (Verrando 2017).

More specifically, he has developed an integrated approach which brings together principles of spectralism, psychoacoustics, and musical informatics with a concrete exploration of new instrumental possibilities through direct manipulation of traditional instruments (*i.e.* new lutherie)³⁶. His compositions are often created for specific performers and ensembles, and they include the use of objects, toys, prepared (and amplified) instruments, and electronics, together with more traditional ensembles. In this way, Verrando achieves a very large timbric palette with noises and distorted sounds and explores new sonorities that recall noise- and punk-rock aesthetics.

³⁶ He initiated in 2016-2017 the first european course on *Chamber music with new lutherie* at the Conservatory of Lugano, Switzerland.

Dulle Griet (2009-2010) and *Triptych #2* (2008) belong to his most recent production and characterize precisely Verrando's timbric research into a complex sound always in equilibrium between harmonic and inharmonic natures.

- *Riccardo Nova* (b. 1960–)

Riccardo Nova is an Italian composer. He studied flute and composition and had a long training period in India where he focused on temporal and rhythmic elements of music and the study of percussion instruments. In parallel with his colleagues and friends Giovanni Verrando and Fausto Romitelli, Nova has worked to develop alternative perspectives within the world of contemporary classical music, trying to escape the traditional compositional conventions. He has composed music for instrumental ensembles, electronics, and performances for theatre and dance.

He has focused his attention on the spectral analysis of sound and the combination of electronic devices with instrumental and acoustic sources. The piece selected for this study, *Eleven* (2005), combines acoustic instruments, electronic sounds, and noise in order to explore new areas in electroacoustic composition. It has been conceived to be performed live by the electro-pop group Art Zoyd and the Ensemble Musiques Nouvelles.³⁷

- *Pan Sonic* (1993–2009): *Mika Vainio* (1963–2017) and *Ilpo Väisänen* (b. 1963–)

The duo Pan Sonic (Mika Vainio and Ilpo Väisänen) was founded in Turku, Finland, in 1993. Initially, Pan Sonic³⁸ gravitated towards the techno and industrial community in Finland, and their first 12" vinyl was released on Finnish Sähkö Recordings founded by Vainio himself and Tommi Grönlund.³⁹

Their records show influences of *musique concrète* and avant-garde electronic

³⁷ The piece (originally entitled *Eleven (420:11@destruction generating deity)* was performed on November 30th 2004 at the Théâtre Marni in Brussels (at Netd@ys Festival) by the electro-pop group Art Zoyd and the Ensemble Musique Nouvelles conducted by Jean-Paul Dessy, the fifth concert in the series "Expériences De Vol" (Nova 2005).

³⁸ Originally called *Panasonic*, the band received a legal threat from the corporation of the same name and was forced to change their name to *Pan Sonic*, removing the *a*, which was then used as the title of their 1999 album.

³⁹ After the premature death of Mika Vainio, on April 2017, Boiler Room TV has recently published online the 1995's documentary *Sähkö – The Movie* by Jimi Tenor that recounts the initial activities of the label (Tenor [1995] 2017).

music (e.g. Subotnick) as well as alternative rock bands such as Suicide, Kraftwerk, Throbbing Gristle, Foetus, and Einstürzende Neubauten (*i.e.* genres such as noise, industrial, punk, kraut rock). Their music recalls industrial and futuristic landscapes mixing techno, dub, ambient, and noise styles. Usually their releases combine short pieces in opposition to one another: for instance, in the release entitled *A* (1999), pieces made of drones, digital beeps, echoing throbs, and scrapes (e.g. *Maa* and *Aleneva*) are compensated by others containing dry beats, single elements, and noises (e.g. *A-Kemia* and *Telakoe*). They exploit contrasts in spectral density (*i.e.* the gathering of acoustic signals into a small range of frequencies) putting together silent episodes made up of almost inaudible traces of sound and sonic spaces saturated with distorted drones.

Their live performances displayed radical forms of electronic improvisation: they made use of homemade analogue electronic devices (home-built by his friend Jari Lehtinen) which contributed to the peculiarity their sound. This is characterised by a kind of deepness and gloom, being particular in its analogue nature that –in contrast to similar artists such as Alva Noto and Autechre– enriches their sound world with organic and handcrafted nuances, revealing a sort of “material beauty”. Moreover, in their live performances they included a video projection that displayed a single vertical line (usually white on a black background) of an oscilloscope which reacted in real-time with the sounds “to further enhance the physical presence [...] [of their] sub-bass tides” (Bailey 2012, 299).

Pan Sonic’s *Kesto* (2004), the selected work for this study, is a four-CD project which lasts for almost four hours and may be seen as an ultimate anthology of their music over the years. Starting with harsh and violent atmospheres, the listener is led, piece by piece, towards more meditative and attentive environments. The first CD is characterized by tight rhythms and rich and distorted spectra, and pieces on this disc have a strong link to noise, industrial, and club-techno genres. The second disc contains pieces where the rhythmic structures are more complex and syncopated. Pieces in this set include elements more typical of glitch music (*i.e.* articulated and extended construction) rather than techno or IDM styles. *Kesto*’s third CD includes pieces with long developments, fewer and sparser elements, minimal constructions, episodes of

silence, slow rhythmic progressions, and real-word sounds that appear filtered and manipulated. Pieces of this CD encompass elements typical of the avant-garde and *musique concrète* (e.g. *Linjat* is dedicated to Alvin Lucier). The fourth CD consists of a single piece: it stands apart from the Finnish duo's other works because of its atypically long duration. It is a clear tribute to drone-based minimalism. The musical flux may be reminiscent of the aesthetic of materialist minimalist composers (Corbett 2000), such as Charlemagne Palestine, Phill Niblock, and the cosmic music of Klaus Schulze, however, Pan Sonic's drone is not ethereal; rather, it is "rooted in the neuroses of the post-industrial individual" (Scaruffi 2017).

Pan Sonic disbanded in December 2009. Their final studio album, *Gravitoni*, was released in May 2010, and a live recording of a 2009 performance was published in 2014.

- *Ryoji Ikeda (b. 1966–)*

Ryoji Ikeda is a Japanese composer, visual artist, and sound artist. Ikeda concentrates on the primal characteristics of sound itself and manipulates sounds within an extremely large range of frequencies. He usually works with digital electronic devices to explore *raw* elements of sound, such as sine tones and noise. He pays particular attention to the use of frequency ranges and rhythmic textures, elaborating pulsated patterns, often constructed with mathematical algorithms, where a tone's wavelength is carefully modulated: each sound is literally made of a series of partials specifically synthesized by himself.

He also creates dense aggregates of sustained sounds which slowly evolve. In this regard, even if it is a characteristic more commonly associated with glitch and computer music, he can be ascribed to drone music and ambient styles as well. His performances are characterized by a complex combination of sounds, video, and other physical phenomena that allow a listener to become engaged in an immersive live experience.⁴⁰ Live concerts involve light and dark effects, but –in contrast to Haas– he is interested in design, symmetry, and processes, being particularly focused on

⁴⁰ Recently, he developed installations where video projections are extended to the surrounding floor and ceiling (Spielmann, Welle, and Jones 2012, 122–23).

mathematical and data processing, and he implements these domains through sound.

Ikeda's album *+/-*, which contains the two works *Headphonics* and *+/-*, represents a crucial step in his early artistic career. Acknowledged by curators and researchers such as Hasegawa and Demers, as the key point of a process of radicalisation in the use of microscopic sonic elements (Ikeda and Hasegawa 2009; Demers 2010, 86–87), this release consists of pieces made from single musical figures which gradually change in spectral density but with the music remaining in a sort of static position. Sound frequently moves through the stereophonic field and –as Ikeda explains– “has a particular sonority whose quality is determined by one's listening point in relation to the loudspeakers” (1996b). The inclusion of *+/-* in the body of research is important for its extreme characteristics: Ikeda represents an ultimate example of glitch and sound artists who –coming from independent contexts– have gained attention from the general public. His music is associated with microsound but does not belong to its institutional branch (*e.g.* Xenakis, Truax, Vaggione (Roads 2004, 64–65)) but rather to the one

often described as *minimalist*, *ambient techno* and *electronica* [...]. Microsound musicians of this ilk are usually not associated with research or academic institutions and in many cases have no formal music training. Instead, they gravitate toward visual arts and design and may consider themselves affiliated with the intelligent dance music (IDM) movement that evolved from the techno and house scenes of the 1990s. (Demers 2010, 72) (*italics added*).

- *Raime (2010–): Joe Andrews (n.d.) and Tom Halstead (n.d.)*

The London-based duo Raime (Joe Andrews and Tom Halstead) are typical of the most recent underground scene in that they move freely between noise, techno, and dub styles. The pair were initially influenced by Detroit techno (*e.g.* Model 500, Drexciya), jungle, and dubstep/basic-channel style. However, their sound includes influences from 1980s industrial, post-punk, and doom metal, as Tom Halstead confirms: “the whole palette of electronic music wasn't flicking any switches in us any more; there's a certain level of aggression [in industrial] that struck a chord” (Beaumont-Thomas 2012).

From the small amount of published material in print and available online, it seems clear that they seek to move away from clichéd formulas, trying to balance a

fragile equilibrium between the repetitive schemes of techno and dance-based music with a sort of organic manipulation of sonic material. Their music combining the slow rhythms of dubstep with minimal musical textures might be defined through their sense of irregular tactility rather than a strict conformity with IDM paradigms: “the taut percussion is loosened, and guitars, cellos and live drumming help sketch out a powerful narrative” (Beaumont-Thomas 2012). In contrast to the automated rhythmic structures typical of certain types of IDM, Raime want to integrate live instrumentation, field recordings, real-world sounds, and a kind of human touch all together into a sound where at times “vocal samples were propelled amid tightly paced beats and behind deliciously gloomy layers of reverberation” (Birkut 2012). In this regard, they approach an organic idea of sound which is consciously crafted; they express the desire for “rawness and viscosity and unpredictability” (Beaumont-Thomas 2012).

Most recently, they have divided their collaborations by performing under new names, alternating work with live performers for rock-oriented songs (*i.e.* as Moin) with work more focused on rhythmic structures (*i.e.* as Yalla). The four pieces selected for this study come from the period 2010 to 2012 and include early experiments and pieces coming from their first long release *Quarter Turns Over A Living Line*. The inclusion of the most recent tendencies within IDM (both Andrews and Halstead are in their thirties) is quite important in tracing connections with current musical trends. The lack of a literature about these new practices may hamper a full analysis and hinder comparison, but Raime come from a well-established offshoot of dance music and so their output can be still be contextualised within a wider group of artists such as Demdike Stare and Moritz von Oswald, primary figures of dubstep, minimal techno, and remix practices.⁴¹

⁴¹ Recently, labels such as Deutsche Grammophon and ECM, quintessences of specific classical and contemporary musical genres, have inaugurated new lines of releases centred on remixing material from their catalogue by figures such as Moritz von Oswald, Carl Craig, Ricardo Villalobos, and Max Loderbauer.

II Analysis of Musical Works

II.1 Premises

The set of musical works analysed as part of this study span a wide range of genres and styles. This diversity presents a difficulty: how is it possible to examine the complex composition for twenty-four instruments *in vain* by Georg Friedrich Haas together with the seemingly indefinite electronic drone of *Säteily* by the duo Pan Sonic? This chapter summarises the more detailed analysis carried out as part of this study (see Appendix A for the full analysis) and proposes that a meaningful examination should be concerned not so much with different compositional methods but rather with shared tendencies in handling sound. This examination should then start by establishing those musical components perceived to be common to all the selected works.

One should consider that genres such as drone, dub techno, or noise sometimes explore the very physical limitations of listening itself (*e.g.* through extreme durations, saturated spectra, and loud volumes) and “push sound beyond semiosis to a state in which it communicates directly to listeners’ bodies” (Demers 2010, 15; Solomos 2013, 166) (see also (Solomos 2013, 166)). Thus, in order to allow for meaningful comparisons, this outlook should hold when extreme oppositions, challenges to listening, and radical acoustic choices are encountered during the examination.

Some pieces in the study are written compositions, while others consist only of recorded material without any notated aspect. Centring the analysis on a score for some pieces and recorded audio for others would not represent an equal treatment, the presence of a score potentially biasing the analysis by focusing on technical methods and strategies of construction rather than sonic results (Delalande 2013, 145–46). In order to ensure a coherent examination, I base the analysis off recordings⁴² for the

⁴² At the time of carrying out the research, there was only one recorded version of each of these notated pieces available (except for a recent version of *Differenz/Wiederholung 2* published on 2016 (Lang 2016a)). The information I am extracting does not assume that these recordings are the definitive versions of the pieces, rather they allow a way into the work that looking at score alone would not permit.

notated works, favouring audio and spectral approaches to all works as central to the analytic procedure, and considering score, textual, and other external references as auxiliary materials.⁴³

Following this, the current analysis seeks to approach works from different genres from the side of perception and spectral examination rather than through the comparison of any predefined compositional method or theory. By building on certain existing analytic methods that take perception into account (*i.e.* spectro- and spatiomorphological approaches (Smalley 1997); the structural grid (Emmerson 1986); perceptual categorisation (Landy 1994)), I aim to use a consistent set of musical descriptors for different types of composition.

Most existing methods, approaching analysis in similar ways to this, are applied only to electroacoustic and acousmatic music (Roy 2003, 187–95; Landy 2013), and these tend to focus on morphological approaches (Smalley 1997; Couprie 2003; Couprie and Malt 2014) or consist of studies of perception itself (Bregman 1999; Landy 2007; Delalande 2013). Though spectro-morphological analyses are highly precise in how they examine sound, and show considerable potential for other genres, they are usually only applied in non-comparative analyses of electroacoustic music. These analytic procedures are certainly well suited to acousmatic and electroacoustic music: they make use of special tools for spectral and morphological analysis and focus attention on the classification of the nature of sound (*e.g.* acoustic, noise, concrete, real-world, electronic...). Moreover, a detailed statistical and quantitative analysis of sonic elements does not usually allow for inspired or insightful comparisons. It is clear, for example, that an electroacoustic piece has the potential for a larger sonic spectrum than a composition for string quartet. Musical episodes would be better characterised and compared using a qualitative description rather than a quantitative analysis that examines, for instance, magnitude spectra (Malt and Jourdan 2011). There is in fact a current interest in extending approaches to a more general level to allow for comparative studies across different genres (Bodin 1997; Emmerson and Landy 2012,

⁴³ The audio, spectral, and score analyses include the use of Sonic Visualiser[®] (Cannam, Landone, and Sandler 2010), Eanalysis (Couprie 2008), and TIAALS software (M. Clarke, Dufeu, and Manning 2013).

2016).

In Chapter I, following the historical and theoretical speculations and premises, I established the following initial characteristics which are shared by all pieces of the type under consideration:

- the development of a complex and articulated notion of sound which includes noises, microtonal practices, and use of layering;
- a peculiar use of repetition that involves different perceptual stances (*e.g.* in accumulation, rhythmically animated, ecstatic, hypnotic);
- the exploitation of sustained sounds and slow progressions.

The analysis aims to further develop the outlook outlined by these characteristics, extrapolating evidence for a more precise description, disclosing other shared elements, and potentially also finding significant divergences within the more general common perspective. Even though this analysis is placed before the other parts of the study in terms of order of the chapters, it underwent some refinement based on results and data coming from the other facets of the study which are presented in the later chapters (*i.e.* perceptual, poietic, Chapters III and IV). Likewise, this analytic step has in turn influenced those other tasks.

II.2 Stepwise method

To refine and bring detail to the characteristics described above, two questions were formulated and serve as the foundation for the analytic approach. This two-step foundation supports a more detailed stepwise approach, which ultimately led to a taxonomy which enables the articulation of connections between use of means (different sources and instrumentations), sonic characteristics and evolutions, and broader organizations of different musical episodes within the group of selected works. The two fundamental stages are encapsulated by the following questions:

- *What are the elements that define a musical episode? What characteristics do these elements have? (Step #1, Table II.1).*
- *What are the aural developments of these characteristics? (Step #2, Table II.2).*

Step #1

The first step consists in the identification of general categories through which musical episodes⁴⁴ may be described and compared. These categories represent fundamental dimensions that can be adapted to different styles and sound sources (*e.g.* acoustic, electroacoustic, electronic...) and that have the potential to describe the characteristics of sound itself. Similar to previous studies (Smalley 1997; Roy 2003; Emmerson and Landy 2012), I propose four categories with which to describe a piece: *time*, *dynamic*, *spectrum*, and *perceptual mode* (Table II.1). In this first stage, attention is focused on sonic qualities, and so it is not by chance that three of these categories correspond to the three dimensions of spectral representation: time, dynamic, and frequency.

Table II.1 Description of music events as cross-combination of four categories⁴⁵

Time	Dynamic	Spectrum	Perceptual Mode
pulse	$p - // - f - ff$	harmonics	foreground
decay	contrasts	world-sounds	background
waves	static	acoustic	acousmatic listening
accelerate	crescendo	electronic...	multichannel...
rhythm	distortion	(Arrangement)	
...	...	density, layers, sparse...	

The *Time* category relates to the shape of a sound and its attack and decay (*i.e.* ADSR properties). Considering this category in a wider sense, it also concerns larger configurations such as rhythm, gradual changes in tempo/pulse/rate of flow (*accelerando*), or the transition of patterns. *Dynamic* contains all descriptive aspects that relate to the intensity of sound, not simply loud and soft but dynamic contrasts and

⁴⁴ Each piece was divided up according to either an intuitive approach, or a different succession of musical textures and events (*e.g.* short episodes, single tracks...) (Giomi and Ligabue 1998; Roy 2003, 149–52; Delalande 2013).

⁴⁵ This categorisation is not restricted by the selection of the musical works. In order to have a greater viability, Tables include more general cases beyond the research sample, embracing for instance acousmatic listening and multi-channels diffusion.

variations of any kind. *Spectrum* concerns all frequency-based descriptions⁴⁶. The remaining category, *Perceptual Mode*, encompasses the different practices of sound presentation and perception in the physical space (e.g. concert hall context, stereo or multichannel listening), as well as those aspects that account for the positioning of sonic events within the internal space of sound (e.g. figure-ground positioning, cf. Smalley's spatiomorphology). The subcategory *Arrangements* (Table II.1) includes those aspects that relate to the general arrangement of aural events. This subcategory might highlight similarities between, for instance, the layering of either sonic events or parallel movements.

These categories aim to help distinguish and order different episodes, illuminating specific aspects within complex sonic constructions. Episodes are defined using a combination of categories, e.g. "loud and complex pulses with long decay are placed in a sparse environment with a large dynamic contrast".

Step #2

When the episodes being compared are constituted by morphologically different sound elements but show affinities in terms of development, organization, and impact, this method is able to give an account of these similarities by focusing more on behaviours than on the intrinsic qualities of single sounds. These aural developments may emphasize a kind of sharpness or smoothness of sound, giving the impression of an approach or a climax. Alternatively, they could concern spatial aspects, creating the impression of an expansion or contraction of sonic space, or they could even involve time-related aspects created through the use of repeated and contrasting elements (Table II.2).

Episodes can also be described through a more intuitive apprehension of their properties and developments beyond the steps outlined above. This type of comparison would proceed by collecting as many examples as possible, in a less systematic or conscious manner, according to whether they seem to have a common global

⁴⁶ The identification of acoustic and electronic sounds –properties which depend on frequency-based dimensions– does not aim to segregate and assess different sonic sources, rather it allows for the recognition of the use of different means to achieve comparable results.

configuration. This intuitive selection can then be refined in order to remove those less representative cases and potentially add new more convincing ones. In this way, the most numerous and important cases would lead to more general definitions (Delalande 2013, 178–79).

Table II.2 Correlation with possible sonic developments.

Sound Characteristics	Space^a	Repetition / Difference
sharpen / smooth	multi- / single diffusion	single / continuum
approaching / leaving	expansion / contraction	excess / minimal fact
climax	filling / removal	rhythmic
multivoiced / solo	layering / uniqueness	hypnotic
		combination tones

^a *This is a general label that refers to sonic effects both in the physical space (e.g. multi-diffusion) and in the inner space of sound (e.g. expansion).*

The framework put forward here is designed to be flexible and comprehensive, taking the characteristics of sound itself as experienced through listening and described through spectral analysis as its starting point. Even though this study uses descriptive tools, the examination itself seeks to identify musical sections not just in purely morphological terms (Step #1) but also according to the perceptual effects of how those morphologies are used (Step #2), including their aesthetic and functional dimensions (Delalande 2013, 38). To highlight only correspondences between, for instance, rotative, spin, spiral, pericentral, and centrifugal motion processes (Smalley 1997) would not necessarily contribute to the definition of a shared perspective, and may only provide a list of similarities that could hold for many different and unrelated approaches. Furthermore, the proposed two-step method is meant to lead to comparisons between pieces, rather than exhaustive analyses of single pieces. Its usefulness comes in fact from finding similar ideas between different pieces where a method suited to examining specific pieces would not be able to draw these parallels. Hence, the analytic procedure presented here is best regarded more as a comparative method than as a taxonomic description.

II.3 Analysis

The analytical process outlined above was applied to the set of pieces.⁴⁷ Below, I summarize the main elements that have emerged for each piece. It is worth noting again that the analytic process was informed by the subsequent parts of the study, and that the elements that emerge for each piece do so in light of the other pieces being analysed.

II.3.1 Georg Friedrich Haas

String Quartet n°2 (1999)

[notated piece / digital version of the score and audio material available / Recording: Haas – Kairos Quartett. Edition Zeitklang – ez-19017 (Adenbüttel / Deutschland, www.zeitklang.de) (Haas 1998b, 1998a)]

String Quartet n°2 by Haas is characterised by a rigorous integration of the four instruments creating a complex sonic hybrid that behaves as a unique corpus, being at times static and at others in motion (throbbing, ascending or descending). Haas uses microtonal harmony and *glissandi*, and he makes use of bowing techniques to widen the spectral palette (*i.e.* he uses *bichords*, alternating dynamics and exploiting *vibrato*, “*sul ponte*”, and “*sulla tastiera*” techniques). He often works with repeated small units (sequence of pitches or dynamic sequences, sometimes both) interspersed among the four instruments. For example, at 06’45” (bar 86), he constructs an episode using repetitive *glissandi* played with the same dynamic structure (*i.e.* a middle note of the *glissando* is played *sforzato*) to build a larger configuration. The sonic cascade thus generated from E $\flat$ 6 to G $\sharp$ 3 (bars 87–96) is a movement that starts vertically (steep *glissandi*) and ends horizontally (*i.e.* sustained tones moving within a microtonal range of frequencies, Figure II.1) and in which the interweaved construction of the four

⁴⁷ As noted above, recordings were used to analyse all pieces. Each recording is indicated at the beginning of the corresponding analysis. For works with a notated score, I decided to refer mainly to temporal indications in these recordings rather than bars to identify specific musical episodes. Occasionally, in order to provide a very precise references, I also use bars numbers. Traditional notation is expressed here in accord with the Helmholtz-Ellis microtonal notation extended to quarter and sixth tone (♯, ♭, ♯♯, ♭♭ and ♯♯, ♭♭, ♯♯, ♭♭, ♯♯ respectively) and superscripted “-” or “+” over the modulation mark indicate minor alterations (lower or higher) around the note. Standard characteristics of depicted spectrograms are listed in Appendix A, Table A.2.

Haas often exploits structural oppositions based on spectral characteristics, dynamic character, and different musical atmospheres. Examples of this are the timbric and dynamic oppositions at 04'26'' (bar 57), and the transition from the fragile aura at 09'50'' (bar 129) to a dramatic and intense character (10'00'' – 10'30'', bars 136 – 145).

Using these forms (*e.g.* repetition of elements, sustained sounds, structural oppositions), Haas creates a rich and diversified sound world. On the one hand, the music is apparently static and sound may be perceived vertically (Kramer 1988) outside of chronometric time through the focus on its continuity and its instantaneous presence. Through a tight combination of different timbres, Haas expands and reduces sonic space using frequency-based interactions (*i.e.* starting from a single tone, the four lines branch and converge within a microtonal range, see for instance Appendix A, Figure A.9), bowing techniques, and dynamic. The use of these means (*i.e.* timbric and dynamic structures) within recurring patterns creates small-scale hypnotic effects and contrasts. On the other hand, the sound is also dramatic: instrumental attacks in *sforzato*, *ostinato* sequences of repeated notes, loud *glissandi*, and metronomic accelerations enhance the sense of a concrete and almost tactile sound.

in vain (2000)

[for 24 instruments (2 flutes, oboe, 2 clarinets, soprano saxophone, bassoon, 2 horns, 2 trombones, 2 percussionists, harp, piano, accordion, 3 violins, 2 violas, 2 cellos, double bass) / notated piece with indications of light/dark lighting changes during performance / score and audio material available / Recording: Haas – Klangforum Wien, S. Cambreling – In Vain. Austria: Kairos – 0012332KAI-CD (Haas 2000b, 2000a)]

In vain is characterised by a number of specific musical figures which return throughout the entire piece, demarcating clear musical episodes (often in correspondence with changes between light and dark in the lighting of the concert hall).

(i) A main figure which opens and closes the piece (the opening figure being mirrored at the end) and which appears in a central episode is a cyclical progression that continuously changes in timbre, moving between percussion and piano to strings, giving

a monumental global development. The descending lines which begin the figure are weaved together in a dense sequence of notes (the initial pitches are G $\sharp$ 6 / D6 / G5 / C $\sharp$ 5 / G4 / C $\sharp$ 4 / F $\sharp$ 3 / C3) and their fast repetition generates a sort of sustained and oscillating effect of suspended tritones.⁴⁸ With each repetition, the lines converge on low pitches, mixing together into an indistinct mass of sound as the new ascending profile emerges. The initial sequence progressively slows down to a dilated succession of sustained notes. At the end of the piece, the same design is reversed: starting with a continuous and static construction, the movement begins to accelerate (*i.e.* large chords are gradually converted to rapid descending notes). Each new cycle overlaps on top of the previous one, accelerating more rapidly than the previous one, and the piece ends when the last cycle stops unexpectedly in midair, leaving a feeling of interruption.



Figure II.3 Spectrogram [40 – 5000 Hz / 31'11" – 35'21" / bars 343 – 413] of *in vain*.

This construction, when observed on a macro-scale, recalls the never-ending development of some acoustic illusions such as the Shepard tone (Hasegawa 2015).⁴⁹ The spectral analysis of this construction (Figure II.3) shows how this effect is created, and if the entire episode is taken as a whole, it is possible to see how Haas uses a very meticulous construction to create a larger sonic idea: starting from a fast succession of short tones within a steep descending configuration, he progressively dilates the entry

⁴⁸ While when the section reappears (31'17" – 35'24", bars 344 – 413), the descending line consists of an almost chromatic series.

⁴⁹ These lines are often based on a tritone relationships which adds a bewildering effect (Deutsch 1986).

points of new notes and their durations, modifying the sequential overlapping of every descending figure (Figure II.3, dashed arrows). He creates a pulsating temporal identity without using any percussive elements, composing a flexible sonic matter that is pulled out and extended.

(ii) Another musical construction consists of a dilated episode typified by a more static character. It usually corresponds with the extinguishing of the lights and –in the score– to an unmetred section (*e.g.* from 05'23" to 11'00", bar 76; from 44'18" to 54'12", bar 529). In these sections, Haas provides approximate temporal indications for each new musical situation and performers –when the light is extinguished in the space– repeat a series of musical modules, orientating themselves through listening alone. These sections are characterised by a sequence of sustained chords, timbral shifts from strings to wind instruments where the overall sound consists of a combination of long notes using both tempered and natural tunings. Haas uses delicate contrasts between held notes and *glissandi*, continuous and discrete sounds, slow fades in and precise attacks. He applies different dynamics and playing techniques (*e.g.* playing *sul ponticello* and *sforzato*) to enlarge or reduce the harmonic spectrum and articulates this evolution using full-orchestra chords, solo instruments, and silent interludes.

(iii) A key figure found throughout the entire piece (*i.e.* including inside the musical sections previously described) is the continuous interplay between the natural harmonic series and the equal temperament scale. This juxtaposition is found in its starkest form in the harp solo at ~09'17" (bar 76). In this clashing episode, Haas uses these tuning systems to generate a sense of incompatibility between two sound worlds (Figure II.4, (Hasegawa 2015; Rattle 2013)). In a similar way, close to the end (~48 min, bar 529), Haas reaches a climax of intensity, placing the natural and tempered scales against one another: the repetition of notes creates a concatenated and continuous texture of sound over which the harp plays a series of *glissandi*. The full-ensemble creates a dense sonic aggregate which culminates with a noisy and dissonant chord (53'43").

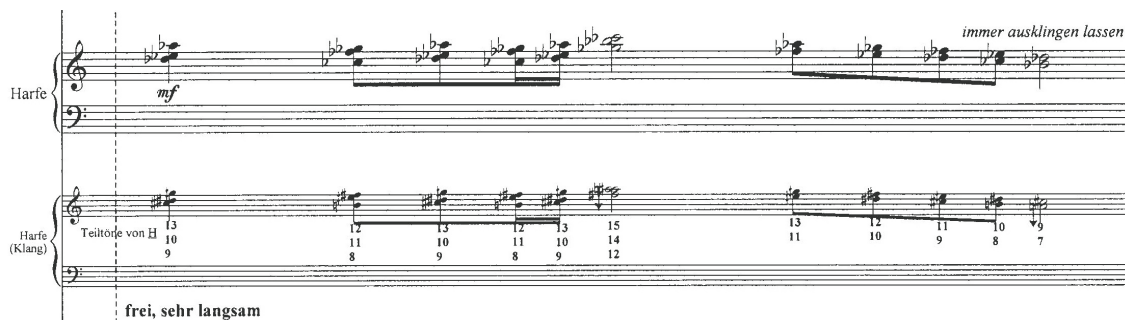


Figure II.4 Extract of *in vain* [p 81, bar 76, begin of harp line]. (Georg Friedrich Haas “*in vain* | für 24 Instrumente” © Copyright 2000 by Universal Edition A.G., Wien/UE 34805)

(iv) Another recurrent figure is the succession of clusters made up of different fundamental notes and their corresponding harmonic series. The two episodes in which this practice is exposed (at 24’20”, bar 240⁵⁰; and at 39’38”, bar 457) are conceived as a pair with one mirrored by the other and possess the following internal geometry: a sequence of *arpeggi* (each one based on a different fundamental note), descending or ascending (*i.e.* first or second episode), layering the natural harmonics of each note. This musical figure works both as repetitive module and as a sort of escalating means to transform a suspended episode into a progressive motion.

In addition:

- Haas frequently uses loud dynamic contrasts to create clashes, demarcate sections, trigger new movements, or emphasize timbric differences (*e.g.* 02’07”, bar 29; 31’10”, bar 344; 51’46”, bar 529).

- He uses tight microtonal designs creating very close combinations of tones. He sometimes reduces the sound spectrum of the whole ensemble to a very limited frequency range (*e.g.* 07’34” – 08’04”, bar 76; 29’52”, bar 325; 30’04”, bars 328). Typical of this design is the suspended drone made from the 12th, 13th, and 14th natural harmonics of G and the F[♯] chords (30’43” – 31’01”) where each instrument plays

⁵⁰ In the first exposition of this musical figure, Haas composes an ascending sequence of clusters from a B cluster at 24’20” then an A cluster at 24’48”, a G cluster at 25’15”, an F[♯] cluster, 26’01”, an E^b cluster, 28’08”, a D^b cluster, 28’41”, a C cluster, 28’54”, and again a B one at 29’03”.

sforzato on the same notes (in particular, each string plays a sustained chord of two notes, Table II.3).

Table II.3. Sustained notes in measure 339 of in vain.

Instrument	note	natural harmonic
1 st flute / 2 nd flute	E $\flat$ 6 / D $\sharp$ 6	14 th (F $\sharp$) / 13 th (F $\sharp$)
oboe	E $\flat$ 5	14 th (G)
1 st clarinet / 2 nd clarinet	E $\flat$ 6 / D $\flat$ 6	13 th (G) / 12 th (G)
tenor sax	D $\sharp$ 5	13 th (F $\sharp$)
bassoon	E $\flat$ 5	13 th (G)
1 st horn / 2 nd horn	E $\flat$ 5 / D $\sharp$ 5	14 th (F $\sharp$) / 13 th (F $\sharp$)
1 st trombone / 2 nd trombone	E $\flat$ 5 / D $\flat$ 5	13 th (G) / 12 th (G)
1 st and 3 rd violins / 1 st viola	[E $\flat$ 5 + D $\sharp$ 5]	[14 th (F $\sharp$) + 13 th (F $\sharp$)]
2 nd violin / 2 nd viola	[D $\flat$ 5 + E $\flat$ 5]	[12 th (G) + 13 th (G)]
1 st cello / 2 nd cello	E $\flat$ 3 / D $\flat$ 3	13 th (G) / 12 th (G)

– He uses a very peculiar organisation of instrumental interventions based on different timbres. In particular, the harp (tuned to the harmonic series of C1), horns and trombones, and the loud insertions of tam-tam acquire a significant role in terms of “timbric presence” above any other type of narrative character.

The general idea of the piece is centred around the opposition between elements, whether dynamic, temporal, rhythmic, or relating to tuning systems (*i.e.* natural *vs.* tempered). Haas designs symmetries and makes significant use of repetition to create larger structures. As Simon Rattle accurately describes, *in vain* is a dramatic piece, grounded in a sort of primordial research into a harmonic gravity (2013).

II.3.2 Pan Sonic

Kesto (2004)

[Musical project edited in 4CDs / audio material available / Recording: Pan Sonic – Kesto 234.48:4”. UK: Blast First – BFFP 180BX-CD (Vainio and Väisänen 2004)]

Keskeisvoima / Centralforce [CD1-track 8]

Keskeisvoima consists of two musical sections that are arranged in an ABAB’ structure, where A is a largely empty scene mainly characterised by rhythmic elements and subtle high-pitched tones, while B represents a longer section consisting of a dense drone standing in contrast to the rhythmic elements of A and noisy interventions. The reprise, B’, is a *closing element* in the sense that it differs from the original B section through the absence of rhythm. The drone of B is composed of a dense aggregate of sustained and distorted tones that extend over a large spectral region and it is based –in its first exposition (*i.e.* 02’38”)– on a A $\sharp$ harmonic series (*i.e.* 238 Hz (A $\sharp$ 3);⁵¹ 475 Hz (A $\sharp$ 4); 712 Hz (F $\sharp$ 5); 950 Hz (A $\sharp$ 5); 1193 Hz (D $\sharp$ 6); 1423 Hz (F $\sharp$ 6); 1660 Hz (G $\sharp$ 6); 1897 Hz (A $\sharp$ 6); 2134 Hz (C $\sharp$ 7)). Within this mass of sound, Pan Sonic create illusory movements in which a descending transition (*e.g.* from F $\sharp$ 4 to C $\sharp$ 3 at 05’09”) is perceived –due to the complexity of spectra and the unnatural intensity of higher partials– as an ascending motion (see also Appendix A, Figures A.26). These elements make the music seem massive, filling sonic space in every direction, and the piece is characterised by a furious opposition of dynamics and spectral density.

Lautturi / Rafter [CD1-track 11]

Lautturi is constituted by two clear musical sections, both possessing a static and oscillating character. In the first part, Pan Sonic focus on the superimposition of a sequence of sounds traveling through the stereophonic field (00’24”– 02’09”, Figure II.5 top-left, blue/red line labelled as “bass drone”) and cyclical *glissandi* (fading in at

⁵¹ In absence of a notated score the identification of tones was usually extrapolated from Sonic Visualiser spectrograms (A=440Hz) and it is expressed with traditional notation together with the corresponding frequency range.

01'06'' – 02'23'', dashed line in Figure II.5 top-left). While the second part of the piece (from 02'30'') consists of periodic waves of sounds forming an interlaced texture that is regularly modulated in dynamics (Figure II.5 bottom-right).

Throughout the entire piece, the intention is to create a continuous sound made up of circular patterns in different sonic dimensions: frequency vs. time; stereophonic space vs. time; dynamic vs. time. In fact, the two parts of the piece are both constituted of two oscillating forms which formally belong to different physical dimensions. In the first case, the beat and the periodic *glissandi* develop within a frequency/time space while the spatial fluctuation occurs between the two stereo channels. In the second case, the periodic *glissandi* is combined with another movement occurring in dynamic. The idea is to enhance to characterisation of the different spaces where sound may unfold.

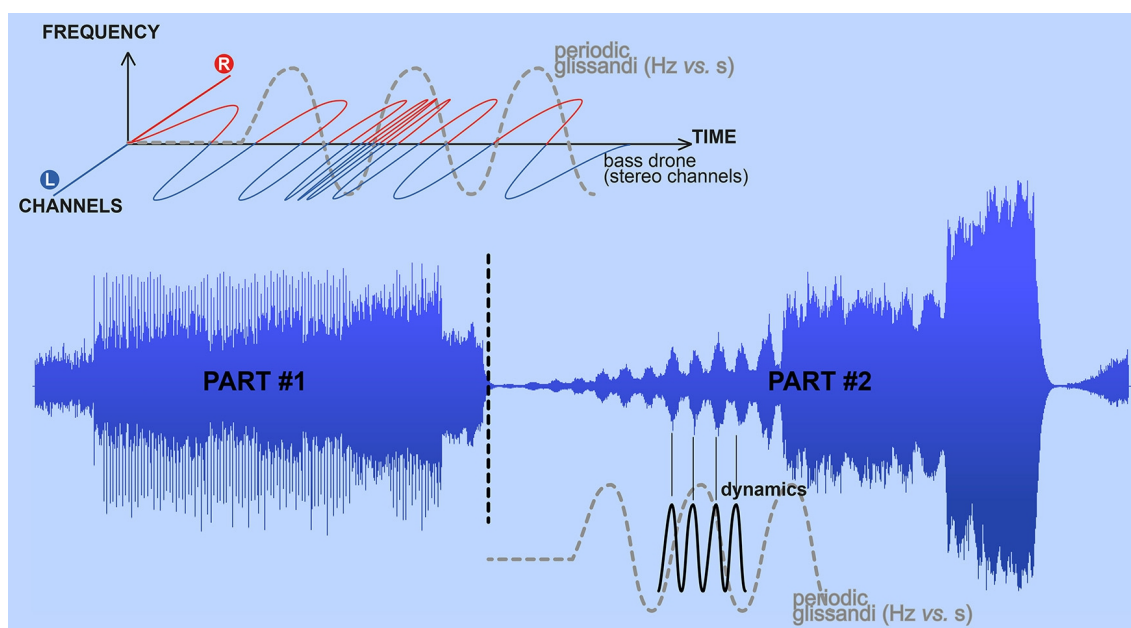


Figure II.5 Schematic representation of the two parts of the sonogram of Latturi (Top-left and bottom-right plots depict the evolution of the two circular movements within distinct two-dimensional spaces).

Etäisyys / Distance [CD2-track 1]

The core of *Etäisyys* is developed as a strict polyrhythmic structure (using a global unit of eleven beats, see Appendix A, Figure A.31) that works as a framework to

support at times noises, concrete sounds, or high and sustained tones. There is a clear delineation of sonic domains where distinct spectral regions are selectively occupied by different sonic forms. However, the consistency of sonic events leads to a perception of the piece as a unique whole possessing multiple facets (*i.e.* rhythmic, harmonic, noisy).

This piece incorporates both an opening and closing episode as a sort of symmetrical *intro* and *coda*. These sections are composed of noises and concrete sounds that move gradually inside (and outside) a virtual musical space, acquiring (and losing) a reverberation effect. This movement may recall the beginning of Ligeti's *Artikulation*, and similar to Ligeti's piece, it creates a "contrast between two possible environments [giving] the possibility [...] [for] an interplay between the electronic (or synthetic) and the 'natural'" (Windsor 2000, 25).

Prospekt Vernadskogo [CD2-track 11]

Prospekt Vernadskogo is a short piece that consists of a mirrored *glissando*, simultaneously ascending and descending, containing within itself the antithetical form of the piece.⁵² Pan Sonic use spatial, temporal, and pitch-based elements to create this sonic evolution, exploiting symmetrical *glissandi* and both a fluctuating and static sound character.

Ilmenemismuoto / Appearanceform [CD3-track 3]

Ilmenemismuoto is composed of discrete blocks of sound interposed with silence and quiet episodes. Pan Sonic work with extreme contrasts, and the piece moves from extremely noisy sounds to microscopic interventions in the high frequency range. At first listening, one may be tempted to adjust the volume to temper these dynamic contrasts. The very slow decay that starts at 01'08" serves to prepare the listener for the delicate sounds that follow. This second part is defined by the use of sparse elements with a specific decay time (*i.e.* the high frequency echo is very short, while the bass reverberation is dull and compressed) which are immersed in a dense drone in the low frequency range (168 Hz (E[♭]3); 230 Hz (A[♯]3)). There is a clear intention to challenge

⁵² Similarly to Haas' *in vain*, Pan Sonic compose a musical episode that is illusory since it appears to move simultaneously in opposite directions.

the listener's perception with a drastic range sonic material and a very good listening environment is essential: the lack of this would completely compromise the appreciation of the piece. Sound is treated as if it were a plastic substance, stretched, compressed, and dilated; extreme dynamic contrasts enhance the effect of a physical consistency of sounds.

Selittämätön / Inexplicable [CD3-track 5]

Selittämätön displays dense fluctuating yet static sonic textures. There is an important dynamic and spectral transition (02'58'') that separates the two sections. It functions as a structural *caesura* that introduces a new musical chapter in which the music proceeds by softly reiterating elements and creating hypnotic echoes. Pan Sonic use different sonic forms constructed using flat continuous sounds, indistinct noises, punctual and sequential notes (*i.e.* ~D6; ~E6; ~F6; A[♯]6; B6)⁵³ which may remind the listener of a dodecaphonic series (in the final part of the piece), and a loud percussive intervention that interrupts an overall sense of fluctuation (02'58''). The piece is designed with separated scenes and transitions, and the general hypnotic effect is created largely through the use of sustained sounds and reiterated figures.

Ilma / Air [CD3-track 6]

After a short introduction, *Ilma* presents a compact sonic texture that gradually unfolds throughout the entire piece. Pan Sonic use marked dynamic peaks to punctuate a continuous musical flow which is based on a sort of A open chord (*i.e.* E3 / A4 / E5 / A5 / E6 / A6). Sonic aggregates become gradually more dense, several tones comes in and out creating interlaced textures, and the harmonic centre moves away from the A chord towards a more complex collection of tones (*i.e.* F[♯]3, B[♯]3, [A[♯]4 – A[♯]4], B[♯]4, D[♯]5, F[♯]5, F[♯]5, C[♯]6). Microtonal evolutions and modulations occur within a complex sonic material: some lines deviate and converge, emerge and disappear, and these movements –marked by regular elements replicating the periodicity of waves– give the impression of a global sound going in different directions.

⁵³ At every cycle each note shifts within a microtonal range (*i.e.* D6 [D[♯]6 – D[♯]6]; E6 [E[♯]6 – E[♯]6]; F6 [F6 – F[♯]6]; A[♯]6 [A[♯]6 – A[♯]6]; B6 [B[♯]6 – B[♯]6]), the temporal transition progressively changes, and the duration of each note (*i.e.* its decay) expands.

Linjat / Lines [CD3-track 8]

Linjat is dedicated to Alvin Lucier and is characterised by a single and coherent idea: discrete electronic sounds follow one another within an interlaced microtonal structure. The piece proceeds with an apparently undetermined structure, but spectral examination shows that the music is arranged in a rigid matrix: there are six levels of development, each one centred on a different D# (*i.e.* from D#2 to D#7, Figure II.6).

The tones at each level are organised within a microtonal range; globally, these (almost) pure tones follow one another, conflicting, harmonizing, creating dense clusters, or resounding alone. Occasionally, tones that are not included within the microtonal matrix of D# emerge (*i.e.* F#3, G#3, A#3, E4, G#4, C#5, F5): these external elements –when they appear– open up a sort of traditional harmonization within what is otherwise a microtonal piece. The arrangement of sounds is tight and plastic: some elements return and the rigid microtonal construction contributes to create a sense of hypnotic and non-teleological evolution.

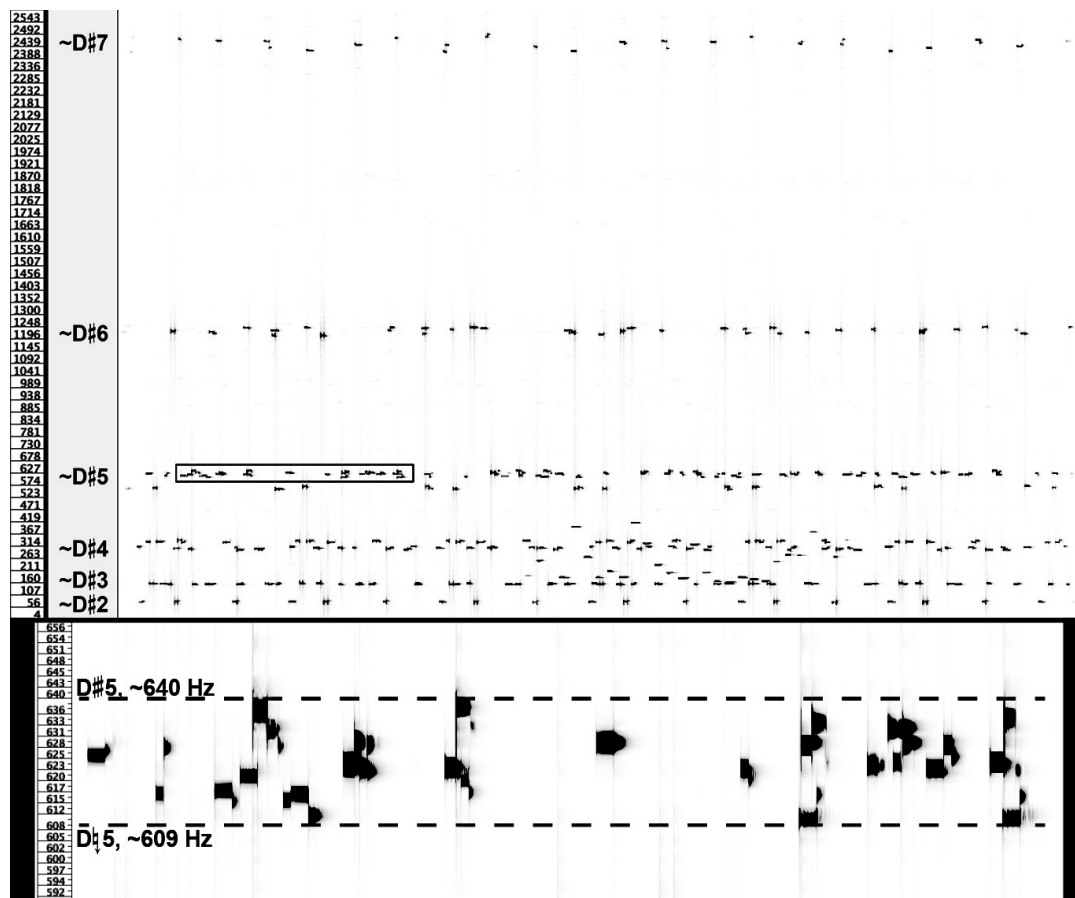


Figure II.6 Spectrograms [top: 4 – 2550 Hz / entire piece; bottom inset: 617 – 656 Hz / 00'27" – 05'34"] of Linjat.

Säteily / Radiation [CD4]

Säteily stands out due to its duration of sixty minutes, longer than is typical for pieces by Pan Sonic. It is conceived as a minimalist composition:⁵⁴ it is composed as a single, indefinite, and ever-changing drone.

Throughout the evolution of *Säteily*, the sound spectrum is transformed using slow processes and the music gradually passes through different sonic scenes. The inner profile of individual sounds is often composed by superimposition of steady and

⁵⁴ The piece is dedicated to Charlemagne Palestine and, in terms of general structure, it recalls spectralist (e.g. Murail's *Désintégrations* or Ligeti's *Atmosphere*) as well as minimalist compositions (e.g. Lucier or La Monte Young's pieces).

throbbing lines (Figure II.7),⁵⁵ while globally the piece evolves through a succession of different combinations of layers.

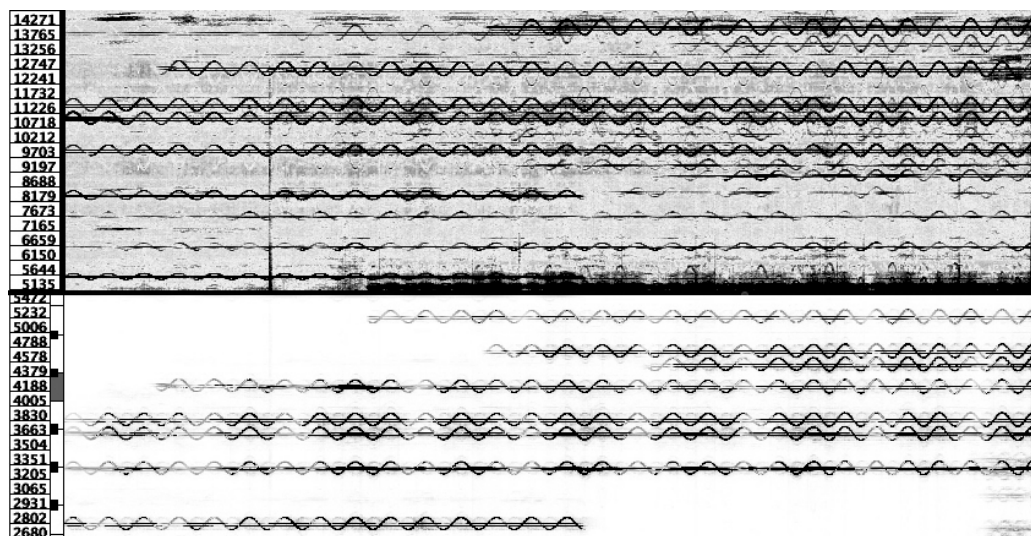


Figure II.7 Spectrogram [top: 5.1 – 14 kHz; bottom: 2.6 – 5.4 kHz / 26'10" – 28'00"]
of *Säteily*.

Pan Sonic construct scenes giving the impression of an expansion and contraction of sonic space.⁵⁶ Additional oscillations are present in the use of dynamics, giving a sense of increased instability. Even though the electronic medium allows for an enormous variety of timbre, sound in *Säteily* retains a coherence in terms of shapes and profiles used.

II.3.3 Bernhard Lang

The specific properties of the *Differenz / Wiederholung* series, namely the complex repetitive structures, have required the use of a particular terminology to articulate the hierarchical organisation of the pieces. These works present these properties frequently, and the use of these same terms makes the analysis easier and clearer. These terms fit within and are part of the more general classification framework

⁵⁵ In most cases, tones oscillate within a little frequency range: for instance the initial tone at ~280 Hz, C[♯]4 moves from 277 Hz, C[♯]4 to 290 Hz, D[♭]4.

⁵⁶ Similar to some sections of Haas' *in vain*, they layer up groups of tones filling the whole spectrum and then follow this with a concentration on a few lines of sound.

used throughout the study, and are situated within the *Arrangement* category (Table II.1). Specifically, I refer to *cell*, *unit*, and *unit-cluster* as part of a particular bottom-up hierarchical structure. A *cell* refers to the smallest musical element that is then repeated. A *unit* is a group of repeated *cells*. A *unit* could be composed of a single kind of repeated *cell*, and it includes starting and ending portions that demarcate its beginning and end. A *unit-cluster* (for brevity *u-cluster*) is a pattern of several *units* which can themselves be identical or different (see Appendix A, Figure A.42 for details).

Differenz / Wiederholung 2 (1999)

[Differenz / Wiederholung 2 (from now on DW2) is a multimedia piece that includes a music performance of an electronic instrumental ensemble and three singers as well as a video installation on multiple projection walls. DW2 is based on texts by Gilles Deleuze, William Burroughs, and Christian Loidl, and the ensemble includes: three singers (Kurdish, Rapper, Classical); oboe, clarinet, tenor saxophone, cellos, double bass, synthesizer (Yamaha 77/99), a series of drums and percussions, marimba, electric guitar, electric violin / notated piece / textual and audio material available / Recording: Lang – Klangforum Wien, Sylvain Cambreling – DW2. Austria: Edition Kairos – CD-0012112KAI (Lang 2000)]

DW2 is a composition divided in eight parts in which the various movements present very clear sonic developments *e.g.* *Repetition And Difference* is closer to an improvised session with a very rich sonic material, dynamic contrasts, and polyrhythmic structures; *The Ovens Reconstruction*, in contrast, is a continuous extended loop which evolves into different forms while maintaining a unified shape. Peculiar of Lang's construction is the redundant and *ecstatic* effect that arises not from the duration of the musical episode but rather from its fragmentation: the rapid repetition of different short units (working as mini u-clusters) and the disordered evolution of musical discourse of *Dead Repetitions* and *Repetition And Difference* are examples of this kind of hypnotic effect.

Lang makes use of very short u-clusters in repetition where rhythm is fragmented and embedded in a disordered sequence (*i.e.* *Dead Repetitions*). In *Habit*, he shows how the compositional approach using u-clusters, units, and cells generates a

complex musical structure and it often consists of layered combinations of tones with an intense use of repeated *glissandi*. *The Ovens* and *Prisoners* (*i.e.* third and fifth part of the composition) are more easily understood from an overall perspective: there is a unified idea of sound which encompasses microscopic sonic details and nuances made of spoken and singing voices, strings, winds instruments, electric instruments, and electronics that may escape inattentive listening. As evidenced by Utz and Hiekel,

[...] a special complexity is developed by Bernhard Lang in *Differenz / Wiederholung 2* [...] for which “limping” (meticulously written) pulsations [and] transcription of improvised structures play a decisive role.⁵⁷

Lang, in particular in the central section of *The Ovens* (02’35” – 05’52”), uses a dense sonic palette that has to be globally perceived as a sort of *pointillist* aggregation of sounds.⁵⁸

The fourth and the sixth chapters of *DW2*, *Image/Idea* and *Need*, are instead characterised by their static and uniform nature. *Image/Idea* is a pure electronic drone block containing beats and microtonal variations. The rhythm is generated by binaural beats and, at times, a reciting voice is audible but always remains submerged under a dense mass of the electronic sound.⁵⁹ *Need* is almost a *one unit-cluster* piece: even if the piece is characterised by different episodes constituted by different units, the regular cadence ensures the homogeneity of repeated modules.

DW2 is a piece conceived to be seen live (*i.e.* multiple video projections) and the strong connection between musical forms (*i.e.* based on repetition of elements) and the meaning of the texts recited by the singers is strongly felt in *The Ovens*, a piece which shows a spectacular interplay between singers and musicians. However, the music itself, aside from the text, still holds a strong enough character that aural and spectral inspections remain powerful analytical strategies to extract useful elements for

⁵⁷ “Besondere Komplexität entfaltet dabei etwa Bernhard Langs *Differenz / Wiederholung 2* [...], für dessen (minutiös ausnotierte) ‘hinkende’ Pulsationen Transkriptionen improvisiert Strukturen eine entscheidende Rolle spielten” ((Hiekel and Utz 2016, 539; Sanio 2010) my translation).

⁵⁸ The combination is chaotic and could be seen as a single sonic idea split between different sources, thus recalling, in its structural conception, past examples of Schoenberg (*Klangfarbenmelodie*), Varèse, and Xenakis.

⁵⁹ The plastic use of several tones as tools to generate beats is a practice that could be found in similar experiments by figures such Alvin Lucier and Ryoji Ikeda.

the comparative purposes of this study.

DW3 (2000)

[for flute, accordion, and cello / notated piece / digital version of the score, liner notes, and audio material available / Recording: Lang – DW8/DW15/DW3. Germany: Col legno, Bayerischer Rundfunk, BR-Klassik – WWE20090-CD (Lang 2004)]

DW3 is a piece inspired by Lang's previous works for solo instruments (specifically those for flute, cello, and accordion) and makes use of u-clusters where there is a clear distinction between the three instruments. Lang constructs a long succession of very different u-clusters (presented mostly in fast transition) which might be considered together within a unique sonic flow: there are differences in dynamic, tempo, and rhythm, but the units themselves follow a continuous progression due to the appearance in every cell of at least one sustaining element. U-clusters used here are dissimilar to one another but in combination they act in accordance with a general horizontal development (e.g. from 11'35" to 14'30").

Globally, *DW3* shows different sequences of instrumental interventions that recall automated mechanisms (i.e. motoric repetition, (Leydon 2002)). Lang explores a wide range of instrumental timbres through the use of a scrupulous notation (e.g. multiphonics, whistle-tones, percussive techniques) and he frequently superimposes sounds, uses dynamic and temporal contrasts⁶⁰, rhythmic and repeated figures, and occasionally creates hypnotic atmospheres with *glissandi* and pitch-based movements. Considering the overall structure, the fast-paced succession of sections distinguishes *DW3* from the other pieces in the *DW* series which show a slower rate of unfolding.

DW7 (2002)

[for large orchestra and loop-generator⁶¹ / notated piece / audio material available

⁶⁰ For example when clusters constituted by a small number of scattered elements (e.g. 19'14" – 19'33" or 21'02" – 21'11") are followed by others made of dense layerings of sounds (e.g. 19'33" – 19'55" or 21'24" – 21'34"); or when constructions of sustained sounds (e.g. 19'55" – 19'59") are replaced by fast successions of very short elements (e.g. 20'00" – 20'04").

⁶¹ The loop generator creates real-time echoes of the instrumental sound.

(Lang 2002)⁶²]

DW7 is a composition characterised by episodes of two different kinds: on the one hand, Lang creates delicate sonic texture with repeated modules forming extended drones that fade in gradually. On the other hand, there are episodes where the orchestration used is that of a sort of jazz-ensemble: drums and percussion mark rhythmic figures and wind instruments play on top of this.

In the episodes of the first type, he explores the whole sonic spectrum through the simultaneous presence of both a large variety of timbres and a very precise selection tones arranged in layers.⁶³ For instance, from 08'45'' to 09'30'', Lang uses units consisting of sustained sounds featuring the superimposition of repeated sonic elements: the intensity of the drone increases and the sonic material gives the impression of being continuous but unstable. Rhythmic interventions by strings and keyboards, manipulated in real-time by the loop generator, create a fragmented horizontal contour. Lang takes advantage of all the timbric possibilities by creating more articulated u-clusters. The loop generator further enhances the modalities of repetition with effects of reflection, distortion, and fragmentation. At 16'21'', for instance, the loop generator produces a fragmented echo of previous material: the original unit of the previous u-cluster is shortened and distorted and this manipulation is protracted in the next module played, this time by the orchestra.

Other episodes are typical of jazz-style u-clusters that pop up in succession where orchestral roles are divided in rhythmic elements (*i.e.* drums and percussions) and soloist musical lines (*i.e.* wind instruments).⁶⁴ Lang introduces a series of contrasting u-clusters (*i.e.* fast, slow, empty, and full of sounds) exploiting opposing dynamics, using repeated *glissandi* in different modes (*i.e.* 11'49'', 11'58'', 12'09''), and increasing the musical tension.

⁶² Audio material available online at <http://youtu.be/XJr8hr1EK8Q?list=RDXJr8hr1EK8Q> (part 1); <http://youtu.be/bGvbJbnawzI?list=RDXJr8hr1EK8Q> (part 2); <http://youtu.be/ZMxsyosaVNg?list=RDXJr8hr1EK8Q> (part 3) (last access April 2018))

⁶³ Episodes made of long musical shapes which repeat themselves within a gradual evolution are similar to Raime's constructions (*e.g.* *Passed Over Trail*): in this comparison, each track of Raime's work corresponds to one of Lang's clusters; in both cases, the music unfolds step by step and at every cycle of the repetition new elements are added.

⁶⁴ But the frenetic progression of micro-clusters often found in *DW2* and *DW3* is rare.

From 19'00'' to 19'36'', Lang uses units made of several asynchronous events (complicating the identification of the *cell*) possessing scattered and continuous elements (either as linear or wavy forms), placing in sequence keyboard interventions and wind instrument *glissandi*. The global effect is of a dense combination of elements reinforced with a microtonal series of sounds and works as an example of how Lang creates a musical episode where rhythm and stasis coexist.

DW8 (2003)

*[for orchestra and two turntable soloists / notated piece / digital version of the score, liner notes and audio available / Recording: Lang – DW8/DW15/DW3. Germany: Col legno, Bayerischer Rundfunk, BR-Klassik – WWE20090-CD (Lang 2004)]*⁶⁵

The slow beginning of *DW8* exemplifies the principal nature of this piece: using both pre-recorded and live sounds, Lang intends to reconstruct a massive repetitive mechanism. A cyclic music interrupted by unpredictable *mistakes* proceeds seeming suspended and enigmatic, punctuated by silent interludes, and characterised by the use of distinct elements plastically inserted in the sonic space.

Lang uses the typical construction of repeated elements, but he superimposes on this a larger form creating more complex arrangements. For instance, from *ca.* 05'00'', he composes a large bridging episode to interconnect two different u-clusters (Figure II.8). This consists in an elaborate texture of strings playing high pitches⁶⁶ and wind instruments (*i.e.* 07'00'' and 07'54'', Figure II.8 “bridging element”). These constitute a sonic stream made of a rich timbric diversity that starts a very slow descending movement (Figure II.8, arrows) and then vanishes, leaving the rhythmically regular elements of the new u-cluster (08'12'' – 09'00'').⁶⁷

⁶⁵ The following text from liner notes of the original CD edition has been taken into account during the analysis: “[...] The piece *DW8* draws on passages from *DW11* played by *Symphonieorchester des Bayerischen Rundfunks* and recorded to vinyl before being mixed by the two turntable artists in live performance, there entries being given a defined structure. The orchestra becomes a kind of gigantic record player, the plethora of loops and more well-known sounds emerge in a context of repetition and may be perceived or understood anew” (Lang 2004).

⁶⁶ Which has correspondences with those used by Nova in *Eleven*.

⁶⁷ This section might recall several episodes of Haas’ *in vain* in which the global movement of sound, perceivable as a macroscopic design, is achieved through a microscopic orchestration.

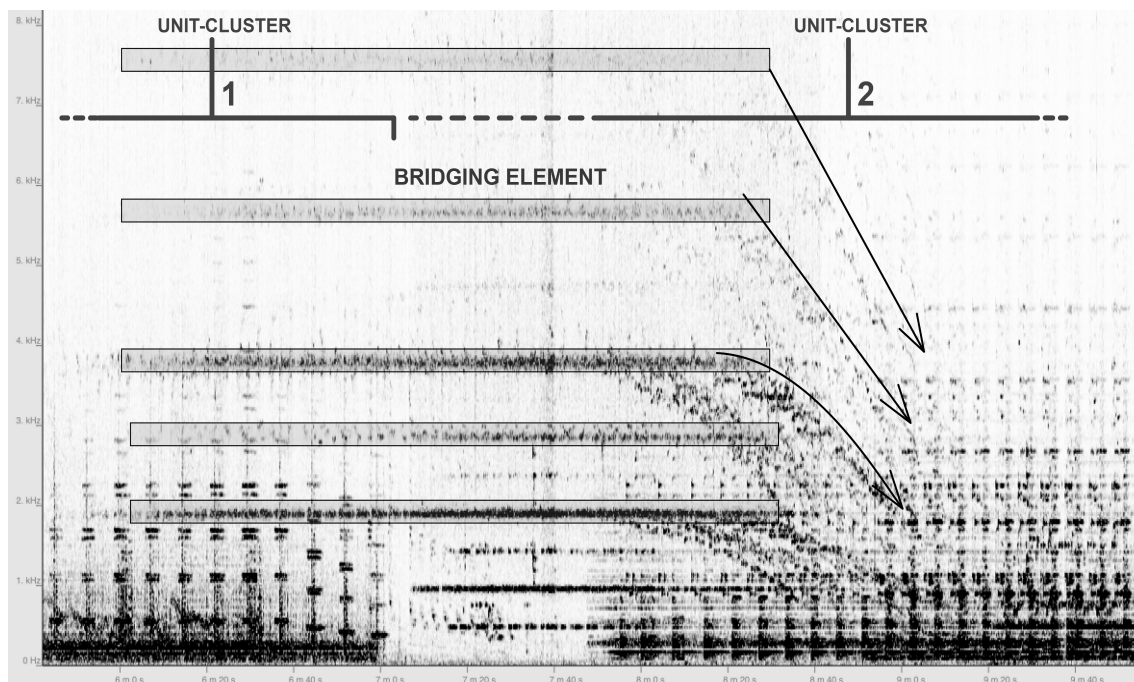


Figure II.8 Spectrogram [0 – 8.2 kHz / 05'50" – 09'40"] of DW8.

With a similar role ascribed to the loop generator in *DW7*, the two solo turntablists manipulate the orchestral sound. They maintain a musical coherence using regular repetitions but create a collection of deformed (*i.e.* detuned fragments of instrumental sounds), filtered, and irregular interventions, adding noises, echoes, and high-pitched glissandi (*i.e.* from 15'57" to 18'05"). The deformation of traditional orchestral sound and the unpredictability of development enhance the impression of a giant mechanism producing sound as a kind of “gigantic record player” (Lang 2004).

Even if *DW8* also includes fast, rhythmic u-clusters generated by short units displaying a tight and regular form (*e.g.* 11'38"),⁶⁸ the composition embodies a concept of development based on very long repeated units that progressively change and become more complex. The attention in *DW8* stays focused on: the spectral exploration of sonic material and its dual nature (*i.e.* the simultaneous presence of both the original and manipulated orchestral sound); the use of sustained and layered tones within a

⁶⁸ In these cases, Lang develops polyrhythmic patterns that bring to mind pieces of early minimalism (*e.g.* Reich, Andriessen) in which fast repetitions generate suspended and non-teleological profiles. Here, however, the musical conception is more sculptural: sounds continue to have a precise location in terms of dynamic, spectral region, and a clear role in the musical development.

microtonal range of frequencies; the recurrent presence ascending and descending movements; and the rhythm and the formation of dense masses of sound.

DW9 – Puppe Tulpe (2003)

[for voice, viola, cello, double bass, flute, clarinet, trumpet, trombone, percussions, and piano, based on texts by P. C. Loidl / notated pieces / score⁶⁹ audio material available / Recording: Lang – DW14 + DW9. Germany: Cavalli Records – CCD452 (Lang 2007)]

In *DW9* Lang alternates two constructions typical of his work implementing oppositions between different types of loops to create hypnotic, developing atmospheres.

On the one hand, he exploits contrasts between rhythmic and continuous u-clusters (similarly to *DW2* and *DW3*)⁷⁰, creating animated episodes (with the appearance of voice) made of pointillistic interventions, short u-clusters, and fast transitions (*i.e. part I*, from 08'25" to 14'21"); on the other hand, he develops suspended episodes (*i.e. part I*, 05'02") with the recurrent repetition of a single unit that gradually develops (as in *DW7* and *DW8*) where there is a precise arrangement of sounds based on their timbric characteristics (see Appendix A, Table A.10). For instance, *part III* from 04'08", he shapes a dense mass of superimposed sounds mainly centred around F, C, and A#, but containing several groups of tones within a microtonal range of frequencies (Figure II.9).

⁶⁹ An online version of the score is embedded in the youtube video (Lang 2016b).

⁷⁰ However, while in *DW2* and *DW3* some instruments are used to keep playing the same figures across different clusters, in *DW9* transitions between clusters happen all at once.

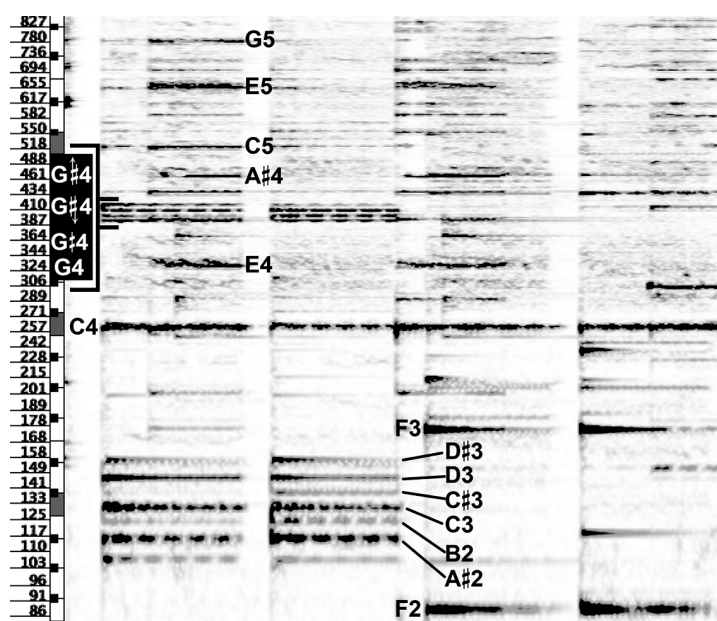


Figure II.9 Spectrogram [82 – 835 Hz / 04'23" – 05'14"] of DW9-III.

The long solo for the voice (*i.e.* DW9-II) brings out the strong relationship between music and text. However, this material largely falls outside the scope of this analysis given the focus of the research.⁷¹

Lang develops two types of repetition: on the one hand, he maximizes the timbric possibilities of traditional instruments, giving the impression at times that they are being electronically manipulated, *e.g.* the repeated *glissandi* at 07'51" (*i.e.* DW9-III) dissolves into silence, mimicking the failure of a mechanical device. On the other hand, some episodes –in particular at the beginning of the piece– do not appear to be generated from a mechanical defect of a repeated process, but instead give the impression that the performers are stumbling or partially improvising. This is because Lang uses u-clusters made of units of different size: these units are not composed of identical cells, rather each cell is composed of diverse combinations of the same sonic elements, thus giving the impression of a repetition that is not mechanical but humanized.

⁷¹ In this section, Lang juxtaposes silence with loud elements of voice, breathy sounds, and spoken words. He makes frequent use of repeated long phrases as well as very short utterances. The idea is to emphasize dramatic and *performative* aspects, and the repetition of phrases and words gives prominence to specific portions of the text.

DW14 (2005)

[for jazz trio (saxophone, bass and drums) and Loop Orchestra / notated piece / audio material available / Recording: Lang – DW14 + DW9. Germany: Cavalli Records – CCD452 (Lang 2007)]

In *DW14*, the instruments are given particular musical roles following a free-jazz aesthetic: the piece includes blues-style rhythmic sequences, solo episodes, and improvised parts. Frequently, drum and double-bass mark rhythmic structures while the saxophone plays on top of them (*e.g. DW14-I*, 04'40" – 07'44"). Sometimes musical interplay becomes more complex, leading to a free-form episode in which the sonic stream is dense, inharmonic⁷², and polyrhythmic. Other times, for instance in *DW14-II* from 02'21" to 03'22", the rhythm is interrupted by an almost silent interlude using a few saxophone and percussion elements.⁷³

Recalling similar processes in *DW7* and *DW8*, Lang includes gradual evolutions: with each repetition of the unit, a different collection of sonic layers is presented over which the solo saxophone traces high-pitched phrases. In these cases (*e.g. DW14-II* from 16'23") the atmosphere becomes quieter and the impression is of a unique aural atmosphere that incorporates many different constitutive elements (*e.g. bass pulsations, electric drone, wind instruments, and high-pitched tones*).⁷⁴

DW15 – Songs/Preludes (2003)

[for electronic zither, voice, and cd-recording / notated piece / liner notes⁷⁵ and audio material available / Recording: Lang – DW8/DW15/DW3. Germany: Col legno, Bayerischer Rundfunk, BR-Klassik, WWE- 20090-CD (Lang 2004)]

⁷² The saxophone plays sforzato notes and multiphonics creating a series of inharmonic and overtone sounds (*e.g. 14'15"*).

⁷³ Even if the instrumentation recalls a jazz orchestra, the incessant slow rhythm of the following episodes (*i.e. DW14-II*, from 03'23" and 04'28"), bass pulsation, and the large sonic spectrum might recall the atmosphere of some pieces by Raime (*e.g. Told & Collapse*).

⁷⁴ Such kind of effect have similarities to some pieces by Pan Sonic, Rioji Ikeda, and Raime.

⁷⁵ "[DW15] is a dramatic inscape comprising works song-like in form. The loop technique present in the earlier works is taken forward a notch, the aim being to complete a larger song cycle, the Songbooks. The vocal part represents, in an imaginary way, a number of whispered inner voices, ones associated with the uttering of demons, just like those transcribed in the medieval "Grimoires". These voices can only be heard in trance, where the subject is in an exalted state of awakened sleep. The writing for the zither is overlaid with an electronic texture and thus takes on a kind of double instrumentation. [...]" (Lang 2004).

The peculiar instrumentation of *DW15* characterises the piece: the sound of the e-zither is mainly high-pitched and possesses a sharp attack with a short decay; the voice sometimes acts as connecting element between different u-clusters, and at other times it emerges with short utterances to reinforce the rhythmic structure. Throughout the four songs of *DW15*, Lang maximizes the opposition of elements.

On the one hand, the *First Song* is characterised by a complex interplay between zither, electronics, and voice. The repeated unit used throughout is based on an irregular rhythm that gives the impression of stumbling like a sort of defective mechanism.

Conversely, the *Second Song* has a more ecstatic atmosphere: the electronics take on a primary role, creating deep bass and oscillating sounds, with continuous and overlaid sounds being developed horizontally. Lang makes a peculiar use of vocal utterances: some short breathy sounds (*i.e.* aspirated consonants) appear over a continuous texture and expand the spectrum up towards high frequencies; other vocalizations occupy middle and high frequency ranges. Complementing this, e-zither and electronics cover middle and bass frequencies.

Exemplary of this organisation is the very slow sequence of units from 06'40" to 08'00" (*DW15-Second Song*, Figure II.10). The sequence is characterised by the presence of a rich sonic spectrum (from 55 Hz to 13 kHz) made of groups of sounds contained within microtonal ranges (*e.g.* the electronic tones around 270 – 317 Hz, C $\sharp$ 4 – D $\sharp$ 4, Figure II.10). The slow tempo generates a hypnotic effect that is enhanced by the presence of continuous sounds, while the presence of the detached notes in the zither delineates a large empty sonic space.

The *Third* and the *Fourth Song* reflect a strong narrative and dramaturgy. The former has a structure made of pointillistic constructions using mini u-clusters and vocal fragments with textual and narrative elements typical of a song. The latter has a mainly rhythmic character using short u-clusters in a rapid turnover where the voice maintains a strong semantic character and, even if the singing is decomposed and fragmented, the original idea of a songbook is still discernible.

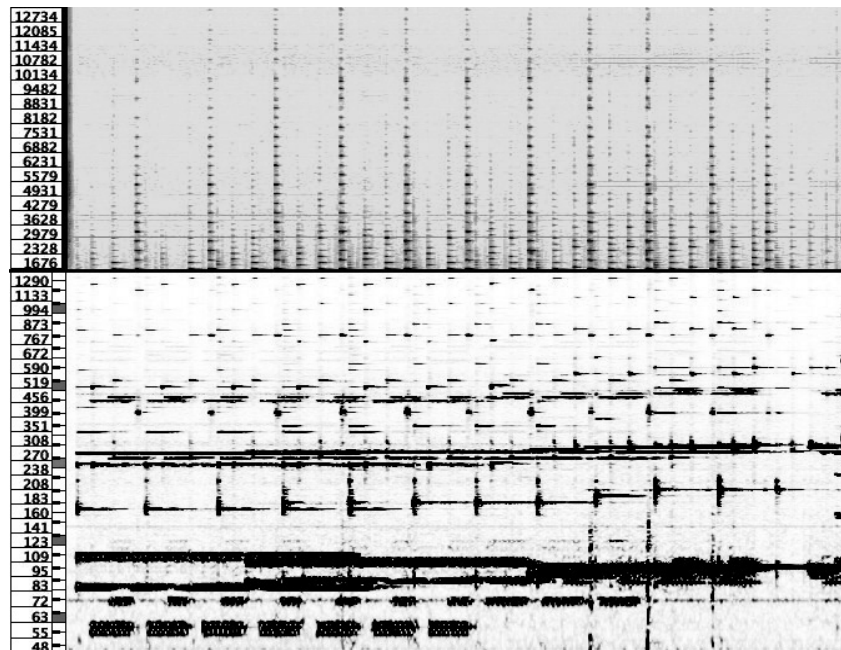


Figure II.10 Spectrograms [top: 1.6 – 13 kHz; bottom: 44 – 1300 Hz / 06'39" – 08'00"] of DW15–Second Song.

DW17 – Doubles/Schatten II (2004)

[for electric viola, electric cello and surround orchestra / notated piece / audio material available / Recording: Lang – DW17: Doubles/Schatten II . Germany: Col legno, WWE 1SACD 20613 (Lang 2006)]

DW17 lasts for over forty minutes and is characterised by both a fast turnover of mini u-clusters using dynamic and spectral contrasts and static episodes consisting of overlaid sounds and where the music unfolds gradually.⁷⁶

The first aspect, typical of the initial and final parts, takes place in the form of elaborated u-clusters: at times, Lang uses recurring patterns in the wind instruments and percussion which serve to support the solo phrases of electronic viola and electronic cello (e.g. 03'30" – 04'55"); he exploits fast rhythms, short u-clusters, obsessive repetitions, and fragmented evolutions (e.g. 39'58" – 40'15") mostly generated by the

⁷⁶ This piece encompasses many characteristics common to other works within the selection and shares practices with Raime (e.g. the clusters at 14'40" and at 35'15" where sound is developed by layering sounds), Haas, and Nova, as well as sonorities found in Ryoji Ikeda and Pan Sonic (e.g. 25'30" and 33'00").

real-time manipulation of surround orchestra. Other times, the orchestra plays short sequences of repeated units which bring to mind elements of pop music or soundtracks (Polaschegg 2013), but Lang decomposes these clichés. The music is fragmented, generated by different sources: solo instruments, orchestra set up in surround, and real-time sound processing interplay within a musical organization that is stumbling and recalls a flawed mechanism (Lang 2008).

The second aspect of *DW17*, found in the central part (19'50" – 39'00"), consists of a quiet section made of a series of blocks of sustained sounds (in the range of 800 – 6000 Hz). The musical structure here is typical of spectralism where each aggregate of tones depicts a new *composed timbre*. Sound is sustained by a succession of fragile chord-timbres where the liminal nature of the music is due to the almost imperceptible presence of overtones that continue to appear and disappear. Lang develops a series of static scenes where different drones follow one another in a sort of ecstatic sequence, and he enhances the sequence by leaving long silences or short percussion insertions (*e.g.* from 28'15" to 28'29"). Dynamic and spectral oppositions articulate these transitions in which sound is both acoustic and electric, original and manipulated.⁷⁷ Lang uses several types of repeated elements (*i.e.* a regular noisy pulsation, an ascending movement of notes, and a sequence of two tones in opposition) with each of these occupying a discrete portion of the sonic-spectrum.

II.3.4 Ryoji Ikeda

Headphonics (1995-1996)

[*Musical project edited in one CD*⁷⁸ / *audio material available* / *Recording: Ikeda – “+/-”. UK: Touch – TO:30-CD (Ikeda 1996a)*]

In his pieces, Ikeda frequently uses only a small set of raw sounds, mainly generated using oscillators and digital manipulation.

⁷⁷ This section has some similarities with Nova's *Eleven* piece where the ensemble generates a complex sound which behaves as if it were a single entity: sometimes leaving empty spaces of silence, other times saturating the spectrum with dense and extended textures.

⁷⁸ The CD entitled “+/-” includes both *Headphonics* and +/- series of pieces.

The three pieces that constitute *Headphonics* display a similar conception: all evolve by progressively adding new elements. In this way, Ikeda succeeds in developing elaborate combinations of sounds that, even if often involving bewildering interference effects, can be perceived globally as a coherent sonic material. The central idea of Ikeda's work is the use of simple sounds of dissimilar timbre, such as mechanical square pulses, bass beats, recurrent noisy insertions, drones made of specific tones, and rhythmic pulsations oscillating between the stereophonic field. All these elemental sounds, occupying the whole audible spectrum (sometimes embracing sonorous stimuli beyond it), are combined in such a way that the resulting sonic texture is innovative and unexpected.

In the 3rd piece of the project, *Headphonics 10*, for instance at 02'47'', there are a significant number of sonic elements of different types.⁷⁹ This framework, as an articulated repetitive pattern, is similar to the complex arrangement created by Lang in his *DW*-series (e.g. *DW8*, 06'15''). When the piece reaches its highest level of complexity, one may easily listen to the global sonic result, but the listener is also able to isolate single elements within this whole. This ability to segregate components is facilitated by the fact that each element is presented and added gradually during the progression of the piece.

More generally, as the title suggests, the three pieces of the *Headphonics* series are specifically designed for listening with headphones: the oscillation between the two stereo channels is more evident with headphones, and these pieces have “a particular sonority whose quality is determined by one's listening point in relation to the loudspeakers”, meaning headphones provide a more ideal listening position (Ikeda 1996b).

⁷⁹ (in order of appearance) (I) a tone, as alternated square pulse alternated [990 Hz, B5]; (II) regular interventions (based on C#4, D#4, D#4); (III) two tones [1110 Hz, C#6; 3340 Hz, G#7]; (IV) a bass beat synchronous with elements II/III [G#1, 52 Hz]; (V) a dry beat [covering the range of 10 – 9000 Hz, duration: ~370 ms]; (VI) a noisy insertion [2000 – 19000 Hz, duration: ~418 ms]; (VII) a bass line [45 – 162 Hz]; (VIII) two high tones appearing in a reversed-decay mode [7033 Hz, A8; 9375 Hz, D9]; (IX) two sustained tones with a slow fade in [C5, 523 Hz, C#5, 554 Hz]; and (X) an additional sharp tone [C8, 4168 Hz].

+/- (1996)

[Musical project edited in one CD (see footnote⁷⁸) / audio material available / Recording: Ikeda – “+/-”. UK: Touch – TO:30-CD]

“+” series (+ / +. / +..)

The piece entitled “+” consists of a single sonic element which is filtered in different ways during the course of the piece’s evolution. The result is a slow and incessant emergence: the sound seems to always have the same form but in fact it is ever-changing and appearing in each moment to be different from how it just was. Ikeda constantly reveals different traits of the same element. In a similar way, “+.” replicates the elements of the previous track, but here a more articulated design is developed in the high frequency region of the spectrum.

The third piece (*i.e.* “+..”) also uses a similar concept: Ikeda composes a unified sound, modifying its inner characteristics while maintaining its unity and structure. In this third piece, Ikeda uses a very fast mechanical pulsation (*ca.* 62 pulses every 5 seconds) that functions as a stable material that is filtered and manipulated. The analysis of the spectrum from 2 to 18 kHz reveals a very rich evolution of sonic textures which are however hidden within an apparently uniform profile. The piece contains several bass sounds (up to around 200 Hz, Figure II.11, letter “a”) and two high-frequency sounds centred on 8 kHz (B[♯]8), and 12 kHz (F[♯]9) (Figure II.11, letter “b”). When the high sounds disappear (01’50”), a series of new patterns emerges which is more polarized towards the very high frequencies. In taking to the extreme these high tones, Ikeda lets the bass line emerge more clearly while adding brighter harmonics to the sound (Figure II.11, letter “c”). These changes are sometimes evident while other times they are almost inaudible. For instance, manipulations of sound in the frequency range between 3 – 19 kHz are very clear in the spectral analysis, but the listener finds it challenging to perceive and distinguish what are minimal differences for human perception within an almost unchanging structure.

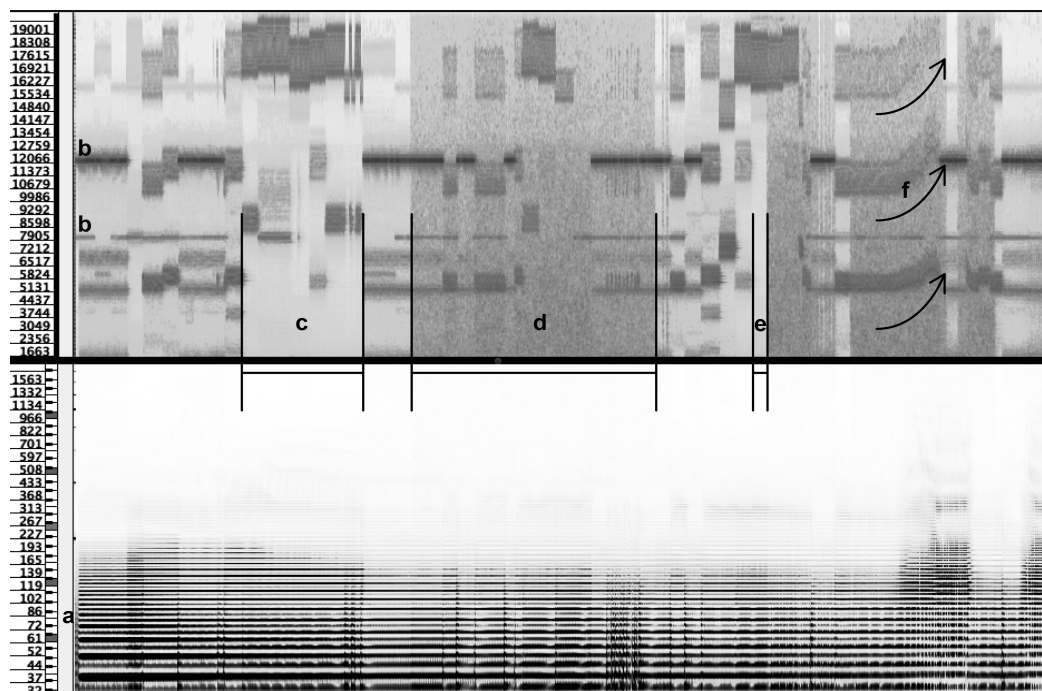


Figure II.11 Spectrograms [top: 1.6 – 20 kHz; bottom: 35 – 1600 Hz] of “+. .”.

The central part of the piece (03’44” – 06’27”, Figure II.11, letter “d”) explores more dilated elements, and Ikeda ends up reducing the rhythmic line to its simplest form (07’35” – 07’42”, letter “e”).⁸⁰ Ikeda constructs a very slow (almost imperceptible) glissando (09’10” to 09’33”) in a very high spectral range (*i.e.* three blocks at 5, 10, and 16 kHz): this ascending movement is perceived as a brightening of the sound rather than a rise in pitch (Figure II.11, letter “f”).

Ikeda’s use of extreme spectral contrasts and the mechanical repetition of the same elements generates hypnotic effects.⁸¹ When “+. .” is listened to with headphones, the long exposition of the fast pulsation (split between channels) results in a disturbance of the listener’s perception. The ever-changing and compulsive repetition is bewildering: listeners tend to subdivide the pulses into two (*i.e.* focusing on a single channel) or try to organize them following different patterns.

More generally, the “+” series (*i.e.* pieces “+”, “+. ” and “+. .”) are based on the

⁸⁰ This reduction of elements allows the listener to perceive that the basic pulsation travels through the stereophonic field.

⁸¹ But this hypnotic effect is different to the one generated by the use of suspended atmospheres of sustained sounds (*e.g.* Haas, Pan Sonic or Lang).

same idea: the use of a very fast and regular pulse based on a systematic series of bass frequencies and the modification of this pulse in different ways. The pulse works as a continuous element; it does not mark a rhythm, rather it delimits a framework in which the sound evolution occurs.

“–” *series* (– / –. / –..)

In the piece entitled “–” (the seventh within the original record), Ikeda exploits horizontal sonic lines interacting with one another. There are three distinct blocks of tones: (i) an electronic sound containing an almost perfect semitone (943 Hz, A[#]5; 1001 Hz, B^b5; between 00’00” and 01’30” and at 04’55”); (ii) a group of tones (949 Hz, B4; 576 Hz, D^b5; 589 Hz, D5; 686 Hz, F^b5; at *ca.* 00’55”); and (iii) a third element (comprising of sounds centred on 26 Hz, ~G[#]0; 55 Hz, ~A1; 110 Hz, ~A2; and 190 Hz, ~G^b3) that starts to develop from 01’55”. This third block of sound generates binaural beats (*ca.* 180 bpm) when the sound centred on 26 Hz broadens out to 22 Hz (occupying a larger range from F0 to A^b0) and the one centred on 55 Hz expands to 59 Hz (A[#]1). This *induced* rhythm varies when another modulation occurs: the other sounds broaden to 29 Hz (A[#]0) and 52 Hz (G[#]1) respectively, generating a new, slower beat at around 72 bpm.

The second piece of this collection, “–.”, develops as a continuous succession of different drones. Ikeda makes use of a regular beat (pitched around C^b6, 1068 Hz) that might recall an alarm clock combined with a bass drone to delimit a very large sonic space: these two elements are in fact very marked and contrasting. Spectral analysis allows the identification of recurrent elements that characterise three parts of the piece. The evolution of these parts is so dilated in time that it might be undetectable through normal listening, but a general sense of cyclic repetition of the same sonic elements can be perceived.

In general, “–.” evolves towards an increased density of sound with Ikeda introducing two bass drones outside of the audible frequency range (*i.e.* 11 and 18 Hz)

which leave a sort of unheard but felt trace (Solomos 2013, 207–11).⁸² In the central part of the piece, the beat may be reminiscent of a heart rate measuring device that is immersed in a sort of dense sonic matter.⁸³ Close to the end, Ikeda enriches the music with higher frequencies, enhancing the static and hypnotic impact: sound polarizes towards the highest and lowest extremes.

Similar to the previous two pieces in this group, “–.” is characterised by a continuous evolution. Ikeda uses a dilated combination of a collection of sustained sounds in a very high range of frequencies (*i.e.* C♯9, 8.6 kHz; G9, 12.5 kHz; C♯10, 17.1 kHz;) and a drone made of several dyads separated by an exact tone (*i.e.* two hundreds cents) and spaced-out by an *octave*.⁸⁴ Ikeda designs a movement between tones that is parallel but not equivalent (*i.e.* the higher line does not react as the natural partial of the lower line), and the resulting aural development is highly original. Their transition is very slow and the long crossfading between sounds makes the recognition of an overall movement difficult. The bass lines merge into one another creating a fluctuating and resonating mass over which dispersed high sounds appear.

“+–”

The last track of “+–” (entitled “+–”) is a one-minute coda where Ikeda takes his exploration of aural perception to extremes, “suggesting a synthesis of opposites through its barely audible volume, short duration, and reliance on the faintest gossamer sound grains” (Demers 2010, 87). It consists of a single sonic element: a fixed sound at 16 kHz with several less prominent lines. The general result is a very soft sound which is almost inaudible but which possesses an aura, a shadow of sound which exists only as a sort of *trace* of a previous sound, a *potential* of a sound.

To summarize, the three pieces labelled “–” (*i.e.* pieces “–”, “–.” and “–.”) have the same properties: they all have a gradual development made up of sustained sounds

⁸² These are inaudible *infrasounds* which may provoke neural entrainments, organ resonance effects, nausea, physical impact and respiration inhibition (S. Goodman 2010, 11).

⁸³ There is an interesting parallel with Lang’s *DW2–Image/Idea* where binaural beats are exploited to generate rhythmic profiles and an immobile atmosphere mimicking a sort of “*vacuum* of sound”.

⁸⁴ Two pairs of drones which from C3/D3 and C4/D4 move upward to C♯3/D♯3 and D♯4/E♯4 and then to F2/G2 and G♯3/A♯3 respectively

and are characterised by an increasing complexity (conceivably corresponding to the number of dots in the title-track).⁸⁵ Moreover, Ikeda explores the extremes of the audible spectrum (sometimes incorporating frequencies outside these limits) so that what would appear to be *silent episodes* actually contain sounds which lie beyond the threshold of audibility. These are clearly visible in the spectral analysis but are only perceivable as sonic *glimmers* made of colours and indistinct impressions. Ikeda himself, in describing the last piece (*i.e.* “+–”), talks about “a high frequency sound [...] that the listener becomes aware of only upon its disappearance” (1996b).

These aural details represent potentials for sound traditionally described as liminal characteristics of a particular sound or musical figure or element: the traces and the ephemeral aural elements (*e.g.* the instability of harmonics, overtones, crackles, and rustles). Ikeda lets these traces emerge as if they were put under a magnifying glass. The exploration of these unstable components as sound subjects in themselves, even if carried out as part of other creative strategies, is another common aspect that typifies composers within this study.

II.3.5 Giovanni Verrando

Dulle Griet (2009-2010)

[for amplified ensemble: bass flute, bass and B♭ clarinets, master keyboard (connected to a computer), percussion, violin, and cello; performers play various additional objects and toy-instruments / notated piece / audio material available / Recording: Verrando – On Mdi ensemble, RepertorioZero – Dulle Griet. France: AEON 1328-CD (Verrando 2013)]

In *Dulle Griet*, Verrando condenses within a few minutes several characteristics of his aesthetic: the explicit interrelation between harmonic and inharmonic musical forms and between acoustic and electric sounds.

⁸⁵ In general, this type of construction, *i.e.* the idea of composing a unique sound by layering different continuous lines and creating a permanent yet ever-changing sonic flow, is common to many other pieces considered in this study and is close to several practices within (structural) minimalism (*i.e.* Riley, Lucier, Niblock) and spectralism (*i.e.* Murail, Haas).

The first part of this piece is constructed using two elements in opposition: very soft episodes composed of interlaced lines of strings, bass electronic sounds, and scattered noises (electric and acoustic); and loud interruptions using the entire ensemble to create dense masses of sound, mixing harmonic and inharmonic components, and using an intricate combination of electronic and acoustic elements.

Musical elements succeed one another assuming distinct roles based on timbric characteristics in such a way that they acquire a specific “place inside the spectrum” (02’32” – 03’28”, Figure II.12).⁸⁶

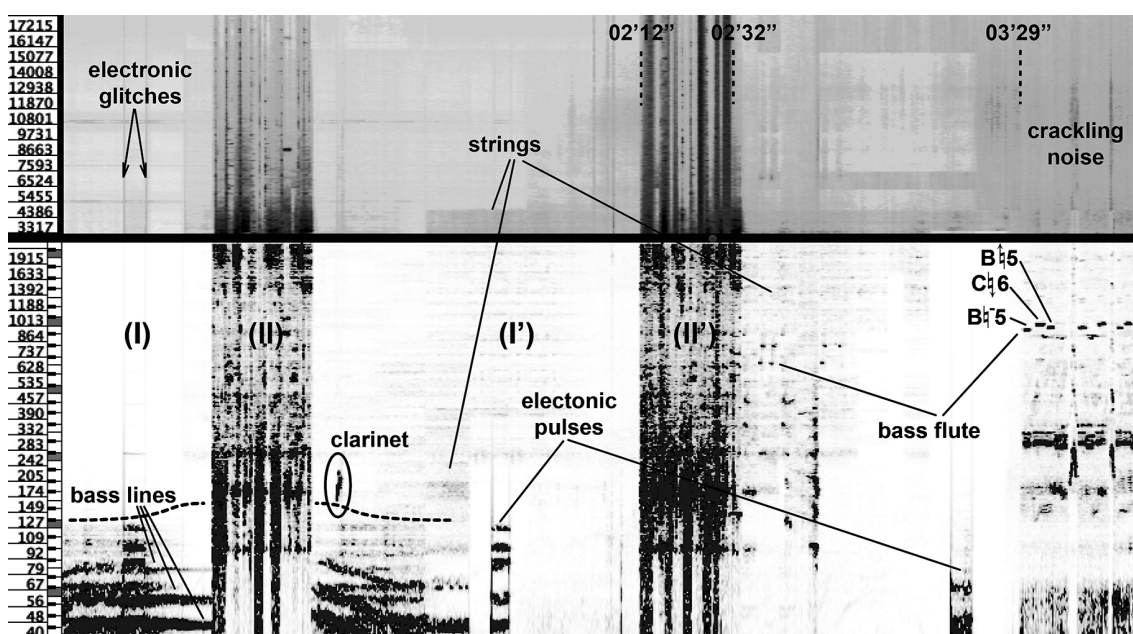


Figure II.12 Spectrograms [top: 3.3 – 17.5 kHz; bottom: 40 – 2000 Hz / 00’00” – 03’54”] of Dulle Griet.

Verrando, composing intricate interplays between the sound of the strings, wind instruments, and electronic noises, creates an ever-changing sonic texture constituted by ascending and descending lines, made up of a fast succession of *glissandi* and sustained notes, forming sonic aggregates (*i.e.* 03’29”). These aggregates oscillates between melodic lines and noise in a tense balance that is always threatening to collapse.

⁸⁶ *E.g.* the electronic bass pulse at 03’14” (and before at 01’41”, see Figure II.12, “electronic pulses”) in particular recalls Pan Sonic’s use of similar interventions: its presence is so specific that it demarcates not only a sonic position but also a sculptural character within the global development.

Verrando takes the dynamic and spectral contrasts to extremes: the sound is often distorted and this polarisation of musical events gives the impression that these noisy interruptions materialize in the sonic space with a physical presence. The atmosphere is electric and *bruitist*, the sound of the instruments is often unrecognisable.⁸⁷

In general, Verrando creates a sound composed of different elements coming from different sources (*e.g.* acoustic instruments, pure electronics or electroacoustic sources, noise-producing objects), but he is able to merge these different materials to create a unified corpus of sound.

Triptych #2 (2008)

[for electric ensemble (electric guitar, master keyboard with samples, percussion, electric string quartet) / notated piece / audio material available / Recording: Verrando – On Mdi ensemble, RepertorioZero – Dulle Griet. France: AEON 1328-CD (Verrando 2013)]

The first chapter of *Triptych#2* (*i.e.* *Musikplastik #2*) demonstrates how Verrando creates very detached musical episodes or sonic scenes, each with its own degree of inharmonicity that is achieved when instruments are played in such a way as to enhance noisy effects and where electronic sounds are distorted.⁸⁸ Music appears to be played (or emitted) very close to the listener's ear, giving the listener the impression of exploring sonic details through a magnifying glass.

Similarly, the second part of *Triptych#2*, *Harmonic Domains #3*, presents a structure made of oppositions of dynamic and spectral density. From 02'10" to 03'09", Verrando moves gradually from harmonic to inharmonic timbre: he uses *glissandi* and sequential chords to carry a continuous sonic stream from lower harmonic pitches towards higher frequencies and noisy components.

In this last episode of *Triptych#2*, Verrando focuses on the combination of

⁸⁷ In several instances, there is an interesting parallel to be made with Bernhard Lang: the musical evolves by alternating sudden loud interruptions with quiet episodes, recalling sections from the *DW*-series formed by sequences of clusters, repeated units, and cells.

⁸⁸ In a similar way to how Lang forms his clusters, Verrando combines different scenes: sometimes he inserts a short scene within the slow evolution of a longer one (*e.g.* from 00'13" to 00'16"); other times he composes a succession of different brief episodes.

electronic and acoustic sounds which –especially in this movement– is characterised by noisy and distorted qualities. The title itself, *Filtering #5*, suggests that he explores specific and limited portions of the sonic spectrum. He uses different filters to compose noises of different nature; he alternately enlarges and reduces spectral spaces and densities, making sound appear to move closer or further away from the listener.

More generally, in *Triptych#2* and *Dulle Griet*, specific sounds correspond to particular sections, the attention being focused on the spectral material. Verrando conceives each sonic scene through the total accumulated sound matter: each scene is not identified or characterised by notes, melodies, specific rhythms, or any other musical element, rather every detail is part of a more complex idea of *timbre/sound*. This understanding of a scene as defined by a complex sonic or timbral identity is extended in Verrando's use of spectral regions and their degree of harmonicity (or inharmonicity).

II.3.6 Raime

Pieces by the duo Raime, and more generally works belonging to minimal techno and dubstep styles, are conceived as single musical units which usually develop gradually. Typically, these pieces are based on a strong rhythmic structure and use dynamic and harmonic elements which follow standard principles of organization found in IDM's sub-genres (*i.e.* dubstep, minimal techno, glitch).⁸⁹

If Anywhere Was Here He Would Know Where We Are (2010)

[for electronic instruments / audio material available / Recording: Raime – If Anywhere Was Here He Would Know Where We Are. UK: Blackest Ever Black – BLACKEST002-Vinyl (Andrews and Halstead 2010)]

In the piece entitled *If Anywhere Was Here He Would Know Where We Are*, Raime use a tight rhythmic frame in which pulsations are manipulated by the addition of an echo in order to recreate the impression of a large physical space in which the

⁸⁹ Even if this music could function as an accompaniment to dancing and entertaining, the sonic material articulates a complex combination of elements.

music resonates. The sound becomes progressively more complex through the addition of several events, but, close to the end, this rich combination of sonic material gradually peels off its various constituent elements and reduces itself to its essentials, describing a sort of climax/anticlimax structure.

This piece shows characteristics typical of Raime's music. All elements work as constituents of a larger sonic idea. They merge and interfere with one another. The pulsations, for instance, do not only serve to mark a regular metre but are given a specific location in the spectrum, a particular temporal and spatial decay, and more generally function in precise relation to the other sonic events.

Told & Collapsed (2011)

[for electronic instruments / audio material available / Recording: Raime – Hennail. UK: Blackest Ever Black – BLACKEST005-Vinyl (Andrews and Halstead 2011)]

Told & Collapsed's rhythmic structure uses a tonal bass line in A minor whose identity is undermined by a sequence of high-pitched lines that pass through dissonant notes (D#, A# and C#) and by some other microtonal interventions. The rhythm is not fast, but there is a high concentration of different events within each bar. Several elements are gradually added:

(i) events added in both the middle and bass frequency ranges (Figure II.13, spectral regions around 40 Hz labelled as “a”);

(ii) high-pitched drones emerge and last for several bars (*e.g.* from 01'59” to 02'30” the sound at D#5 spans several harmonic patterns, Figure II.13), favouring the perception of a continuous sonic flow even if marked by a regular rhythm;

(iii) a continuous synthesizer line appears in the foreground with a rich harmonic content (Figure II.13, spectral region labelled as “b”)

(iv) and further percussion elements, noises, and additional bass pulses.

These new elements thicken the musical material and reinforce the impression

of a unified sound within which the pulsations appear⁹⁰ and disappear, giving the impression that the music continues to build (*i.e.* incorporating noises and scattered interventions, Figure II.13 “d”).⁹¹

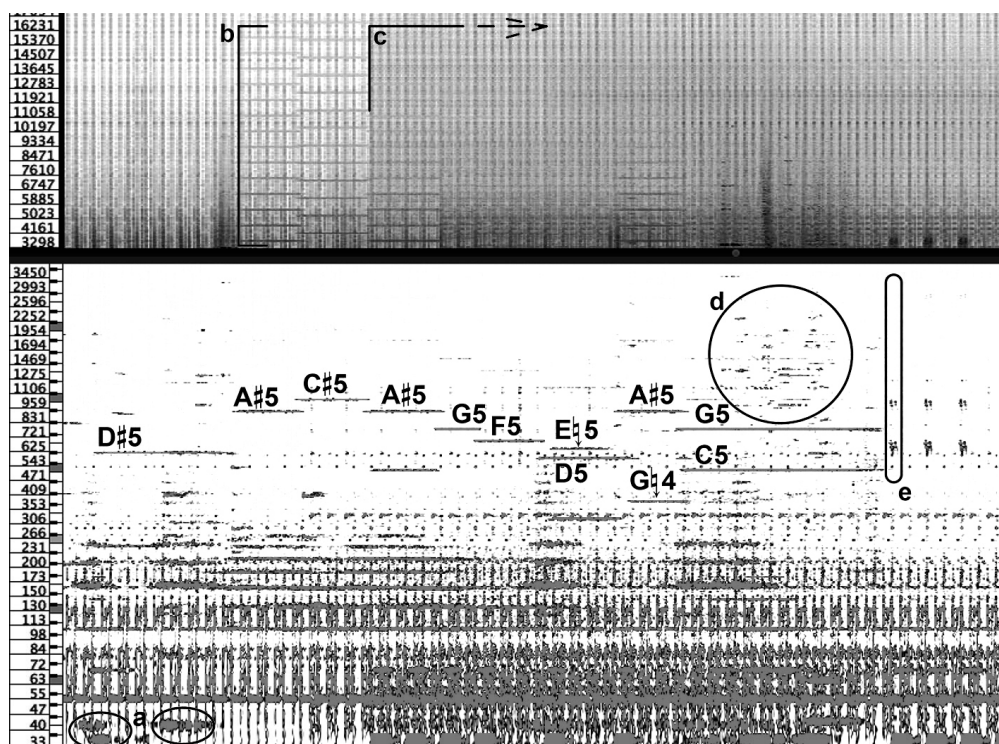


Figure II.13 Spectrograms [top: 3.3 – 17 kHz; bottom: 30 – 3500 Hz / 01’52” – 05’19’] of Told & Collapse.

The variety of elements used by Raime is huge and includes drums and percussion (with echoes using different delay times), electric bass or bass synth, distorted voices, sounds of bells, and thunder (manipulated to fit). All these types of sounds not only define and make up the metric units of the piece but also form a rich combination of events that merge together as a coherent sonic whole. Raime use materials occupying different portions of an extended frequency range, exploring the effect of layering sounds to create static and continuous sonic masses and working in

⁹⁰ A new rhythmic element comes out at 03’00” reaffirming the initial cadence and the typical dance music characteristics (Figure II.13, “c”).

⁹¹ The idea of a complex sound unit that is adding to (or reduced) with each repetition has a parallel in Bernhard Lang’s work. For instance, in *DW7* the cluster at 12’27” displays some similarities to Raime’s piece.

detail with the repetition of events in order to create rhythmic and hypnotic developments.

Told & Collapse is based on a rigid and regular rhythmic framework, thus moving clearly through a series clichés typical of IDM, but it offers a rich variety of sonic elements which allow it to be compared with other pieces in the selection.

Passed Over Trail (2012)

[for electronic instruments / audio material available / Recording: Raime – Quarter Turns Over A Living Line. UK: Blackest Ever Black – BLACKEST001-CD (Andrews and Halstead 2012a)]

Passed Over Trail explores a single musical unit which is periodically repeated with other elements scattered but precisely located in the sonic spectrum.⁹² Raime generate a bass sound that is combined with noisy and vibrating effects. The impression is that of sound generating a “response” in some physical objects (such as walls or panels) that were present during the recording (possibly this effect was introduced afterwards in the mixing or overdubbing stage). Spectral analysis shows that the fundamental notes cover a contiguous area from 28 to 34 Hz, thus leading to a series of perceptual interferences coming from the use of neighbouring frequencies.

Additional elements emphasise both the continuity of flow (*e.g.* a soft drone at A5 from 00’45”) and the coherence of the unit (*e.g.* a sonorous event marks the begin of the unit at 00’53”). In fact, even if a clear rhythm is absent, there is still a sense of regular cadence. The music seems to be caught between a progressive development and a static position. In contrast to other pieces by Raime, *Passed Over Trail* is not composed by starting from a pure rhythmic pattern, rather it develops a periodic figure that resembles a sort of wave that grows and throbs.

The Walker In Blast And Bottle (2012)

[for electronic instruments / audio material available / Recording: Raime – Quarter Turns Over A Living Line. UK: Blackest Ever Black – BLACKEST001-CD (Andrews and

⁹² This structure has strong parallels to the compositional approach of Bernhard Lang in *DW7* and *DW8*.

Halstead 2012b)]

In *The Walker In Blast And Bottle*, Raime introduce a rhythmic frame by using a sequence of complex chords that generate strong spectral and dynamic contrasts. They create a repeated cluster that progressively evolves, meaning that each chord gradually becomes a complex aggregate of sonic material. This reaches a high degree of complexity with the music seeming to dissolve into a pulsating continuous sound: high-pitched sounds generate recurring microtonal *glissandi* and sonic aggregates start to become more distorted and split between the two stereo channels, creating a hypnotic effect in perception. The very precise and definite atmosphere of the beginning ends up becoming complex and indistinct.⁹³

Raime exploit the initial rhythm (*i.e.* dry beats with an embedded melodic line comprising C#5, D5, C#5, F5 and bass pulses on G) as a simple element that serves only to establish a recognisable framework. In this way, the listener relies on this structure when, from 02'43'', additional chords appear irregularly (in terms of entry points and dynamic) and sonic material starts to become more intricate. Moreover, they use continuous drones occupying the middle frequency ranges – to achieve a change in the character of the piece from being initially more concrete to having a more ecstatic aura.

II.3.7 Riccardo Nova

Eleven (2005)

[for strings, percussion, electric keyboards and theremin / notated piece / audio material available / Recording: Nova – Art Zoyd Studio & Musiques Nouvelles Ensemble, Expériences De Vol 4–5–6. France: In-Possible Records – EXP01CD (Nova 2005)]

Every episode in this piece exhibits a similar organisation where the sound grows through a detailed layering of several lines and the sonic articulation of the ensemble culminates in a very loud climax that then vanishes abruptly. In these cyclic

⁹³ This practice has been found both in Pan Sonic and Ryoji Ikeda pieces (*i.e.* *Lautturi* and *Headphonics00*, respectively).

constructions, the sonic flow proceeds through a slow *crescendo* as if it were a single body that grows until the end of the episode and then suddenly disappears, leaving behind a sort of hollow presence. Riccardo Nova, exploiting contrasts, uses a large variety and range of means to compose a sound that increases in dynamic and spectral dimension. He introduces electronic sounds within a regular pattern and composes cumulative movements in the strings –reinforced by their increasing or decreasing electric amplification– that recall waves.⁹⁴ Strings move sequentially with *glissandi* or create continuous sounds overlapping one another (e.g. 14'20'' – 14'40'').⁹⁵ A key example of this practice is the musical scene that fades in from 10'32''. Nova composes a stepwise motion in both dynamic and pitch (i.e. a repeated *crescendo* and a sequential *glissando*, Figure II.14, red arrows labelled as “b” and green arrows labelled as “a”, respectively).⁹⁶ The strings delineate a complex mix of musical lines that move either in parallel (descending or ascending) or in divergent directions. This aggregate of lines presents a series of contrasting passages (similar to those used by Lang) in which the spectral density and dynamic are maximized by the electronic manipulation of sound (e.g. 12'34 – 12'38'' and 13'02'' – 13'33'').

⁹⁴ Strings and electronic sound possess a resonance possibly generated by a realtime effect applied to the instrumental sound.

⁹⁵ These *glissandi* (e.g. the episode from 08'17'' to 08'32'') may recall Haas' practices in his *String Quartet n°2*.

⁹⁶ Spectral examination shows clearly how dynamic *crescendos* give rise to an expansion of spectra towards higher regions (Figure II.14, green areas labelled as “c”).

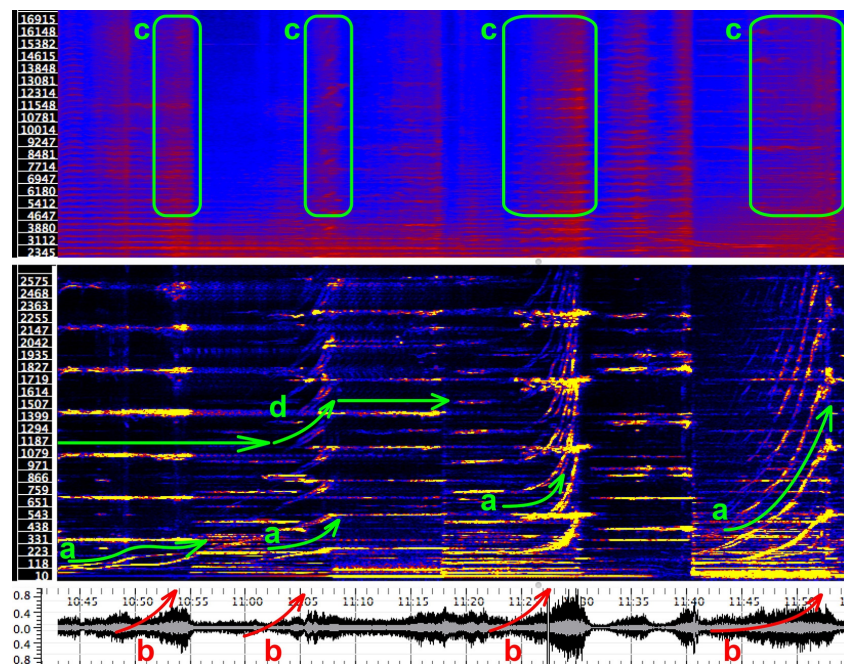


Figure II.14 Multilayer representation [top spectrogram: 2.3 – 17 kHz; centre spectrogram: 20 – 2600 Hz; bottom waveform / 10'42" – 11'53"] of *Eleven*.

Globally, the piece appears to possess a periodic structure: starting from a horizontal and static profile, instruments describe different combinations that evolve vertically in dynamic and spectral density. The individual instrumental phrases are conceived together and act as an elemental material: they delineate fluxes (*e.g.* ascending, descending, thickening), they converge or diverge, and disappear suddenly leaving an emptiness of matter. It is in this global idea of sonic substance that seems to lie the development of *Eleven*: the events are always part of a more extensive sonic conception which grows in dynamic, spectral extent, and movement. Sound behaves as an organic substance, instruments and electronics merge together creating global movements and interferences rather than a discursive interplay made up of musical lines.

II.4 Results and discussion

The audio, spectral, and score examinations reveal various correspondences between the pieces in terms of aural quality and sound manipulation, both on the microscopic scale and in the larger arrangement, as well as in the use of musical figures

and forms (for instance in the types of repetition or the figure-ground configurations).

Building on the initial theoretical and empirical observations (*i.e.* starting from the three general characteristics and the two-step method outlined at the opening of the chapter), the analysis summarised above led to the definition of nine musical attributes that are, to a large extent, common to all pieces. These attributes are:

- (A) **An Expanded Spectrum**, *i.e.* the use of an extended frequency range. This trait is especially prominent in electronic or electroacoustic pieces. However, this feature is also apparent in acoustic compositions using traditional instruments: Haas, for instance, makes frequent use of *sforzato* and *sul ponticello* techniques to generate multiple overtones.

- (B) **Microtonal Variations**, *i.e.* the use of microtonality, or more generally the use of interactions between neighbouring frequencies. Specifically, this attribute concerns the exploration of binaural beats (*e.g.* Ikeda, Lang) and the creation of static blocks with minimal fluctuation (*e.g.* Pan Sonic, Haas).

- (C) **Systematic Glissandi**, *i.e.* the use of *glissando* embedded within repetitive units. In the case of contemporary instrumental compositions, it often arises as a core structure used to create larger patterns (Haas, Lang), while in electronic pieces it is used more as a systemic contour to shape continuous evolutions (*e.g.* Pan Sonic's *Prospekt Vernadskogo* and Ikeda's "+" and "-").

- (D) **Rhythmic Developments**, *i.e.* an attribute integral to glitch and techno genres but occasionally appearing in other pieces. These are frequently used by Lang within repetitive clusters (*i.e.* attribute F, see below), but also by Haas, who creates synchronous progressions that generate a kind of rhythm (*e.g.* the final part of *in vain*). This attribute is typical of all styles that are based on pulsations (Pan Sonic, Ikeda and Raime). In these cases, the rhythmic development should be considered and understood within the specific socio-cultural context of these genres (*i.e.* IDM). These genres do develop sophisticated rhythmic textures that are associated with timbric, spatial, and dynamic attributes identified by this study. Moreover, regular cadences may be created without percussive elements, as occurs for instance in Haas' *in vain* and Raime's *Passed Over Trail*.

- (E) **Static Masses**, *i.e.* an attribute constituted by layering sounds, but that can also be created through continuous stationary textures, *e.g.* in Lang's pieces. This static attribute embodies an atypical vision of time. The creation of non-teleological musical sections is a common tendency among post-spectralist and minimalist pieces (Haas, Lang) using an immobilized temporal flow to explore sonic nuances. This attitude is also typical of those genres that use drones (*i.e.* the use of sustained, repeated sounds, or tone-clusters) to originate hypnotic effects, such as in the work of Pan Sonic and Raime.

- (F) **Repetitive Clusters**, *i.e.* invariant musical motifs articulated in various dimensions (*e.g.* pitch, dynamic) that can be used to generate rhythmic patterns (attribute D), hypnotic effects (attribute H, see below), or mechanical and automated profiles (Leydon 2002). This attribute is strikingly prevalent in the pieces by Haas and Lang where it is often the building block for more complex musical organizations. Each cluster can be composed differently: in the case of *in vain*, for example, the cluster consists of sequential groups of tones (during the first part) and layered groups (during the final part). It is interesting to note that the repeated cluster may only consist of a dynamic pattern, as in the case of Haas or Raime's music.

- (G) **Dynamic Contrasts**, *i.e.* the opposition of different elements according to certain sonic dimensions. This attribute has been evaluated through a qualitative and aesthetic assessment rather than a quantitative analysis using absolute values. A hasty comparison of the use of dynamic contrast in, for example, Ikeda and Haas' pieces according to a quantitative point of view could lead to erroneous conclusions. The former makes use of extreme spectral ranges, whereas the latter creates contrasts only within a traditional acoustic palette. However, taking the limits in dynamic range of instrumental composition into account as compared to electronic means, Haas' designs can be seen as equally radical and contrasting.

- (H) **Hypnotic Reiterations**, *i.e.* repetitive musical elements used for creating both static masses (attribute E) and rhythmic developments (D). The creation of hypnotic effects using sustained sounds or streams of short tones and continuous pulsations is common to all of the pieces selected.

- **(I) A Plastic and Sculptural Arrangement of Sound**, *i.e.* the use of a particular characterization of sounds based on their various identities, whether according to their sonic characteristics, spatial character, their role, intensity, or presence. This attribute, typical of electroacoustic and mixed music, is predominant in those genres that use multichannel sound diffusion (where this arrangement is achieved in the physical space). In our selection, the sculptural arrangement of sonic elements is most often based on spectral qualities in order to create virtual planes or dimensions of perception (*i.e.* Smalley's spectral space and spatiomorphology, (Smalley 1997)). Sounds appear, emerge, and blow up within a depicted sonic space of perception as they occupy a spaciousness and hold a sort of tactile and plastic presence; they are perceived due to how they are manipulated as well as for what they are themselves and for their role. In some cases (*i.e.* Pan Sonic and Raime pieces), this sculptural arrangement is also accompanied by the use of real-world sounds that serve to further characterise specific spectral regions.

These attributes are frequently combined within the same piece, *e.g.* glitch-electronic music usually exhibits repetitive clusters (F) within rhythmic frameworks (D), while the repetition of musical units (F) in Lang and Haas' pieces can at times be associated with non-rhythmic hypnotic reiterations (H) or more complex structures.

A typical example of this combination of attributes might involve the superimposition of musical elements of different types and opposite impacts: for instance, a musical event that consists of harsh interventions scattered within continuous layers of sound could be seen as exemplifying the attributes of (A) expanded spectrum, (E) static drones, (G) dynamic contrasts, and (I) a sculptural arrangement of sound. More generally, it can be seen that some contemporary instrumental compositions (*i.e.* Haas' and Lang's pieces) make elaborate use of simple musical elements to create new developments: the reiteration of descending notes at the beginning of Haas' piece *in vain* evokes a sort of large-scale falling spiral that constantly ascends on the small-scale level. Similarly, electronic pieces apply drastic timbric techniques to arrive at analogous results, such as the application of periodically fluctuating frequency filters in Pan

Sonic's *Lautturi*.

There are other parallels evident within our selection, for example when more static musical episodes are considered, or even when, in the case of Lang's or Nova's pieces, electronic devices are used in instrumental compositions (*e.g.* Lang *DW2* and Verrando *Triptych #2*). In these cases, there is an explicit intention to take inspiration from wider cultural aesthetics, such as turntablism, glitch, or noise styles.

Considering the overall results of this study, each work displays at least eight out of the nine attributes identified above. Therefore, even though these nine attributes are fairly general, their simultaneous presence across all pieces consolidates an aesthetic framework and may represent a starting point for the definition of a common cross-genre perspective (Table II.4).

The selection of pieces analysed above were carefully chosen to represent a wide range of genres. The pieces themselves are not meant to exhaustively represent each genre in its entirety, rather they represent, within those genres, those works that explore sound itself rather than more structured writing techniques or systems. In fact, what makes this first step of examination possible is the coherence and affinity between these works from very different contexts.

The analysis itself tries to balance a detailed examination of the pieces with a more general overview. While a detailed analysis of certain sections was necessary to ensure academically original and meaningful conclusions, the inclusion of a more general overview was crucial as it permits the comparison of pieces from many different genres and cultural contexts. The works and method chosen allowed for this comparative style of analysis, and, as the first step in a larger research project, the analysis presented in this chapter provides promising tools for the other stages of research.

II.5 Final remarks

The analysis presented in this chapter aims to highlight correspondences between different genres according to specific uses of sonic material. The concentration

on simple rhythmic sections or the choice not to include examinations of certain elaborate compositional processes are not done to privilege one genre over another. Rather, the analysis strives to compare different styles based on a more aesthetic approach, trying to express similar material through descriptive attributes capable of defining more clearly these connections.

Initial results indicate that IDM styles that use a limited set of characteristics (e.g. hypnotic effects, repetition, rhythm) but which make use of innovative sonic contrasts and complex elaborations of sound possess several similarities with compositions belonging to the so-called contemporary instrumental music genre which tend to use these qualities within more elaborate structures.

In expanding on this analysis going forwards, it seems necessary to incorporate aspects of production and reception (Delalande 2013). To this end, the next chapters seek to make these extensions through listening sessions and interviews in order to enrich the scope of this cross-genre perspective to include perceptual and poietic aspects.

Table II.4 Musical attributes (columns) identified within the selection of pieces.

Author	Haas		Lang		N.		Verr.		Pan Sonic						Ikeda						Raime																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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	String Qt. 2	in vain	DW2	DW3	DW7	DW8	DW9	DW14	DW15	DW17	Eleven	Dulle Griet	Triptych #2	Keskeisvoima	Lautturi	Etäisyys	Prospekt V.	Ilmenenismuoto	Selittämätön	Ilma	Linjat	Säteily	Headphonics00	Headphonics01	Headphonics10	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Note: ^{*}real-world sounds; ^a(I, from 04'40''); ^b(07'33'' – 07'50''); ^c(15'35'' – 16'05''); ^d(10'20'' – 11'20''); ^e(III, 07'70'' – 09'09''); ^f(35'15'' – 38'50''); ^g(03'18'' – 03'30''); ^h(II, 02'29'' – 02'52''); ⁱ(19'50'' – 23'45''); ^j(II, 03'22'' – 05'42''); ^k(end); ^m(12'00'' – end).

III Perceptual Studies

The previous two chapters outlined several essential elements that sketch out a common perspective among the various musical pieces looked at in this study. In this perspective, sound is conceived as if it were a tangible substance to be sculpted (*i.e.* drawing on Scelsi's notion of spherical sound) and manipulated from within its spectrum. In particular, the analysis presented in Chapter II seems to indicate that the pieces in this group not only use similar sound shapes, but use these shapes for similar perceptual ends. This suggests that these composers share a similar taste not just for sonic material, but also for perceptual effects. In this chapter, I examine in more detail the perceptual aspects of this music in order to delineate a more nuanced account of this cross-genre perspective.

This chapter starts with a reflection on traditional studies in music and sound perception, in order to justify the grounds on which the discussion is built. A consideration is then given of emotive and neurological aspects of perception in relation to experimental music. This section aims to clarify how these genres possess peculiar traits that require a different approach from the one found in traditional perceptual studies. The main body of this chapter describes a listening survey carried out to assess various listeners' responses to a series of samples from the pieces selected for this study.

III.1 Introduction

III.1.1 Traditional studies in music and sound perception

The perceptual aspect of sound has been the subject of an immense range of studies in the cognitive sciences, from psychology (Susini, Lemaitre, and McAdams 2011) to neuroscience (Blood et al. 1999; T. D. Griffiths and Warren 2004). These studies span human reactions to simple stimuli all the way to complex feelings and emotions (Juslin 2013). Acoustics, psychoacoustics, and neurophysiologists, as well as psychologists, philosophers, musicologists, and composers, have for years discussed the mechanism of perception for a given aural stimulus. In trying to correlate several

propositions, it is clear that some core fundamentals of sound perception are shared between the different scientific perspectives (Figure III.1).

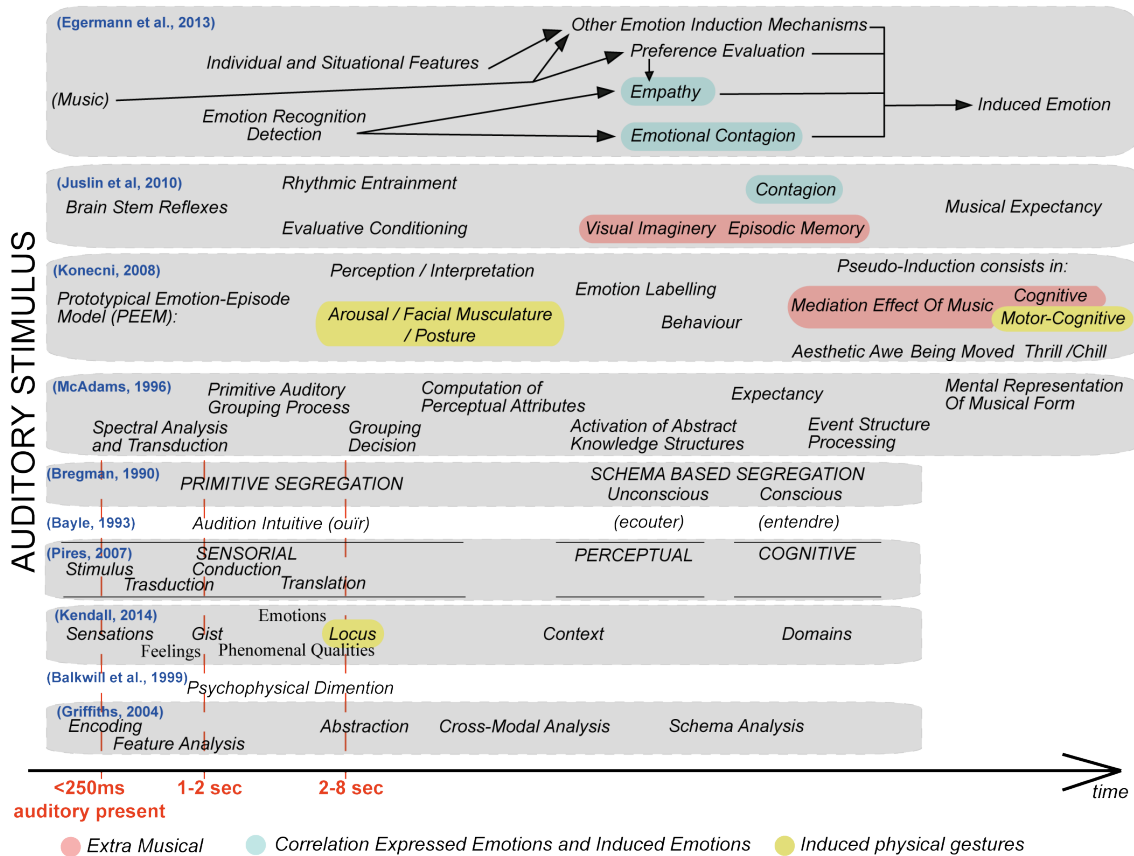


Figure III.1 Schematic representation of the primary process of perception (horizontal temporal line) for different studies.

McAdams and Griffiths (Egermann and McAdams 2013; T. D. Griffiths and Warren 2004), for instance, speak of a first step of *encoding* or *transduction* in which our system reacts within a psychophysical dimension (Balkwill and Thompson 1999) and operates a primal grouping of the sounds that Bregman defines as a *primitive segregation* (1999, 38, 665–67). This is the intuitive phase of perceiving with the ear (*ouïr*) (Bayle 1993, 93–109; Pires 2007, 64–65). Once the sonic message is segregated, the successive steps correspond –following Bayle’s labels– to the processes of listening

(*ecouter*) and hearing⁹⁷ (*entendre*), which correlate with Bregman's *schema-based segregation*. This second phase has to do with the activation of *abstract knowledge structures* (McAdams 1996) and the emergence of contextual expectations (Kendall 2014; Konečni 2008). This is the perceptual stage in which induced emotive mechanisms are activated, as noted by psychoacousticians (Juslin et al. 2010; Eggermann and McAdams 2013). What is peculiar to the majority of these studies is that they consider either a set of many kinds of short, simple, aural stimuli, or draw on a musical database comprised of musical works from Western classical, World, and popular music repertoires.

These studies tell us that the series of features on which our auditory system bases its sensorial processes has to do with both material aspects (*e.g.* temporal and frequencies-based) responded to intuitively and other more complex criteria such as melodic progression, timbre, or articulation, which relate to cultural and environmental customs. But when music does not use –for instance– tonal constructions, traditional narrative structures, or linear time perception, and contains instead, variously, noises, real-world sounds, acoustic and electronic sounds, and manipulated sounds, all potentially within non-linear structures, what is then our neurological and emotive response? Should this type of music be considered along the same lines as simple sonic stimuli or, on the contrary, could experimental practices also be part of a sort of entrenched repertoire of musical genres?

By considering a set of pieces coming from experimental contemporary music, this study forces a confrontation with certain rooted convictions, trying to verify whether these principles work for experimental music as well as they do when applied to a more traditional repertoire (*i.e.* Western classical and popular).

III.1.2 Emotional aspects in experimental music

The investigation of the emotional sphere of music involves academics from diverse disciplines engaged in ongoing debates around emotivist (*e.g.* Juslin),

⁹⁷ I adhere here to John Dack's translation of the Schaefferian terms (Chion [1983] 2009)(Chion [1983] 2009).

cognitivist (e.g. Kivy), and formalist (e.g. Hanslick) visions. What seems a crucial issue here is the separation between recognized and evoked emotions. One of the main positions asserts that emotion in music does not need pass through any external stage, rather it is expressed and/or induced directly by music. McAdams, for instance, proposes a sort of empathic inner movement that would modulate the association between expression and induction (Egermann and McAdams 2013), while Konečni suggests that this dichotomy reflects a generalized confusion of terms such as mood, attitude, feeling, physiological responses, and he puts forwards the idea that emotion is not a direct consequence of music but is actually generated from extra-musical associations that music stimulates (2008).

The traditional emotivist stance normally handles the concept of *emotion* as if it were a clear, definite, and unequivocal notion,⁹⁸ treating parallel terms such as *sensation*, *mood*, or *feeling* in the same way. Emotion does not always have a clear boundary and an explicit origin: it is connected in some way to memories, verbal expressions, and signs, and relates also to sensorial stimuli. What seems true is that anyone can experience an emotion in absence of any external stimuli (a memory alone may be sufficient), and, conversely, the presence of a sensorial stimulation alone is not sufficient to cause an emotion.

It is not rare to encounter, often among cognitivists, discussions in which the terms *emotion* and *meaning* of music are used interchangeably (Kivy [2002] 2007). Even supposing that emotion is expressed by music, this happens through musical elements such as consonances or dissonances or harmonic progressions. These are the elements that Kivy associates with the complex and emotive qualities of music and with its “beauty” (Kivy [2002] 2007, 44, 161). If this is the case, emotion is part of the *meaning* of music, yet this incorporates a lot of more than signs relating only to emotional expression. Therefore, even if emotion is somehow codified and recognized, it would be always as a *subset* of meaning.

⁹⁸ Following Juslin and Sloboda’s definition, “this term is used to refer to a quite brief but intense affective reaction that usually involves a number of subcomponents –subjective feeling, physiological arousal, expression, action tendency, and regulation– that are more or less ‘synchronized’. Emotions focus on specific ‘objects’ and last minutes to a few hours (e.g. happiness, sadness).” (2013, 585).

Regarding the formalist stance, the situation it considers is unlikely ever to exist in practice: a specific kind of music (*i.e.* absolute and non-referential), listened to in appropriate conditions (*e.g.* without indications illustrating the reasons for its production) by pure listeners (*i.e.* without professional, aesthetic, or cultural prejudices), is able to convey a *value* that only the music itself possesses and, thus, consolidates the *signified* and the *signifier*. Real-world listening (*i.e.* the everyday experience that occurs in most cases) is complex and occurs in real circumstances with real listeners who themselves give meaning to the music through associations and conventions (Jankélévitch [1961] 1983). Thus, even if the formalist position might start with some justifiable theoretical assumptions, it encounters difficulties when looking at music experienced in practical situations. Given that this project uses and analyses an empirical survey, the formalist approach offers little insight.

While formalist approaches were revived during the 1960s and 1970s within a *structuralist* musicological view⁹⁹ (Forte 1973), an effort to enrich traditional theories of music interpretation to include “contemporary musics” (thus extending the domain of musicology towards new subjects such as psychology and musical semantic) opened up the range of research (Meyer 1956; Cooke 1959; Scruton 1980; Lerdahl and Jackendoff 1983). For instance, Deliège and Imberty contributed to the idea that perception can encompass free associations, intuitions, and temporal elements (Deliège 1989; Imberty 2005).

These points take on a particular importance when considering the works from today’s experimental music genres selected for this study. This repertoire does not follow established rules and often explores sonic possibilities that go beyond ordinary practices. The dichotomy between *expressed* and *induced* emotion may be justified in essence (Juslin 2013), but the distinction is not rigid, and may more usefully be seen – when looking at these types of experimental music – as a continuous field of impressions that progressively moves from *expression* to *induction*. Even when considering this less rigid perspective, the distinction between the representation of emotions versus the

⁹⁹ Most often used in approaching certain movements of 20th century music, such as the first avant-garde movement and the post-WWII modernism, whose leading figures were strictly committed to searching for new paradigms rather than disclosing expressive intentions (Baroni 2001a, 634–35).

arousal of emotions starts to blur and become confused when examining music typical of today's experimental scene. From the limited number of perceptual studies that deal with today's experimental music, there emerges the idea that listening experience has more to do with feelings than with codified emotions, and that "contemporary art [...] [has] placed more emphasis on *phenomenal qualities* than emotions" ((Kendall 2014, 200), *italic is added*).

Moreover, when pieces by Lang, Ikeda, Verrando, and Raime are considered together, as is the case in this dissertation, their emotive impact is conveyed differently: there are different purposes, enjoyments, stimuli, and interests (Stockfelt 2004). These pieces lack clear canonic practices concerning harmony, tonality, development, instrumentation, and instead they appear as a series of musical episodes, assembled in different ways, making unconventional use of temporality, space, noise, and referential sound. Many composers working in this area explicitly reject the idea of music expressing a meaning or representing something in favour of an idea of music as stimulating an aural experience that is engaged with by each listener in their own way; this is closer to seeing music as dealing with *sensations* rather than *emotions*.

For this reason, the studies¹⁰⁰ examining the subject of perception in the context of current styles of experimental music frequently draw on phenomenological perspectives and *Gestalt* theories (Koffka [1935] 1999; Merleau-Ponty [1945] 2003; Varela, Thompson, and Rosch 1991), elaborating on several disciplines within the so-called information sciences such as cognitive semantic, philosophy of art, and ecological approaches (E. Clarke 2005; Gibson [1979] 2014). Starting from these viewpoints, scholars –mostly in electroacoustic and acousmatic fields– claim that an intrinsic capacity of *sound objects* is to provide a sufficient basis to allow an approach to perceived sound in itself. In this way, these studies forgo any discussion of the emotional effect of music. Rather, in going beyond Schaeffer's *reduced listening*, these authors elaborate theories that suggest the possibility of sounds holding a value that is inherent to sound itself (*e.g.* "affordance" (Windsor 1995, 2000)) or is part of poietic

¹⁰⁰ *e.g.* I am referring here to recent publications (E. Clarke 2005; Kim-Cohen 2009; Voegelin 2010; Bonnet 2012)

and aesthetic spheres and which “refers to the world beyond the musical work” (Demers 2010, 36) (e.g. “Intention/Reception” project (Landy 2007)).

III.1.3 Neurological aspects in experimental music¹⁰¹

Pieces by Pan Sonic or Haas move explicitly beyond formal canons, focusing instead on sound and seeking to enhance its physical characteristics. How does perception work in the context of listening to a long, dilated drone made by electronic synthesizers, or when faced with massive pulsations or continuous *glissandi* from an acoustic ensemble?

The complex auditory process, involving cochlea fibres and the organ of Corti at the periphery all the way in to the cerebral cortex in the Central Nervous System (CNS), reveals primal details in frequency and pitch distinction (Hyde, Peretz, and Zatorre 2008), spatio-temporal indications (Schönwiesner and Zatorre 2009), and music/speech recognition (Peretz et al. 2015).

The recent study by Norman-Haignere and co-authors (2015) describes six different regions of our auditory cortex that react to decisive aspects of acoustic information. The large database of sounds used by the authors¹⁰² and the method applied to interpret the fMRI responses from overlapping neural populations allows them to trace a rich map of responses: it appears that two primal regions of our auditory perception are based on a specific sensitivity to low and high frequencies of sound. Secondly, regions three and four respond to particular aspects of the *spectro-temporality* of sound. Region three is selective for broadband sonic events that are rapidly changing in time, *i.e.* discrete episodes, while the fourth region includes all sonic features extended over time such as continuous sounds with spectral variations, *i.e.* harmonics and overtones modifications. Finally, specific regions in distinct non-primary areas are dedicated to speech (foreign and mother languages) and music (vocal and absolute music), thus indicating that the auditory cortex has clear anatomical pathways for the

¹⁰¹ This section has been realized in exchange with the Laboratory of Neurophysiology Group in the Dept. of Milano-Bicocca University, Milan, Italy.

¹⁰² Two hundreds eighty sounds, such as man speaking, typing, keys jangling, pop song, guitar, siren or wind.

reception of music and language, confirming the common understanding that our auditory system consists of highly specialized cerebral processes able to selectively recognize different sonic stimuli such as noises, speech, or music.

Studies of this type consider a large collection of sound sources and are of great interest to musicologists focused on experimental music. For instance, in the case of music that makes use of real-world sounds (including soundscape, field recording, and certain practices within acousmatic music), it would be reasonable to take into consideration the primal neurological pathways typically active when presented with stimuli consisting of raw sounds and noises, as well as the discovery that certain regions of our auditory cortex respond selectively to various spectral ranges and particular spectro-temporal characteristics.

As illustrated in Figure III.2, sound (SS), touch (TS), and visual (VS) sensory systems share a similar periphery-to-central pathway consisting of four steps: (i) the physical-to-nerve impulse mechanism of transduction; (ii) the brain thalamus receives all the sensory nerve fibres for a pre-assessment of raw data; (iii) bi-directional pathways sustain the thalamus-to-cortices links; (iv) the complex tasks of cell-groups in the sub-areas of cortices extract the relevant features of physical stimuli such as *intensity*, *time-modality*, and *spatial location*.¹⁰³

In the VS cortex, the more common features are image resolution, contour shapes, black-white vs. colour, and stereoscopy. On the other hand, the most common features of the TS sub-areas are rapidly-adapting, slowly-adapting, deep-tissue transient, and deep-tissue transient, and so in contrast involve *time-based* stimuli (Kandel, Schwartz, and Thomas [1981] 2000, 412).

The time modalities of touch stimuli are very similar to those present in sound stimuli: the ciliary cells present in the organ of Corti send similar information to the auditory cortex where the two time-related sub-areas ascribed to discrete and continuous sonic stimuli extract these features (Norman-Haignere, Kanwisher, and McDermott

¹⁰³ *Spatial location* features map the precise position where the stimulus is operating, and are present in sub-areas of TS and VS cortices (not shown in Figure III.2). Since stimuli in SS have primarily *intensity* and *time-modality* features, I considered –for comparative purposes– only these types of features in sub-areas of VS and TS.

2015) (Figure III.2).

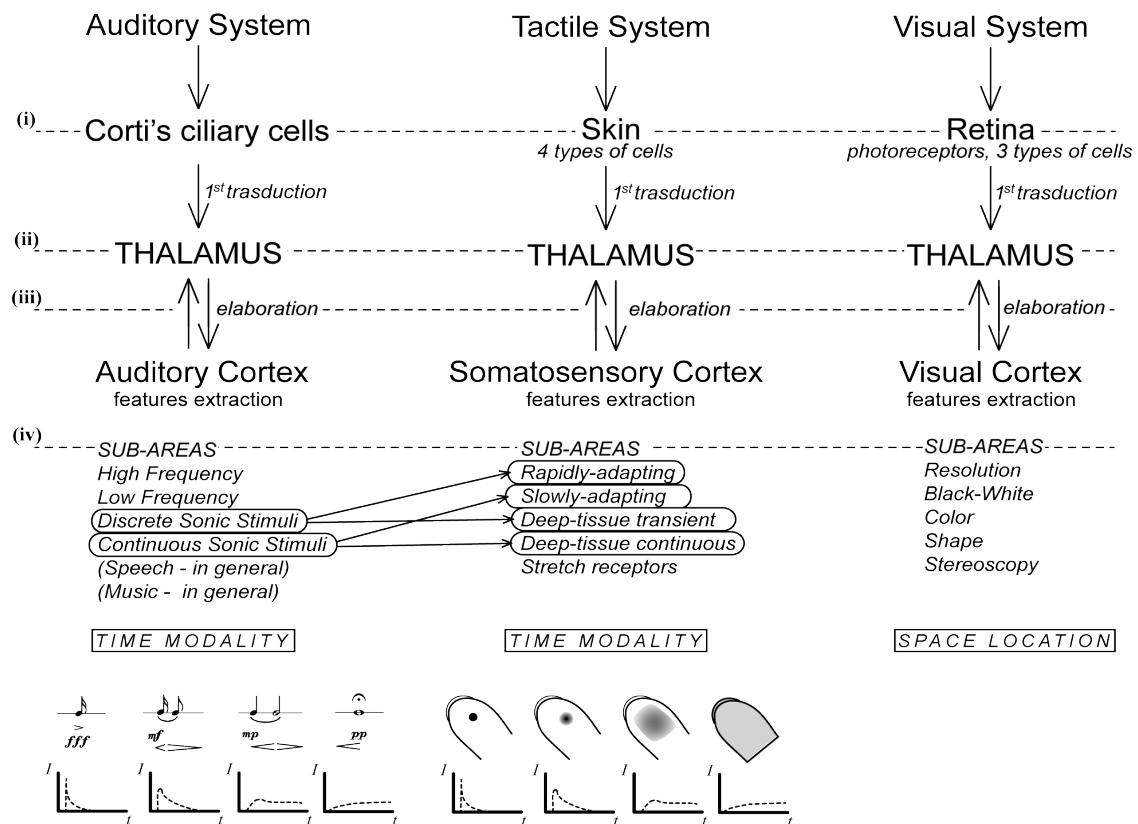


Figure III.2 A general parallel among auditory, tactile, and visual systems: left, middle, and right columns show an overview of structure-function mechanisms of these pathways, respectively. Bottom left and middle schemes represent a possible parallel among auditory and tactile temporal-based stimuli (plotted as musical notations and stimulated areas of the fingertip).

In general, the presence of time-based cues (*transient* and *continuous*) appears to be a common base between auditory and tactile perception and opens up a series of parallels in terms of intensity of stimulation vs. time (Figure III.2). Therefore a correspondence might be drawn between stimuli generated by discrete and continuous sounds (Figure III.2, bottom left), and those produced by –for instance– a short prick on a fingertip and a more extended pressure (bottom middle).

The temporal dimension appears to be a key aspect that associates the auditory and tactile systems, while visual perception seems primarily grounded in the spatial

dimension. The primary distinction between transient and continuous sonic events is such a fundamental aspect of how we parse sound stimuli that needs to be given a primary role in approaching the analysis of the pieces. It might work as an additional aspect to approach pieces of this study which exploit equally the use of sustained and repeated musical elements as well as the dynamic opposition of discontinuous figures (*i.e.* Chapter II, attributes E, F and G respectively). This parallel between tactile and auditory perceptual modes finds fascinating convergences with the outlook on sound developed in this study. This outlook uses components from physical and temporal dimensions as well as basic formal configurations. These correspondences, even if mainly brought up by reflections on neurophysiological matters, have marked the preparation of the listening survey (*i.e.* semantic descriptors) and the elaboration of data.¹⁰⁴

III.2 Listening survey

The majority of studies that involve listening surveys make use of several strategies (*e.g.* semantic differential (SD), multidimensional scaling (MDC), verbal attribute magnitude estimation (VAME), spontaneous verbal description (SVD), verbal attribute ranking rating (VARR)), moving between two main approaches: on the one hand, analytical assessments tend to explore sonic qualities and timbre (Giordano and McAdams 2010; Grey 1977) using adjectives from different semantic classes to define simple often uniform sounds (*i.e.* single tones or noises) in order to promote consistency in the responses to their surveys. On the other hand, certain studies have more to do with philosophy, semiology, and psychology (Ridley 2004; Scruton 1999; Davies 1994; Kivy 1991), and conventionally refer to western classical repertoire and 20th century popular music (Egermann and McAdams 2013).

As I previously mentioned, within this large group of studies on music perception, only a small number deal with the contemporary experimental scene

¹⁰⁴ There are of course interesting studies that compare auditory and visual systems. For instance, those seminal studies by Christman (1971) and Kimble *et al.* (1968) relate more to psychological aspects and the nature of stimuli in a way that parallels between loudness of sound and brightness of colour and between pitch and hue appear fascinating points of speculation as well.

(Kendall 2014; Terrien 2012), and an even more reduced number make use of empirical examinations (Weale 2005; Frey et al. 2009). This lack seems paradoxical as many genres of experimental music are themselves concerned with these very questions of sonic perception. Perception of new music seems to have interested more composers and performers than scholars themselves. When these figures coincide we find exciting debates: for instance, the intense literary production within the electroacoustic community is an example of how profound the interest in listening, appreciation, and cognition of current music is amongst composers who are also academics (Emmerson and Landy 2016). A significant number of books that deal with the world of experimental music focus more on philosophical and aesthetic aspects than on perceptual surveys, fieldwork, and analyses (Kim-Cohen 2009; O’Callaghan 2010; Voegelin 2010; Bonnet 2012). Nevertheless, certain publications suggest original outlooks that aspire to expand the horizons of these themes (Windsor 1995; Leman 2008; Frey et al. 2009; Schulze 2016). A more animated discussion about today’s exploratory music by neuroscientists, psychologists, and philosophers would support and fortify both the artistic and theoretical contexts and help promote unexpected reverberations.

III.2.1 Aims of the listening survey

This survey strives to find ways to investigate a listener’s appreciation of specific currents in contemporary experimental music. More specifically, my objective is to test the key results that emerged from the analysis of the previous chapter, in order to extend the examination towards a perceptual level.

Even given the proposed common aesthetic perspective elaborated in the previous chapters and based on a particular understanding of sound, how should such a diverse selection of pieces from figures such as Haas, Lang, Pan Sonic, and Raime be evaluated in perceptual surveys side by side?

In considering the two approaches to perceptual studies mentioned above, these pieces have little to do with simple sounds made of single tones or pure sine waves and little to benefit from a detailed comparison of the emotional effect of compositions that

belong to dissimilar genres of music. This survey places itself midway between a timbric assessment and a conceptual appraisal. It investigates perception of the complex internal sonic characteristics of the pieces and aims to connect the way listeners articulate their perception of sound with the specific theoretical and aesthetic bases on which the survey was founded. This then allows reflection on possible new convergences between sonic practices and listening approaches.

In providing participants with a common aesthetic framework for many different genres of music, achieved by presenting specific audio samples as well as analytical tools as part of the survey itself, this part of the project examines the potential for cross-genre keys of interpretation to extend the appreciation of contemporary experimental repertoire beyond restricted and specialized contexts. In this way, this work is best regarded as an effort to find feasible ways to put new audiences in contact with various facets of experimental music by using a targeted perceptual method.

III.2.2 Method

III.2.2.1 Procedure

A majority of 89% from a total of 75 participants, average age in the mid-thirties, reported a prior professional or semiprofessional link to music through being either students of music or musicology (53%), musicians (69%), or scholars (17%) (some individuals were categorised in several groups).¹⁰⁵

The survey itself consists of a listening session combined with a questionnaire and was carried out both through a web-based platform (*i.e.* via personal and academic contacts, and social networks) as well as physically attended survey events (*i.e.* within academic contexts). The beginning of the survey aims to establish a profile of the listener (age, link to music, musical preferences, and familiarity with the audio samples following the first playback of the selection). Following this, the perceptual evaluation is structured in two parts: first (Perceptual Evaluation 1, PE1), participants are invited to freely sort the audio samples into groups and to indicate which criteria they applied in

¹⁰⁵ For additional details please refer to Appendix B.

creating these groups; second (Perceptual Evaluation 2, PE2), they are asked to associate each extract with up to five descriptors from a given list (Table III.2), starting with the most fitting. In this way, I tried to balance giving room for the participants to freely evaluate the samples (first step) with the inclusion of a more rigid aesthetic framework (second step).

The final section includes questions concerning the listener's own opinion of the questionnaire itself, in order to obtain insights about the level of interest of the participant for the present investigation and possible suggestions for improvements.

III.2.2.2 Semantic descriptors

While the first task (PE1) is designed to encourage an autonomous classification of audio samples on the part of the listening subjects, the second task (PE2) forces participants to focus their listening on intrinsic musical elements rather than on any other aspect the music might evoke. For this reason, the second task benefits from the presence of a set list of targeted adjectives to describe musical episodes in order to guide the listening focus of the participant. But when the intention is to encourage listeners towards sonic descriptions that allow for the articulation of parallels also arrived at in the analytic step (Chapter II), which types of adjective are more appropriate?

Verbal descriptions of music are often problematic. It is reasonable to say that a significant part of the impact of music on the listener is not conveyable through verbal means. This barrier exists due to the notion that the effect of music might be both too indistinct to be described by linguistic expressions and, on the contrary, excessively precise and detailed so that any report would inevitably not be able to cover its richness. Jankélévitch has insightfully expanded upon the ineffable (*ineffable*) aspect of music, relating it to both the excess and the absence of meaning, and questioning whether the musical content that we are unable to express verbally is truly something to *say*, an *information*, a *meaning*, a *message*, or something else (Jankélévitch [1961] 1983). However, the process of verbalisation itself may be seen as a sort perceptual step, probably inaccurate, but that in many cases may help a listener to clarify his/her impressions (Delalande 2013, 164).

The musical works considered for this study contain elaborate sonic constructions, and consequently the use of simple semantic descriptors such as “sharp” or “dull” to define the material in a composition for 24 instruments (*e.g.* G. F. Haas – *in vain*) would be too vague to be useful. These pieces may include complex sounds and structured textures that could be categorized simultaneously as *sharp* and *dull*.

Semantic descriptors are at times used without careful clarification of their qualities. However, recent studies in systematic musicology (Leman 2008) propose new applications for musical descriptors and, as suggested by Lesaffre (2008), an important distinction between *affective/emotive* and *structural* descriptors has to be established. The *affective/emotive* descriptors encourage expressions of *emotion* (*e.g.* “happy”, “joyous” or “tender”), whether arising from an emotion recognized *in* the music or induced *by* the music. In contrast, the *structural* descriptors challenge the listener to focus their attention on sound’s *qualities*, be they related to its *shape* (*e.g.* “continuous”, “scattered”) or *behaviour* (“ascending” or “fluctuating”) (Zacharakis, Pasiadis, and Reiss 2014). These descriptors define intrinsic sonic characteristics and refer to the concrete features of music better than other adjectives. Following these definitions, I set up a classification of semantic descriptors in Table III.1, where a series of adjectives are ordered based on their affective or structural character.¹⁰⁶

Many of these adjectives belong to spheres of sense other than hearing (*e.g.* tactile, corporeal, visual) and are particularly appropriate within this study due to the morphological and spatial characteristics of today’s exploratory music (Piana 1991, 112–13; Leman 2008, 207):

- Music based on static or sustained tones, for instance, is effectively depicted by expressions coming from the *tactile* domain (*e.g.* “compact”, “rough”, “grainy”). This music describes linear contours using a spectral texture that could appear as a sort of 2D surface, or even as an internal space of a 3D shape.
- Certain styles present manifestations of excess that transcend meaning and push sound beyond semiosis to a state in which it communicates directly with listeners’

¹⁰⁶ A similar Table has been elaborated by Lesaffre and coworkers in which they include a third category of descriptors, *kinaesthetic* (2008, 700).

bodies (Demers 2010, 15; Solomos 2013, 166). Glitch, noise, and IDM make use of *raw* elements of sound with an extreme spectral range at the limits of human hearing. Therefore, it makes sense to pick descriptors within the *corporeal* semantic area (e.g. “enveloping”, “hypnotic”).

- In addition to this, it could be worth considering that *timbre*, as one of the main characteristics of sound, is a concept that has significant ties to the visual sphere (Łętowski 1992). Since *timbre* can be translated as *sound color* (e.g. Klangfarbe), it appears correct to consider among the *structural* descriptors those that suggest a metaphorical parallel with *visual* domains (e.g. “sculptural”, “scattered”).

Table III.1 Classification of semantic descriptors considered in this study

Affective- Emotive	Mixed Area ^(a)		Structural		
	more A-E.	more structural	qualities	shape	behaviour
<i>Tense</i>	<i>Harmonious</i> [#]	Penetrating [†] ~ Intrusive [*]	<u>Full</u> ^{c,†} / <u>Empty</u> ^c	<u>COMPACT</u> ^c / <u>SCATTERED</u> ^c	FLUCTUATING - [Fluctuation [*]]
<i>Calm</i>	<i>Dark</i> [†]	Wide [†]	<u>RICH</u> ^d / <u>Poor</u> ^d	Diffused [†]	ENVELOPING
<i>Quiet</i>	<i>Gloomy</i> [†]	Transparent	Rough ^{*,†}	COMPLEX	HYPNOTIC
<i>Aggressive</i> [#]	<u>Colourful</u> ^{c,†} / <u>Colourless</u> ^c	<i>Flowing</i> [#] / <i>Stuttering</i> [#]	Grainy	Three-dimensional	Hidden
Bleaty [†]	<u>Warm</u> ^{d,†} / <u>Cold</u> ^d	Clear [†] (~ Sharp) [‡]	HETEROGENOUS	Multilayered	STATIC [#] / <i>Dynamic</i> [#]
Hearty [†]	Rustle [†]	<i>Bright</i> ^{b,†}	Smooth [†]	Round [†]	Speed [*]
<i>Angry</i>	<i>Delicate</i> [†]	<i>Vigorous</i>	Metallic [†]		Noisy [†]
<i>Happy</i>	Sweet [†]	<u>Soft</u> ^{b,†}	Harsh ^{b,†}		Ringling [†]
<i>Joyous</i>	Radiant [†]	Humming [*]	<u>Dull</u> ^{b-d,*,†} / <u>Sharp</u> ^{c-d,*,†}		DESCENDING
<i>Melancholy</i>	Cool [†]	Whispering [*]	<u>Doughy</u> ^b / <u>Dry</u> ^b		
<i>Sad</i> ^{s#}		Pure [†]	Narrow [†]		
<i>Anxious</i> [#]		Hard ^{*,†}	<i>Lucid</i>		

Table legend: ^(a) In the *mixed area* are located those descriptors that could be interpreted as more affective-emotive or structural based on the indications of the survey or other subjective factors. Slash punctuation (/) separates two descriptors frequently used as a couple of opposite adjectives in SD studies; tilde symbol (~) indicates two adjectives that are often used as equivalent. Font Styles: normal indicates adjectives mainly used in timbre assessments; *italic*, those mainly used in studies of psychology of music (Juslin and Sloboda 2013); underlined, those historically essential parameters of timbre for ^b Rousseau ([1767] 1995, V:1135) (english translation taken from (Dolan 2013, 57)), ^c von Bismarck (1974), ^d Pratt and Doak (1976). CAPITAL LETTERS refer to those adjectives selected for this study. [‡] (Lesaffre et al. 2008) the article use “*clear*” as antonym of “*dull*”; ^{*} (Susini, Lemaitre, and McAdams 2011); [†] (Stepánek 2006); [#] (Lesaffre and Leman 2006).

All of the criteria listed above were taken into account in formulating the list of semantic descriptors presented to listeners taking part in the survey. In order to provide participants with a set of tools that adhere to the specific selection of audio extracts considered in this study (see section III.2.2.3 Audio samples), the list of structural descriptors are strongly influenced by the results of the previous analysis (Chapter II). This analysis arrived at a set of musical attributes common to all pieces (though not all attributes are applicable for all portions of each piece) and which cover a range of musical practices: (i) an extended spectral vocabulary; (ii) a clear use of repetitive musical units for specific purposes; and (iii) a particular idea of time and space within the sound material itself. These attributes are structural qualities of music and function as semantic *structural* descriptors (see Table III.2).

In this way, the list of descriptors provided to participants works as a sort of *sonic map* of the selected pieces and, even if it integrates diverse types of *structural* descriptors (of nature, arrangement, and effect of sound), its aim is to prompt listeners to reflect on musical forms and actions.

Table III.2 Correspondence between musical attributes and structural descriptors.

Code	Musical Attributes*	Structural Descriptors
(A)	Expanded Spectrum	Rich / Heterogeneous
(B)	Microtonal Variations	Compact / Fluctuating
(C)	Systematic Glissandi	Descending / Ascending
(D)	Rhythmic Developments	Rhythmic / Pulsating
(E)	Static Masses	Static / Continuous
(F)	Repetitive Clusters	Repetitive / Periodic
(G)	Dynamic Contrasts	Contrasting / Scattered
(H)	Hypnotic Reiterations	Hypnotic / Enveloping
(I)	A Plastic And Sculptural Arrangement Of Sound	Sculptural / Spatial

*(Chapter II)

A linguistic adjustment¹⁰⁷ of these attributes has been carried out (Table III.2) in order to offer a more accessible list of adjectives and favour the participation of untrained listeners who may be unfamiliar with the meaning of certain words such as *spectrum*, *glissandi*, or idiomatic expressions, e.g. “repetitive musical clusters”.

This array is not provided to test for statistical preferences within a set group of known sound properties, rather it is there to study how listeners respond to verbal expressions which are targeted at particular sonic descriptions that are part of a unique aesthetic framework.

III.2.2.3 Audio samples

The selection of audio extracts is detailed in Table III.3 and is formulated upon the previous analysis summarised in Chapter II. The selected extracts were chosen to represent precise episodes within the pieces while trying to avoid misrepresenting the nature of each piece in its entirety (e.g. two fragments of Lang’s *DW7* have been selected and account for different musical episodes with identical instrumentation). Care has also been taken to avoid selecting episodes from the different pieces that would seem to homogenize them all into one style. Where the original piece lasts longer than thirty minutes and consists of very slow evolutions, extracts in which instrumentations and styles are recognizable have been selected. The selection process does not aim to eliminate or reduce contextual musical elements, and indeed including these components might allow listeners to discover unconventional practices within recognizable and familiar contexts. This collection of audio excerpts aims to bring together works of vastly different practices, means, and expectations, while also embodying the shared perspective on sound as a potential mirror of material substance.

Concerning PE2, each extract has been chosen to display a range of attributes (Table III.3, middle column): some of these are easily discernible (primal attributes), while others are secondary. Crucially, each extract has been selected to lack a couple of

¹⁰⁷ This adjustment is related to the specific pieces selected and is not universally applicable: the use of microtonality, for instance, is encountered in sustained musical episodes and relates to the creation of static blocks of sound with aural fluctuations generated by acoustic binaural beats. In this way it has been possible to adapt the expression “microtonal variation” into the couple of adjectives “compact / fluctuating” (Table III.2).

attributes. Samples #6 and #9 (*i.e.* Verrando – *Dulle Griet* and Raime – *Told & Collapsed*) represent special cases: they exhibit more pronounced characteristics (*i.e.* sample #6 is harsh, noisy and sparse while #9 possesses a fast and regular rhythm). These samples are chosen to allow for a more immediate sonic recognition and to help those listeners lacking experience to have an increased confidence in their own judgments.

Presenting many short extracts instead of fewer longer audio samples aids in the effective comparison of many genres without a listener becoming too expectant towards genre-specific musical evolution that longer extracts may provoke (Huron 2006). Moreover, shorter extracts gives the participants a straightforward test that lasts thirty minutes in total.

Table III.3 Selected samples of musical works used for this survey

Author/Piece ^a [time]	Attributes ^b	Short Description
1) Lang – <i>DW7</i> [05'02" – 05'40"]	(p) F H E B D; (s) A I; (a) C G	Regular interventions by strings and wind instruments are made of complex inner textures in which sustained tones overlap, interacting with one another. These interventions outline a systematic and uniform sequence of events.
2) Pan Sonic – <i>Rafter</i> [03'15" – 04'30"]	(p) A E C H B; (s) F I; (a) G, D	Continuous electronic sounds form a complex structure. They oscillate in opposite directions creating a specular profile that periodically enlarges and reduces. At the end, the sound increases in volume and distortion: high frequencies start to loom out over the global density of musical flow.
3) Lang – <i>DW7</i> [08'47" – 09'31"]	(p) D E G H; (s) A F B; (a) C I	Linear orchestral sonic flow of repeated and mechanical fragments proceeds in <i>ostinato</i> mode. Instruments overlap creating sparse polyrhythmic structures.
4) Haas – <i>in vain</i> [51'42" – 52'24"]	(p) G F D C; (s) A I B; (a) E H	Similar to previous sample, a progressive texture of orchestral profiles moves in the background with slow glissandi, while percussive sounds (<i>i.e.</i> tam-tam) appear in the foreground with a great dynamic and timbric contrast.
5) Lang – <i>DW17</i> [32'28" – 33'33"]	(p) E H B; (s) I A; (a) C G F D	Quiet orchestral episode with sustained sounds: continuous high tones of orchestral instruments and soft interventions by bass electronic tones. These sonic contours weave together affecting one another and creating a dense surface of layers.
6) Verrando – <i>Dulle Griet</i> [05'00" – 05'50"]	(p) G A I; (s) D E; (a) F C H B	Loud and harsh interpositions of distorted elements (acoustic, electronic) create irregular fragmented clusters of sound that abruptly stop, leaving a very soft and continuous stream of string instruments.
7) Raime – <i>Passed Over Trail</i> [01'43" – 02'46"]	(p) F H I; (s) A D B E; (a) C G	A complex loop of synthesized sound (acoustic and electronic), with vibrating interventions, sirens, echoing voices, overlaps, and cyclical changes becoming more and more elaborated while maintaining a sort of slow regular metric.
8) Lang – <i>DW15.2</i> [06'48" – 07'59"]	(p) H B E F; (s) A D; (a) C G I	A simple microtonal line from an acoustic string instrument delineates a foreground recurring profile, staying on top of a continuous and oscillating stream of bass electronic sound that progressively enhances the sonic space.
9) Raime – <i>Told and Collapsed</i> [02'12" – 02'58"]	(p) D I H; (s) F E B A; (a) C G	Flows of percussive, sparse, and continuous sounds develop in a clear rhythmic evolution that extends over a large portion of the spectrum, originating a series of virtual planes of sounds.

^a (Andrews and Halstead 2011, 2012a; Haas 2000b; Lang 2002, 2004, 2006; Vainio and Väisänen 2004; Verrando 2013). ^bAttributes from theoretical analysis: primal (p), secondary (s) and absent (a) (Table III.2).

III.2.3 Results and discussion

The questionnaire was carried out via both web-based and direct means. The Internet setting gave the possibility to the participant of completing the survey in their own private environment, allowing them time to listen to the music in a calm context and to replay the audio samples if desired (Honing and Ladinig 2008). The direct survey offered the opportunity for the person giving the survey to give more explanations. After a separate analysis of each approach, the results of both proceedings turned out to be comparable and were combined in order to form a global evaluation.

III.2.3.1 Perceptual evaluation 1 (PE1)

The first part of the perceptual evaluation (PE1) invites listeners to sort the samples into groups of their own choosing and to specify the criteria of the classification they used. Despite the variety of verbal expressions, a significant number of participants used similar criteria and based their categorization on instrumentation and style. Others indicated criteria mostly related to aural sensations and sound descriptions. Certain criteria indicated by untrained participants appear to rely more on the musical effect (*e.g.* “oneiric”, “cinematic”); these include intuitive explanations (*e.g.* “Here I perceived sounds more melodic and clear, even if they are complex and structured”) and genre statements (*e.g.* “historic, experimentation of modern music; [...] symphonic contemporary music...”). Figure III.3 illustrates the global response for groups of two samples: the thicker the connecting lines are between two samples, the higher the number of participants who associated them together. Interesting relationships are visible for the couples #1/#4, #1/#5, #2/#3, #3/#4 and #2/#5.

While the links between samples #1 and #4, and between samples #1 and #5 concern their common instrumentation (*i.e.* “orchestral music”), the frequent association made between extracts #2 and #3 (*i.e.* Pan Sonic – *Rafter* and B. Lang – *DW7*), and the rarely made link between #1 and #3 (*i.e.* two extracts of the same piece) shows how –in these cases– musical evolution appears perceptually more important than instrumentation. Samples #2 and #3 do not in fact share a common instrumentation, but exhibit a similar use of repeated figures creating static sonic layers,

whereas the two extracts from Lang's *DW7* (*i.e.* samples #1 and #3) substantially differ in their musical form.

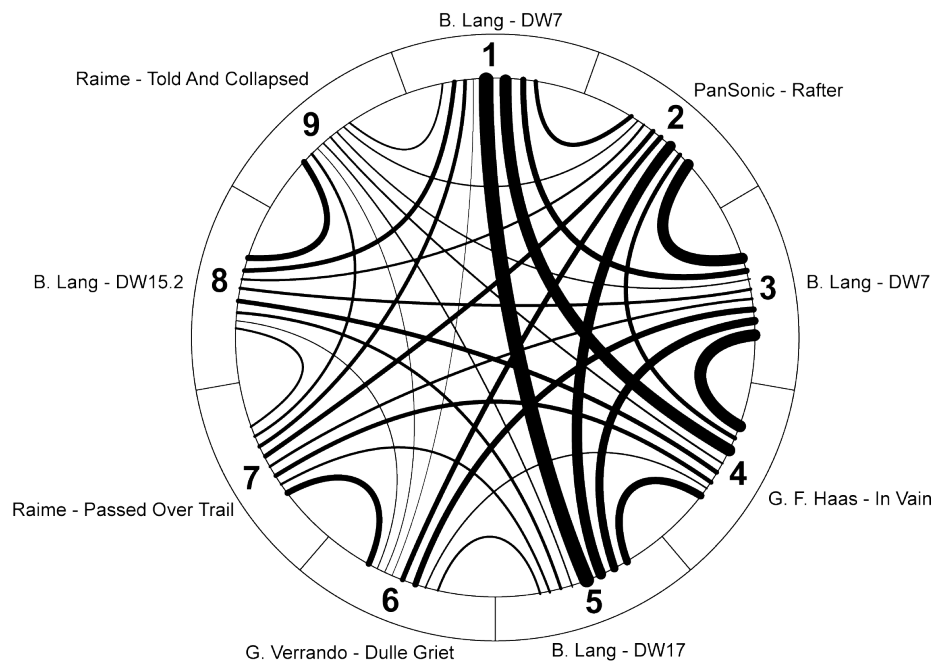


Figure III.3 Sorting for groups of two samples: the thicker the connecting line is the higher number of participants associates the respective pieces

More general observations confirm the idea that a significant experience in this field of music enables trained participants (or those more familiar with the repertoire) to identify nuances despite the complexity of the audio samples. This becomes evident in the range of descriptions and multiple classifications (*i.e.* the inclusion of the same sample within different groups) used by trained participants, while untrained participants tended to group the samples progressively (*i.e.* first groups often contain opening extracts) and within fewer multiple classifications.

Looking at the PE1 exercise as a whole, there is a positive and interesting result. If one considers that this task requests solely the grouping of a list of audio excerpts with no restriction as to the number of groups, criteria used, or other parameters, there were a significant number of participants (80%) able to group all the samples, find multiple associations and classifications, and articulate their sorting criteria. The response of unskilled participants was informative, though less organized and related

more to sporadic sensations than to elaborated thoughts. In contrast, experienced listeners were inclined to assume an analytic stance, finding some difficulty in staying open to more spontaneous reactions. Overall, given that the group of extracts were chosen to fit a theoretical perspective, the fact that the majority of participants found rich and spontaneous criteria to categorise audio samples belonging to complex and unconventional styles of today's musical panorama may indicate the coherence of the theoretical approach; if this coherence were absent, we might have expected a difficulty in grouping multiple extracts into a few groups, poor classifications, and unclear articulations (see III.2.4 Modes of listening).

III.2.3.2 Perceptual evaluation 2 (PE2)

In the second step of the evaluation (PE2), participants are provided with the list of descriptors (Table III.2, right column) and asked to indicate which descriptors are more appropriate for each sample, starting in each case with the most relevant descriptor.

Globally, descriptors in the responses were distributed in accordance with the analysis (Chapter II, and Table III.3, column *Attributes*). In some cases (*i.e.* samples #2 and #4) the discrepancy between a listener's response and the theoretical results most likely lies in the proper understanding of the semantic descriptors, the modality of listening, or the participants' background (see Appendix B).

The specialized nature of the questionnaire¹⁰⁸ enables the observation of some global trends within the group of musicians and students of music:

(i) There was a general reduction in the use of the descriptor H (*i.e.* "hypnotic / enveloping") when we consider musicians (including students of music). This result indicates that adjectives that belong to a large and flexible semantic area, and go beyond pure aural description, such as *hypnotic*, may be more comprehensible for non-musicians. Therefore, when an audio extract exhibits characteristics such as the repetition of musical elements or the presence of continuous and regular profiles,

¹⁰⁸ Even if 89% of participants reported a general expertise in music, only 54% admitted to having a familiarity with the audio samples.

trained participants are able to identify these features within the list of adjectives (being descriptors E “static / continuous” or F “repetitive / periodic”, respectively), whereas untrained listeners associate these elements with the effect that they produce (*i.e.* “hypnotic”).

(ii) The descriptor I, “sculptural / spatial”, was preferred by musicians in comparison with the global response. The adjective *sculptural* may not be immediately associated with a piece of music. Even if terms from other sensory spheres are well-suited to describe experimental music, the metaphorical link between a sound and this adjective that belongs to the visual domain, and that accounts for practices and unfolding structures, might not be obvious: the interpretation of a piece of music as *sculptural* implies a capacity to identify a process rather than a simple quality. Experienced participants are able to differentiate virtual planes of sonic evolution that form a spatially structured environment.

In general, PE2 provides useful information about the specificity of the descriptor: its intelligibility, accessibility, and its potential when connected to the field of contemporary experimental music (*e.g.* how an adjective works, where and how it should be applied...). Untrained participants prefer more general descriptors (“static”, “rhythmic”) as well as those that relate to the effect of music (“hypnotic”), whereas trained ones usually use descriptors concerning nature and behaviour of sound (“descending”, “contrasting”, “sculptural”).

III.2.3.3 General remarks

While in-person surveys took place in academic contexts with the presence of students of music and musicology and scholars (and this explains the high percentage of experienced participants), the web-based inquiry could, in principle, extend participation to a larger and more varied group, although this platform has the disadvantage that it is easy to abandon and leave the questionnaire incomplete. Some feedback has confirmed that untrained listeners often left the questionnaire when they started to listen to the musical extracts. They stated that they felt “incompetent and unsuitable for the type of music”, and became reluctant to participate.

The responses to the extracts do allow some conclusions to be drawn:

- (1) There is a mutual correspondence between musical preferences, familiarity with the audio samples, and the questionnaire evaluation,¹⁰⁹ thus indicating that, even though this work extends across various genres of contemporary music, the group of genres as a whole is still considered as a *niche*: a limited and isolated branch of today's music.
- (2) More generally, participants with a professional background in music showed a greater ability to: (i) distinguish styles and genres; (ii) identify the nature and the source of different sounds; (iii) deal with semantic descriptors from different spheres of sensation other than hearing.
- (3) The PE2 was completed more successfully than PE1: it seems to be more demanding to express verbally one's own musical decisions (PE1) than apply given set of designations (PE2).

III.2.4 Modes of listening

The sorting task (PE1) reveals that the main tendency is to categorize pieces using a sort of *analytic listening* that allows the listener to identify contextual elements (*i.e.* styles and instrumentation), while a second set of sorting criteria relies on personal associations resulting from aural stimuli (*affective listening*, Table III.4). A significant number of participants used a combination of these in classifying the audio samples (Table III.4, *Mixed Analytic + Affective*, 18%). In the absence of established rules and canons on which participants could rely during listening, the perceptual response to a diverse collection of abstract and experimental music would naturally draw on rational aspects from a listener's background (*analytic listening*: sound source and genre identification, dependent on a listener's particular background) and description of personal sonic sensation (*affective listening*: description of emotive associations).

¹⁰⁹ Those who appreciated the test have mostly reported a good familiarity with audio samples and a preference to those genres related to the selection of pieces, and *vice-versa*.

Table III.4 Modes of listening and selected comments

Analytic (45%) h:56%; p:95%*	“electronic, oscillators”; “acoustic instruments treated electronically”; “experimental electronic, contemporary classical”; “sound synthesis and manipulation of sound previously recorded”; “acousmatic music produced only by electronics processed through plug-in or laptop”
Affective (18%) h:33%; p:55%	“sensation of suspended state and anxiety”; “dark and mysterious atmosphere”; “mostly distorted atmosphere”; “melodic and distorted, oneiric”; “concrete, tense, hybrid”; “more pensive, melancholic”; “aggressive”; “quiet”
Mixed Analytic + Affective combination (18%)	
Immanent (19%) h:90%; p:99%	“punctual pulsations superimposed over a continuous development in a figure/background relationship”; “pulses periodically repeated, in order to create discontinuity within a continuity”; “complex rhythms, multilayered, based on repetition”

*h = relative % of high familiarity with audio sample; p = relative % of professionals link to music.¹¹⁰

But a third tendency emerges (*immanent listening*): a small number of participants, those with a higher familiarity with the audio samples,¹¹⁰ took an interesting approach to sorting that appears to describe music through an act of direct apprehension of musical forms and shapes, sound morphologies, and evolutions (Dibben 2001). This mode of listening does not transcend sonic experience to arrive at external causes or derivative associations; rather it appears to be free of genre conventions and source identifications, and to be based on a person’s own active judgement, demonstrating that participants are finding their own formulations and approaches. This listening mode focuses on the immanent aspect of sound using

¹¹⁰ There is a weak correlation between modes of listening and familiarity with the audio sample (Table III.4, $\chi^2 = 12.92$, $df = 4$, $p < .012$, Cramer’s $V = 0.392$).

concepts drawn from the natural tendency to organise sensorial data according to how it informs us about the physical world: its shapes (“punctual pulsations...”), its temporal evolution (“pulses periodically repeated...”), its spatial dimension (“in a figure/background relationship”), and its general descriptions (simple or complex). The criteria exemplifying *immanent listening* consist of natural schemes of recognition (“music is structured in distinct events with a continuous pad in background”) or originate in the appreciation of simple elements despite being expressed with technical language (“complex spectra, with periodicity”), therefore it seems reasonable to expect that this approach could be readily adopted by listeners from a wide range of backgrounds. However, participants who manifested an *immanent listening* in this survey had a high familiarity with the samples and a professional link to music.

Why does it seem like the ability to describe generic sonic characteristics correlates with a high level of awareness of these pieces? Why are simple and seemingly almost universal musical figures identified only by practiced listeners? There could be several explanations for this (*e.g.* the length or number of samples, the type of extracts, external circumstances...), but the higher education in music may not be the key to the *immanent listening* attitude. Table III.4 seems to suggest that it is not so much the higher musical training but more the familiarity with styles of music that typifies participants of the *immanent listening* group.¹¹¹

Musical training is mainly cultivated in institutional contexts which tend to separate communities, styles, and perspectives, providing students, musicians, and researchers with genre-specific tools for recognition. In contrast, curious listeners, experimental performers, and open-minded composers with a versatile understanding of different styles in the current musical panorama, when faced a cross-genre selection of pieces, might more easily discern sonic elements (*e.g.* musical forms, contours and evolutions) from those aspects typical of each genre (*e.g.* media, contexts, sources).¹¹² Traditional musical culture has for years constructed the conviction of there being a

¹¹¹ Only 56% of listeners who have assumed an *analytic listening* declare to have a high familiarity of the audio samples (Table III.4).

¹¹² A genre could be seen as a collection of works sharing a set of consolidated conventions (*e.g.* sonic, social and cultural) that when repeated create listening expectations and recognitions (see Glossary, Appendix D (Demers 2010)).

correct approach to high-art music and this might be a reason why untrained listeners opt to express themselves in terms of their feelings rather than attempt to formulate verbal descriptions of sound in which they might judged to be unsuccessful or *wrong*.

Moreover, the use of the *analytic* attitude by a large number of respondents might also depend on the type of enquiry itself (*i.e.* categorisation): with respect to the other two modes of listening that deal with a more personal sphere, the *analytic* attitude might be seen as the most secure sorting criterion (again relating to the concern of completing a sort of *correct* classification), and so a participant may choose that one even if they perceive an extract according to an *affective* (or *immanent*) attitude as well.

Globally, the three modes of listening (*i.e.* *analytic*, *affective*, and *immanent*) accurately outline a listener's approach towards experimental music. Listening practices relating to other genres of music (*e.g.* western classical repertoire, rock, folk¹¹³) show similar characteristics, but there the presence of pre-defined acquired structures (*i.e.* culturally prevalent, widely taught, conventional), such as *refrain*, *chorus*, *theme*, *exposition*, or *counterpoint*, promotes the direct description of musical passages. Experimental practices, lacking codified musical conventions, cause the listener to favour *analytic* and *affective* criteria. The presence of a genuine tendency to focus on listening to sonic material (*i.e.* *immanent* mode) rather than to its source, reference, or conventional structure is –within the world of experimental music and in particular from a musicological point of view– of great interest: supported by the proposed aesthetic framework, listeners employing the *immanent* approach grasp material aspects of sound in the form of profiles, shapes, or groups that unfold, expand, or collapse (*e.g.* “punctual pulsations superimposed over a continuous development”; “distribution by sub-sequential peaks”). What gives these elements a coherence is that they are part of a particular understanding of the material world, but as potential: participants articulate their perception of sound in terms of traces, shadows, and imprints of this potential material world.

Even if several traits of these listening modes could find parallels in previous

¹¹³ In ethnomusicology, for instance, Lomax's *Cantometrics* taxonomy takes on an important role as system of musical parameters.

theories (e.g. Schaeffer's definition, (1966, 103–28)), these modes are best seen as fluid and dynamic processes: participants often integrate several of these approaches. The results, when considered globally, confirm that these listening modes in some ways overlap since all deal with how we relate to the external world through perception: in terms of (i) appearance, (ii) specific object origins, or (iii) associated emotions from particular situations. Hence, the *immanent* level is not a self-contained stage,¹¹⁴ and it has little to do with *reduced listening*: given a set of works having a shared aesthetic framework that focuses on the immanent aspects of sound (*i.e.* those that push towards poietic and aesthetic levels), listeners use criteria that are derived from our apprehension of the material world and expand on spatial and temporal concepts, cultural factors, or more complex descriptions.

These three modes of listening ought to be carefully considered since they emerge within a specific empirical survey regulated by strict standards. Could these approaches be precisely ascribed to ordinary modes of listening? Are the tendencies to search for sources, effects, and types equally present in common listening practices? (Dibben 2001)

In this regards, the seminal work of sociologist William W. Gaver represents a crucial reference for an ecological approach to everyday sound perception (1993). He demonstrates that listeners tend to identify sounds in terms of the objects and events that originate them. However, the work of Gaver, particularly useful for studies in electroacoustic and acousmatic music (Windsor 2000), considers *everyday* and environmental listening, and uses sound samples such as climbing stairs, typewriters, and a car's engine starting up. Gaver explicitly distinguishes between *everyday* and *musical* listening, and, following his definition, the present study might be better regarded as an attempt to encourage this second kind of listening. In this sense, in contrast with Graver's conclusions, the observed preferences towards an *analytic*

¹¹⁴ The language of the *immanent* approach is at times borrowed from what we might expect to produce the sound (e.g. "pulses periodically repeated", "multilayered") or what we might associate the sound to (e.g. "unpredictable contrasts").

listening which looks for sources and styles may instead be due to the reasons I discussed above.

Moreover, Erik Clarke, moving through the ecological approach, claims that “[music] perception is not a process of taking in ‘raw sensations’ and then interpreting them, and the purely sensory character of perception is usually not at all evident to a perceiver” (2005, 32). However, he admits that this is not always the case:

“[w]hen perception proceeds in an unproblematic way, we are usually unaware of the sensory aspect of the stimulus information, and are only attuned to the events that are specified by stimulus structure. But when that relationship is problematic, the stimulus structure itself can become more evident” (2005, 32).

I argue here that it is precisely this kind of “problematic” perception of today’s experimental music¹¹⁵ that allows some works in the genre to focus on sensory aspects (the “stimulus structure”): the music of Haas, Verrando, and Pan Sonic is based precisely on unconventional musical forms which exploit sonic effects that are embedded within musical episodes, eliciting a sensorial impact (cf. Kendall’s *phenomenal qualities*, (2014, 200)).

Nevertheless, there is still an active debate on the *myth of the aesthetic attitude*¹¹⁶: are participants of this survey inclined to take on a particular stance that allows them to perceive the audio extracts in a distinctly different way? Can we talk about specific attitudes (Stolnitz 1960), modalities (Dickie 1964), or simply degrees of concern (Ihde [1976] 2007, 44)? This questionnaire does not aim to elicit simply a casual listening attitude in its participants, rather it aims to engage a focus on music in such a way that a listener’s active attention is able to constitute a point of convergence for the discussion of results.

Following Clarke’s description, so-called absolute (or autonomous) music –*i.e.* music considered independent and distinct from words, images, dance, drama, programmatic narratives, and all those attributes which manifestly make connections with a world outside the work– seems able to be appreciated through an autonomous

¹¹⁵ Clarke refers to musical examples mainly from the traditional classical repertoire (*i.e.* Beethoven), and he indicates musical *invariants* which allow listening to proceed in an “unproblematic” way.

¹¹⁶ I indirectly quote here the title of the well-known article by George Dickie (1964).

listening: “musical listening [that] is structural listening, and structural listening can be understood as the perception of musical event structures specified by sound” (E. Clarke 2005, 133). This definition may fit with the observed *immanent* mode. However, the results of this study show the contemporaneous (often integrated) presence of all three modes of listening which approximate –keeping Clarke’s definition– to a sort of *ecological* approach to music that “gives a coherent account of the directness of listeners’ perceptual responses to a variety of environmental attributes, ranging from the spatial location and physical source of musical sounds, to their structural function and cultural and ideological value” (2005, 46).

In setting up an international series of listening sessions between Portugal, England, Belgium, France, and Italy, and extending the approach to web-based platforms, my interest here was to extrapolate practical conclusions more than theoretical ones. Is there a way to empower listeners to approach an experimental music repertoire as they would approach any other established or well-known style of music? This particular study takes a cross-genre aesthetic perspective as a possible path forwards. The *immanent listening* attitude, even if it appears only a minority perspective, remains important due to the individual nature of the responses which were notable for the richness and variety of concepts used and for the particular details with which participants accounted for the music. They succeeded in making multiple groupings and diverse assessments, and described musical episodes based on their qualities and shapes, being able to move critically within what they recognized as a consistent aesthetic frame of reference.

III.3 Conclusions

In considering a very restricted selection of pieces and genres, I strive in this chapter to draw more general conclusions about the ways in which some of today’s exploratory music can be perceived.

When we look at a painting, be it abstract or figurative, we can talk about the quality of the paint (*e.g.* dense, watercolour), the style (*e.g.* impressionist, symbolist), and the sensations it transmits (or it seems to express). However, we could also describe

more directly what we see: what sits in the foreground or background, its general structure, or even describe how one part of the painting is more captivating, or how another part appears unclear. The same might be possible for traditional classical or popular music, but does not seem to happen as naturally for contemporary experimental music.

The difficulty this type of music has in reaching larger audiences beyond elitist contexts is largely known, and the insistence by specialists on restricting interpretations, separating styles, and limiting accepted approaches to understanding new music has frequently been in evidence in our recent past (Landy 2007, 23–26). For this reason, talking about our perception of experimental music without being either too technical or too trivial is a problem that involves researchers as well as those in educational, artistic, and cultural contexts.

The survey used in this chapter tackles the theme of perceptual evaluation in a non-conventional way by setting up a questionnaire according to theoretical assumptions and examining feedback to then gather elements to better define a common aesthetic perspective.

The results of this chapter tell us which musical aspects draw a participant's attention more readily and which generate difficulties in approaching this type of music. The *immanent* approach to such a diverse selection may require effort and practice and is contingent on the presence of an appropriate aesthetic framework (*i.e.* the perspective on sound that is in common among all the selected pieces). However, this approach is able to give coherence to works from different genres of music and offers innovative connections.

It is not a question of defining new rules or taxonomies, but rather of creating the situations in which we, as listeners, are empowered to escape from the clichéd treatment exploratory music and establish new socio-cultural forms and convergences.

In this way, the construction of new didactic platforms, the planning of new activities in music production, new approaches to artistic and academic events,¹¹⁷ all

¹¹⁷ Examples of these type of activities may found in Chapter VI and (Emmerson 2007, 64).

these might aid in designing more accessible paths for a diverse audience to appreciate genres and styles beyond their own musical background, encouraging listeners to break down the barriers between different contexts within experimental music. These aspects among others will concern the final discussion in Chapter VI.

IV Composers and Performers

IV.1 Introduction

The idea of placing a set of specific compositions at the centre of this study helps to maintain an approach that is rooted in the object of study, allowing the focus to remain on the same particular leading figures and subjects from which cross-genre perspectives are then developed.

Pieces from diverse musical contexts incorporate different poietic practices, however, in general, the composers considered in this study all take the sonic result of the material they use into account and attempt to foresee or imagine the audience's reception or the interpreter's reading (Delalande 2013, 138).

As demonstrated in previous chapters, the pieces included in this study can be understood together within a particular perspective on sound, which –at an analytic level– can be partially defined using certain common musical attributes (Chapter II). Even so, these authors all conceive of their music in different ways. This conception depends on the nature of each individual but also on the differences between their socio-cultural contexts and the existence of conventional practices within their various specific artistic domains.

The aim of this chapter is to examine these diverse compositional practices to try to find evidence of common poietic outlooks. Through a series of questions for composers and performers, directly or indirectly related to the selected pieces, I conducted discussions, both by email and in person, touching upon the following topics:

- the specific piece(s) included in the study;
- general perspectives on sound;
- compositional practices and perceptual intentions;
- view on today's experimental panorama and cross-genre contacts.

These written and oral exchanges do not aim to directly address the more general comprehensive socio-cultural theories about the differences between musical communities, rather my purpose is –as with several other tasks in this dissertation– to maintain a limited and specific focus in order to extract elements within an explicit frame of reference that may then yield more general conclusions. The set of pieces and outlook on sound and perception form the explicit frame here.

IV.2 Discussions with composers and performers

Below I include a summary of the separate discussions and interviews that were carried out during the research project.¹¹⁸ Where not specifically indicated, citations are to be attributed to the corresponding person (performer or composer) with whom the dialogue is being undertaken.

IV.2.1 Haas (Georgia Privitera – Maurice Quartet)

The conversation with Georgia Privitera, first violin of the Maurice Quartet, focuses on Haas' *String Quartet n° 3 "Im iij Noct"* (2001)¹¹⁹, though many aspects that emerge are related to more general characteristics of Haas' music. By positioning the questions within a perceptual perspective, I have encouraged the interpreter to focus more on the global idea of sound in the piece than on the technical details of the score. The music of Haas is described by Privitera in terms of sound, sound effect, overall character, detailed materials. Even though the piece is composed using sophisticated elements and elaborate constructions, these serve a larger and more unified idea of sound which is surprisingly more simple, essential, and organic than its means of construction. Similarly, the analysis of *in vain* has confirmed that the meticulous notation used there serves a primal and primitive construction made of *accelerandi*, contrasts, horizontal designs, and vertical explosions. In other words, the microscopic compositional detail does not generate independent lines within an interrelated design

¹¹⁸ The complete texts of the exchanges are included in the Appendix C.

¹¹⁹ This particular piece is conceived to be played in complete darkness and musicians are positioned in the four corners of the room. It consists of a series of musical figures with specific instructions and rules: there are musical "invitations" and "acceptances", possible "competitions" and alternative solutions. The piece lasts 35 minutes but it can run significantly longer (Haas 2001).

(e. g. counterpoint), instead Haas' detailed writing simply allows for the appearance of larger forms, such as fluid masses of sound, cyclical movements, or tense evolutions. In order to develop the sonic elements he uses in greater depth, Haas sometimes limits the musical material he allows himself to use. As Haas himself declares: "for nearly two decades, I composed basically with only two chords. And I have not yet exhausted all the possibilities inherent in the relationship between them" (Varga 2011, 106).

Privitera insists on the idea that Haas' sound is an elaborate entity that involves technical and perceptual aspects, as well as engaging temporal, emotional, and existential dimensions. The sonic immersion "within the sound, with the sound", in Georgia Privitera's own expression, may refer to the fact that the relation with the music does not occur only in a purely sonic sense ("within the sound") but also in terms of a wider emotive and embodied connection with and in relation to the sound: tensions, vibrations, pulsations are shared elements between sound and body. In this way, sound possesses a sort of familiar character: "[a] sound that we know already without being aware of it we grasp as a preconscious memory". This intimate insight into sound coexists with a particular internal perception of the temporal evolution of the music.

"The frequent use of cyclic forms and recurrent repetitions, often performed in *accelerando*, characterize some aspects of [Haas'] pieces, together with the quadraphonic perception derived from the position of the performers [in the *String Quartet n°3*], all these elements contribute to that perceptual *being*, [...] which is hypnotic and abandoned [...]. We strive to leave behind our temporal codes [...] or our normal playing (and this is why every performance has a different duration). It is important to stay away from any sort of predictable and temporal cadence while avoiding any artificial construction of this non-sequentiality, and on the contrary drawing on our inner and corporeal freedom."

In addition to the aural and temporal facets, Haas' music is closely connected to the physical space of listening: both *in vain* and the *String Quartet n°3 "Im iij Noct"* make use of darkness to enhance the listening experience. In this regard, Georgia Privitera explains how Haas' music could be perceived as in relation to the expansion or reduction of space: "[w]e noticed that the state of blindness strongly changes our perception of the physical space. Listening becomes a means of orientation, the space itself shrinks and the four corners of the room seem to move inexorably closer to us". This sensorial impression is related to the inner dimension of the sound of the work: "*Im iij Noct*" does not incorporate any sort of sound manipulation to create new virtual

spaces of listening; it is only through the combination of acoustic sounds from a traditional string quartet that generates a particular sonic interaction with the physical space that leads to this sensation. On this matter, Haas' conception of physical space seems to bear more similarities to certain compositions of Alvin Lucier, in which sound interacts with the physical space to generate aural interferences, than to electroacoustic and acousmatic pieces where sounds are moved around and projected in physical space to create imaginary environments.

In Haas' music, the perceptual level connects composer with both performers and listeners, not only because the composer asks the performers to use listening to orientate themselves during the performance, but also because performers engage with the audience within a sort of mutual experience: "it is no longer just an acoustic listening but also a kind of energetic one in that there are strong interactions with the audience. I would definitely say that the audience takes on an active role during the performance". However, in the case of "*Im iij Noct*", Privitera suggests that Haas does not intend to control the listening process:

"we [, as interpreters,] prefer to give just a few pieces of information [to the audience], as indicated in the score, we advise the audience about the darkened conditions of listening and the approximate duration of the performance to steer clear of any type of traumatic or provocative situation, something that Haas absolutely does not look for. The important thing is to set up a comfortable environment for the audience in order to avoid that the concert be seen as an intrusion or a sort of violence; but the listening should not be guided. This practice actually led –after the concert– to a very rich and interesting exchange with the audience: it creates a condition for stimulating debates and interchanges of ideas about perception."

At the end of the exchange, it emerges that Georgia Privitera, though a specialized interpreter of contemporary repertoire, shares a cross-genre interest in different styles of today's experimental panorama: the Maurice Quartet includes in its repertoire collaborations with electronic performers and, in Privitera's everyday listening, she is also interested in genres such as glitch music, electroacoustic, and minimal-techno, and artists like Pan Sonic and Ryoji Ikeda among others.

To sum up, what emerges is that Georg Friedrich Haas uses a careful organization of timbric elements, in particular when exploring atypical listening conditions, that results in a sound that is essential and primordial, that resonates with the

body, modifying temporal and spatial perception through sound and lighting, respectively.

IV.2.2 Riccardo Nova

The dialogue with Riccardo Nova moves from discussing the piece selected for this study (*i.e. Eleven*) to his ideas on sound, musical perception, and time, as well as his technical and compositional processes, and finally to his unique relationship with eastern music and alternative electronic fields.

The starting point of this exchange is Nova's own conception of sound as "the final result of the superimposition of the pulsations that compose it".

I am interested in analysing the vertical timbre/spectra/chords and clusters that I transform within polyrhythmic multi-layered structures. Ultimately, an interval is the relation between two frequencies [...] that has in its DNA a specific rhythmic pulsation. [...] For instance: a perfect fifth holds a specific sound that every musician recognizes. [...] What makes it identifiable? In my opinion it is the rhythmic pulsation generated from the ratio of its constitutive frequencies... that is, in this case, a triplet over a duplet (3:2). [...] [A]ctually everything is more complicated since I work with instrumental timbre (the timbre of the clarinet, for instance, generates a really unique rhythmic sequence that is 15:13:11:9:7:5:3:1). If we enter into the domain of inharmonic (non-periodic) sounds, the complexity becomes huge [...] I study complex vertical structures that create polyrhythmic hypercomplex relationships.

This complex idea of sound is elaborated in different ways by Nova, resulting in –for example– regular pulsations, punctual episodes within a complex temporal relationships, or multi-layered and throbbing sonic aggregates. In the case of *Eleven*, the title of the piece reveals the essential structure of the work: Nova starts by establishing

a fundamental unit to which every aspect will relate, then [he tries] to shape these relationships. [...] [T]he title refers to this fundamental unit: a cyclic meter of 11/2 that will remain unchanged during the piece, even if it will be elaborated in different ways. [...] [E]very episode has a constant relationship with the fundamental cycle that stays unvaried."

It becomes evident that the piece's structure is closely related to time: rhythmic or chronometric relationships characterize the main correspondences of the piece's organization. In the case of *Eleven*, "the idea of cyclical nature is evident".

For me *cyclicity* does not only appear with the return of certain situations / gestures / sounds but also with the precise relationship between the specific durations and the global duration: the time in which each event occurs must have a precise relationship

with the general time and with the events that precede and follow it. Every moment has a hierarchical relationship with everything else. When viewed through a magnifying glass, sound becomes pulsation.

When prompted, Nova reveals that his essential conception of temporality has more to do with a sort of pulsated recurrent movement rather than a vision of free and static time in music. This idea has strong connections with the Indian vision of “pulsed time” in which “time [is] based on a defined unit of measurement”. It is a conception of time in which the cyclic idea is “developed to its maximum potential. [...] Even when my music seems to relate to a fluid time, the pulse is always present if only implied. I am interested in the rhythmic complexity only if it is related to a simple and explicit figure”.

Riccardo Nova is conscious of the complexity of sonic exploration: while at the moment his interests focus on the sonic translation of complex polyrhythmic structures, he acknowledges that “the more [he] explore[s] this matter, the more [he] realize[s] that a conclusive answer does not exist”. At the beginning of his formation together with Fausto Romitelli and Giovanni Verrando, he investigated different possible answers to a very crucial question: how to articulate timbre?

Murail [and] Grisey [...] composed (I refer here to their first period) with extended timbric layers, but they articulate very little: they were so totally focused on the ‘sound’ that they did not care too much about the “gesture” or the “figure”... I remember Donatoni criticized Grisey, Murail, and their fellow composers exactly for this lack of “gestures” and “figures”.

Nova does not simply identify spectral exploration with the *substance* of sound, but he expands this idea of substance to include a more profound research into the fundamental unity that is the essence of a piece. For this reason, he examines and develops frequency relationships, multi-layered clusters, and polyrhythmic constructions. In other words, the timbric research is carried out to emphasize a larger idea rather than simply as an end in itself: “my timbre colours are a second step, and I use them to create hierarchies and polarize the subunits within a fundamental unit”.

In addition to these elements, the interplay of electronic and acoustic sounds takes on a great importance. Depending on the circumstances, Nova either composes the electronics fully himself or asks the electronic performers to manipulate sound material that he prepares. He develops specific combinations of the two sources (*i.e.* acoustic and

electronic) to achieve fusions of the two, creating unique sonic entities. For example, the introduction of *Eleven* clearly shows this type of arrangement: it consists of “the opposition between the acoustic sound of the cello and a pre-recorded sound of the electric guitar, and finally a bass sound, created *ad hoc*, which discloses the pulsation of the fundamental unity”. *Eleven* is characterized by an intense interaction between electronic and acoustic sounds. These interplays often appears in the form of abrupt dynamic contrasts made of distorted sounds which may recall noise or –when rhythmically structured– techno or IDM’s styles. Nova reveals his interest in underground electronic fields of music and explains how the use of these new sonorities was tied to the need to break with academic dictates:

In 1999, with Massimiliano Viel, we founded a group that was producing techno music. [...] [W]e were more fascinated with the sound which we could hear in the underground electronic scene rather than with the old fashioned acoustic chamber sound which was still prominent in the “contemporary” music festivals around Europe. [...] [W]e felt the narrow limits in which academia was moving. It was around that time that we decided to found *Sincronie*. The idea was to go beyond the empty forms of the traditional concert to experience instead new ways of presentation also interacting with musicians from different backgrounds.

In this way, Nova, Viel, Romitelli, and Verrando explored different live modalities and investigated alternative approaches to perceiving and listening to contemporary music.

[These] were events where the various pieces were merged one into another, often with the public in the centre surrounded by several stages (the ICTUS ensemble was directly inspired by our events when they were developing their “liquid rooms” event), nothing to do with the academic ritual: piece “a” / applause / piece “b” / applause / piece “c”.

Nova recognizes that “performer and listener’s perceptions” are key aspects to take into consideration during the composition process. When asked if –during the listening sessions– he finds it important to provide listeners with informative texts about the piece, he acknowledges that

perception works by recognizing the patterns that recur and characterize a particular music. Anything that might in some way help the listener to identify these patterns [would] influence the listening. My pieces often have titles with a close relationship to the musical structure. But maybe it is better to leave the listener free to trace his own patterns.

IV.2.3 Giovanni Verrando

The dialogue with Giovanni Verrando focuses on his pieces *Dulle Griet* and *Triptych#2*, and his book “*La Nuova Liuteria: Orchestrazione, Grammatica, Estetica*” (2012), in which, among other things, he describes in detail his own idea of sound and his compositional methods. Giovanni Verrando was very generous in discussing his conception of sound and composition, and his interest in perception and musical contexts.

First of all, this exchange reveals that Verrando’s music is characterized by a carefully considered notion of sound materials and practices, starting with sound production and emission and extending out to include recording and manipulation. He indicates two main aspects of his compositional research: “the exploration of the inharmonic (or the equilibrium between harmonic and inharmonic) and new instruments”. The two pieces selected for this study (*Dulle Griet* and *Triptych#2*) are characterized by specific traits: their construction embodies a succession of musical episodes that are differentiated by their degree of inharmonicity, dynamic, and spectral characteristics.

“[I]n *Dulle Griet*, traditional acoustic instruments, modified or prepared, and concrete ones constitute –together with electronics– different sections based on their degree of inharmonicity and brightness. It was important for me to transform these properties of sound into thematic material: *Dulle Griet* consists of clear sections in which the main character is the spectral material. [...] In *Triptych#2* and *Dulle Griet*, specific sonic material corresponds to fixed sections. Time is translated into form (with reappearances and new beginnings). Thus, in these pieces, I did not consider temporality as a continuous flux, but as a container with its own clear limits, useful in characterizing the composed sections.”

Different musical temporalities exist then as holders of a kind, each one defined by a particular equilibrium between harmonic and inharmonic sounds. Consequently, Verrando does not merely aim to create suspended and vertical temporalities, rather he creates sequential contrasts between different sonic spectra through temporalities.

More generally, as mentioned above, in order “to render what resonates in [his] mind”, Verrando “need[s] to go beyond the world of harmonic sound and extend the ordinary instrumental domain”. The close connection with instrumental characteristics is a particular aspect of Giovanni Verrando’s work, the idea of developing a new

lutherie to be able to work with the spectral characteristics of invented or modified instruments lead him to write pieces for specific instruments and performers, such as *Fourth Born Unicorn* for cello.

I believe that the “instruments/tools” are a means, or rather, are “vehicles” for a purpose. They of course exert a strong influence on the ultimate objective [...]. But the relationship between the means and purposes is part of the writing process: I start from an idea, I'm going to confirm it with the instruments, and come back to the starting idea that now is inevitably changed, I return again to the instruments, and so on. If needed (and this happens frequently), I search for new instruments not typical of the traditional set and I modify them. In other words, I put my sonic image into a working area, try the best means to translate it expressively, to finally reach my purposes.

This compositional practice has been well described by Verrando himself¹²⁰ with the following figure (Figure IV.1):

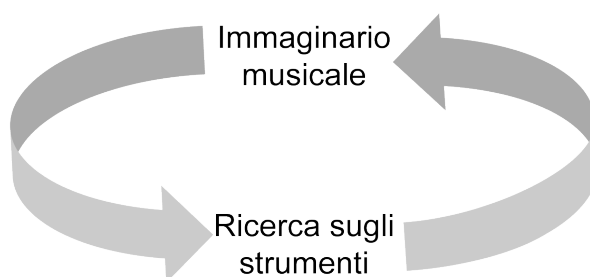


Figure IV.1 Verrando's compositional scheme (“immaginario musicale” and “ricerca sugli strumenti” may be translated as “musical imaginary inventory” and “research on instruments” respectively).

Moreover, from the conversation it emerges that he possesses a specific idea of the perceptual impact of his music. In order to put his idea “into the score, to realize it through the instruments, [he has] to forge the details of sound and to know its properties”. He studied psychoacoustic principles and based his perceptual intentions on a simple but

fundamental truth of psychoacoustics: there is no absolute assessment of sonic properties (roughness, brightness,...), rather there exist evaluations that depend on single individuals and on the different perceptions of the inner characteristics of sound that inevitably everyone has. This shift in perception is due to psychophysical conditions, cultural contexts, musical background, and so on, elements that represent our irreducible identity.

¹²⁰During a lecture held at *Dialoghi sul Comporre*, 28-30th December 2016, Budrio (BO), Italy.

Verrando's idea of the *non-confirmity* of perception extends to the reflection that "there is no longer a unique interpretation of musical data, rather there are common conditions where the individual perceives sound and its characteristics in a unique way that is in fact irreproducible". Verrando's engagement against the *uniformity* of sound has been shared with his fellow composers Riccardo Nova and Fausto Romitelli, with whom he has attempted "to go beyond the sound of *Pierrot Lunaire*".

There is a legacy, noble but outdated, that might coincide with the sound typical of the 20th century chamber ensemble. Stockhausen, for example, contributed to this change of sound paradigm [...]; and then Fausto Romitelli: we are still noticing how much Romitelli's ensemble for *Bad Trip* is helping to modify the general horizon of the typical idea of the sound of a "contemporary ensemble". [...] Academia, however, finds it difficult to accept the disappearance of the only truth. And at the same time, this statement (*i.e.* there is no one truth) cannot and will not justify any aesthetic choice, style, or perspective.

Here, then, is the responsibility involved: I can put myself on stage only if developing constant proneness towards research, the study of the context that surrounds me, and an in-depth analysis. Otherwise, I risk following the choices of others: I re-produce instead of create.

In his book, Verrando clarifies how after the emancipation of timbre during the 20th century, composers could be seen as having an increased responsibility. The most recent exploration of sound spectra has opened up an immense range of sonic possibilities: taboos and rules have collapsed, and traditional dichotomies (*e.g.* sound vs. noise) have been dissolved. The role of conscious choice, of the individual's responsibility, of aesthetic and critical judgement start to become even more fundamental constituents of a composer's work.

[...] everyone pursues with great depth and seriousness their own project. The answer [...] is in this act of responsibility. [...] In the world of written music, it is hard to accept what emerges with always more clarity: the stronger the individual's ability to express their own vision of the world, the more interesting the music becomes. I refer to the innate difference typical of each one of us that, when combined with a great technical knowledge, a well-grounded awareness of past and present contexts, and a potential talent, accounts for an irreproducible aesthetic and opens up towards a new perspective on the world.

Again, then, the idea of *uniqueness* that characterises the peculiarity of each individual's perception reappears here at the poetic level: the *non-conformity* protects the composer from the risk of re-producing the choices of others.

Regarding cross-genre influences and contacts, Verrando recognizes that –in the past– outside academia he "met a different approach to sound [...] that led [him] to

create a new sonic idea”. In the case of *Triptych#2*, Verrando explicitly integrates sonic elements from different genres into the writing of the piece (“I wanted to bring *non-academic* musical elements into my language”). He made manifest his background “made of many different musical stimuli, many different experiences, academic and non-academic”. More recently, he states that he does not “feel the need to explicitly recall any specific element” because he has succeeded in integrating and elaborating his material to better express his identity and his particular characteristic traits. However, he confirms his interest in the works of Pan Sonic (with whom he directly collaborated) and Rioji Ikeda, as well as in Lang, Nova, and Haas’ music.

IV.2.4 Bernhard Lang

The dialogue with the Austrian composer Bernhard Lang occurred both in person and by email. We had chance to meet at the DARE – International Conference On Deleuze & Artistic Research, Orpheus Institute, Ghent, Belgium, on November 9, 2015. On that occasion, a live performance of his piece *Tables Are Turned* was scheduled, and I was allowed to be present at the rehearsals with the Italian ensemble Alter Ego (Manuel Zurria – flute, Paolo Ravaglia – clarinet, Aldo Capagnari – violin, Francesco Dillon – cello, Oscar Pizzo – piano) and the turntablist Philip Jeck.

Tables Are Turned is a one-hour piece for small ensemble and turntablist (Figure IV.2). The piece is divided into five movements, and its general structure consists of a complex arrangement of repeated polyrhythmic modules and free phrases in the ensemble which interact with the pre-recorded material performed by the turntablist.¹²¹ On that occasion, as is the case in general, Bernhard Lang worked in close collaboration with the interpreters, following, discussing, and commenting on the rehearsals. Lang seems especially interested in the dynamic relation between subjects: composers and interpreters, elemental musical forms and complex sonic results.

¹²¹ A similar arrangement can be found, for instance, in Lang’s pieces of *Differenz / Wiederholung* series: *DW8* and *DW11*.



Figure IV.2 Rehearsal of Tables Are Turned at International Conference On Deleuze & Artistic Research, Ghent, Belgium (from left to right: Bernhard Lang, Oscar Pizzo, Manuel Zurria, Paolo Ravaglia, Aldo Capagnari and Francesco Dillon; not visible but present on stage Philip Jeck).

The long sections found in several pieces of the *DW*-series, where the music is static and suspended and the sound gives the impression of expanding “vertically” (e.g. the final part of *DW17*), are conceived by looking at the “dialectics between minimal initial conditions and resulting complexity”. Lang has, since the eighties, “been working with FM-Spectra” (*i.e.* Frequency Modulation), and his approach is rooted in a diverse background made up of jazz grammar and improvisation practices, 1960s and 1970s alternative rock, academic compositional roots (*i.e.* microtonal and traditional techniques), as well as electronic and spectral experiments.

He clearly states that his perspective is not that of an established conceptual position, rather he insists on the idea that his method is spontaneous and not premeditated: “I take what I can get and what I find surrounding me: das Zuhandene / das Vorhandene [what it is available and present]”.

Based on the feedback coming from both the direct contact and the email-based exchange, it emerges that Lang does not immediately consider the perceptual aspects of his music when composing and does not seem to be directly concerned with an

audience's reception of his sound. Rather, he has a very intense collaboration with performers coming from different contexts, merging different musical languages, and integrating improvisers and classical musicians in the same piece.

IV.2.5 Mika Vainio (Pan Sonic)

A month after Mika Vainio's death (*i.e.* April 12, 2017), the founder of Sähkö label and friend of the composer, Tommi Grönlund, recalled some significant aspects of Vainio's character that may help to form a clearer reading of his contribution to this study.

[Since mid-1980s, he] had a large collection of rare finds in art and music. His house was always wonderfully set up like an altar for his finds, though after several years there would be a tendency for him to leave these belongings behind. He wanted to be reborn regularly. [...] Another prominent element in Mika's character was his opposition to authority and establishments. As a young kid he was expelled from school for not paying attention. With no-one having expectations for his future, he started to read and study by himself – fiction, science fiction, nonfiction. From that background he created his cryptic picture of the world and of life. [...] I always admired the references Mika threw into our conversations – his imagination was endless and he chose his words carefully. [...] Mika didn't have any formal music education, but had a vast knowledge of music of all kinds, call it classical, modern classical, world music and experimental electronic or electroacoustic. It was only quite recently that Mika categorised his own music as electroacoustic. He couldn't read music or write notes – instead he created a language of his own, based on sounds and silence transforming into rhythms. The chords or melodies he wrote were created by trial and error. (Grönlund 2017)

I got in contact with Mika Vainio on May 2016 by e-mail. I sent to him a series of questions and after only a few minutes he answered. There was no full text in the response: the email only contained the original questions with a short series of responses.

Vainio was known for his marked reluctance to give interviews and talk about his music, and his brief contribution to this study has to be considered of high value. Nevertheless, his feedback might sound at times provocative and evasive and should be considered within a particular cultural and personal context. From the short response to this exchange emerges the instinctive nature of Vainio's approach to music. Sound is seen as an indistinct idea made of aural and physical expressions as well as intuitive and abstract experiences. What seems to be important to Vainio is the perceptual level: he insists on the attitude of listening and the attention to sound ("listening, instead of

hearing”). Similar to Verrando and Nova, he acknowledges the plurality of the perceptual level, and he is not interested in disclosing poietic intentions or in addressing listeners with textual explanations or programmes: “everyone experiences music their own way. I don’t expect any specific reaction”.

There emerges from his response the desire to go beyond Pan Sonic’s sound by developing more personal projects (“after my previous experiences I am not interested in collaborations any longer”). The impact of Pan Sonic on the panorama of electronic music is largely acknowledged and Vainio has, as have many other artists who hold an acclaimed past, made an effort to separate his solo work from that of Pan Sonic. This may be a reason why the prompt to speculate about the sonic characteristics of the duo (“*Which past genres or aesthetic do you think are related with PanSonic’s music?*”) provokes a sharp reply. In any case, his interest in the musical world is hardly classifiable: as Grönlund recalls, Vainio’s artistic stimuli may come equally from literature, junk and trash production, artefacts, unorthodox and subversive material (“traditional music of Africa, Marcel Duchamp, Heavy Metal, raw fish, Sylvia Plath, Heidegger and Link Wray”).

IV.2.6 Other contacts

Over the course of several months, I attempted to contact various artists from underground and alternative electronic scenes. I contacted Joe Andrews and Tom Halstead (Raime), Peder Mannerfeld, Sean Canty and Miles Whittaker (who form the Manchester-based electronic duo, Demdike Stare), among others.

In most cases, I had difficulty in making direct contact (sometimes my questions were forwarded to the artists by the editor of the label), and I did not receive any significant answers. Some artists admitted feeling “a bit intimidated about the length and depths” of the enquiries. As acknowledged by Stock: “the interviewer’s perceived role as a ‘music expert’ may lead interviewees to see the experience as akin to a test, with the result that they feel uncomfortable or struggle to second-guess the ‘right’ answer” (2004, 26). To avoid this, I altered the questionnaire’s format, simplifying and shortening questions, and including multiple choices, for instance:

- *Which background and musical interests do you have? Which past or current genres or aesthetics are related with your idea of sound?*

- *Is your music also based on rhythmic and repetitive structures? If so which of the following effect are more interesting for you?*

- to create hypnotic effects

- to generate static and suspended episodes

- to develop slow and minimal evolutions

- others:

- *How do you create a piece? Do you start improvising on your set of instruments? or Do you think about something before starting (such structured elements, written schemes, or even scores...)?*

Nevertheless, it appears difficult to verbally account for abstract and instinctive ideas. Artists of this kind do not often process their intuitions using theoretical and intelligible terms, indeed they may see this approach as having little use or value; rather they develop their creative practices in direct contact with electronic devices, that is through directly working with and in the sound, being unable to (or seeing little benefit in attempting to) clearly formulate their intentions.

During the period of research, I frequently came into contact with a number of composers and performers who provided useful details which were included at various points within the general reflections of this dissertation. For instance, Italian cellist Francesco Dillon of Prometeo Quartet and AlterEgo ensemble, a frequent interpreter of Haas and Lang's music, offered many pieces of information and advice relating to his work. Marco Momi, an Italian composer working at the IRCAM in Paris, was also helpful through various meetings (*i.e.* conferences and concerts). His pieces *Almost Nowhere* (2014) for saxophone, electric guitar, percussion, piano, and electronics, *Unrisen* (2016) for smartpianoquintet (*i.e.* piano, string quartet, and embedded electronics), and *Vuoi che i passi accadano* (2017) for string quartet and electronics, were stimulating starting points for discussions about the integration between electronic and acoustic sound.¹²²

¹²² Momi, in fact, has recently elaborated an original approach, designing specific devices which –through electric transducers– are physically inserted inside the wooden body of the instruments. Electronic sound is then emitted within the instrument and is acoustically amplified by it. In this way, electronic sources is *coloured* by the instrument and the resulting timbre becomes a mix of electronic and acoustic ones.

IV.3 General remarks

The uniformity of the questionnaires presented to composers and performers allows the identification of five main themes on which the interviewees elaborated (Figure IV.3): (i) conception of sound; (ii) time and temporality; (iii) compositional practice; (iv) musical contexts and genres; (v) perception and space of listening.

Each composer, directly or through an interpreter's words, expressed a distinctive perspective. Natural convergences may be found between Verrando and Nova who, coming from the same cultural background, demonstrate a common interest in going beyond restrictions towards cross-cultural contacts between institutional and independent contexts. On the other hand, Haas does not manifest a clear necessity to break bridges with classical traditions, rather, in keeping the focus on sound, he reinvents musical forms in which well-tempered and microtonal practices coexist within innovative symmetries.

Nova and Haas converge in their conception of a sort of temporal unity within a piece, but while the former constructs periodicity as a complex sequence of recurrent proportions, the Austrian composer uses cyclic profiles as a kind of ancestral form of recognition that allows listeners and interpreters to lose themselves in perception by focusing on sonic complexity. It is also within a complexity that we may find parallels between Lang, Nova, and Haas: the meticulous, micro-scale composition of single musical episodes which results in a macro-scale aural effect is the common trait among these composers.

Moreover, the perceptual aspect is a shared concern, with the exception of Lang; Vainio, Verrando, and Haas have all expressed in different ways the importance of listening as a revealing experience within sound. Perception for these authors is a specific experience that involves "psychophysical conditions, cultural context, musical background, and so on, elements that represent our irreducible identity" (Verrando) (Figure IV.3, blue connecting lines "intimate experience"). Haas, commenting on collective listening in darkness, talks about listening as a sort of orientation which connects one another through tensions, vibrations, and pulsations. Lang distinguishes

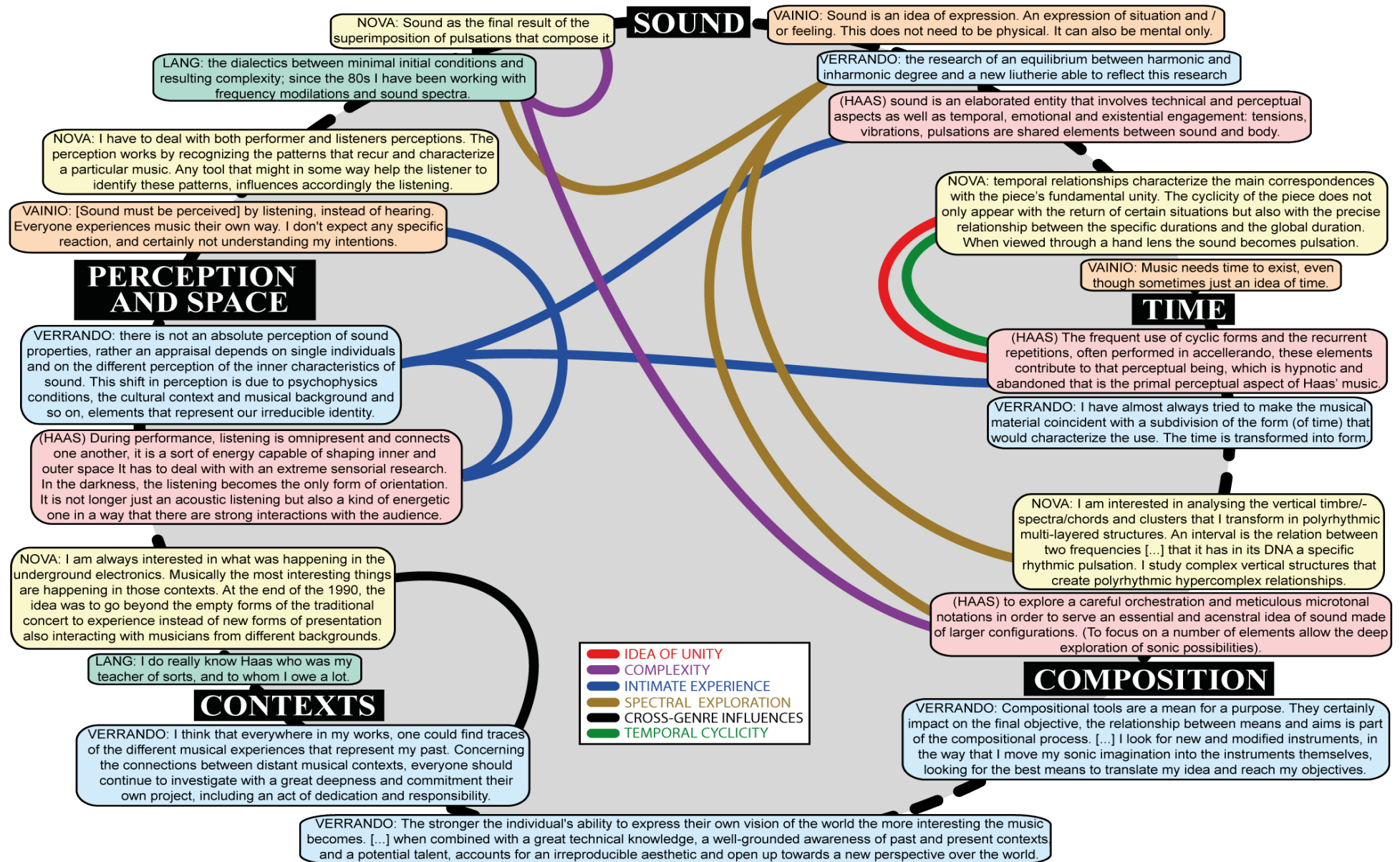
himself through his declared indifference for the perceptual aspects of his music. He admits, though, that sonic exploration is part of his background: he is recognized as one of the current composers who develops spectral research within original forms of microtonality, complex sonic aggregates, electronic and acoustic combinations (Hiekel and Utz 2016, 113). In this aspect, he is positioned close to his colleagues.

There is a subtle red line which connects certain poietic aspects of Nova, Verrando, Lang, and even Pan Sonic that relates to the idea of breaking rules, imposing personality through musical gestures, marking and embodying actions in sound. On the one hand, Riccardo Nova and Giovanni Verrando talk about their initial intention to mark a distance from both traditional schools (*i.e.* serialism) and the first spectralist approach which lacked gestures (Nova). They investigate how to empower the expressivity (“articulate”) of timbre. On the other hand, Bernhard Lang, building on his multi-faceted background, has implicitly and explicitly contrasted his music with his Austrian musical heritage.¹²³ He has composed music mixing electronics, turntablist and glitch aesthetics, and has included representational components of theatre, texts, and images from avant-gardist culture (*e.g.* beat generation, psychedelic rock). Finally, Mika Vainio has always moved within counter-culture practices and has always belonged to nonaligned contexts. His music, in solo and with Pan Sonic, is typified by violent gestures that mark the *presence* of the artist and is far from being impersonal or distant.

Therefore a common thread emerges: the roles of composer and performer take on a greater relevance together with the importance of individual duty. “[T]he answer [...] is in this act of responsibility. [...] [T]he stronger the individual’s ability to express their own vision of the world, the more interesting the music becomes” (Verrando).

[next page] Figure IV.3 Summarizing scheme of main themes emerging from the interviews.

¹²³ I recall here his well-known piece entitled *I hate Mozart* (2006).



IV.4 Conclusions

Even with the absence of figures from independent and alternative contexts, the material collected in these conversations provides interesting data.

On the one hand, the responses reinforce some of the premises developed in the previous chapters, namely: (i) the presence of a shared interest in spectral exploration as compositional strategy; (ii) the idea of sound as a composite notion: musical creation passes inevitably through the development of methods that converge on this complex concept rather than involving the elaboration of separated parameters, such as melody, pitch, dynamic; (iii) the common interest in the temporal aspect of sound existence and its perception.

On the other hand, several topics emerge more clearly: the attention given to the internal qualities of sound does not hamper a poietic involving extra-musical elements, such as a need to break established rules by recalling different listening modalities, corporeal engagement, and the necessity to transcend technical dictates to establish a more direct communication. These composers are similar to one another in how they conceive of various traits of sound, but each one develops different thematics, for instance the polyrhythmic relationships of sonic clusters for Nova and Lang, and the equilibrium between harmonic and inharmonic components for Verrando. In this sense, convergences occur around a similar focus on sound, its inner characteristics, its *attributes* and *perception*, and then occur less often where personal implementations are in play.

The utopian idea of finding perfect correspondences between theoretical reflections and empirical data coming from these discussions is naive and would in fact weaken the examination. Rather, the variety around certain core ideas should allow both the definition (or reinforcement of the definition already proposed here) of a new perspective on sound in current compositional approaches, and the exploration in more detail of the particularities of how each practice approaches that central perspective from a different angle.

V The Ecstatic-Materialist Perspective

V.1 Introduction

This chapter aims to bring together the results that have emerged from the historical considerations and the analysis of the pieces (Chapters I and II), the perceptual reflections and survey (Chapter III), and the interviews with composers and performers (Chapter IV).

In Chapter II, the analysis outlined nine common attributes (*i.e.* (A) An Expanded Spectrum; (B) Microtonal Variations; (C) Systematic Glissandi; (D) Rhythmic Developments; (E) Static Masses; (F) Repetitive Clusters; (G) Dynamic Contrasts; (H) Hypnotic Reiterations; (I) A Plastic and Sculptural Arrangement of Sound) which were then implemented within a perceptual survey to verify their coherence for the selected pieces.

From the perceptual task of Chapter III, it emerged that when approaching a set of pieces of experimental music, people listen to them using multiple approaches. These approaches depend on their particular view of the physical world; people relate to the works in terms of how they appear (*e.g.* musical shapes) and where they come from (*i.e.* sources and instrumentation), including cultural (genres) and affective aspects. This result tells us that “attending to sounds as part of the human and material worlds is a genuinely musical part of musical experience” (Hamilton 2007, 96).

The discussion of the poietic level (Chapter IV) disclosed several key elements relating to the particular perspective on sound examined in this thesis: the shared focus on sound as a primary and material aspect, the sound as temporal process of creation and perception, the importance of artistic gesture, and intentionality and responsibility as a means to break with conventions and express a personal identity through sound.

The initial premise of this cross-genre perspective is, recalling Scelsi’s vision, the conception of sound as a complex and almost tactile material. The outlook on sound

developed throughout this thesis sees it as disclosing components from physical and temporal dimensions as well as basic formal configurations that give the music a material presence. A common aesthetic emerges from very different contexts (concert hall, club) and media (*e.g.* classical orchestra, electroacoustic ensemble, electronic and sample-based emission), issuing from a similar approach that perceives and reveals a *material* trace in sound, a *materialism* of sound.¹²⁴

A number of theoretical and creative works propose a *sonic materialism* in which the attention moves towards *sound-in-itself*. Philosopher Christoph Cox has animated the debate on the materiality of sound in contemporary experimental scenes, discussing a new theoretical stage capable of going beyond representation and signification (2011). The composer Fausto Romitelli has insisted on the need to include materiality in musical practices: these activities should pass not only through abstract symbols or objects but should be enriched by the contribution of practical experience in order to develop a complex organism with a metabolism, carnality, density, thickness, and grain character (2001). Döbereiner, criticising the idea of a living character of sound, claims that sound-in-itself is accessible only through composition, and that the materiality of sound belongs neither to the subject nor to the object but remains in compositional practices “as material (re)configurings of the world” (2014).

Correspondences between figures such as Georg Friedrich Haas, Giovanni Verrando, and Bernhard Lang, and performers coming from independent scenes such as Pan Sonic, Autechre, and Raime concern a common focus on the sound-in-itself, its intrinsic characteristics, and highlight similar choices such as the use of complex spectra and periodic movements within globally rich and sculptural textures.

Sound, continuous or discrete, is conceived by both groups of figures as a dense, tactile, and three-dimensional matter that is moulded as if it were a physical substance. This idea of sound, which recalls Scelsi’s definition of spherical sound (Scelsi 2006), touches on both stable materialist and unstable ecstatic concepts in an apparent self-

¹²⁴We encounter the term *materialism* related to art music as “the focus on material, the physical stuff of artistic creation and life itself” (Demers 2010, 79), and as a general term “to refer to the direct interpretation of raw phenomena” (Bataille [1968] 2002).

contradiction. Scelsi's sound is profound and vibrant; it is typical of an exploration of the inner extent of sound itself, but is also characterised by being intuitive and enigmatic, an almost mystical material. It behaves as if it were a living entity, typical of its concrete nature (*i.e.* material) yet unstable (*i.e.* ecstatic).

All these elements, collected during the previous research steps, converge on a cross-genre viewpoint that I call the *ecstatic-materialist* (E-M) perspective. This frame of reference is defined by specific musical characteristics. Some of them, as previously mentioned, coincide with the main concepts expressed by spectralism, minimalism, and *musique concrète*, while others emerge as typical only of this multi-genre perspective, marking it out within the variegated panorama of today's music.

As shown in the previous chapters, *sound* has become the material nexus between listener and author within several currents of today's experimental scene. By discussing the materialist approach to sound, the particular conception of time and space, and the compositional and perceptual aspects of the music, and by detailing similarities between distant currents and disclosing crucial differences between contiguous styles, this chapter aims to postulate the presence of an ecstatic-materialist domain by first considering the pieces selected for this study and then expanding the focus out towards a larger panorama.

V.2 The Ecstatic-Materialist perspective

Following the precepts of the *Gestalt* approach, which favours the apprehension of the entity as a *whole* rather than as the sum of its constitutive parts, Abraham Moles, in his seminal book on information theory (1968), presents two different theories that describe our perception of the external world: the theory of scanning and the theory of form. The first theory asserts that perception derives a message from the scanning of various distinct elements, perceiving particular collections of the various separate elements, while the second theory states that the message arrives as a unified form: a series of elements perceived as a whole unit and not as a collection of distinct elements. Moles shows different possible syntheses of these theories, but this dual representation is useful in making clear crucial aspects of the ecstatic-materialist perspective.

Certain practices within electroacoustic music¹²⁵ conceive the structuring of a piece in a way that appears comparable to the theory of scanning. These methods proceed from the conception of various elements, differentiated mainly in terms of their morphology, to the composing of a complex combination. A theory of a morphology of sounds has been developed not only for academic studies but also within the fields of perception and composition (Smalley 1997). Typo- and spectro-morphologies open up to processes based on articulation and construction using distinct sonic elements in collections.

In contrast, the E-M approach embodies the theory of form. Compositional methods as well as perceptual approaches are integrated processes in which composer and listener search for a unified sonic matter. The composer creates the sound as a single entity to be developed. There is often an intentional limitation on the sonic material used and the music does not progress according to a functional design. Listeners approach the sound perceiving a single body that evolves. Sound is then a form conceived and appreciated as a whole and explored through its complex characteristics.

In addition to this parallel with the theory of form, the dual vision of this *ecstatic-materialism* rests mainly on a particular conception of sound and its positioning as the locus of convergence of composer and listener within various frameworks and contexts.

It is a *materialism* because both author and listener within this perspective intend to explore the substance of sound-in-itself, its consistency and presence, to confront dense masses and examine the constitutive elements of raw sonic matter. Materialist sound serves itself, but in embracing subjective experiences and extra-musical elements as part of the listening and creative processes, it calls to a reality and carnality that it conveys through the expressivity of pure sound. Furthermore, it is an

¹²⁵ As previously mentioned, the term *electroacoustic* is a large designation (see Appendix D, Glossary). In this chapter, I use it as a label that spans acousmatic, sonic art, multi-channel diffusions, and mixed-sound compositions, and includes figures such as Horacio Vaggione, Denis Smalley, Jonathan Harvey, and independent sound artists such as Robin Rimbaud and Steven Roden. When necessary, I specify whether I refer to the academic or the independent context.

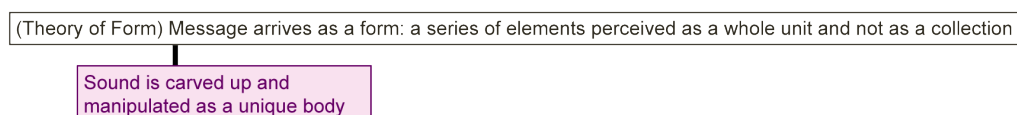
ecstatic materialism: for the composer, this refers to the unstable, ephemeral, and personal nature of sound, its liminal aural characteristics and its intimate relation with time and evolution; ecstatic-materialist sound is to be understood as not just a sonic substance but also as an unstable and transitory experience. For the listener, *ecstatic* concerns the liberty to move within the intrinsic characteristics of sound: to freely associate insights, fleeting impressions, and to penetrate an author's sense of sound.

Sound is the common ground between creator and recipient in which the vital impact of raw sound and its intimate temporality and spaciousness incorporate the extra-musical and bodily aspects. Therefore, sound is both tangible, as physical material, and volatile, due to its ephemeral behaviour in perception.

In engaging the ecstatic-materialist perspective, the vision of music that claims an impersonal and scientific investigation of and approach to sound, detached from everyday life and "purified" from extra-sonic traits, is left behind. Composers that fall within the E-M perspective convey elements of practical experience (Romitelli, Pan Sonic) and intimate discovery (Grisey, Scelsi) through sonic exploration so that their music, even if it is founded mainly on research into purely sonic aspects, maintains a dramaturgy and a personal touch. These authors focus on sound-in-itself but crucially do not reject external content relating to wider social and cultural meanings. Listeners, each within their own context, are engaged in a rich listening experience, free in their interpretations and sensations: they are faced with pure aural stimuli and, as a result of a specific cultural and aesthetic framework of communication, intuitions and personal exchanges are activated. Perception is far from normalised and automated, it is a captivating and inclusive sonic engagement that unfolds as an open, personal, unique, and thoroughly involved participation, as a synthesis of temporary feelings and socio-cultural habits.

In presenting a series of examples from contemporary instrumental music, post-spectralism, minimalism, and electronic-glitch music, I delineate this cross-genre *ecstatic-materialist* perspective by focusing on musical perception and conception, aural references, and extra-musical content. I demonstrate that several details frequently overlap from one genre to another, being essentially part of a single transversal vision of

sound across several currents of today’s music, and that this perspective belongs to both composer and listener. In order to emphasize the strict interconnection between different elements coming from aesthetic considerations and aural and theoretical reflections, I include at the end of each section a stepwise representative schema (Schema V.1).



Schema V.1. E-M elements (step #1)

V.3 Sound

Some practices within electroacoustic music, *i.e.* those coming out of *musique concrète*, acousmatic music, and sonic art, started from the concept of *reduced listening* and have gradually moved towards the inclusion of several mimetic aspects (Emmerson 1986; Landy 2007) while still drawing on the Schaefferian definition of “sound object”. Some composers and scholars have criticised this concept and developed it into that of “event” or “image”, enhancing the debate around phenomenology (Bayle 1989; Kim-Cohen 2009; O’Callaghan 2010; Voegelin 2010; Bonnet 2012), but it is still the legacy of *musique concrète* that has led to a particular aesthetic and musical syntax. From a very general point of view, this aesthetic is grounded in the idea of composing the sound itself (*i.e.* French terms *composer*, *développer*): creating a number of finite aural events combined together according to their morphology to constitute complex sonic arrangements. Horacio Vaggione states: “[t]he compositional, it seems to me, would be anything but articulable. [...] *To compose is then equivalent to generating genuinely singular events and articulating them in larger and larger groups without losing the sense of these singularities*” (1998, 154); italics in the original)).¹²⁶

¹²⁶ “Le composable, à ce qu’il me semble, ne serait autre chose que l’articulable. [...] *Composer équivaut donc à générer de véritables événements singuliers et à les articuler dans des ensembles de plus en plus grands sans perdre le sens de ces singularités*” (my translation).

The parallel with Moles' theory of scanning lies exactly in the "sense of these singularities": pieces are built from units and elaborated through functional relationships that are operational within different domains (e.g. spectral, dynamic, temporal or spatial). This approach reaches a musical syntax of significant complexity that is intended to be perceived as an interconnected structure, a kind of *morphological* language. Music in this context is *constituted*, complying with a given function (Bonnet 2012, 130), and pieces of this kind proceed through *semiotic chains* (Murphy 2006, 50). Sound used here is complex, elaborated, sometimes ambiguous, multifaceted, and, to some extent, functional and representational. Electroacoustic composers such as Bernard Parmegiani and Denis Smalley compose sonic events and arrange them in terms of relations, successions, and differences.

In contrast, within the E-M perspective I am considering, sound is not composed (*i.e.* French terms of *composé, développé*), it is posed (*posé, déployé*). I emphasise here the double parallel, highlighted in the case of Scelsi and spectral music (cf. Murail and Bériachvili), between *composing* and *posing* (or *de-posing*) on the one hand, and between *developing* and *deploying* (arraying) on the other. Sound is created and then left to unfold: the author conceives a unique sonic form and then proceeds to explore and disclose it (Grisey; (Ferguson 2007, 117)). Sound, then, evolves and assumes organic characteristics (Bériachvili 2008). Even in the case of electronic music, as for instance in some pieces by Pan Sonic, sound appears as natural, primordial, ancestral, and instinctive. Mika Vainio and Ilpo Väisänen use sound that is raw, radical, textural, and material, whether it is continuous or discrete. They shape sound, manipulating its spectral range, partials, and dynamics to achieve a sonic material that has a physical impact on the ear. They frequently exploit acoustic interferences based on the auditory phenomenon of critical bands and as a consequence, due to the pervasive effect of aural beatings, their sound gives the sensation that a concrete imprint has been left behind. In this sense, Bonnet refers to the *imprint* of sound as a notion that recalls the materiality of sound and which "drains the sound towards this materiality itself by making it tangible" (2012, 32).¹²⁷

¹²⁷ "[...] draine le son vers cette même matérialité en le rendant tangible" (my translation).

These characteristics are typical of continuous musical episodes made up of sustained and overlapping tones (*e.g.* drones) that build as a kind of material thickening, layering up in perception. These practices were typical of materialist minimalism (Corbett 2000) and spectralism during the 1960s and 1970s. Composers of these genres, starting from different assumptions, explored slow evolutions of rich masses of sound, working with microtonality, harmonic and enharmonic aggregates, and noises.

When discrete sounds are employed by composers within the E-M perspective, these pieces (or episodes) proceed by developing families of sounds in such a way as to create an internal natural coherence in which each aspect is part of an integrated form. The tendency of *convergence* is often present: different sonic events balance each other, occasionally recur (periodically or not), and do not progress as a fast succession of many different sound types. In other words, functional relations between discrete sounds are minimised. It is common to find a couple of elements that are continuously repeated and that work as a support for other discrete elements, strengthening the musical flow, as in the case of IDM artists such as Pole (Stefan Betke) and Peder Mannenfeld. In general, the repetition of sound elements, both continuous and discrete, could be rhythmic (*e.g.* IDM, glitch), hypnotic, cyclic (*e.g.* drone music, spectralism) or sporadic (*e.g.* glitch, sound art).

The concept of sound in E-M pieces is far from being that of an immutable entity; sound can exist in continuous or discrete episodes, but, as a sonic substance, it forms, thickens, and changes even while being always present: sound is *posed* and its presence is almost atemporal, yet it continues to change. Sound could be indefinite but its essence could still be perceptible, expanding the present out to the horizons of linear perception (Bergson [1922] 1998), as Solomos perceptively describes in the case of Scelsi's *String Quartet n°4* (1964): “not only do I hear things at every listening, moreover, it is always difficult for me to know if what I hear (or believe to hear) is ‘there’ (in the score or in the recording) or whether I imagine it” (2013, 261).¹²⁸

¹²⁸ “non seulement à chaque audition j’y entends des choses, en outre, il m’est toujours difficile de savoir si ce que j’entends (ou crois entendre) est «là» (dans la partition ou dans l’enregistrement) ou bien si je l’invente” (my traslation) (see also *combination tones*, Glossary, Appendix D).

This appreciation of what I term the *ecstatic* combines the eternal and the temporal, an eternity contained within an instant with impressions that are temporary: “[...] the D chord appears set for eternity. But it is a light eternity, as if suspended: some ears will never perceive this chord, because it is constantly subject to interference, worked upon by unfamiliar notes [...]” (Solomos 2013, 263).¹²⁹

This description touches on the concepts of presence and evanescence of sound and its transitory character, which has been deeply developed by spectralists (*i.e.* liminal sound). Within this E-M perspective, sound is simultaneously permanent (*i.e.* material) and ephemeral (*i.e.* ecstatic).

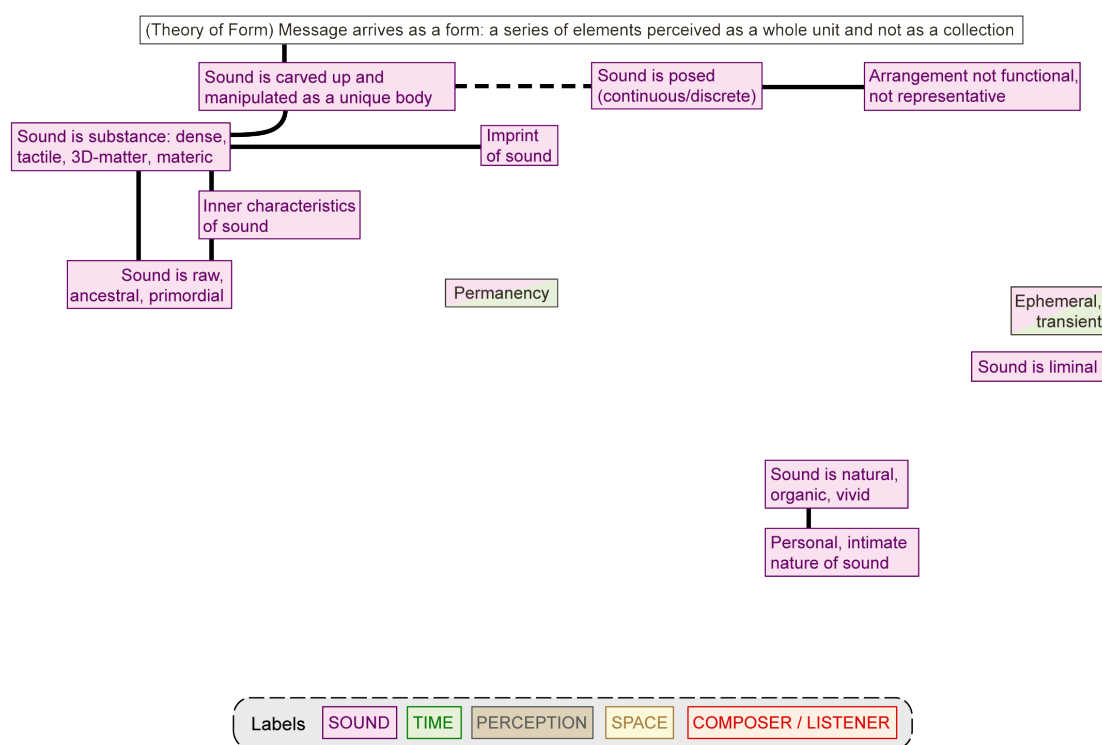
The distinction I made earlier between *posing* and *composing* sound could be related to the epistemological debate in music between the intuitive and axiomatic positions, in which the former is generally ascribed to Cage’s idea of “leaving sound to be” while the latter asserts the poietic intention to compose sound (*e.g.* Xenakis) (Solomos 2013: 355). However, within the E-M outlook, the composer maintains a prime role such that the presence and the intention of the author are essential aspects. Pieces such as the *String Quartet n°2* by Haas or Pan Sonic’s *Keskeisvoima* reflect this characteristic (Verrando 2012, 195): these composers impose embodied movements onto the music (attacks, contrasts, vibrations, interferences) in such a way that the impression given is of a material that is far from being autonomous or self-developing.

The sound artist Richard Chartier examines minuscule, unprocessed, “nonreferential and precultural” sonic elements (Demers 2010, 76) whose nature is so impersonal and neutral that they appear to some degree distant. In exploring the inaudible and the *microsonic* world, Chartier sometimes appears to reach the coldness of scientific objectivity that sets his work slightly apart from the perspective that I propose. Within the E-M thinking, the author manipulates and engraves the sound, signaling their presence in a way that makes their sound vibrant and vivid. For example, in an apparently similar way to Chartier, Eliane Radigue, in her more recent works such as

¹²⁹ “[...] l’accord de ré semble se fixer pour l’éternité. Mais c’est une éternité légère, comme en suspens: certaines oreilles n’entendront jamais cet accord, car il est sans cesse parasité, travaillé par des notes étrangères [...]” (my translation).

Trilogie De La Mort, creates extremely gradual transformations of almost static blocks of sound that hold a sort of internal resonance and movement, describing linear and curved fluctuations that seem to mimic human breathing.

The authors that exemplify the E-M perspective forge a quasi-permanent sound: manipulating frequencies, noises, and dynamic contrasts as well as fluctuating and enveloping textures, they explore the instability of sound, from liminal aspects (spectralists) to interferences and collisions (glitch music), in such a way that allows them to make their music pass through transitory moments and explore imperceptible flaws and illusory rifts in sound, always evolving within their personal time flow.



Schema V.2. E-M elements (step #2)

V.4 Time

Time in music has always been a fundamental subject in compositional, perceptual, and theoretical studies. This dimension has taken on a great importance in the last century, during which some composers renewed the seemingly primordial role of sustained and continuous sounds (*e.g.* Xenakis, Ligeti, Scelsi, Grisey...), while others

studied the effect of repetitive structures (*e.g.* minimalists). Today, time has also become an element of technological research (*i.e.* granular synthesis), and certain strands of music aim to confuse temporal perception using, for instance, ping-ponging echoes or indefinite drones.

Temporality in spectralism and minimalism has been explored by using repetitive structures to create hypnotic reiterations, periodic profiles, and continuous shapes. One could associate these figures with the idea of horizontal evolutions where, based on Kramer's definitions (Kramer 1988), the concepts of linearity and verticality of time lie more with the perception of music over time than with the shape of musical episodes themselves. Kramer then associates minimalist and spectralist visions of time with the concept of 'verticality':

The reason that this piece [Terry Riley's *A Rainbow in Curved Air*] is heard in vertical time is that its phrases refuse to form a hierarchy and are therefore heard to some extent as arbitrary. [...] the work exists primarily in vertical time despite the presence of comfortable phrases. In linear time, on the other hand, phrases group into periods, subsections, sections, movements, etc., in a usually well-ordered hierarchy. Some cadences are stronger than others, and the stronger ones close off larger portions of the piece. A vertically conceived piece, then, does not exhibit large-scale closure (Kramer 1988, 55).

I found Kramer's definitions very useful for a general distinction, but these terms do not work properly in many specific cases (Bériachvili 2010, 100). In particular, the parallel between the lack of teleology and the absence of organisation and hierarchy does not always hold. Many spectralist and minimalist works contain long musical passages that are substantially undifferentiated, but their development follows a strong dramaturgy and creates musical forms that are ordered and organised.

There is a wide, continuous gradation from pure linearity to extreme examples of verticality in music.¹³⁰ Within this range, many composers utilise repetition as a means of playing with a listener's perception (Leydon 2002; Margulis 2014), and so it seems important to reconsider the meanings of adjectives such as linear, narrative, cyclic, or teleological. Scelsi's *Quattro Pezzi*, for example, shows a sense of dramatic

¹³⁰ The verticality of music is evoked also within the theory of Ernst Kurth as potential energy, in which – similar to Bergson's vision – the author proposes the simultaneous and static nature of "impressionistic" perception (Kurth 2006).

construction (for example, using the ‘tension/resolution’ schema) typical of the Western musical tradition together with unconventional sonic metres commonly found in Eastern practices (Menesson 2008). Despite Kramer’s idea, there is in this piece a sort of expectation and structural hierarchy; the musical time is not linear but a progression of sound flow is discernible. There is a narrative but not a teleological profile (*i.e.* directionality): the listener is absorbed (or immersed) into a sonic discourse. In the case of the more recent work *in vain* by Haas, musical time (and consequently the listener) moves at different rates: the succession of episodes with diverse profiles (*e.g.* circular, flat, accelerating), each one composed of repeated motifs, opens up to different temporalities and therefore to different perceptual dimensions.

I argue that authors such as Grisey, Scelsi, Radigue, and Haas belong to the ecstatic-materialist vision and explore an idea of time that is internal and organic, intimate and vital. Bériachvili talks about the breath and the vibration of Scelsi’s sound, and Scelsi himself talked about the “right sound” (*i.e.* in Italian, *suono giusto*) that needs the right time to develop.¹³¹ Grisey founded his research on Bergson’s notion of duration (*durée*), in which the music is an expression of time and the musical material is a manifestation of pure duration (*son–durée*):

“[...] this principle of instantaneous generation, this matryoshka effect where sounds themselves generate one another at every given instant seems to me full of consequences [...]. The composer operates on the whole duration at once, at every possible instant [...]” (Grisey [1982] 2008, 52).¹³²

From a specific point of view, these lines seem to recall the Deleuzian rhizome: a body that renews itself with no centre or periphery, instantaneously present.¹³³ Music is a *process* in which the sound is an “*être vivant*”, not fixed but ever becoming (Solomos 2003).

Bergson’s inner time cannot be expressed as a line, our perception is in constant

¹³¹ A similar intuition is expressed, by Vainio when he reflects on sound and temporal aspects of music (Chapter IV).

¹³² “[...] [c]e principe de génération instantanée, cet effet de matriochka par lequel les sons s’engendrent les uns des autres à chaque instant donné me semble lourd de conséquences [...] Le compositeur opère sur toute la durée à la fois, dans tous les instants possibles [...]” (my translation).

¹³³ I briefly discuss the parallels between Deleuze’s philosophy, and the rhizome form, and glitch aesthetic in Chapter I (Cox 2003a; Quinz 2006).

movement, and in Grisey's music this idea of innermost time is realised through a distortion of a sound's perspective in memory ((Hervé 2004), see also (Imberty 1993)). Memory, "through to its retroactivity", becomes the way in which we "rebuild the *trace* described in time by what lasts" (Imberty 2005, 53), *italic is mine*)¹³⁴. Memory is the locus of the "mental" resonance of sound, as a sort of re-exposition of the *trace* of sound (Bonnet 2012, 29) allowing us to perceive this *continuity* as "movement that is not associated to a cause" but consists "in a transformation where nothing changes" (Bergson [1934] 1960, 164).¹³⁵ We are here within the human domain where the innermost time of perception is made of memory, traces, and imprints.¹³⁶

From this human dimension (microphonic), Grisey passes to a universal dimension (macrophonic) through a *process* of revealing. In discussing these dualities, between personal/universal and subjective/objective, an interesting parallel between Xenakis and Grisey reveals that these two composers similarly capture the emergence of sound through "fullness" and "presence" (Solomos 2003). Their musical figures leave nothing behind; their compositions reject absence and are characterised by a continuity of matter and a fusion of components (cf. Moles' theory of form) that achieves a unique presence ("*un art de la présence*", (Solomos 2003)). This perpetual *presence* recalls the idea of the eternal present in which musical material is *posed* and evolves almost atemporally.

Sound in the music of Scelsi (from 1959) is concerned with a personal journey and an internal sense of time: the music of the Italian composer possesses a sort of "warm" and gravitational centre (Scelsi 2006, 145; Bériachvili 2008; Solomos 2012). This concept of Scelsi's intimate tension merges with the notion previously proposed of E-M sound as *organic* and vital. Solomos suggests a sort of bio-morphology for Grisey's and Scelsi's visions (2013, 272): the former achieves the fusion of form and

¹³⁴ "qui, par sa rétroactivité, reconstruit la trace décrite dans le temps par ce qui dure" (my translation).

¹³⁵ "mouvement qui n'est pas attaché à un mobile, d'un changement sans rien qui change" (my translation).

¹³⁶ On this matter, Bonnet distinguishes between the *trace* and *imprint* of sound: the former accompanies the sound, is associated with memory, and makes possible the equivalence between physical and "mental" resonances (2012, 29). The *imprint* of sound, instead, "is the 'moulding', the evidence through contact, of a past presence" ("le 'moulage', le témoignage par contact, d'une présence passée", my translation)(2012, 31). See also footnote n°127, in this Chapter.

material through the *process*, while in the case of the latter this convergence is fulfilled as a private encounter at the centre of sound (“*au cœur du son*” (Solomos 2012)). Both composers find this unification in the sound, the return to it through repetition, as an integral phenomenon in which sound is a living entity. Cyclic forms and repetition define several aspects of our life (e.g. reproductive cycles) and physiological mechanisms such as the heartbeat, breathing, walking, and sleeping (cf. Grisey’s *Périodes*¹³⁷). All these shapes encompass the idea of a return to an original state and constitute “one of our most basic patterns for experiencing and understanding temporality” (Johnson 1987, 121).¹³⁸

Within the E-M perspective, time could be seen as vertical, cyclic, intimate, organic, vital: this sense of time *gives time* for sound to develop. Music is characterised by its permanent presence and movement towards the private dimensions of perception rather than by any linear correspondence to chronometric time. Temporal elements are – as introduced in Chapter III – of a great importance within this perceived materiality that holds *transient* and *continuous* cues typical of both auditory and tactile systems.

Time conception in minimalism also shares several aspects with the E-M perspective but differs in several essential ways. Early minimalism (Reich, Riley, Young) matches perfectly with Kramer’s definition of vertical time: strict repeated mechanisms (i.e. periodicity), by definition, lack linearity, narrative, and teleology (Moles 1968). John Corbett (2000) distinguishes between structuralist (Reich, Glass, Riley) and materialist (Young, Conrad) minimalists, and this distinction is useful in defining those characteristics that fit within the E-M vision. Structuralist minimalists typically work with *linear* units (i.e. groups of notes) continuously reiterated and perceived *vertically* over time, exploring profiles more than textures. In contrast,

¹³⁷ The score notes for Grisey’s *Périodes* states: “*Périodes* presents a constant cycle of three part periods which are analogous to the respiratory rhythm: inhalation, exhalation and rest. [...] Another element essential to this piece is what I call the ‘soft periodicity’. Our heartbeat, our breathing, the rhythm of our walk and doubtless many other unknown rhythms (our nerve impulse for example) are never as rigorously periodic as a clock; they vary around a time constant. [...] The same thing can be said for periods which have never been regular. This is the way of breaking automatism and of giving life to the periodicity, which it otherwise might not have.” (1974).

¹³⁸ The idea of repetition as a sort of restoration process could be found in Leydon’s discussion of different types of repetition among minimalist composers, and corresponds to the *maternal* type of repetition (2002).

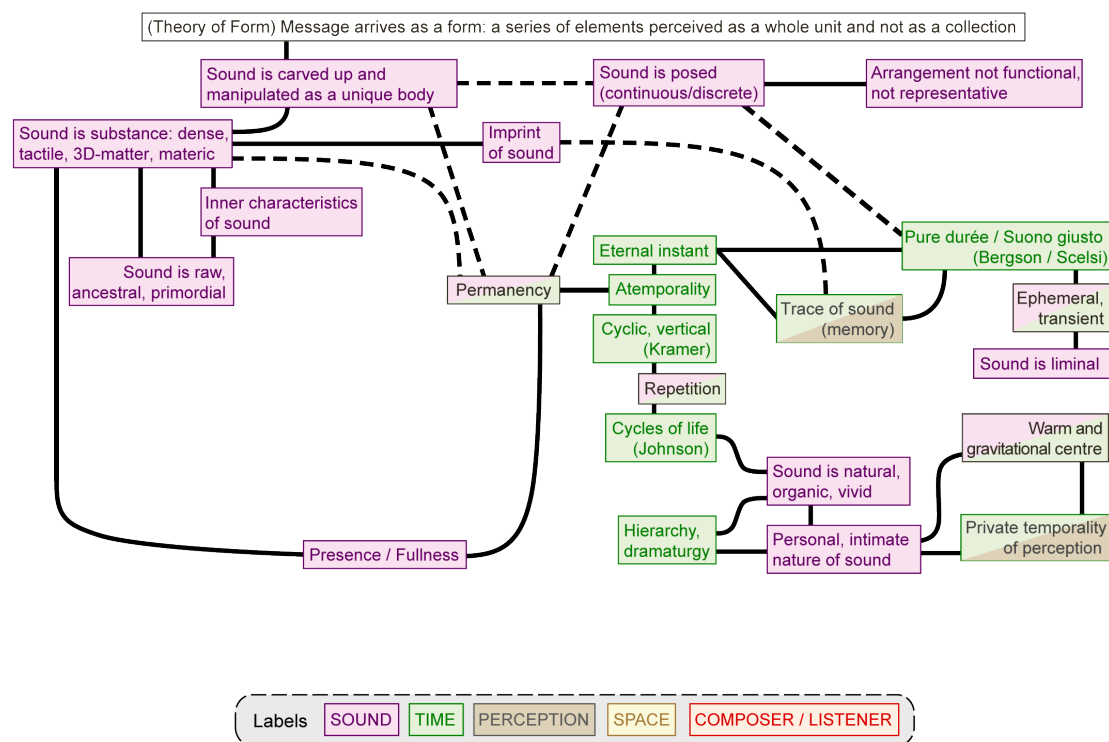
materialist minimalists use musical practices similar to those of spectralist and avant-garde artists, such as the minute exploration of sustained neighbouring frequencies. They achieve different results from the spectral composers in terms of how the notions of “stasis”, “teleology”, and “directionality” are realised. But in some cases their aesthetic could be considered to be within ecstatic-materialism: figures such as Phill Niblock, Eliane Radigue, and Alvin Lucier represent good examples of this correspondence.

Special attention should be given when considering the notion of time in electroacoustic music. It is not possible to cover all approaches within this vast field of music that extends from sonic art, acousmatic and mixed-sound compositions to real-time performances and soundscapes, but it can be observed that the central focus within certain streams on *composing* sound directly affects musical syntax and temporal evolution. Sound is often structured as interlaced events and, as previously mentioned, this functional arrangement could be created within the spectral domain as well as in spatial and temporal dimensions. For instance, a 360° multichannel piece could construct a virtual scenery in which a sound reverberates with a specific decay, and character defining the geometry and the dimensions of space. In this case, the listener is immersed in a simulated reality with a corresponding time frame. When this temporal simulation is disturbed by sounds of a different nature, possessing, for instance, different delay times, the perceiver is puzzled and moved towards different temporal dimensions. In some cases, listeners are immersed in a multi-dimensional sonic design in which temporality appears to progress at different rates. Horacio Vaggione, for instance, presents his granular synthesis by introducing different temporalities (*i.e.* micro- and macro-scale) that depend on the morphology of sound (Solomos 1998, 2013, 403–14).

When the succession of different sonic events is very fast, a listener’s immersion within a coherent sonic space is more difficult and the perception of the temporal flow becomes more confused. In these cases, a listener is not immersed in a unique aural landscape and the succession of finite events tends to bring temporal perception back to chronometric time. Sonic objects could be defined by their relationship with time (*i.e.* a

sound that begins, develops, and ends) such that their finiteness is part of their nature. Thus, their combination within a non-coherent simulation pushes the listener to perceive them in chronometric time: objects are arranged in mutual relations and they are perceived distinctly, finitely, pushing the listener out of an immersive virtual reconstruction.

The immense aural potential of electroacoustic music therefore leads some practices to touch on certain notions of E-M vision (*e.g.* verticality–duration, repetition, intimate time-frame), whereas other movements move towards a completely opposite aesthetic (*e.g.* narrative, figurative).



Schema V.3. E-M elements (step #3)

V.5 Space

The spatial features of music have been extensively developed within the practices of acousmatic and electroacoustic music in which spatial characteristics are studied from both internal (spectral space) and external (physical space) points of view: sounds are combined, overlapped, and occupy discrete areas of both spectral and

physical space. Electroacoustic music explores the multi-dimensional space of sound morphologically: it focuses on relations between sounds and their interactions as well as their diffusion in physical space.

In contrast, the E-M perspective concentrates exclusively on the internal space of sound: spectral space enlarges and reduces based on a sound's evolution, sound exists within a compact *space-matter* (*espace-matière*) in which sound expresses “its colours, light effects, tactile sensations...all properties of a physical matter” (Bériachvili 2010, 12).¹³⁹ Space-matter, as one of many notions of musical space, is defined by Bériachvili as the extent to which sound possesses a quasi-objective presence and material nature: it is the place of palpable qualities of sound, its volume, its density and grain (2010, 32).

Historically, spatialisation has been developed in various ways. On the one hand, Stockhausen elevated it as a proper parameter of music (together with pitch, duration, timbre, and dynamic) by integrating spatial elements within combinatorial and serial designs. On the other hand, Xenakis used spatialisation to explore architecture and enhance the impact of his pieces. Figures such as Chion, Bayle, and Parmegiani introduced the design of virtual spaces: using a very large sonic palette, they constructed complex sounds and simulated aural spaces for perception.¹⁴⁰

The E-M vision restricts its research to sound-in-itself in such a way that all external considerations are reflected back into internal aspects of sound. The *immersive listening* often invoked in many manifestations of multichannel diffusion (Solomos 2013, 235–78) here exists as a demand that listening move into sound: the immersion arises primarily in a sonic-perceptual sense rather than a spatial sense. Pieces of the E-M perspective do not necessarily ask for a multi-directional experience (though it is not excluded, as in the case of Haas' *String Quartet n°3*, in which the performers are placed in the four corners of the room with the audience in the centre), rather they solicit the listener to descend or enter into the internal space of sound (*i.e.* space-matter) simply by

¹³⁹ “[...] des couleurs, des effets de lumière, des sensations tactiles, des propriétés des matières physiques [...]” (my translation).

¹⁴⁰ Cf. for example Michel Chion's relation between inner and outer musical space or Annette Vande Gorne's distinction between real, designed and virtual spaces. For an exhaustive description please refer to (Chouvel and Solomos 1998; Solomos 2013).

listening to a sonic source (be it an acoustic source, or a stereo or multichannel loudspeaker system).

On this matter, I would append a simple empirical consideration. Consider the following sound with changing dynamic: a sound that begins soft and increases in intensity. When this sound is perceived acousmatically (*i.e.* without knowing the source), the listener may interpret the softness as a spatial distance and the loudness as proximity (Piana 1991, 333), especially if –as could be the case with a multichannel format or projection– the direction of the sound moves during its dynamic evolution. When, instead, the sound is played by a musician, be it a violinist or an electronic performer playing through loudspeakers in a frontal stereo setup, the listener is aware of the action producing the sound and is less engaged with its movement. In this case, the listener can better focus on the characteristics of sound, perceiving dynamic, spectral, and timbric changes, paying attention to –for instance– the appearance of new harmonics or overtones. I argue here that acousmatic listening –in particular when enriched with a spatial diffusion– draws the listener’s focus to the behaviour of a phenomenon rather than to its intrinsic qualities (*i.e.* space-matter).¹⁴¹

In the E-M perspective, the reification of space occurs within the listener’s apprehension of the sound rather than within the physical space. It is hard to locate exactly this space-matter: is it within our cochlea or does it exist in the relationship between listening and the acoustic space? It is not crucial for this study to identify the location of space-matter, however it is important to perceive and recognise it within music as a distinct manifestation of space beyond the physical layout or location of sound sources.

Some composers, such as Scelsi and Haas, focus on space-matter, developing a sort of aesthetic around the consistency (in a material sense) of sound. The exploration of space-matter relates to the suspension of Kramer’s temporal linearity and focuses rather on the reality of the *instant*. Space-matter is, in fact, where the inner

¹⁴¹ The opposite is also argued: the absence of actor or performer would allow better focus on the sound itself, and the spatial diffusion can enhance and further clarify a process happening in the sound. But in focusing on practical listening circumstances, I concur with the former opinion.

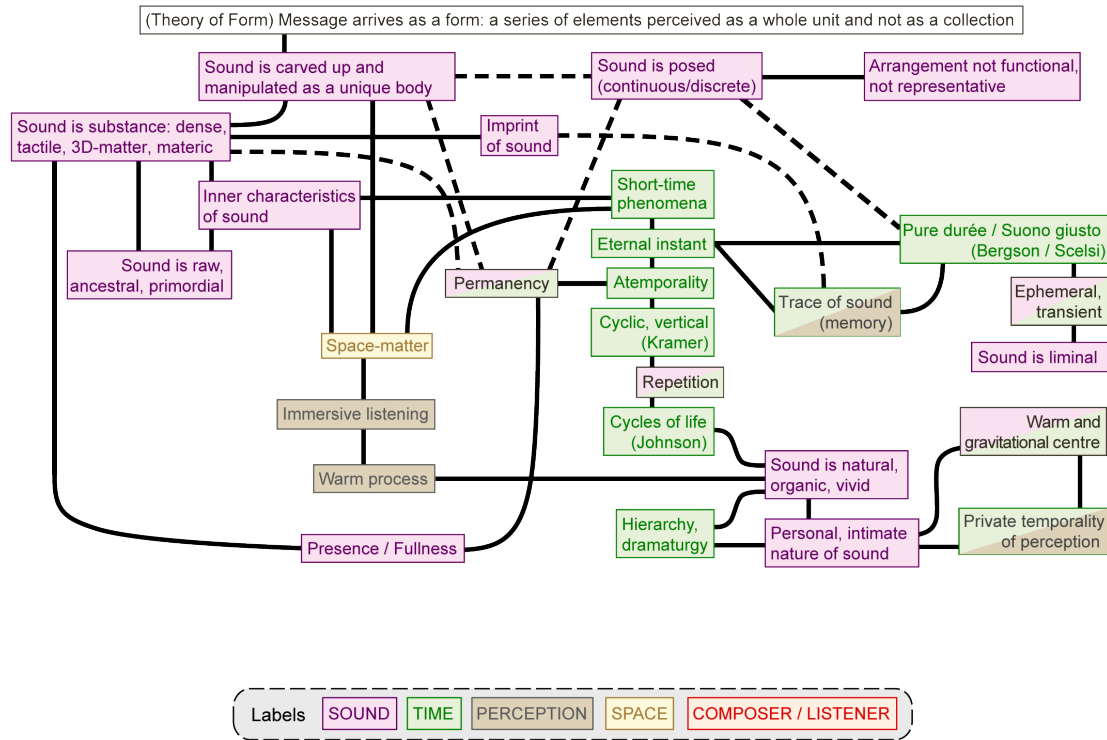
characteristics of sound and short-time phenomena occur during an “apparent present” (Bériachvili 2010, 41; Solomos 2013, 250). The music that extends this present toward a larger scale (*i.e.* an eternal instant) is actually based on static constructions, such as the repetition of elements, the use of sustained and interacting tones, and slow progressions (*i.e.* Chapter II, Attributes E, F and B). Those genres of music that use these practices deepen the exploration of the inner characteristics of sound.

For instance, pieces such as Scelsi’s *Okanagon* (1968) and Parmegiani’s *Ondes Croisées* (1976) show differences not only in terms of material (*i.e.* acoustic and electronic) and construction but also more fundamentally in a different approach to sound. That consists, in case of *Okanagon*, in the fusion of different timbres (*i.e.* harp, tam-tam and double bass) into a unique sonic space while for Parmegiani’s piece this approach to sound is realized as a morphological interplay of distinct sonic events.

The example of Alvin Lucier’s music –in particular the pieces that include traditional instruments– is of interest here as it expands on the behaviour of sound waves within a physical space. Lucier incorporates this behaviour within the sound material of the piece instead of simply positioning it as a supplementary possibility of manipulation concerning the external physical layout of performance once the piece has been completed (Wanke 2016): the frequency interactions between electronic and acoustic contours in *Two Circles* (2012) act as veritable three-dimensional explosions within the sonic space-matter but not within the physical space. In pieces by Lucier that focus on sonic diffusion, such as *I am sitting in a room*, *Vespers*, or *Music for a solo performer*, this process is carried out to examine the purely aural result, and his intention is not to recreate virtual sonic environments. Lucier’s music reveals characteristics of the space through sound; it explores space within the boundaries of sound, almost as a sonic phenomenon.

In summary, in emphasizing the distinction between the physical space, the recreation of a virtual space, and the sonic material that has a physical-spatial reality, the E-M perspective proposed here looks at space as something internal to sound, within the realm of intrinsic aural properties that occur out of time. This is in contrast to space as it is typically addressed in electroacoustic and acousmatic music where, whether it is

considered as physical, designed, or virtual, space is an element of design, movement, and reconstruction.



Schema V.4. E-M elements (step #4)

V.6 Musical communication: creation and perception

Musical communication is a multifaceted concept that involves different aspects of creation and perception, and encompasses socio-cultural systems and technologies. Many currents of experimental music aim to engage the listener in an immersive listening experience that could be at times corporeal (*e.g.* noise, minimal techno), hypnotic (*e.g.* drone music), ecstatic (*e.g.* glitch, sound art, spectralism), or visual and multi-dimensional (*e.g.* acousmatic).¹⁴² Listening as understood from the E-M

¹⁴² The apparent paradox in associating acousmatic with a visual listening experience lies in the fact that the acousmatic, more than other genres, has developed a morphological syntax able, within certain practices, to reconstruct virtual scenes and portraits, capturing listeners within a pictorial simulation (see also (Voegelin 2010, 34)).

perspective is a sort of grasping of the space-matter and the intrinsic characteristics of sound. However, this E-M perspective is cross-genre and encompasses pieces from post-spectralism and minimalism, as well as from glitch-electronic music, IDM, and minimal techno, in which different aesthetics display divergent purposes and expectations. Thus, exploring the question of musical communication in this setting involves examining potential modes of creation and perception, defining movements and actions.

Artists included in the E-M perspective operate mainly within their own cultural environment: they use techniques typical of their context (*e.g.* steady rhythm for club-based styles) but do not necessarily expand on referential formulas; rather, they focus on the characteristics of sound.¹⁴³ The presence of models typical of each genre could be seen as the means through which the authors lay claim to a vitality of musical experimentation beyond the canons of mainstream and institutional contexts, expanding the modalities and contexts of communication for experimental art forms. This facet is most often unintentional or disguised and is typical of genres that have their origins in popular currents (*e.g.* club-based styles). Many have grasped the necessity of revealing manifestations of experimental tendencies in non-academic music and of recognising the plurality of exploratory culture (Romitelli and Denut 2005).¹⁴⁴

Cross-cultural influences abound in current musical scenes and so the importance of a firm distinction between musical contamination and metabolisation is crucial to avoid oversimplification (Romitelli and Denut 2005). As Nova himself affirms in the exchange we had as part of this study,

[w]hat is interesting is the *non-academic* view of the musicians which operate in these domains, this is very interesting for me because I am obliged to rethink my knowledge, my technical vocabulary and interact with a musical sensibility which is quite far for someone like me with a classical background (Nova, see Chapter IV and Appendix C).

¹⁴³ Accordingly, contacts and collaborations across these areas of the musical panorama (*e.g.* the collaborations among: R. Sakamoto and Alva Noto with Ensemble Moderne; B. Lang and P. Jeck; R. Nova, A. Ingolfsson, Y. Maresz and PanSonic with AlterEgo ensemble; the work of Zeitkratzer and Ictus Ensembles) reflect a common interest in sound, its intrinsic characteristics and manipulations, whatever the differences in instrumentation, techniques, and socio-cultural motivations.

¹⁴⁴ In 2008, *Organised Sound* included several types of sound art and electronica, especially in the Vol.13, No. 1 issue, which focused on work not supported by the academic economy. Articles in this issue address works by artists such as Alva Noto, Björk, and Merzbow.

Aphex Twin and Florian Hecker draw on Xenakian stochastic synthesis (Haworth 2010), and Romitelli and his colleagues have written music including interventions by Pan Sonic. These authors express themselves through their own musical language but are proof of the vitality of genres: they are able to respond to stimuli from other contexts and elaborate on them in their own environments. The E-M perspective lives precisely in these connections as a sign of a shared sensitivity towards the sound-in-itself.

The use of technology deeply impacts the nature of creative and perceptual practices. For instance, spectralists and electroacoustic sound artists explore the acoustics and psychoacoustics of sound through spectral analysis, moving from the rules of physics towards elements of musical grammar (Verrando 2012). On this matter, Romitelli found that a crucial dilemma for a composer today is to make technology personal and functional for one's own creative requirements, avoiding the completely automated control of technology that leads to a uniformity in music (Romitelli 2001). Pieces belonging to the E-M aesthetic match this idea of music that tends not to be representative of the technical equipment used. Technology, be it a question of new lutherie techniques, electronic devices, or software, is treated as if it were a manual tool such as a chisel or hammer, not something that could make decision itself: it is a tool used to achieve a result.¹⁴⁵ For instance, Haas' *in vain* for 24 instruments shows how careful orchestration can avoid revealing instrumental roles and can instead subordinate these to a global sonic result, in the same way that Pan Sonic's *Keskeisvoima* uses analogue filtering and stereo spatialisation in a way that creates a coherence among scattered sonic elements leading towards a global idea of sound. The conscious control of technology goes hand in hand with the defence of the role of the composer: certain compositions within the experimental scene rely so heavily on technical practices resulting in autonomous processes, where sound depicts a preset style rather than a composer's poietics, that artists appear to consolidate their identity only by showing the potential of technical equipment rather than elaborating their own voice. As Ferraris

¹⁴⁵ Within the selection of this study, certain pieces of Ryoji Ikeda includes evolutions and constructions which are distinctive of the technology used (e.g. filters of frequencies in “+”-series or the stereophonic oscillation in *Headphonics*-series) and do not completely correlate with E-M perspective.

puts it: technology is always faster than the human, and technical competence comes before comprehension (2016, 47).

More generally, a simple principle governs these methods: the larger the palette used to compose, the greater the exploration of the relations between elements (*i.e.* horizontal development); in contrast, limiting the compositional material, reducing the degree of freedom, favours the focusing on the intrinsic qualities of those elements. This simplification does not imply that many composers do not employ a variety of strategies to enquire into the intrinsic qualities of sound. Xenakis, for instance, has explored technological, spatial, and sonic aspects; he borders on the E-M paradigm when he explores the material consistency and density of sound masses, or in his conception of an almost physical sonic presence (“*plénitude sonore*”, (Solomos 2003)). On the other hand, his sound is complex, sometimes created through stochastic processes, and the fusion of constitutive elements is traditional and not ambiguous or fleeting. Even if his sound holds a sort of atemporal fullness, it is *composed* of sonic elements of different nature so as to achieve a global sound that reflects a non-organic naturalism (Solomos 2003; Bériachvili 2008).

The creative process within the E-M perspective is a movement towards sound as an act of discovery: creation is not a simple record of the conducts of sound previously tested but rather, as Grisey makes clear, it is an insight into sound, its disclosure and opening (2008, 84). Musical creation is a violent act aiming to set free the *latent* that is hidden in the sound (Manfrin and Piras 2003). Romitelli has also claimed that musical practices must incorporate practical experience in order to repossess reality and matter and to reinstate the role of the author, their decisions, intentions, and personal traits: all contribute in creating a living, corporeal, violent entity (Romitelli 2005a, 2005b). In other words, Romitelli tries to create a new efficacy in the expressivity of sound by incorporating *experience*. This concept relates to the notion of the active and raw character of sound and expands into a new concept of “experience”, articulated by Mark Johnson, that includes “basic perceptual, motor-program, emotional, historical, social and linguistic dimensions” (1987, xvi). I would extend this definition of “*experi-ence*” and its domains of pertinence to the adjective

“*experi-mental*”, and associate this meaning to the ecstatic-materialism in *experimental* music: E-M music is experimental in terms of how it encompasses practical research, driving forces, and choices that allow the inclusion of extra-musical aspects as imprints on the sound material. In this sense, the listener does not *contemplate* the sound (Piana 1991, 160) but is engaged in a dialectic relation with it. Music of this kind conveys these extra-sonic aspects through a return to sound-in-itself, its expressivity and physical presence.

Therefore, as in a circular process, pieces of the *experimental* E-M domain begin with the sound (material), evoke the external through imprints and traces, and converge on the real through sound and its perception. They focus on sound and stimulate materialist and ecstatic sonic potentials (*e.g.* acoustic pressure, consistency, density, graininess, sonic transients, and overtones at the threshold of audibility); further, sound recounts intentions, processes, and discoveries that come from the *experience* of both creator and recipient, thus enlarging on intuitions, dramaturgy, movement-related and cultural stimuli. But sound continues to be the medium and locus of expression and contact, and so from this frame of external references sound recalls the material and embodies the real (Figure V.1) . *Sound* exists as a territory of convergence between author and listener and it reaffirms itself within its internal space, its time, and the experience of it. In this way, the sound, viewed as the irreducible connection between creator and recipient within various contexts, is the key element for the cross-genre nature of the E-M perspective.

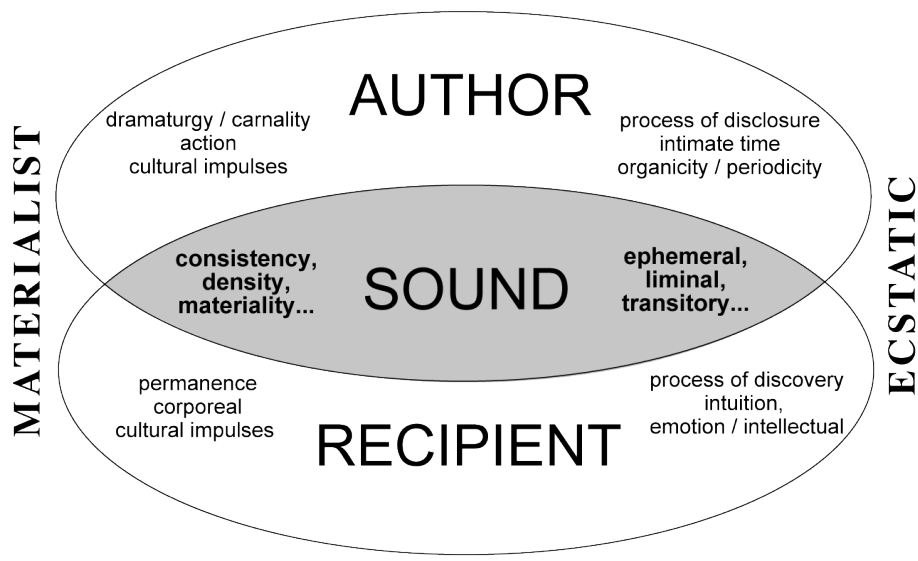


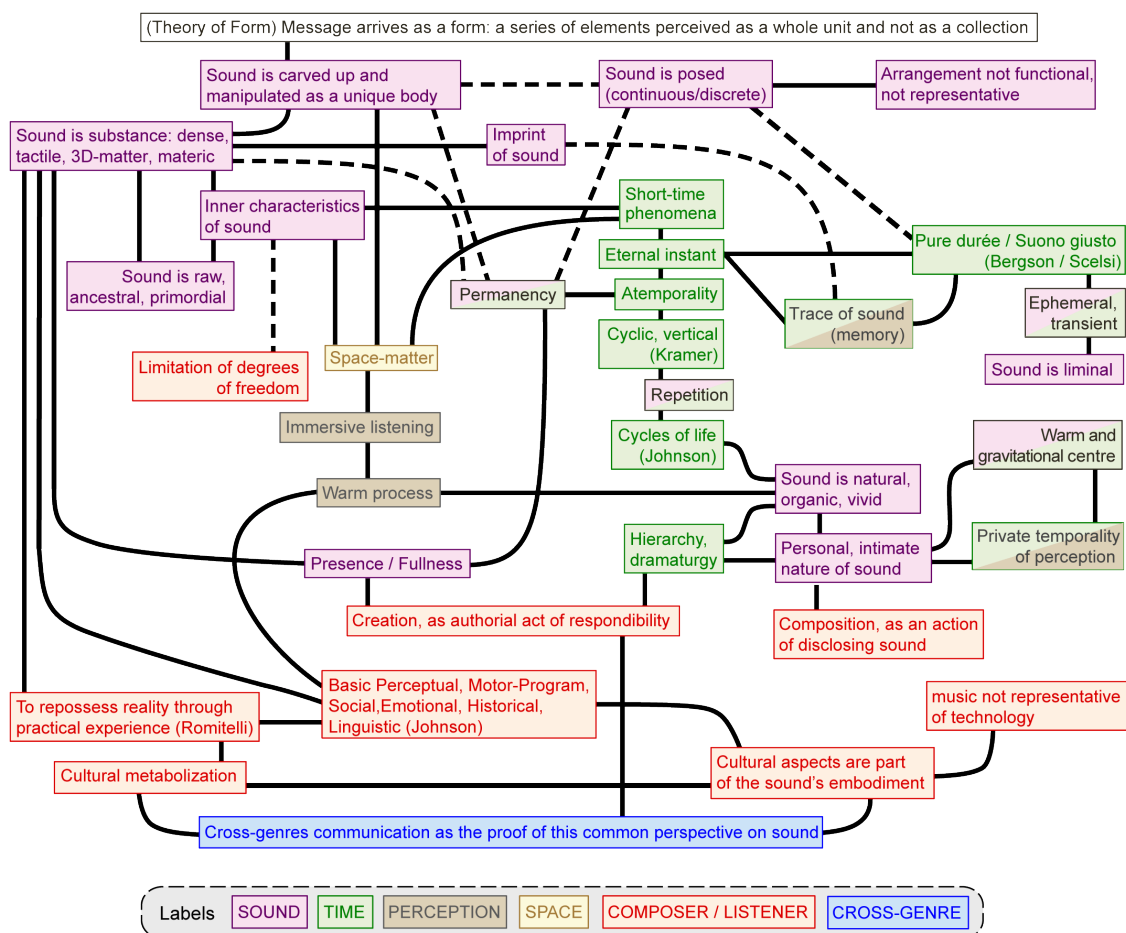
Figure V.1 Visual representation of the E-M model of communication.

Concerning musical communication, one leading stance in the current debate on the materiality of sound revolves around the non-representativeness of sonic events (e.g. Cox 2011) that are directed towards the sound-in-itself. Within my proposition, sound-in-itself appears directly accessible when compositions are developed primarily using sound's intrinsic properties, and I repeatedly observed that the presence of functional constructions, for instance, distance these pieces from the E-M perspective. Thus, it seems logical to favor an anti-representational premise in defining this ecstatic-materialism. Even so, E-M communication goes beyond the purely phenomenological and sensorial experience: the music of Georg Friedrich Haas, Riccardo Nova, Peder Mannerfelt, and Mika Vainio defends a musical grammar typical of their genres, but each moves towards the sound-in-itself from different directions, making choices, using codes, ingraining personality, conveying subjectivity, intimacy, violence, and practical motives.

In other words, ecstatic-materialism does not only inhabit the compositional process (Döbereiner 2014) but extends to the idea of a potential of sonic matter that is at times present as a transcendent character of sound (Scelsi), a process of disclosure through duration (Grisey), a physical substance concretely shaped (Pan Sonic), or a bloody organism with a metabolism, carnality, and grain (Romitelli). However, as

Döbereiner criticises the non-dialectical vision of sound that is exclusively seen as matter-energy, vital in itself, I also go further by picturing the *sound* as the convergence of the participants' realities on a pure sonic matter.

Seen from this point of view, the E-M perspective can be understood as having been shaped by distinct but interrelated facets that concern multiple aspects of music (Schema V.5).



Schema V.5. E-M elements (step #5)

V.7 Conclusions

The ecstatic-materialist approach focuses on sound-in-itself, the meeting *in sound* of composer and listener, the coexistence of the fugitive perception of sound (ecstatic) and the quasi-atemporal materiality (materialist). It is a unified concept in

which corporeal reactions, innermost discovery, and personal *experience* come together within the pure sonic element. This description is reminiscent of Thompson's notion of *affect* –drawing on Spinoza and Deleuze– which

“pertains to a web of relations that traverses the divisions that hold apart human and non-human, beings and things [...] and places an emphasis on *materiality*. [This materiality, however,] does not just pertain to objects and artefacts but extends to include elements that have been thought of as immaterial by virtue of their invisibility – atmospheres, forces, sounds and vibrations” (Thompson 2017, 63).

Therefore, within the E-M frame, the *sound* may be seen as a web of connections between participants.

Several movements or figures within today's experimental music may come close to the E-M vision and match different characteristics of this perspective. Consequently, the closeness with the ecstatic-materialist perspective is more accurately understood as a sliding scale of degrees of affinity, rather than an absolute fixed attitude. There are no clear boundaries that limit this cross-genre proposition and the points discussed above function as parameters to evaluate the proximity with this framework (Figure V.2).

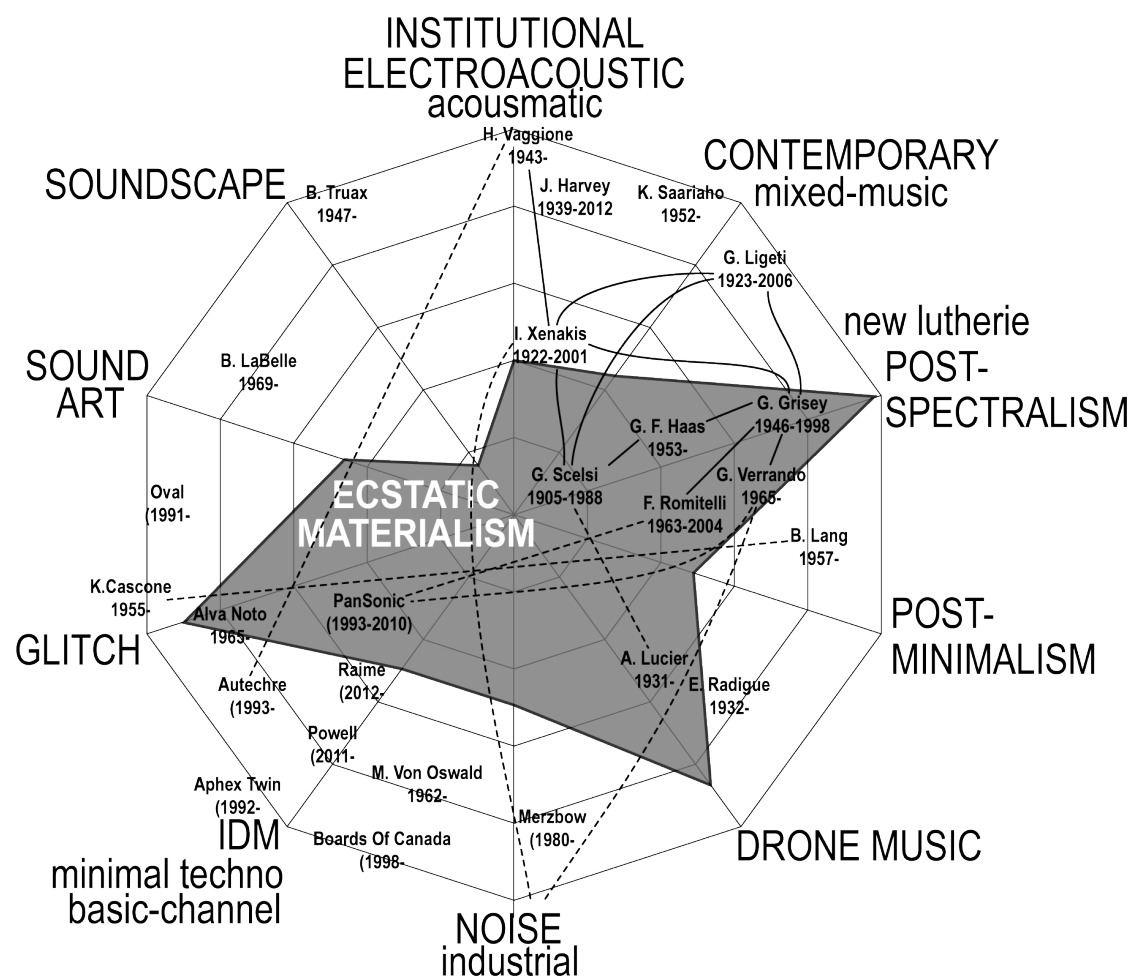


Figure V.2 Schematic representation of possible affinities of E-M perspective with several genres and authors of today's experimental scene.

Ecstatic-materialism emerges from similarities (*e.g.* aural, poietic, perceptual) across several genres of music that go beyond techniques and instrumentations, allowing us as listeners, musicians, and scholars to approach compositions by Scelsi, Grisey, new pieces by Giovanni Verrando, Georg Friedrich Haas, Jay Schwartz, and records by Pan Sonic, Miles Whittaker, Oscar Powell, Oren Ambarchi, and Peder Mannerfelt from a fresh point of view, considering their common focus on the inner qualities of sound and recognising cultural patterns as models of communication.

VI Conclusion: From Sound to Music

VI.1 Introduction

As referred to in the opening introduction of this dissertation, the initial idea which led to this doctoral research is very simple: certain pieces by composers from very different genres (specifically including Haas, Lang, and Pan Sonic) can be considered as sharing *something essential* in common. The difficulty in precisely identifying this common *ineffable* property lead me to explore several different approaches, *i.e.* analytic, empirical, and theoretical.

Is this shared aspect somehow contained in the attributes which emerged in Chapters II and V?¹⁴⁶ Do the modes of listening defined in Chapter III¹⁴⁷, with which participants sort and grasp aesthetic convergences, help support the description of this shared perspective?

The definition of an *ecstatic-materialist* perspective (Chapter V) helps to consolidate elements from aesthetic domains, musical practices, and social sciences into a unified concept. But in order to help ensure that these conclusions can have practical applications, an additional step has been undertaken to reflect on a wider area which includes cultural, artistic, and social concerns and that might be able to shape and refine the results assembled up to this point.

VI.2 From music to sound and back to music again

Serge Provost writes:

¹⁴⁶ These attributes are: (A) Expanded Spectrum; (B) Microtonal Variations; (C) Systematic Glissandi; (D) Rhythmic Developments; (E) Static Masses; (F) Repetitive Clusters; (G) Dynamic Contrasts; (H) Hypnotic Reiterations; (I) Plastic and Sculptural Arrangement of Sound. To which we could add two more attributes that emerge from the synthesis elaborated in Chapter V; (J) Focus on a Restricted Number of Elements; (K) Limited Dialectic Among Elements.

¹⁴⁷ Specifically, the analytic, affective, and immanent modes of listening.

“[w]hen some forms of expression reach a saturation point, they tend to fossilize and become academic habits. This is the point at which the invention of new means restarts creativity and allows the expression of a renewed sensibility”.¹⁴⁸

Is there even the possibility that some experimental musical scenes have reached such a saturation point?

When looked from a particular standpoint, leading figures such as Pan Sonic, Alva Noto, and Ryoji Ikeda, even if they are still active on the musical scene,¹⁴⁹ represent already a sort of past. They are active within alternative and institutionalized contexts and are considered by younger generations as pioneers of a tendency that emerged ten to twenty years ago. Currently, festivals of electronic music, which have recently had great popular success in terms of audience numbers (*e.g.* Sonar), prepare their programmes by putting together these established “big names” with minor artists. Those who attend concerts with these figures have a preformed expectation, taking for granted the types of performance they will experience and considering them as *standards* within electronic culture. This is also one of the reasons why academia has started, a decade after its inception, to acknowledge the presence of an alternative electronic scene that expresses (or more precisely has already expressed) stimulating elements of innovation within an exploratory musical scene. Are these now well-known figures already part of a canon of important experimental artists?

Within a different context, contemporary classical music, despite maintaining a strong connection with academic institutions, is trying to move out of conventional environments by finding a place within multi-media festivals and conferences (*e.g.* Huddersfield Contemporary Music Festival, Ars Electronica).

From this perspective, as evidenced in Chapter I, it seems that some manifestations within exploratory music, in seeking to find new modes of expression, have gone beyond conventional channels of communication by engaging unconventional means and circumstances, aiming to grow within a more diversified panorama.

¹⁴⁸ “Quando talune forme di espressione giungono ad un punto di saturazione, hanno la tendenza a ossificarsi e a diventare accademiche. È a questo punto che l’invenzione di nuovi mezzi rilancia la creatività e permette l’espressione di una sensibilità rinnovata” (Provost 2001, 516) (my translation).

¹⁴⁹ Although Pan Sonic officially split in 2009, four releases were published from 2010 to 2016.

Looking at the progressive emancipation of *sound* in the music of the 20th century, something that occurred at different times for different genres, one might observe that each musical genre has experienced a sort of “zero point” where it reached a stage of extreme aural experimentation.¹⁵⁰ I am thinking, for instance, of figures such as La Monte Young in minimalism, Christina Kubish in electronica, and Radu Malfatti’s solo experiments; Borbetomagus, Merzbow, and the most extreme free forms; even Cage’s *4’33”* and certain conceptual works within *musique concrète*, American avant-garde, not to mention 1960s and 1970s experiments in ambient, cosmic music, and progressive rock. These examples represent, in different ways, radical moves towards the purely sonic in music using extremely dilated temporal frames, oppositions of spectral density, uncontrolled evolutions, and random developments. From these “saturated expressions” that were due not only to musical exploration but also to a perceived necessity to break with conventions and traditional dictates, music has moved forward: Cagean and Schaefferian heritages have been metabolized, some previously new areas of exploration have become conventional territories of musical practices, and the tendency towards radicalisation and the refusal of the past have been transformed by various forces coming from old traditions (*e.g.* new lutheries) and new technologies (*e.g.* music programming). In different ways, certain composers –conscious that nowadays almost every type of musical creation has already been conceived– seek to refresh the territories first opened up by the experimentalist attitude of the past, for instance by researching new perceptual modalities, or by revisiting old languages and developing them into new styles, or by recovering sonic trials from the 1960s and 1970s within innovative technological constructions (Gottschalk 2016; Rutherford-Johnson 2017). In this sense, one could understand the music of post-rock groups such as Battles, Mogwai, Goat (JP), and Oneida as a “second reading” of minimalism, or the new gestures and modalities by figures such Romitelli, Haas, and Steen-Andersen as part of the evolution of spectralism, or even the recent work by figures such Holly Herndon, Tyondai Braxton, and Jerrilynn Patton as transformations of glitch and IDM music.

¹⁵⁰ Even if from a slightly different perspective, Born refers to a sort of historical break with music and the foundation of sound art practices as a sort of “year zero” event (Born 2015; Barrett 2016, 135).

In continuing to adhere to the experimental essence, which could be defined as the desire to trace unexplored pathways, these examples seem to show that, today, *new systems* can consist not only in the radical rejection of past doctrines but also in the re-elaboration of past *sonic* experiments into new *musical* ideas. It is from this specific standpoint that we can talk of a process from *music* to *sound* and back to *music* again.

VI.3 Embodied music, contexts, and an ethic of sound

The multi-faceted and dynamic state of today's music is characterized by the appearance of new controversial aspects such as the multimedia approach to art (Barbanti 2001), the lesser importance of the physical medium used (CD, vinyl, cassettes...), and the renewed role of live performance. On the one hand, several musical notions of the past century, such as those of legendary music bands, composers, albums, and even the idea of record shops, are rapidly disappearing or transforming into more flexible concepts under the influence of the internet (*e.g.* on-line markets, blogs, social networks). On the other hand (and probably as an answer to these new tendencies), music –more than other arts– is rediscovering personal contacts and collaborations, *artisanal* approaches, homemade works, and –as previously mentioned– the importance of live act. This double tendency, universal and localized, of music is expressed through a “*mutual tuning-in* [that] is both globally virtual and locally corporeal” (Born 2005, 29). It is to this multi-faceted panorama that Verrando refers when he calls for an “act of responsibility”, claiming that “[t]he stronger the individual's ability to express their own vision of the world the more interesting the music becomes” (interview with Verrando, Chapter IV). The artist's capacity to interact with the world and convey his/her personal action in the world at different levels (*i.e.* global and local) has become important dimensions. Following Pardo's reflection, the poietic action of *composition* is reminiscent of Benjamin's idea of *montage* and thus is a revolutionary and political action (2017). In this regard, the renewed value of personal *choice* emerges as a crucial facet not only of an artist's authorial duty but also of the entire musical world, globally and locally; programmers, label editors, critics as well as

listeners and artists are in fact faced with an excess of possibilities which demand that a selection or a choice be made. All these traits together, *i.e.* decision, intention, and action, are part of this renewed responsibility.

Nevertheless, the current musical panorama is not easily characterized only through authentic and genuine actions: mechanisms within the contemporary experimental *artworld*¹⁵¹ maintain rules, hierarchies, conventions, and are still full of problems and ambiguities. As Barbanti delineates, certain general problems affect contemporary art such as: (i) its firm auto-referentiality and autonomy hampering every possible ethical dimension; (ii) its continued need to astound and surpass its own current limits;¹⁵² (iii) the restriction on the aesthetic perspective, *i.e.* in front of a new work, the typical position taken is that of assessing how innovative the work is in relation to the limits of art itself; (iv) its isolation within society and the crisis of credibility (since every criticism about art can be ventured from the inside of the *artworld*); (v) the limitation on how a work is evaluated and its subordination to economic profitability; and (vi) the risk for the art to be absorbed within neoliberal schemes of productions which are becoming the model for any utilitarian –and productive– creative activity (Barbanti 2011, 2016).

In contrast, since 1960s, many critics (Danto 1964; Dickie 1974; N. Goodman 1978) have enriched the discussion on the aesthetics of art by expanding on the role of *context*, be it artistic, institutional, economic, or cultural. The *mediation* between creative object and context has been the subject of reflection at different levels: creative (artist, composer, performer), material (technology), perceptual, cultural, and economic (*i.e.* the market) involving the individual and society (Born 2005, 1995; Adorno [1949] 2002).

But what if the critical points listed above are symptoms of an irremediable crisis that also involves experimental music? Has every possible sound already been played, composed, and listened to? Have we really exhausted the possibilities of saying

¹⁵¹ I use the term *artworld* throughout this chapter as presented and defined by Danto (1964).

¹⁵² Even the term *experimentation* has reached and surpassed the status of the *realization*. And the adjective *experimental*, even if continues to refer to an entity with unknown outcomes, is enriched with facets of *innovation* and has lost the connotation of an object “open to improvements” (Clair 1997, 16).

something original and genuine about human production without falling into self-referential activities? Are we forced to commercialize everything while listening to *relaxing* music (S. Goodman 2010, 191; Thompson 2017, 5)? What about the dimension of intention?

The post-modern condition consists of cultural fragmentation, the decline of narrative knowledge, and the impossibility of understanding society as a totality, and it is made up of fragmented needs and views (Lyotard [1979] 2014; Gilbert 2014). Moreover, “the proliferating production of material and immaterial goods” that produced a “huge subjective void, [...] is becoming ever more absurd and increasingly irreparable and threatens the consistency of both individual and group existential territories” (Guattari [1989] 2000, 46). Consumer society also permeates the music-world, “dumbing it down”. Agostino Di Scipio, for instance, refers to a crisis of sound (“*crisi del suono*”) that is ubiquitous, hyper-produced, hyper-consumed, and acts as a sort of polluting agent, an anaesthetic to our aural perception. It is a “sound without relationships” (“*suono senza relazione*”) and, in this concern, he refers to a “crisis of relationships” (Di Scipio 2017). Post-modernity is also then an immersion in an immense quantity of heterogeneous information without comprehension (Pardo 2017) where reflection and research into sound are declining in favour of pragmatic approaches and immediate, short-time, and *sensorial* engagements.¹⁵³

On the one hand, this is a culture that privileges only the present and the immediate [...]; on the other hand, it is a culture that is excessively nostalgic, given over to retrospection [...] (Fisher 2009, 59).

While during the last decades the practice of nostalgic and “retromaniac” rediscovery of mediums and styles from the 1960s to 1980s has engrossed the economic facets of several musical contexts (Reynolds 2011), time quickly marches on. The theme of *the future* has been presented for decades as “the economy of the promise” of wealth and growth. However, since the financial crisis of 2008, the awareness of the end of a cycle of continuous growing has emerged (Fisher 2009). New perspectives able to deal with contemporaneity without being dependent on future pledges have started to take

¹⁵³ I am conscious that a key part of the perspective I have outlined in this dissertation privileges the sensorial over the abstract (see discussion in section VI.4 and footnote n°154).

shape: renewed ecological approaches, de-growing practices, *accelerationist* positions (LaBelle 2006; Alexander 2017; Pardo 2016; Mackay and Avanesian 2014). These practical pathways to tackle *the present* found manifestation in music and are expressions of a need to dismantle the auto-referentiality art music (Waters 2000, 56) and reinstate its connections with reality.

All these points would be worthy of discussion with regard to contemporary experimental music. Some of these themes (*e.g.* the distance between music communities, the isolation of *high* music, the role and the responsibility of the artist, the potential of sonic expressivity) have emerged during this dissertation.

Figures that approximate to the proposed *ecstatic-materialism* perspective embody abstract musical inspirations within a concrete expressivity of sound using reinvented cultural references and musical applications (*e.g.* Lang's loop orchestra) or specific live circumstances (*e.g.* Haas' listening in the darkness). What becomes evident from Chapter V is that participants (composers, performers, and listeners) are engaged in a dialectic relation with sound (Piana 1991, 160) and, in drawing real connections between author and audience, sound *emerges*. This emergence of sound takes place in the form of *energy*: sound waves and gestures.

The rigid pulsations of *Etäisyys* by Pan Sonic or the intricate descending line traced by Haas in *in vain* are sonic materials: they hit our ears and capture us through the acoustic pressure generated in our cochlea. They leave imprints of solid geometries (Pan Sonic) and slippery escalations (Haas), and these acoustic traces convey a presence and a set of gestures reminiscent of industrial societies, granitic representations (Pan Sonic), figurative narratives, and unbalanced hesitations (Haas). We assimilate and integrate this presence within and according to our diverse backgrounds, enriching it through our experience in a continual relationship between the *sonic* and the *personal*.

Sound materializes itself as event, its presence is within a *sonic milieu* (*i.e.* *milieu sonore*, (Solomos 2017)). This materialization occurs between the participants (authors, interpreters, and public) in the sonic milieu, being *inter-referential* (Barbanti 2011): as common territory between them.

In this sense, a new notion of musical *context* emerges: it is no longer a place of

self-recognition, rather it is a cultural base from which to open up to the external world. This kind of context is well represented by the audience who experience Haas' *String Quartet n°3* in the dark and wish to share their impressions and new insights on the perception of music (Priviteira's interview, Chapter IV); or those who listen on the same night to both Kurtág's *Doppelkonzert Op.27 n°2* and electronic improvisations made with Kurtág's piece itself (*i.e.* Rai Nuova Musica 2016 – Festival in Torino, Italy); or people who participated in the 2006 Berlin Festspiele which included music by Kaija Saariaho, Otomo Yoshihide, Yan Maresz, Alvin Lucier, and Ryoji Ikeda, among others.

This is the reason why authors who exemplify E-M perspective include a strong performative aspect to their music. Music is not an exclusive secret phenomenon, rather, starting from subjective experiences, it unfolds towards external elements (social, cultural, politic...) reinforcing subjectivity itself. Participants gain an awareness that music is “a sonic experience of relationships” and to break these relationships is a process of shirking responsibility (Di Scipio 2017). In order to move the subject from an egocentric and self-referential position to having a perspective of the external world, contemporary experimental music has to be considered in its complexity of contacts and relations, that is it has to be *contextualised*. The aesthetic, existing in this perpetual exchange of information between subject and environment, expands its formalist quality, acquiring a new outlook towards works, composers, and audiences.

In referring to a new notion of noise, Thompson talks about a “(re)turn to affect” theory,

“which [...] required a reconfiguration of how we understand the relationships between body (as subject), bodies (in their broadest Spinozist sense) and their (technological, political, economic, social, biological) milieux. This occurs without recourse to [...] the dualism that separates the human from machine, nature from culture, subject from object, science from art, technology from the aesthetic and body from mind. Affect theory thus views human *experience* as part of a wider field of inter- and intra-actions” ((2017, 9) *italic is mine*).

If observed from this point of view, the results of the perceptual survey might suggest that the three listening modes (analytic, affective, immanent) depict –still in an embryonic form– different aspects of this aesthetic inasmuch as they account for direct appraisals of material aspects (*immanent*), technological and cultural recognitions (*analytic*), and *experience*-based associations (*affective*).

Moreover, in Chapter V, several elements indicated that the E-M cross-genre aesthetic possesses a consistency of leading principles and values including (i) a strong poetic impulse against impersonality; (ii) a sense of responsibility; (iii) a high importance given to choice, action, and intention; (iv) a primary focus on perception; and (v) the desire to move sonic engagement towards a more profound level. Finally, *experience* –in the sense delineated in Chapter V– works as a source of elaboration, as a new itinerary made of connections and exchanges. The emphasis on the relational nature of experience (Johnson 1987; Massumi 2002) relates to the subject’s capacity “to affect and be affected, its modulating powers to act and be acted upon” (Thompson 2017, 23; Deleuze [1981] 1991; Böhme [2001] 2010). This *ecstatic-materialist* vision is grounded in the idea of a trace of sound, a potential of sound embodied in practical experience and human value, an *ethic* of sound.

VI.4 Beyond perceptual paradigm, towards multimodal and complex approaches

An important aspect within art music is the overall emergence of the *sensorial-perceptive* paradigm. As mentioned in Chapter III, several approaches which prioritise perceptual practices have been recently rediscovered (Ihde [1976] 2007; E. Clarke 2005; Oliveros 2005; Voegelin 2010): ecological approaches to perception and the musical activities which expand on these themes are rapidly gaining a large interest. However, following the criticism of Barbanti, these perspectives need to be able to look to the external world in order to lead to artistic action beyond their self-referential and elitist characters (Barbanti 2011). In this vein, the disciplines of *sound ecology* and the work of the Canadian team of Robert M. Schafer have developed more contextually aware approaches within genres and practices such as soundscape, field recording, and immersive listening.

When, as in this study, the object of research concerns types of music which claim the importance of external imprints of both author and listener experiences as a bridge towards reality, the *sensorial-perceptive* model requires a successive

examination.¹⁵⁴ Pieces included in this study can be brought together under a common interest in perceptual aspects, but –as I hope to have shown– these aspects are part of a more complex idea of music made of new lutheries (Verrando), temporal explorations (Haas), timbric research (Nova), reinvented cultural modules (Lang, Raime), and sonic challenges (Ikeda, Pan Sonic): music passes through perceptual intentions but incorporates more complex creations.

Salomé Voegelin, in her book about the perception and philosophy of sound art, states that

what sound artists have tried to progress and establish over the last and since the beginning of this century [is] the ephemeral complexity of sound that avoids classification and focuses on being heard rather than on being understood (2010, 54).

This doctoral research does not deal with sound art, but this statement summarises quite well the current perspective among many researchers in the world of experimental music: the idea that the time when music can be considered only through its aural properties has (finally) arrived. This vision –to my mind– is still a product of that sense of rebellion against doctrine, a stance inherited from the 1960s avant-gardist sense of necessity to refuse labels, classifications, and structural approaches. The revolution of the “sound in-itself” has emancipated the conception, the creation, and perception of music. It has been a crucial passage in musical post-modernism, but the most recent developments within exploratory music –as mentioned above– seem now to emerge through the use of renovated gestures and participation, making a stand against impersonality and including citations and cultural references. I think it is time to metabolise and get the most out of the *sensorial-perceptive* paradigm by recognizing its limits when applied to today’s musical panorama.

Why can we not appreciate music by using a multimodal approach which includes both the senses and the intellect? Why should we *reduce* our listening to pure perception? Is the idea of *comprehending* music still taboo? As mentioned above, the emancipation of sound in 20th century music has led, in some cases, to radical examples

¹⁵⁴ During this research, I frequently benefitted from the perceptual perspective (*i.e.* audio analysis and perceptual studies) that I then tried to integrate within a more articulated structure (Chapter V): in the E-M model, the perceptual level is dynamically related to cultural, intimate, and motoric elements.

in which the form of a work collapses in favour of its aural content, allowing the music (as a particular manifestation of sound more than a structured piece of music) to convey only itself and to be appreciated as a sort of acoustic stimulus. How is it possible to reintroduce comprehension and interpretation to this kind of music? Perhaps by identifying a new kind of *form*, one in which the object of art might mean something else beyond itself (Danto 2013). Pieces of this study –even if they do not belong to those radical practices alluded to above– share an outlook (*i.e.* the E-M perspective) which might be seen as a new form and whose presence has enabled a multifaceted understanding in terms of original musical attributes (Chapter II), modes of listening (Chapter III), poietic intentions (Chapter IV), and aesthetic and ethic principles (Chapters V and VI). In this sense, the possibility of developing this multimodal approach that goes beyond the sole sensorial paradigm, indicates that the E-M perspective present in the pieces themselves is a genuine propositional construction.

Nowadays, music and more generally art can be created with all kinds of material and technique. This evolution has led to a continuous challenge for the public in approaching the *artworld*. Danto writes that “[s]uch a development puts great interpretative pressures on viewers to grasp the way the spirit of the artist undertook to present the ideas that concerned her or him” (2013, 128). I claim that it is important to favour the grasping of these processes at every possible level without rejecting the role of interpretation and comprehension.

Though I have been speculating about perceptual listening modes throughout this dissertation, I argue that all researchers –myself included– ought to look outside their elitist academic enclosures and attempt to face the complexity of *real* listening modalities (Delalande 2013, 216). Music must fully occupy that aesthetic space between human beings and reality through a process of continuous exchange that is both sensible and intellectual. In this sense, we do not need to refuse the idea that music could be comprehended (or even classified).¹⁵⁵ Human production is *intentional* and *contextual*, and music is to listen to, to be captivated by, to interpret and understand in a way that is

¹⁵⁵ It might be unnecessary to remember that a *proper* training in the recognition of musical forms and practices does not weaken or inhibit a free listening, rather this can enhance and enrich a more spontaneous approach to music.

not egocentric (or self-centred) but rather is subjective and involves a dialectic between genres and contexts.

My research shows that a preliminary *reading* of a diverse repertoire of experimental music can be done: there are sonic correspondences between these works, rich and coherent modes of perception activated by them, and a common aesthetic trace found in all of them. To expand on this, external elements are welcomed as a means to distinguish stances, recognize intents, confirm intuitions: the *context* is the ground for discovery. The need to propose innovatory pathways is an intrinsic part of experimental music, but this study shows how crucial the work of participants (artist, researchers, curators and listeners) is in constructing a milieu that makes experimental music not just an astonishing event, but something that may convey a message and build relationships to the world that could be elaborated; in a word: to make experimental music, music.

The world of experimental music continues to explore innovatory practices and there is a lot of music that is now concerned with doing something novel with for example the interactive technology. But –as mentioned above– earlier explorative elements are seen today as common and familiar: listeners are not as fascinated by the novelties of the sonic experiments of the 1960s or 1970s as they used to be. It is no longer enough to put a real-world sound in an instrumental piece or exploit a spatial dislocation of a simple sonic impulse: what has become (or become once again) important in these examples is “the music” of these sounds.

The questions raised above come from my perspective as a musicologist. From this standpoint, I am discouraged by the distance that exists between the experimental music world and the wider less specialised group of listeners that make up the majority of the general public. Social practices influence individual choices, and this gap between listeners and “new music” is generally based on a disunion between the modality that seems to be required for listening to the experimental music repertoire and the socially predominant forms of decoding pieces with which people are more familiar (*i.e.* tonal constructions) (Bourdieu [1979] 1983). The hierarchical structure of this condition and the separation between contexts (*e.g.* high/popular, experienced/unexperienced, (Adorno [1962] 1971)) requires a cultural mediation that, as previously

mentioned, has recently opened up to multiple approaches (e.g. top/down, bottom/up, global, local, participatory, and ecological) at different socio-cultural levels (didactic, artistic, economic, promotional...). Clarke claims that inexperienced listeners are able to judge and structure tonal music due to a sort of “unsupervised passive learning” that allows the *ecological* tuning of our auditory system towards those musical practices (“environmental shaping”, (2005, 29–30); see also (Stockfelt 2004)).

The belief is that people become attuned to this property of music through simple exposure, due to the interaction of the regularities of the tonal environment with certain fundamental perceptual capacities of the auditory system. [...] The basic idea of competitive learning is that an existing connection (which may have been made fortuitously) is strengthened every time the connection is reiterated, while adjacent (“competing”) connections are weakened. The consequence of this is that regularities in the environment progressively shape the network simply by virtue of their recurrence and co-dependence (E. Clarke 2005, 29).

A greater exposure to experimental music in our everyday lives might reduce the gap between a general audience and this type of music. This greater degree of contact would certainly help unfamiliar listeners to get over the general feeling of alienation due to experimental music’s distance from tonal music and would help them appraise this kind of music on its own terms. However, the absence of any sort of grammar equivalent to that of the tonal system would make this sense of familiarity to experimental music somewhat superficial and more accurately characterised simply as a greater ease in approaching listening and forming expectations. In any case, this kind of “environmental shaping” that could attune listeners to experimental music practices is far from being feasible in our daily culture, thus I believe, as a researcher, in creating new (even if sometimes artificial) connections and bridges that help to put in communication these subjects, and this desire has guided my entire research. For this reason, I decided to include at the end of my dissertation a series of examples issuing from the outcomes of this study for possible application in the current musical panorama.

VI.5 Practical outcomes

Theoreticians like to speculate, and this study is rich in conjectures, hypothesis, and confirmations. However, since this work arose from a practical necessity, I will

attempt here to give concrete examples of feasible outcomes that issue directly from my work.

- *Didactic level*

The idea of creating educational practices for students based on common attributes identified in the analysis might be a powerful instrument to introduce these musical elements as a means of recognition in listening activities at school. The teacher could provide a student with these simple tools and ask them to associate these with musical examples, similar to how I prepared the listening questionnaire in Chapter III (see also Appendix B). This task could be realized within listening sessions (*e.g.* for primary school) in various ways that could be adjusted to fit the particular age groups (Figure VI.1).

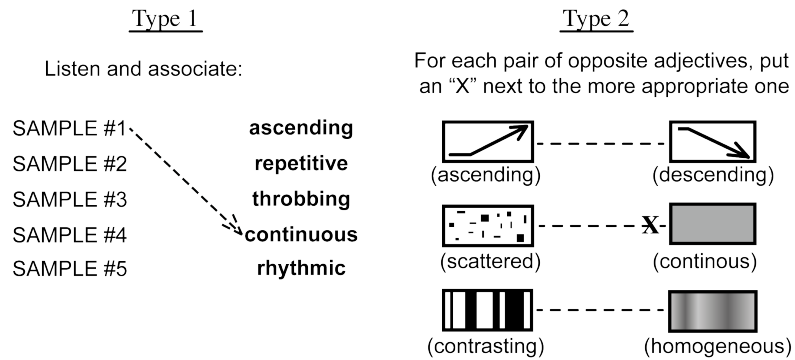
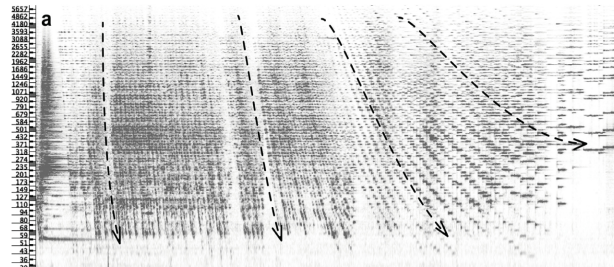


Figure VI.1 Two models of application within listening meetings for primary school

These pedagogical tools could be also integrated within a course on spectral analysis (*e.g.* at high school and universities) as depicted by Figures VI.2 and VI.3.

Indicate using arrows the global descending movement in the spectrogram:



Indicate where the ascending sound begins:

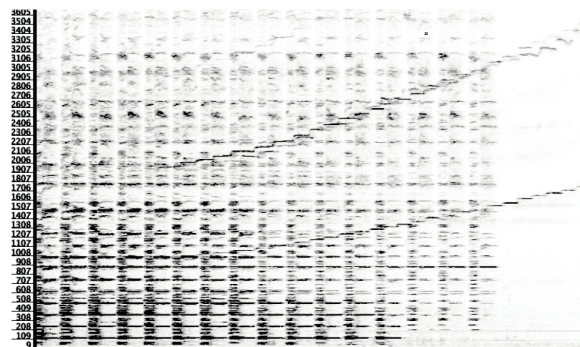
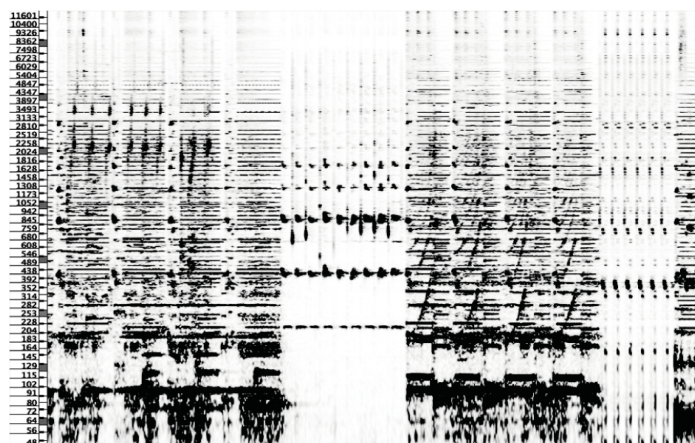


Figure VI.2 Models of application within courses of spectral analysis for high school (Spectrograms taken from Haas' of in vain (top) [40 – 5000 Hz / 31'11" – 35'21"] and Lang's of DW17 (bottom) [20 – 2700 Hz / 44'44" – 46'20"]).

Identify the different clusters. For each clusters identify the repeated unit. Where possible, identify repeated elements of each unit:



Listen and identify within the spectrogram instrumental and electronic sounds:

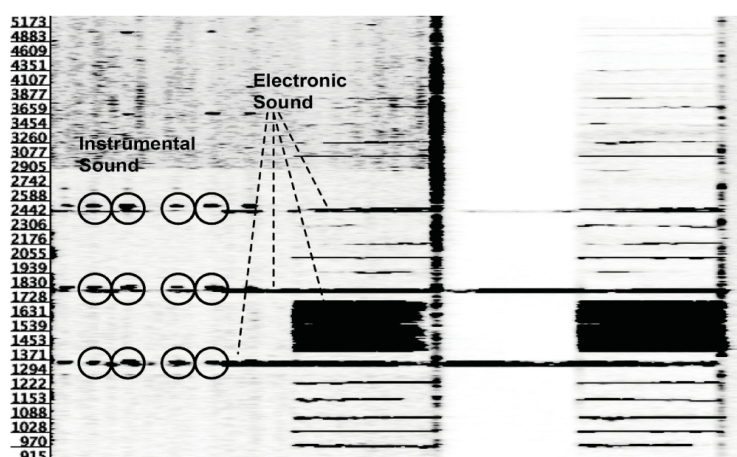


Figure VI.3 Models of application within courses of spectral analysis for high school.

(Spectrograms taken from Lang's of DW2-Habit (top) [48 – 11600 Hz / 03'18" – 04'06"] and Verrando's of Triptych#2: Filtering#5 (bottom) [0.9 – 5.5 kHz / 01'20" – 01'42"].

Similar applications have already been developed by the team at the *Laboratoire Musique et Informatique* of Marseille (MIM) (Frey et al. 2009) as listening activities: the *Unités sémiotiques temporelles* (UST or Temporal Semiotic Units, TSUs) work in a similar way as the tools developed in this study. This method tries to open up musical practices to all listeners, reducing the power of the “expert” mode and providing the

listener with more universal attributes: students approach musical pieces using terms often placed in opposition to one another, such as “rising”/ “falling”, or “dense” / “sparse”. The group at the MIM based its research on the idea that everyone could approach and compare any piece of music in this way, considering music as a contained subject in itself.

The attributes I have put forward in this study were instead developed using a very specific set of compositions from the experimental repertoire and, even if they account for fundamental musical shapes, their potentiality is only fully realised when this type of music is examined. Moreover, educational protocols should exploit diverse approaches in trying to develop a didactic that takes into account both elemental musical tools like those discussed above and those –more conventional– tools that guide a learner to distinguish pieces based on different stylistic and semantic traits, or emotive and affective impacts (Wittenberg, William, and Osborne 1983). In this way, without breaking with the traditional pedagogy of music, a student might benefit from a multiple approach to listening to music (Deriu 2001).

An interesting application of aural analysis for didactic purposes is being developed at the University of Huddersfield, where the Max/MSP–based software *Sybil*, designed by Prof. Clarke, is being used to identify aural elements within electroacoustic pieces (M. Clarke et al. 2004; M. Clarke 2006). Here, technology and informatics serve to engage students with sound interactively.

- *Artistic and Poietic level*

The musical attributes that emerged from this study could form the basis for “composer-audience” interactions. Composers are often teachers (*e.g.* Haas, Verrando) and their personal involvement within educational platforms such as universities is a normal practice. However, the development of a more wide-reaching set of activities that might encompass listening sessions, personal encounters, and discussions with different types of listener could lead to fruitful interactions between artist and audience where both get to contribute to the cultural context. Using the listening questionnaire developed for this thesis, a composer might attend the survey in person, prepare a specific selection of his/her repertoire, and provide additional explanations answering

listener's questions and criticisms.

Similar activities already exist within conferences, workshops, and festival presentations where often the music is performed live and interpreters play an active role in the debate. Nevertheless, gatherings of this type are still specialized happenings and an effort to extend these practices towards a more comprehensive public could be implemented.

- *Performative and perceptual levels*

To my knowledge, a few activities involving interpreters within participatory events with different kinds of audiences already exist.¹⁵⁶ Several results from this study might be used to shape these types of encounter, for example guiding musicians in selecting from their repertoire specific pieces based on thematic arguments which depict particular musical traits such as “intimate temporality”, “the exploration of inner space of sound”, or “the sound of new lutheries”. Interpreters could discuss (before and after the performance) with the public and the composers their impressions and intentions, adding personal feedback and insights drawing on score interpretation and instructions from the composer.

- *Curators and editors*

On several occasions during this dissertation I referred to the importance of live performance. In this regard, curators for theatres and clubs play a crucial role in the bringing together of distant communities of listeners with experimental music. It is not a question of simply mixing together artists from institutional and underground contexts, rather it is about forming a delicate equilibrium by carefully combining these different worlds: avoiding random combinations while trying to integrate different approaches within a single musical event.

I mention here the intelligent work of the London Contemporary Music Festival

¹⁵⁶ I refer here to the periodic meetings organized by the art/music gallery *Spazio O* in Milan. On these occasions, the public is invited, often a couple of days before the related concert, to attend listening sessions, debates, and personal discussion with performers and composers. Another example is *Maurice Quartet*, of which first violin Georgia Priviteira contributes to this study (Chapter IV), who organize every year a three-day meeting where they present their more recent repertoire in collaboration with invited composers and artists.

(<http://lcmf.co.uk/>) which features theme-based evenings where one may attend performances of distant composers brought together under a common perspective. In 2013, for instance, they organized concerts under the label “To a New Definition of Opera” with pieces by figures such as Laurie Anderson, Philip Glass, György Kurtág, and Jennifer Walshe. Or, in the same year, the “Drone Day” featuring Brian Eno, Eliane Radigue, James Tenney, Tony Conrad, and Charlemagne Palestine. Or even the night called “New Complexity and Noise” with pieces by Aaron Cassidy, Brian Ferneyhough, Michael Finnissy, Anthony Pateras, Steve Noble, and Russell Haswell.

Employing a different approach, curators of the Italian festival *Music@villaromana* (musicatvillaromana.org) create, twice a year, special happenings incorporating classical contemporary interpreters and underground performers. The programme is divided by a long break where the public has time to discuss and have exchanges with the artists, moving between different circumstances of listening to music.

These examples show how it is possible to find an *appropriate* way to present very different musical pieces without downplaying their nature. In this regard, Ola Stockfelt clarifies that an “[a]dequate listening, with adequate modes of listening in an adequate situation, is a normative part of music genre, in the same way that sounding material is” (2004, 92).

More generally, this study shows that certain core concepts of interpretation are powerful instruments if they are used to enhance the richness of the exploratory music world rather than contain it within conventional lines. The imperative to choose and select within an immense range of music makes the tools developed in this study of great importance for curators and music editors alike.

VI.6 Closing remarks

At the beginning of this study, I set out certain initial premises based on aural impressions and I then attempted to give foundations to these ideas starting from purely sonic considerations. I believed that, in order to answer to my starting hypotheses, my research would stay confined within the limits of musical analysis and spectral

examination.

Instead, as is to be expected with scientific research, I discovered that my proposition did not limit itself to the field of analysis I had envisaged, rather it pushed me in unexpected directions. I was compelled to deal with sound perception, including its philosophical aspects, as well as the related cultural habits and social practices. I drew on personal feedback from artists and composers, which forced me to change my initial beliefs in some cases. I thought it would be simple to formulate a consistent explanation for something that –to my ears– was evident, but on the contrary I realized that my initial assumptions were weak and not well founded; an additional effort was required to expand my investigation with a more profound interrogation into the origins of this intuition.

As Delalande recognizes, it is rare in social sciences and the humanities that research leads to real discoveries. As is more often the case, we should be happy when the work manages to describe more successfully the concepts we have already comprehended intuitively (2013, 187). From the more cautious standpoint, I hope this work has shown a series of convergences (sonic, compositional, perceptual, and aesthetic) between pieces coming from different contexts. More optimistically, I hope to have demonstrated the potential of cross-genres approaches: the perspective I traced in this study allows for the emergence of a common ethic of sound that goes through (i) a parallel use of sound practices and (ii) a shared perceptual sensibility that involves authors and listeners to (iii) convergences in poietic intentions and principles that (iv) encompass a common sense of responsibility. Moreover, this multimodal research has hopefully shown its power to establish innovative ways (didactic, performative, and cultural) of understanding in order to connect audiences from diverse communities and facilitate the meeting of authors and listeners within unexpected contexts.

This research led me to a new level of awareness that I did not expect to reach, and this is probably the most fascinating aspect for a researcher. The points brought to light in this thesis surely need further development, and I am convinced that from these results new itineraries of research might be built.

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¹⁵⁷ All retrieved websites (URL) were checked on February 27, 2018.

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Appendixes

A. Analysis of Pieces

The process of analysis has been carried out during different periods of time and underwent a multiple process of refinement. The following text is a synthesis of this process. The main phase of examination supported the definition of nine attributes in common to the selected pieces (Table A.1) and in this appendix I include –for each musical episode– a summarizing text, labelled “Overview”, in which I specifically refer to these attributes.

Table A.1. Common attributes in the selection of pieces

code	Musical Attributes
<u>A</u>	Expanded Spectrum
<u>B</u>	Microtonal Variations
<u>C</u>	Systematic Glissandi
<u>D</u>	Rhythmic Developments
<u>E</u>	Static Masses
<u>F</u>	Repetitive Clusters
<u>G</u>	Dynamic Contrasts
<u>H</u>	Hypnotic Reiterations
<u>I</u>	A Sculptural Arrangement Of Sound

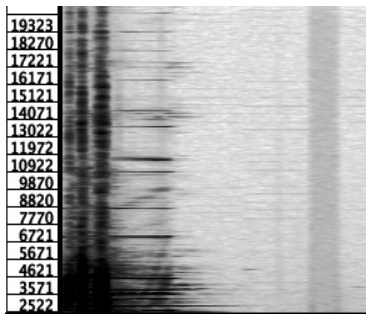
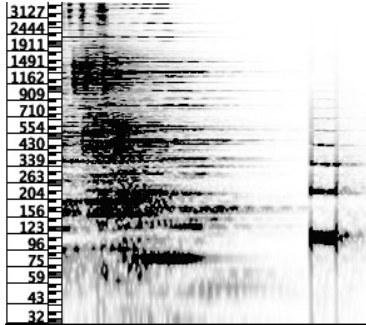
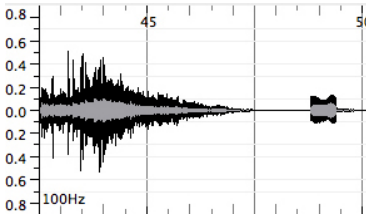
For larger and more structured compositions I include at the begin a general table (not indexed) that highlights main musical sections with the corresponding attributes (starting from the most fitting).¹⁵⁸

General comparisons among different authors and pieces would appear as footnotes and usually refer to specific musical episodes including internal cross-references to paragraphs and figures.

¹⁵⁸ Attributes are identified by the corresponding code (A–I) and are underlined in the text to avoid confusion with musical notes. In case of short musical episodes, I incorporated a synthetic list of attributes (e.g. [A, C, (F), H, I] where round brackets here indicate the secondary attributes) at the end of each corresponding analysis.

Analyses of pieces have been executed through audio, score (when available) and spectral examination. At a first stage Sonic Visualizer® (Cannam, Landone, and Sandler 2010) and Eanalysis (Couprie 2008) have been used for primal screening, subsequently TIAALS software (M. Clarke, Dufeu, and Manning 2013) has provided the necessary support to collect and compare similar practices. In most cases, the spectrograms displayed in the figures come from Sonic Visualizer's analysis and are organized as it is depicted in Table A.2.

Table A.2. Standard characteristics of the spectrograms used in the analysis.

Image	Characteristics	Objective
	Type: <i>Spectrogram</i> Frequency range: 2.5 – 20 kHz Colour Type: <i>Black on white</i> Scale: <i>dBV</i> (Gain: 3 dB) (no normalization) Window size: 16384 Window overlap: 87.5% Bin Display: <i>All Bins</i> Frequency Scale: <i>Linear</i>	Spectrogram of medium-high and high frequencies for detection of high partials, overtones series, concrete sounds and noise types (white, pink, grey...).
	Type: <i>Spectrogram</i> Frequency range: 20 – 3000 Hz Colour Type: <i>Black on white</i> Scale: <i>linear</i> (Gain: 11.5 dB) (no normalization) Window size: 16384 Window overlap: 87.5% Bin Display: <i>All Bins</i> Frequency Scale: <i>Log</i>	Spectrogram of bass and medium frequencies. In particular linear scale and logarithmic frequency scale favour detection of fundamental tones and first partials.
	Type: <i>Waveform</i> Colour Type: <i>Black</i> Scale: <i>linear</i> (Gain: 0.5 dB) (no normalization)	Waveform image is occasionally used in order to discuss dynamic effects.

Caption's figure normally includes spectrogram's exact frequency range,

temporal indications (minutes and seconds and bars)¹⁵⁹ and additional information (e.g. specific legend for embedded inlets, texts or marks).

A.1 Georg Friedrich Haas

String Quartet No. 2 [1998]

SCORE: Universal Edition – Digital copy from the original manuscript © Copyright 1998 by Universal Edition A.G., Wien/UE 31198.

AUDIO [20’44’”]: Kairos Quartett. Edition Zeitklang (Adenbüttel/Deutschland, www.zeitklang.de)

NOTE: Haas’ score is in accord with the Helmholtz-Ellis microtonal notation extended to quarter and sixth tone (♯, ♮, ♯, ♮ and ♯, ♮, ♯, ♮ respectively). Nevertheless, Haas adds superscripted “–” or “+” over the modulation mark to indicate minor alterations (lower or higher) around the note (Figure A.1). These modulations may be ascribed as twelfth-tone accidentals (Hasegawa 2015).



Figure A.1 Example of Haas’ microtonal minor modulation (Georg Friedrich Haas “2. Streichquartett | für Streichquartett“ © Copyright 1998 by Universal Edition A.G., Wien/UE 31198).

- GENERAL SCHEME

Sections	sub-Sections	Attributes <i>(ordered from the most fitting)</i>

¹⁵⁹ As specified in Chapter II, recordings were used to analyse all pieces. Each recording is indicated at the beginning of the corresponding analysis. For works with a notated score, I decided to refer mainly to temporal indications in these recordings rather than bars to identify specific musical episodes. Occasionally, in order to provide precise references and correspondences with the score, I also use bars numbers.

00'00" – 04'28"	[00'00" – 00'43"] [00'44" – 01'30"] [01'31" – 02'20"] [02'21" – 03'19"] [03'20" – 04'28"]	E, A, B, C // I, F // H, G
04'29" – 08'09"	[04'29" – 04'44"] [04'45" – 08'09"]	F, G, I, C // H, A, B
08'10" – 14'15"	[08'10" – 09'50"] [09'51" – 14'15"]	E, B, A // C, H, F, G
14'16" – 20'24"	[14'16" – 15'21"] [15'22" – 17'08"] [17'09" – 19'16"] [19'17" – 20'24"]	E, C, F, H // G, A, B

[00'00" – 04'28"; bars 1 – 56]

- [00'00" – 00'43"; bars 1 – 8]

The opening of the work explores a pedal tone of C2 developed by cello (that will be sustained until the end of the section) which punctuates the musical flow by emphasizing dynamics. In the opening, a parallel construction is developed by all instruments and this consists of a C open-chord with C2(*vc*), G3(*vla*), C4(*vl-II*), G4(*vl-I*) in an *arpeggio* configuration starting from bass to high notes. While the pitches are tidily arranged, the dynamic notation is interlaced resulting in a throbbing sound.

From 00'22", the sonic flow continues: viola and second violin alternate C4 and G3 while cello and first violin play C2 and G4 respectively. First violin and the viola both pass to bichord G4 and C4 respectively and start a single microtonal glissando to the sixth tone generating G4/G $\sharp 4$ and C4/C $\sharp 4$ clusters (Figure A.2). This first microtonal modulation breaks the linear dimension of musical flow opening to frequency interferences.



Figure A.2 Example of Haas' bichord notation for the first violin. (Georg Friedrich Haas "2. Streichquartett | für Streichquartett" © Copyright 1998 by Universal Edition A.G., Wien/UE 31198).

- [00'44" – 01'30"; bars 9 – 17]

A B $\flat$ 9, coming from bar 8, creates a sort of extended chord of C2 –that is always present (*i.e.* cello)– with its natural harmonics: fifth (G4), the seventh (with a sixth of tone lower, B $\flat$ 9), ninth (D5, bar 12, 01'04") and tenth (E5, 01'14", bar 14). This section closed by a *sforzato* of cello (C2, 01'20", bar 17) is a good example of how dynamic variations generate very rich extension of the sound spectrum (Figure A.3): Haas, in this way, creates an episode that is *linearly* static but *vertically* animated.

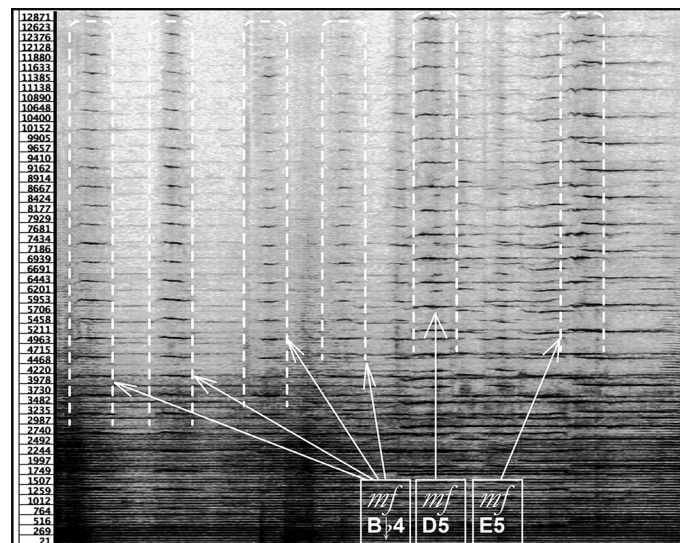


Figure A.3 Spectrogram [20 – 13kHz / 00'40" – 01'20" / bars 8 – 16] of String Quartet n°2, highlighted areas correspond to dynamic peaks.

- [01'30" – 02'20"; bars 18 – 28]

This episode is a kind of restart of the previous one (after the break of cello),

where Haas enhances the tight texture of C2 pedal tone including the 11th (F♯5) and 13th (at the first violin, 01'56'', bar 23, as A♯5) natural harmonics. While the cello continues playing the fundamental, the other three instruments create a complex interlaced effect. The repeated dynamic unit, made of a soft attack and a successive *crescendo* (i.e. *pp* < *mf* > *pp*), generates an asynchronous sonic flow: the attacks high pitched notes (7th, 9th, 10th, 11th and 13th) and the appearance of their full harmonic series (that emerges only at higher dynamics) are out of sync (Figure A.4).

Figure A.4 Haas' String Quartet n°2 score [01'45'' – 02'16'' / bars 21 – 28] (colour graphic elaboration put on top, (Georg Friedrich Haas "2. Streichquartett | für Streichquartett" © Copyright 1998 by Universal Edition A.G., Wien/UE 31198).

- [02'21'' – 03'19'', bars 29 – 41]

A new episode consists in an extended *arpeggio* of C distributed across the four instruments (i.e. C then its 5th, 9th, 10th, 11th, ..., 20th, 21th). In this case, instruments play frequently chords of two notes in which the higher note is that one of the *arpeggio*. These chords, played in *accelerando* and *sforzato*, frequently combine two adjacent notes creating a dense sound. The cello maintains the C2 pedal tone but reinforces its sound with higher notes the periodically move up with *glissandi* (C4 → G4 → B♭4). The musical profile results in two ascending movements (i.e. one formed by violins and viola and the other by the cello) following one another. This global movement proceeds through a strict microtonal progression and culminates to its highest limit as a sequence of sustained chords that design a sort of sonic aggregate, based on C and its natural harmonics (Table A.3).

Table A.3. Harmonic structure of String Quartet n°2, in measures 38 – 39.

	bar 38 [chord] (C–chord degree)	bar 39 [chord] (C–chord degree)
Violin I	[E♭6/F♯6] (19 th / 20 st)	
Violin II	[D♯/E♭6] (18 th / 19 th)	[A♭5] (13 th)
Viola	B5/C♯6 (15 th /17 th)	
Cello	[C2/B♭4] (fundamental + 7 th)	

- [03'20" – 04'28", bars 42 – 56]

While cello designs three sequential *glissandi* (from C4 to B♭5, G4 to B♭ and B♭4 to F♯6) before the reaffirmation of a *forte* C2, sustained chords of violins and viola play sustained chords creating a tight microtonal texture around C, G, and E that merges with the fundamental note of cello. In fact, as Haas specifies, the “[i]ntonation [of violins and viola] always adjusts to the harmonic series of C”¹⁶⁰ in a way that the C chord gives the impression that from the fundamental note several overtones emerge naturally as they belong to the same source of sound. But at the same time the their intonation is transitory, and creates a sense distortion from a harmonic natural series. The musical discourse move dynamically and harmonically toward a pure C/G chord and the cello abruptly closes the episode with a *sforzato* (Figure A.5).

¹⁶⁰“Intonation immer an die Obertonreihe von C angleichen” (Haas 1998a, 6) (my translation).

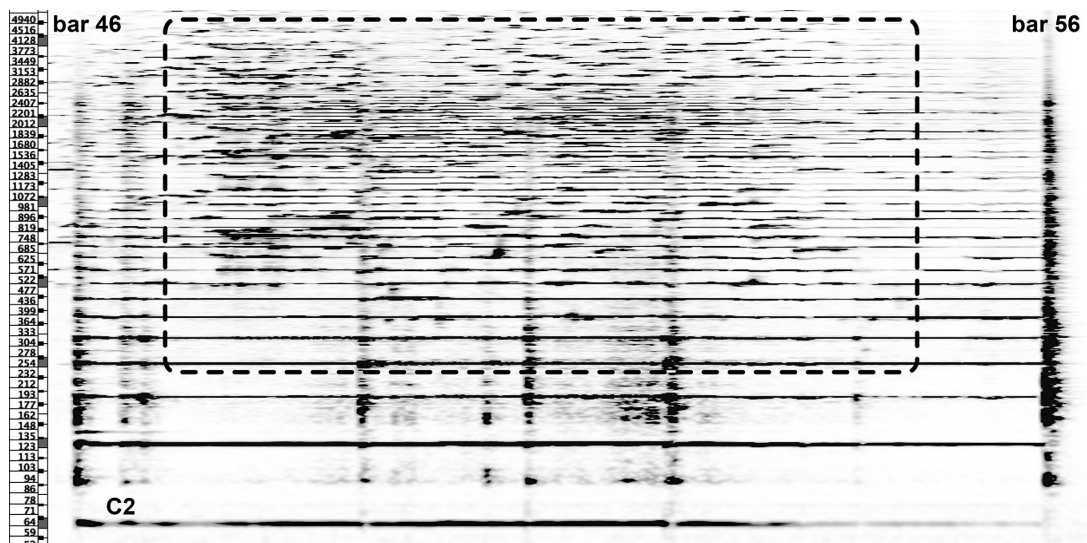


Figure A.5 Spectrogram [52 – 5000Hz / 03'38" – 04'26" / bars 46 – 56] of String Quartet n°2.

- *Overview.*

The entire section is based on C chord.¹⁶¹ Haas develops a microtonal movement around natural harmonic series of C. This section is largely characterised by suspended musical episodes (E), fluctuating and rich microtonal movements (A, B), the presence of recurrent *glissandi* (C) and the construction of larger musical shapes that are combined, alternated, or superimposed (I). The interesting use of dynamic as recurring element (E) generates minor hypnotic effects (H) and contrasts (G).

[04'29" – 08'09"; bars 57 – 106]

- [04'29" – 04'44"; bars 57 – 58]

The *sforzato* of cello that closes the previous episode, marks a dynamic and timbral contrast of the musical development. The following section (bar 57) works as a second resolution: a very soft restart (*ppp*) is immediately shattered by the cello intervention. When globally considered this sonic contrast between sound and silence, harmonic and inharmonic, appears as a sort of opposition between sonic spaces: on the one hand a continuous texture of harmonic sound (from 03'44") on the other hand a

¹⁶¹ Interesting parallels could be found with the begin of Haas' *...for viola and 6 voices* (2006, available online at (Haas 2017)), where the progressive construction of the chord starts with the viola intervention and bass and baritone voices.

discrete and empty situation (Figure A.6).

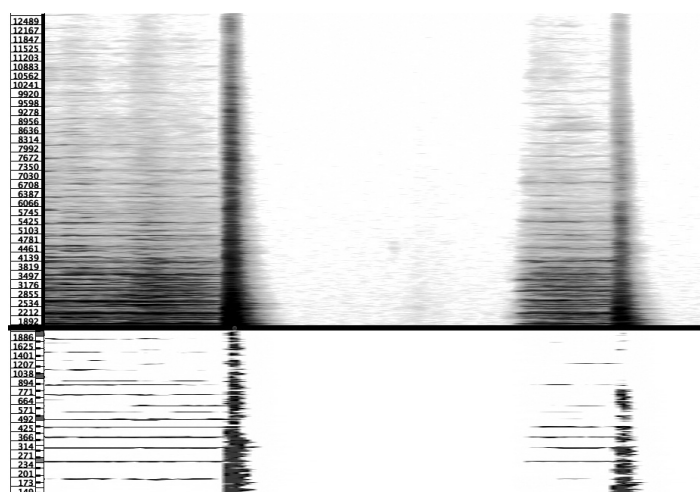


Figure A.6 Spectrogram [bottom: 149 – 1890 Hz; top: 1.9 – 12.5 kHz / 04'19" – 04'42" / bars 54 – 58] of String Quartet n°2.

This contrast does not only occur in musical opposition of dynamic and timbre but also in a sort of semantic opposition: the ecstatic and intangible atmosphere clashes with a kind of *material* gesture made of scrapes of horsehair, strings and wood.

- [04'45" – 08'09"; bars 58 – 106]

A sharp attack (*ff*, *vl-I*(A6 – B♭5); *vl-II*(Eb6 – E5); *vla*(D5 – A4)) opens an episode composed with repeated descending *glissandi*. The global structure is constructed with two pairs of *glissandi* divided by a semitone: the asynchronous design generates a series of interferences (Table A.4). This episode maintains this sequential organisation in which each unit (*i.e.* bar 59 (04'46"), 67 (05'22"), 70 (05'37"), 77 (06'06"), and 83 (06'38")) starts with a loud intervention (single notes or chords, *ff*) at high pitches and continues by successions of sustained tones (steady or descending, *p*, *pp*) that gradually fades out. Each unit progressively becomes more rich in terms of spectral density or dynamic contrast.

Table A.4. Examples of harmonic structures in bars 62 – 64 and 69 – 70.

	Bars 62 – 64				Bars 69 – 70	
Violin I	(D6)	A5 → D5 → B♭4	(D♯5) → A4 → D♯4		C7	Ab6
Violin II	(Eb5)	G♯5 → C♯5 → A4	(D5) → G♯4 → D4		C6	A5
Viola	(B5) → F5	F♯5 → (D5)	(C5) → B4 →		C7	Eb6
Cello	(B♭5) → E5	F5 → D5	(B4) → B♭4 →		G6	D6

The key aspect of this episode is the morphological dynamisms: the loud attack of each unit creates a massive effect of sound that contrasts with the successive sound that is very soft made of subtle microtonal movements of single notes.

The succession of these units culminates with the long section from bars 86 and 101 that is a global descending movement constituted by interlaced glissandi (06'45'' – 07'35''). For each glissando, Haas has indicated the starting and the ending note and the middle note that should be the dynamic peak (and varies along the entire movement from *mp* until *ff*). The four instruments design reiterated descending patterns that are mutually correlated (Figure A.7).

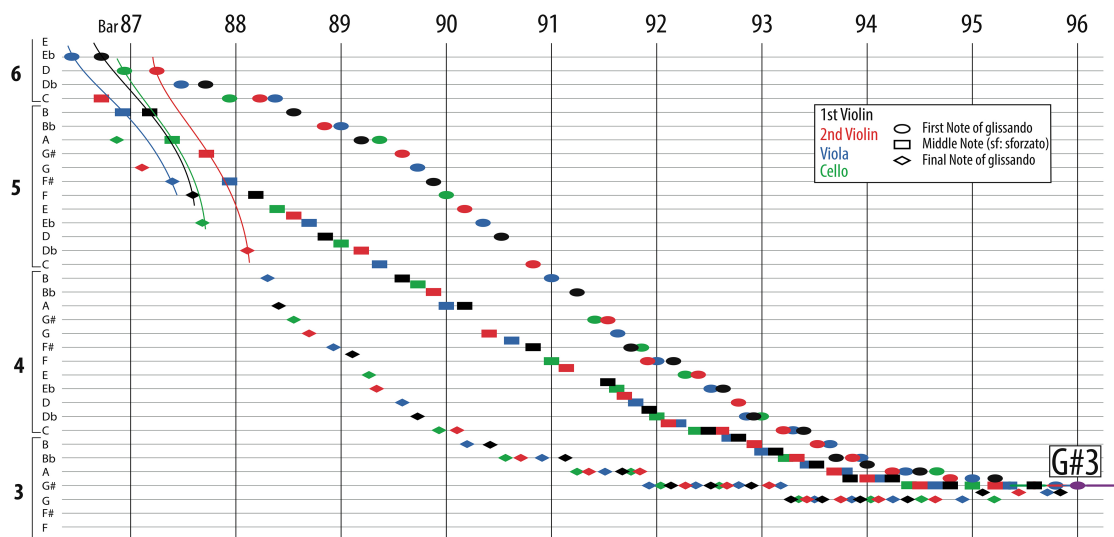


Figure A.7 Pitch-based representation of interlaced glissandi of bars 87 – 96.

Figure A.7 displays first, middle and ending notes of each glissando for the four

instruments. In terms of pitch construction, starting and ending notes of each glissando move down stepwise following a chromatic descending succession (except at the end of episode, from bar 94), while middle notes design a more gradual slope including quarter of tones. The central part of the episode has larger *glissandi* while at the begin and at the end *glissandi*'s compass is smaller: there is a movement that progressively accelerates its descent and at the end reduces its speed. However, the acceleration of the succession of *glissandi* generates an obsessive repetition: the simultaneous restriction of pitch range and the increase of rate of repetition of each cluster lead to a more complex dynamic effect. Moreover, even when the descending movement is very pronounced, it is simultaneously sustained from the interlaced structure: every time a glissando descends a new note of another instrument appears at the high pitch; the sonic result is of a descending movement that continuously regenerates itself.¹⁶²

All instruments reach G#3 at the end of the episode and the closure of this descending motion (*i.e.* bars 94 – 96) is composed to create the sense of a descent that arrives at a sort of bottom level from which it seems not possible to go down. The sonic movement, though, appears more as a landing on a ground level than as a fall in a chasm: G#3 is gradually introduced from bar 92, as the ending notes of the descending movement, and then progressively reaffirmed within a sequence that unfolds more in a *horizontal* sense, with sustained microtonal fluctuations that shrink themselves progressively (ranging from G3 to B3 in bar 94, from G#3 to A#3 in bar 95, until sixth of tones and minor modulations in bar 96), than in *vertical* sense as it were for the central part (bars 89 – 91).

The end of the episode consists of sustained notes around G#3 which form a static microtonal drone with dynamic fluctuations. Music appears suspended out-of-time and this part works as temporal pause after the previous animated section.

- *Overview*

The primal musical elements developed in this episode are: the repetition of

¹⁶² A similar practice is implemented by Haas in *in vain*. In that case the construction is more complex since it involves twenty four instruments and lasts for several minutes.

specific musical units (E). This repetition could be simple (*e.g.* made of single *glissandi*) or complex (*e.g.* in the form of loud notes followed by sustained sounds). The arrangement of contrasting elements (of timbre, dynamic, and sonic profile; G), the reiteration of *glissandi* (C) and their use within larger construction (I).

In particular, the entire closing episode, from bar 84 to bar 98 (06'37" – 07'42"), show how Haas is successful in: (i) modifying the geometry of sonic contour, from horizontal (bar 94) to vertical and to horizontal again; in (ii) creating hypnotic movements that regenerate themselves (H); (iii) interlacing the sound of the four instruments in order to create a unified sound that cannot not be perceived anymore as the result of four *voices*.

[08'10" – 14'15"; bars 106 – 196]

- [08'10" – 09'50"; bars 106 – 130]

In this new episode, the sonic stream (centred in G#3) coming from the previous section is developed horizontally. A continuous drone composed of microtonal and dynamic modulations passes from G#3 (08'20" – 08'23"; bar 108 – 109) to B3 (08'24" – 08'56"; bars 110 – 117) and A4 (09'04" – 09'50"; bars 118 – 129) through glissando transitions (Figure A.8).

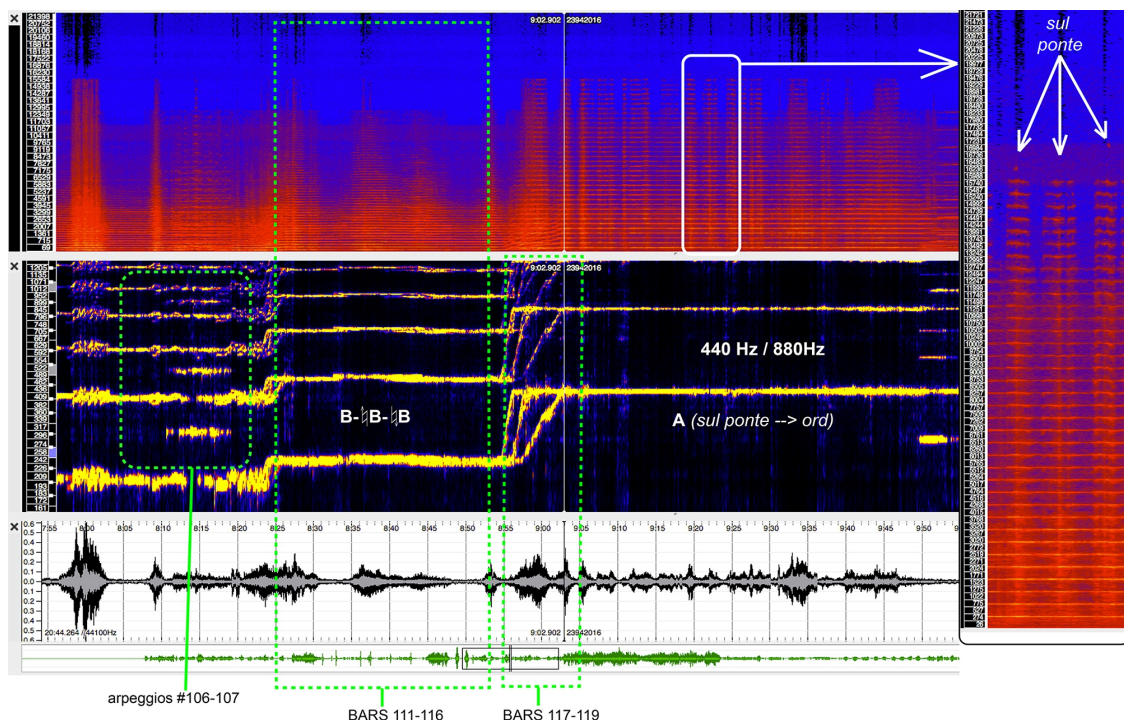


Figure A.8 Multilayer representation [spectrograms bottom: 100 – 1200Hz; top: 0.1 – 21 kHz and waveform / 07'56" – 09'53" / bars 106 – 130] of String Quartet n°2. Right inset shows overtones generated by notes played *sul ponte*.

These sonic textures are characterised by a very rich nature: Haas uses a fine microtonal writing, with *bichords* and he moves the same notes along the strings of each instruments, alternating dynamics and *vibrato*, and exploiting timbric nuances of *sul ponte* and *sulla tastiera* techniques (bars 120 – 129). This process, in particular, allows the expansion of spectral region (Figure A.8, right inset): while the fundamental note remains stable, the dynamism of the music resides in this extension of sound spectrum. Music vibrates and resonates and higher overtones appears and disappears.

- [09'51" – 14'15"; bars 130 – 196]

Musical stream becomes more articulated with the superimposition of several lines within a tight sonic cluster: in the first part of the episode Haas places the four instrumental lines within a range of semitone (Figure A.9).

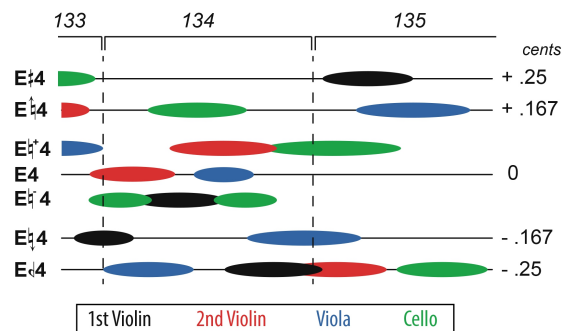


Figure A.9 Scheme of microtonal construction in bars 133 – 135 (10'00" – 10'18").

The global result is a continuous sonic stream where the attacks follow one another creating a sort of polyrhythm. This pulsated progression is characterised by the persistent repetition of chords (*ostinato*) and the dynamic *crescendo* that generate a dramatic tension. The four instruments swap the lines and dynamic accents and the final result is of a unique sustained sound that splits itself in multiple lines that converge and interfere one another. The drone is in fact created by a movement around B♭ – D♭ (bar 147), B♭ – C (150), C♭ – C – C♯ (154), C – F♯ (156). Starting from bar 158 a sequential series of *glissandi* is arranged to design precise *steps* between groups of notes: each *glissando* starts from definite series of notes in a range of semitone (e.g. from B♯3 to C♯3) to reach a new level defined by another group of notes (e.g. from F♯4 to G♯4) and it is reiterated between these two levels. The perceptual result is of recurrent sliding movement between two frequencies that is embedded in a drone constituted by these two sounds (Figure A.10).

At the end of last glissando series (*i.e.* 3rd set, Figure A.10) the drone shrinks itself reducing dissonances and reaches a plateau (~13'00", bar 177). At this point, music accelerates and the attacks start to be rhythmic a more pronounced. Music gradually changes: from a floating and dissonant sonic texture (10'20", bar 138) it arrives to a rhythmic and inexorable sequence of chords (13'08", bar 180; E4/B4 chord modulated with E♯4/B♯4). From bar 188, (metronome is set back to the original time, 60 bpm) the intensity of sound continue to increase: the rhythm generated by the sequence of chords is enriched with noisy interventions of cello and the dynamic tension reaches its highest grade. In the final part of the section (13'51" – 14'07", bars 193 – 195), the

musical lines become sharper and all instruments converge to the chord centred in B4/C5.

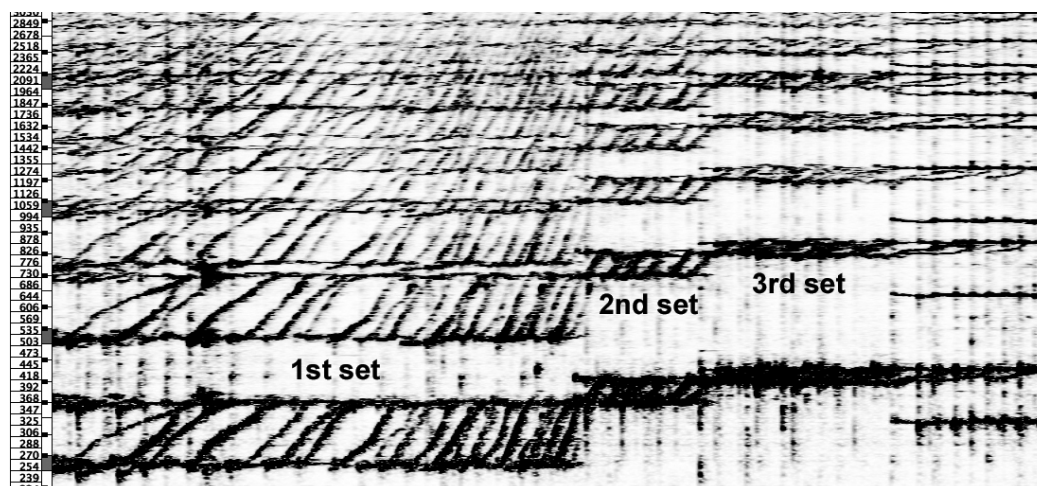


Figure A.10 Spectrogram [200 – 3000 kHz / 11'55'' – 13'11'' / bars 158 – 175] of String Quartet n°2.

- *Overview*

When globally considered, this section displays a horizontal profile with continuous sounds (E) and layered and interweaved structures (A). There is an extensive use of microtonality (B) together with the dynamic contrasts. Through a detailed construction of interventions where instruments are interlaced to form a tight combination of different timbres, Haas expands and reduces sonic space using frequency-based interactions (11'30''). Sometimes these practices generate static episodes in which sound is perceived *vertically* (cf. Kramer) out of chronometric time in a sort of “ecstatic perception”: both eternal and transient. Other times, the sound throbs, shifts (through glissandi, C) and develops itself creating vivid and tense atmospheres. Also rhythmic and reiterated forms (D, E) are present together with a marked intensity in attacks, gestures and dynamics.

[14'16'' – 20'24''; bars 197 – end]

- [14'16'' – 15'21''; bars 197 – 212]

This episode, when globally considered, appears almost static and periodic but

the internal structure is made of a complex arrangements of *arpeggi* and fine details of time and dynamics. Violins start with A♭ major *arpeggi* while viola and cello repeat chords and define varied rhythmic and dynamic shapes. Progressively (bars 200 and 202) all instruments converge to an interlaced texture that continuously moves across several harmonic fields (A♭ major, E major, G minor, F♯ minor). Occasionally viola and cello play notes with the *ricochet* bowing technique (*i.e.* also known as *jeté*) that enriches the timbric diversity. Haas' composition of this episode is so profoundly interlaced that the four instrument form a unique dense discourse made of a micro-detailed design. From bar 211, the sound slides towards a very simple sustained chord (A♭6/D6/A♭5/D5) that initiates the new episode.

- [15'22" – 17'08"; bars 213 – 227]

This episode has a horizontal development, all instruments play continuous single notes or simple chords and they originate a layered mass of sound, moving from one note to another through parallel (but not synchronous) *glissandi*. Table A.5 and Figure A.11 exemplify the successions of these static figures.¹⁶³

Table A.5. Sequence of harmonic clusters in bars 215 – 227.

bar	215	217	219	221	223	225	227
Violin I	A♯5	G♭5	A5	G5	G♯5	E♯6	A6
Violin II	D♭5	B♭4	C♯+5	B♯+4	C♭5	A♭5	F6
Viola	B3	G♯3	B♭3	A♭3	A3	F♯4	A5
Cello	E2	C♯2	E♭2	D♭2	D2	B2	F5

¹⁶³ This practice together with similar uses in bars 106 – 129 and 158 – 175 (Figures A.8 and A.10 respectively) might be comparable with Pan Sonic's use of sustained electronic drones in *Keskeisvoima* from 03'50" to 04'30" (Figure A.25). They use, in fact, rich electronic sound to generate multiple tones that progress through glissandi.

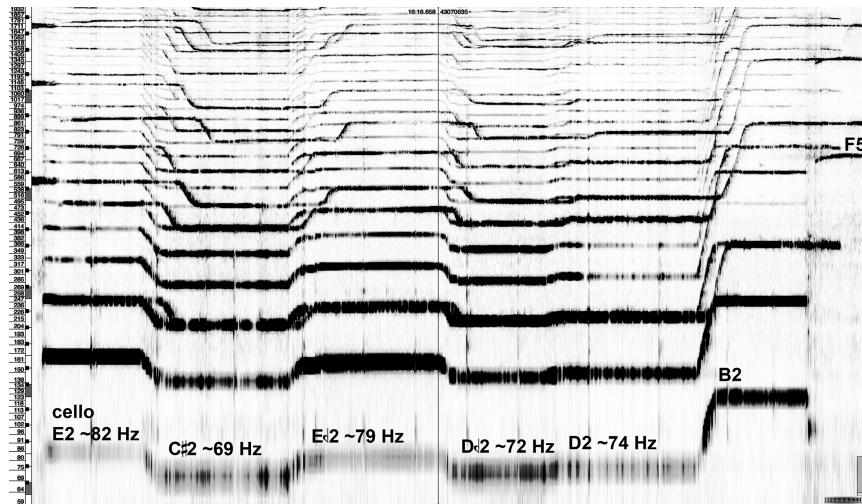


Figure A.11 Spectrogram [59 – 2000 Hz / 15'27'' – 17'08'' / bars 215 – 227] of String Quartet n°2.

- [17'09'' – 19'16''; bars 228 – 245]

The new episodes has a similar conception of the previous one. It develops along a horizontal extent and the sounds evolve through continuous movements. Here the dynamic marks a sequence of distinct musical scenes each one characterised by specific harmonic construction (Table A.6) The simplicity of these construction is only apparent: in this episode the sound is perceived as if it were under a sort of microscope or hand lens. The dynamic motif (*i.e.* $pp < f > pp$) generates multiple overtones and is cause of an expansion and reduction of sonic spectrum (Figure A.12).

Table A.6. Sequence of harmonic clusters in bars 230 – 244.

Bar / Instruments	230	232	234	236	238	240	242	244
Violin I	C7	D7	B6	A6	E $\flat$ 7	D6	F6	C#6
Violin II	E $\flat$ 6	G6/D6	G#6	E6	G6	A5	B5	F#5
Viola	C6	-	B5	A5	B $\flat$ 5	D5	F5	C#5
Cello	E $\flat$ 5	G5	G#5	E5	E $\flat$ 5	A4	B4	F#4

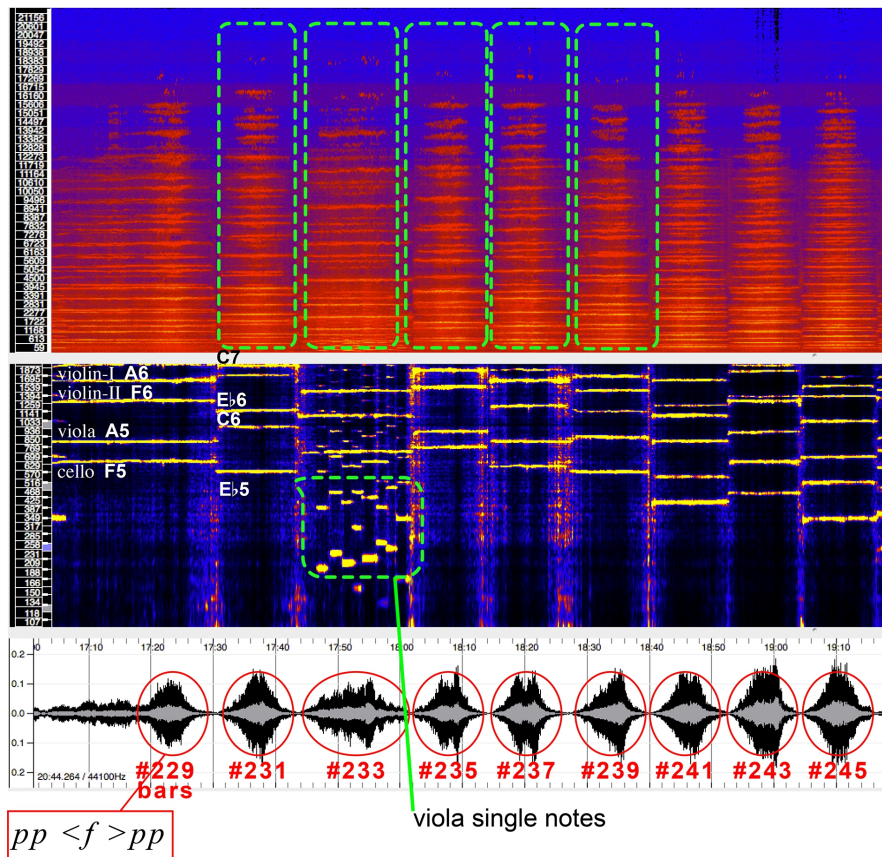


Figure A.12 Multilayer representation [spectrograms top: 59 – 20 kHz; medium: 100 – 1900 Hz; bottom: waveform / 17'00" – 19'20" / bars 228 – 245] of String Quartet n°2.

- [19'17" – 20'24"; bars 246 – end]

The closing episode that works as a sort of *coda*, transforms the stasis of the previous episode in a more animated and indefinite scene. Chords becomes more dissonant and complex: cello develops a microtonal phrase while violins and viola play sustained notes (*i.e.* F♯6/G5; B♭5; C3). The end of the piece remains open and unresolved: the four instruments play continuous notes and the sound moves to higher pitches with sequential *glissandi* when simultaneously fades out.

- *Overview*

The absence of noisy and inharmonic sounds makes this episode more uniform and continuous. Sound in this case moves within a limited sonic space. The atmosphere is suspended: the music appears to simplify the construction (after the first part) and sound appears perceptually more profound and subtle. Haas constructs continuous lines

(E) that evolve with glissandi (C, 15'22 – 17'08'') and reiterated clusters (E, from 17'09'' to 19'16'', for instance, these repeated figures consists of dynamic modules). The end of the quartet is a motion without destination, sound becomes more fragile and even if it fades out, it seems to endure after the conclusion remaining in midair.

in vain [2000]

SCORE: Universal Edition – Original copy © Copyright 2000 by Universal Edition A.G., Wien/UE 31198.

AUDIO [63'11'']: Haas, G. F. 2003. *Haas – Klangforum Wien, S. Cambreling – In Vain*. Austria: Kairos, 0012332KAI-CD.

NOTE: Similarly to the String Quartet n°2, *in vain* score is in accord with the Helmholtz-Ellis microtonal notation extended to quarter and sixth tone. However, Haas makes use of additional details to clarify the fine opposition between equal temperament and just intonation.

Haas has composed *in vain* as a reaction to 1999 political events: the rise of the far-right Freedom Party of Austria (FPÖ) in the 1999 elections. *In vain* is a piece for 24 instruments (2 flutes, oboe, 2 clarinets, soprano saxophone, bassoon, 2 horns, 2 trombones, 2 percussionists, harp, piano, accordion, 3 violins, 2 violas, 2 cellos, double bass) which includes precise indications of light/dark lighting changes during performance.

• *GENERAL SCHEME*

Sections	Attributes (<i>ordered from the most fitting</i>)
00'00'' – 02'08''	F, H, C // A, E, G
02'09'' – 05'22''	F, H, E, C, B // A, G
05'23'' – 11'00''	H, I, A, B // E, G, C
11'01'' – 24'19''	E, H, B, A // F, C, G

24'20" – 31'02"	B, F, E, H, G // C, A, D
31'03" – 35'31"	F, D, H // A, C, E
35'32" – 44'17"	B, F, A, D, E // G, H
44'18" – 54'12"	A, E, F, I, H, G // B, D
54'12" – end	F, D, H // A, B, E, C

- [00'00" – 02'08"; bars 1 – 29]

A G4 played by a percussionist (*i.e.* crotales, Figure A.13, letter “a”) set in motion a cyclical descending movement of marimba, piano, accordion and strings. The descending lines (“b”) are weaved together in a dense sequence (the initial notes are G#6 / D6 / G5 / C#5 / G4 / C#4 / F#3 / C3) and the fast repetition of these series of notes generate a sort of sustained and oscillating effect of suspended tritones (Figure A.13, horizontal arrow labelled as “c”).

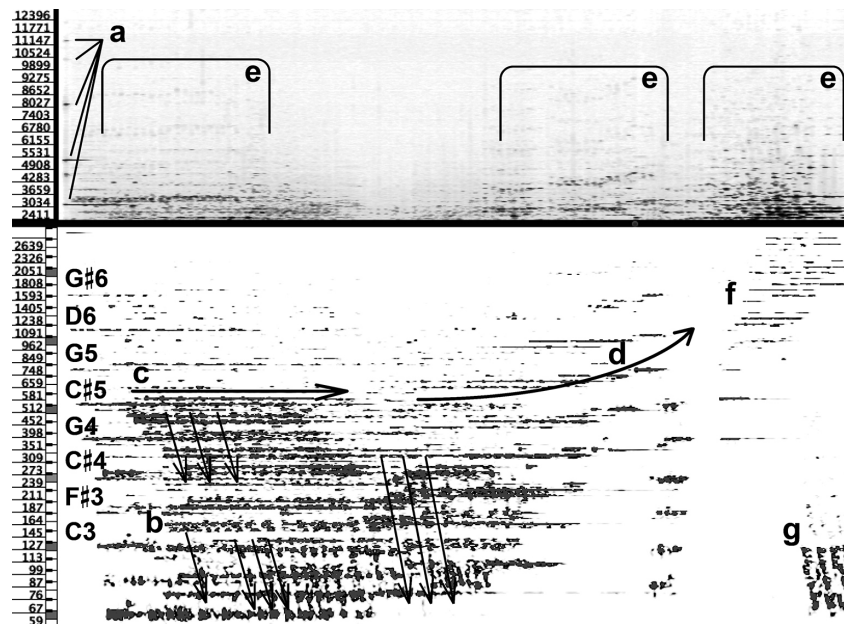


Figure A.13 Spectrograms [top: 2.5 – 13 kHz, bottom: 57 – 3000 Hz / 00'00" – 01'14", bars 1 – 16] of in vain.

When the lines converge to low pitches merging together into an indistinct mass of sound the new ascending line of percussions (*i.e.* marimba, vibraphone) and piano enlarge again the spectral space (Figure A.13, spectral regions labelled as “d”, “e” and “f”). From bars 13 to 16, there is an alternation between bass notes of strings (*i.e.* cellos and double bass) and high-pitched percussions and piano defines two distinct spectral regions which follow one another in a sort of suspended atmosphere. After 01’14” (bar 16) the descending movement starts again this time distributed in a larger spectral range.

This cyclical progression continuously changes its timbre passing from percussions and piano to strings and *vice-versa*. From bars 24 (*i.e.* 01’41”) percussions, piano and accordion first disappear leaving the fragile sound of strings then the entire ensemble emerges with a rapid *crescendo* that culminates at bar 29 (02’07”) with a very loud interjection (*i.e. ff*) of the wind instruments (*e.g.* horns, trombones, clarinets...) which inaugurates a new cycle. As Figure A.14 shows this event is a real dynamic surprise: the entire episode (from the begin until 02’07”) moves around the *pp* and *ppp* dynamic and this *crescendo* appears as an authentic explosion (Figure A.14, letter “(a)”).¹⁶⁴

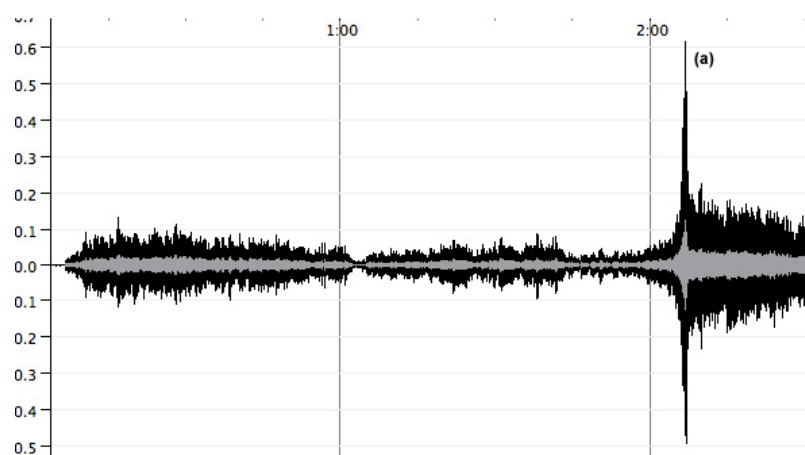


Figure A.14 Sonogram [bars 1 – 32 / 00’00” – 02’31”] of *in vain*.

- [02’09” – 05’22”; bars 29 – 76]

The new episode is an elaborate version of the previous one. In this case there is

¹⁶⁴ An interesting parallel might be found in Xenakis’ *Eonta* (bar 48) where a continuous and rapid phrase played by the piano is covered by a *crescendo* of trumpets and trombones.

a combination of two musical events: on the one hand, the recurring movement consists of an almost chromatic series of descending notes (Figure A.15, green arrows). This repeated shape creates a smooth and compacted combination of sounds that has a large overlapping and gives the impression of being a continuous drone in motion. On the other hand, the presence of sustained notes (*e.g.* violin, viola, bassoon, horns, trombones from bar 49 onward. Figure A.15, horizontal lines in correspondence of letter “b”) designing dynamic variations supports the first figure (*i.e.* descending notes) forming a compacted mass of sound.

The spectral visualization allow to reveal the meticulous construction of Haas which leads to a monumental global effect (Figure A.15): starting from the dynamic climax at bar 22 (“a”) the *micro*-repetition descending elements holds a *macro* ascending design (orange dashed arrow). This motif begins at low frequencies (~60 Hz) and slowly moves up until *ca.* 3.5 kHz while a new one starts. This arrangement creates a never ending effect similar to acoustic illusions, such as the Shepard glissando (Hasegawa 2015). At the same time sustained notes of wind and string instruments form a continuous drone which fluctuates dynamically.

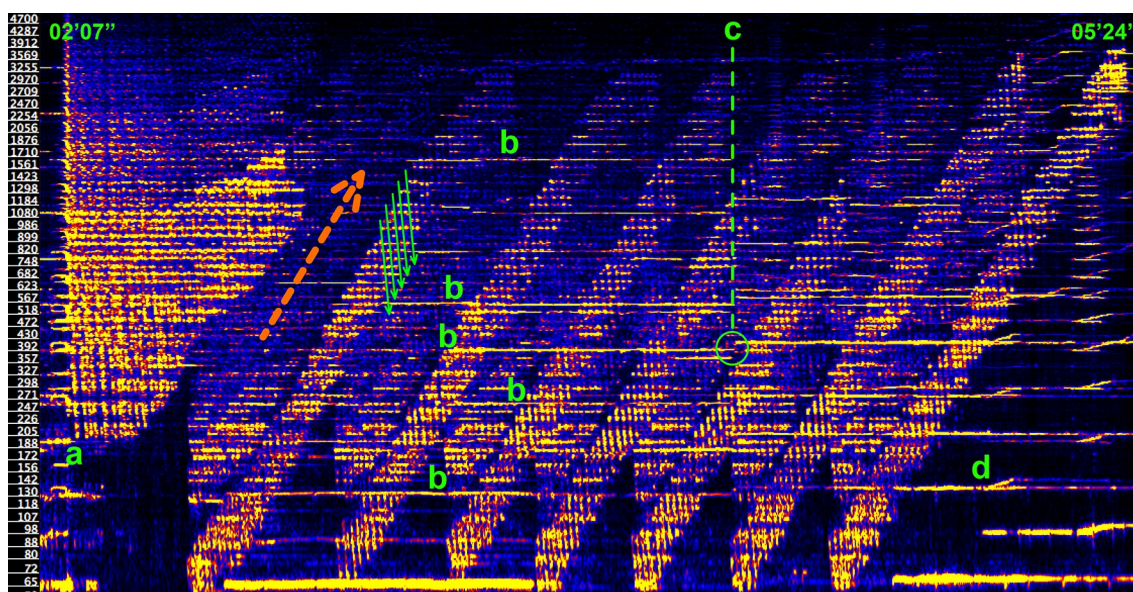


Figure A.15 Spectrograms [60 – 5000 Hz / 02'03'' – 05'22'' / bars 28 – 75] of *in vain*.

At bar 58 (Figure A.15, vertical dashed line labelled as “c”) a modulation of wind instruments demarcates a turning point within the sonic flow: horns and

trombones pass from C/F# to higher semitone C#/G (keeping the tritone relation) and in a similar way bassoon and tenor saxophone move from C# and G to D and G# respectively.

At the end of the episode, the fading out of the recurrent motif leaves an ecstatic series of sustained sounds. During the last repetition, the cello initiates a sequence of microtonal modulations (*i.e.* 04'59'', bars 69 – 70, C#3 *glissando* to C#[♯]3 and then to D3. Figure A.15, letter “d”): it is the begin of the reduction of lighting. From 05'22'' (bar 76), the music progressively dilates towards a suspended musical episode (this corresponds to the first extinguishing of the lights) and the episode comes to the end.

- [05'23'' – 11'00''; bar 76]

The episode that starts at measure 76 is the section performed in the dark: Haas specifies that the communication between musicians would occurs based on the sonic guidance (*i.e.* “*klanglichen Situation*”, original in the score). The 4/4 metronome is suspended and Haas provides just general temporal indications. The general idea of this episode consists of a series of sustained notes played sequentially. Haas focuses his attention on the contrast between wind instruments which play steady note within the equal temperament scale without any type of glissando or modulation and the strings which play microtonal *glissandi* within a semitonal range. This opposition regularly appears at the beginning (Table A.7) and later in the episode the arrangement becomes more complex.

Table A.7. Opposition between wind instruments and strings in bar 76 of *in vain*.

<i>time</i>	Wind instruments	Strings
~ 05'40''	Trombone C#2	Double bass C#3 → C# [♯] 3 → D3
~ 05'52''	Horn D4	Viola D4 → D [♯] 4 → Eb4
~ 06'02''	Trombone G#2	Cello G#2 → G# [♯] 2 → A2
~ 06'16''	Oboe A5	Violin A5 → A [♯] 5 → Ab5

For instance, in the third page of bar 76 (07'15'') there is a very fine combination of tones (Figure A.16). The viola moves up with a *glissando* from Eb4 to E4 with a dynamic peak (*mf*) at Eb4 (Figure A.16, letter “a”), then the intervention of percussion (*i.e.* bell plates and tam–tam, letter “b”) expands spectral density and simultaneously the double bass ascends from Eb3 to E3 (“c”). The viola descends again to Eb4 and here a double combination occurs: the first horn plays a steady Eb3 (letter “d”) generating a semitonal contrast with the double bass (*i.e.* E3 *vs.* Eb3) and reinforcing the Eb of the viola: horn’s first partial, Eb4, sustains the note of viola (letter “d’” and green circle).

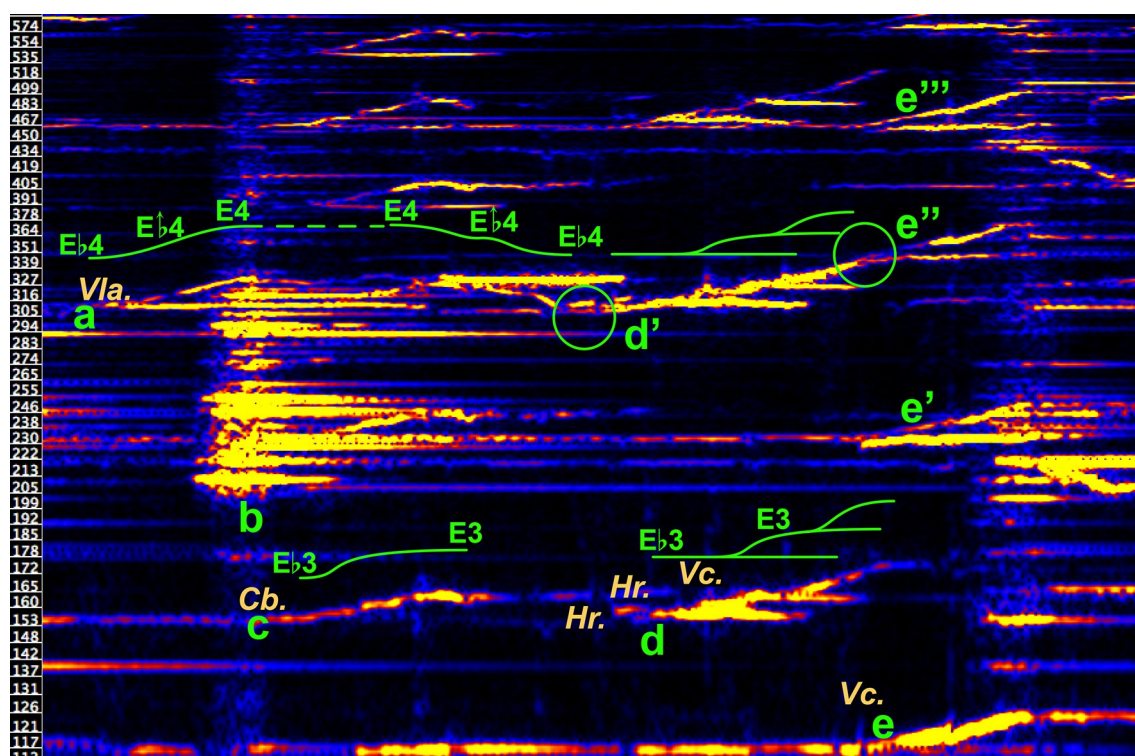


Figure A.16 Spectrogram [113 – 580 Hz / 07'12'' – 08'04''] of *in vain*.

Then the second horn lies on top of the first horn playing a semitone higher, E3, supporting the same note of double bass. Simultaneously with the horns, the first cello designs a glissando between Eb3 and E3 (and then to F3) and the final sonic effect is depicted by the ascending profile in Figure A.16. The episode continues with a glissando of the second cello (Figure A.16, letter “e”) which passes from Bb2 to B2. The

second partial of this line (*i.e.* F4 → F[♯]4, letter “e”) merges with the sonic line of the first partial of the first cello (letter “ e” ” and green round area). Haas continues to challenge the listener with the contrasts between temperament and microtonal frictions and he exploits timbric characteristics of single instruments to merge different sonic profiles and create continuous lines of sound (Figure A.16, the circular areas are the connecting points between different instruments).

At 08’07”, the sound of crotales detaches itself from the dense drone and demarcates a separated spectral extent: Haas composes *plastically* an ecstatic section incorporating isolated sound elements (*e.g.* also at 08’31” and with piano at 08’42”).

Around 09’00”, a static drone generates an immobile atmosphere where the harp suddenly emerges. The harp is specifically tuned to the harmonic series of C1 and Haas’ provides fine details to the performer: he includes in the score the double staff for notated and real notes (see also Chapter II, Figure II.4). It is a crucial moment and the harp’s appearance clashes with the rest, it is sounding drastically out of tune (since it plays a variety of natural harmonics) and the effect is like a sort of alien (or ancient) sound with a different gravity. In order to reinforce this effect, Haas places in the background a very soft drone which seems to mimic a sort of electronic noise.

- [11’01” – 24’19”; bars 77 – 239]

From a silent pause, emerges a soft sound of strings that is subtle and sharp and initiates a new episode. This part is characterised by a sequence of sustained chords separated by short pauses of silence. They are composed with the microtonal superimposition of long notes and the sound passes smoothly from strings to wind instruments (*e.g.* Figure A.17, area labelled as “a”) creating a collection of sounds coming both from natural harmonic series and the equal temperament scale. Haas uses the delicate contrasts between steady notes and glissandi (*e.g.* 19’33” – 19’44” and 22’34” – 22’57”, Figure A.17, areas marked with letter “b”), continuous and discrete sounds, slow fading in and precise attacks. He applies different dynamics and techniques (*e.g.* playing *sul ponticello* and *sforzato*, Figure A.17, “c” and “d” respectively) to enlarge or reduce the harmonic spectrum and he emphasizes the

evolution articulating full-orchestral chords, solo instruments and silent interludes.¹⁶⁵

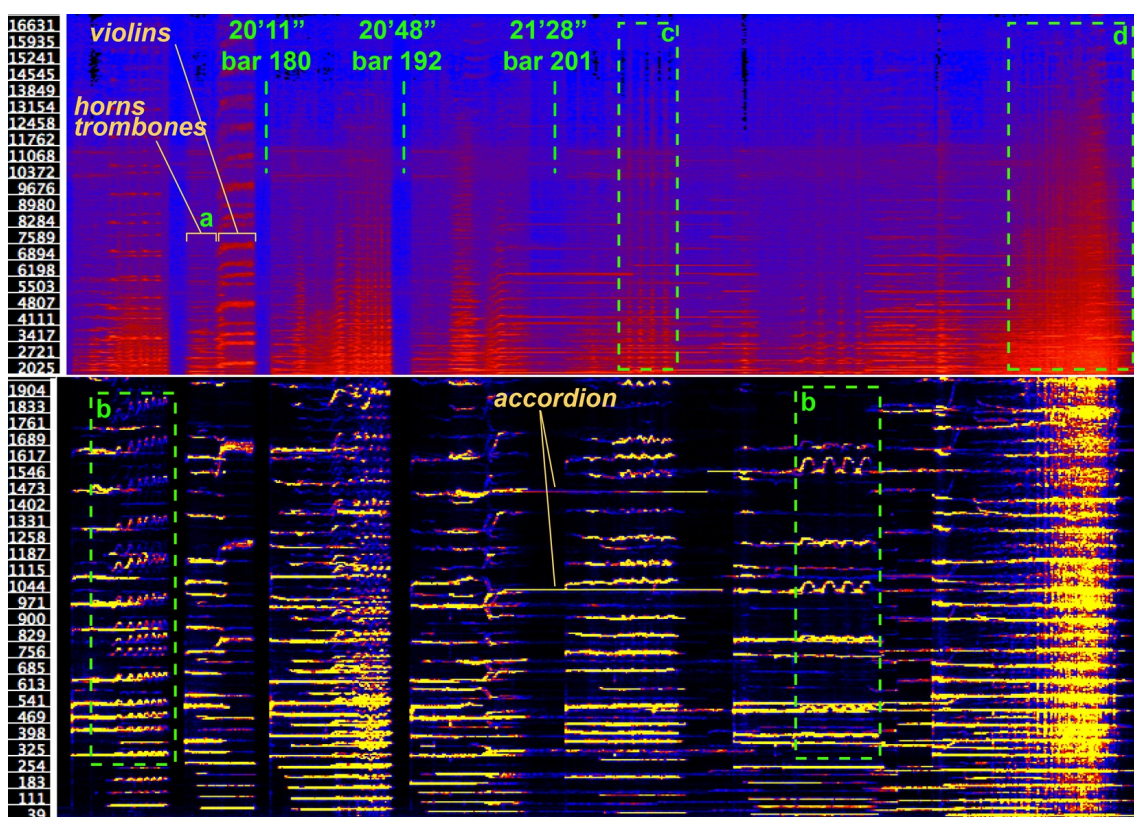


Figure A.17 Spectrograms [top: 2 – 17 kHz; bottom 40 – 2000 Hz / 19'15'' – 24'16''] of in vain.

- [24'20'' – 31'02''; bars 240 – 343]

At the begin of the new episode the construction of harmonic clusters is progressive and each cluster is based on a different fundamental note, in the way that the B chord appears at 24'20''; A chord at 24'48''; G chord at 25'15''; F# chord, 26'01''; Eb chord, 28'08''; Db chord, 28'41''; C chord, 28'54'' and again B chord at

¹⁶⁵ Several harmonic clusters created by Haas has interesting parallels in Pan Sonic music. For instance the chord at 20'11'' – 20'48'' is composed by a tight layering of sounds. Its attack recalls a square electronic pulse. The repeated microtonal *glissando*, from 20'36'', may bring to mind an electronic detuning. On the other hand, the high-pitched and continuous sound of accordion (*i.e.* 21'25'' – 21'33'' and 22'07'' – 22'18'') is similar to an electronic sound over which a dense cluster emerges (*i.e.* 21'33'' – 22'05'', bar 202). The latter created by the combination of horns and trombones which play the 14th, 11th, 10th and 6th natural harmonics of Eb (*i.e.* D $\flat$ 5, A $\sharp$ 4, G $\sharp$ 4, B $\flat$ 3) generates a closed-packed mass of sound that starts to fluctuate when a dynamic cycle is performed (*pp* < *mf* > *pp*, Figure A.17, area "c"). Moreover the last cluster of the episode is an extended chord based on C and the succession of *sforzato* notes recalls similar episodes of the *String Quartet n°2*.

29'03".

Each instrument adds a new note of the natural harmonic series of a fundamental in a sort of sequential order: for B chord, for instance, a cluster of horns and trombones starts with 10th, 7th, 6th and 4th natural harmonic series of B (*i.e.* E $\sharp$ 5, A $\flat$ 4, F $\sharp$ 4 and B $\flat$ 3) then they delineate a descending line from the tenth partial of B towards the fifth while clarinets, oboe and flutes enlarge towards the harmonics 11th 13th, 19th and 25th.

The G chord includes percussive and rhythmic interventions and develops a complex drone from 26'43" where accordion, horns and strings consolidate a dense sonic material that slowly ascends in dynamic and pitch. Each group of sounds is gradually more articulated with the use of dynamic contrasts, repetitive and percussive motifs. The chords of horns and trombones at 29'52" and 30'04" (*i.e.* bars 325 and 328, Figure A.18, areas "a" and "b", respectively) are composed of natural harmonics coming from two different fundamentals: 10th and 9th of A and 9th and 8th of B for the chord at 29'52" and 12th and 11th harmonic of G and 11th and 10th of A for the chord at 30'04". These notes occupy a very small frequency range and this aspect makes these chords sounding extremely compacted (Figure A.18).

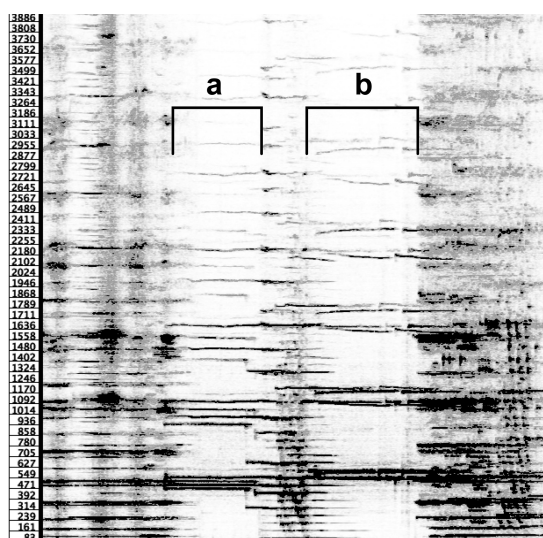


Figure A.18 Spectrogram [400 – 3600 Hz / 29'41" – 30'20"] of *in vain*.

Marimba, vibraphone, piano and accordion show signs of the initial descending line, playing descending sequence of notes (*i.e.* G $\flat$ 6 / C $\sharp$ 6 / G5 / C5 / F $\sharp$ 4 / C4 / F $\sharp$ 3 /

B2) that are interrupted by a full orchestral G chord (30'38'') and a suspended drone (*ff*) made of the natural harmonics of G and the F# (30'43'' – 31'01''). This cluster of note is impressively dense since every instrument plays *sforzato* of the same notes (*i.e.* 12th, 13th and 14th natural harmonic of G and F#) and in particular each string instrument plays a sustained chord of two notes (Table A.8).

Table A.8. Sustained notes in measure 339 of in vain.

Instrument	note	natural harmonic
1 st flute / 2 nd flute	E $\flat$ 6 / D $\sharp$ 6	14 th (F $\sharp$) / 13 th (F $\sharp$)
oboe	E $\flat$ 5	14 th (G)
1 st clarinet / 2 nd clarinet	E $\flat$ 6 / D $\flat$ 6	13 th (G) / 12 th (G)
tenor sax	D $\sharp$ 5	13 th (F $\sharp$)
bassoon	E $\flat$ 5	13 th (G)
1 st horn / 2 nd horn	E $\flat$ 5 / D $\sharp$ 5	14 th (F $\sharp$) / 13 th (F $\sharp$)
1 st trombone / 2 nd trombone	E $\flat$ 5 / D $\flat$ 5	13 th (G) / 12 th (G)
1 st and 3 rd violins / 1 st viola	[E $\flat$ 5 + D $\sharp$ 5]	[14 th (F $\sharp$) + 13 th (F $\sharp$)]
2 nd violin / 2 nd viola	[D $\flat$ 5 + E $\flat$ 5]	[12 th (G) + 13 th (G)]
1 st cello / 2 nd cello	E $\flat$ 3 / D $\flat$ 3	13 th (G) / 12 th (G)

The ecstatic atmosphere of the central part of this episode is animated in this final bars which anticipate the restart of the descending movement that characterise the first part of the piece. Haas enhances musical tension using clashing sounds within a very small microtonal range.

- [31'03'' – 35'31''; bars 344 – 413]

This episode is a never ending descending sequence that replicates the same profile of the begin of the piece. The line proceeds within an almost chromatic scale in a similar way as it occurs in the second episode (*i.e.* 02'08'' – 05'22''; bars 29 – 76). An initial loud intervention of tam–tam (Figure A.19, letter “a”) initiates a continuous descending motion that gives the illusion of an infinite movement. The spectral analysis shows clearly how this effect is created and if one observes the entire episodes, it is

possible to see how Haas uses a very meticulous construction to create a larger sonic effect.



Figure A.19 Spectrogram [40 – 5000 Hz / 31'11" – 35'21"] of in vain.

Differently from previous cases, Haas here constructs a progressive and very detailed slowing down. Interpreters play repetitive units and slow down, *rallentando*, across different time-frames (e.g. demisemiquaver for 52 bpm, semiquavers for 104 bpm...). Close to the end, some instruments start playing longer notes and sustained chords in a way that they overlap and arrive to form a unique horizontal line.

It is evident that Haas conceives a global sound as if it were a plastic substance: at the begin, he designs vertical shapes within a never ending cycle, these repetitions generate a pulsating time; then gradually *verticality* and rhythm are transformed in *linearity* and dilated temporal flows. A parallel could emerge with Grisey's *Vortex Temporum* and Wyschnegradsky's *Étude* as Robert Hasegawa reports (Hasegawa 2015) and the sound seems to be handled as it were a flexible corpus or a mouldable substance which undergoes compressions and expansions, increasing tension or relaxation.

- [35'32" – 44'17"; bars 414 – 529]

In comparison with the previous section, this episode begins with minimal interventions of single instruments. Sound is reduced to a sort of unique dimension: there is a delicate interplay between instruments which combines *glissandi*, sustained sounds and single notes. While the previous section was characterised by a unified

movement, here the development is discontinuous and the musical atmosphere is uncertain. From 37'43" (bar 441) a soft drone created by a few instruments (*i.e.* percussions, double bass and accordion) emerges; the harp plays singular descending notes which float in an indistinct sound of clarinets, marimba and strings.

At 39'34" (bar 457) a new rise emerges. A sequence of chords composed from the natural harmonic series of several fundamental notes replicates in reverse the episode at 24'20". Here the chord is formed in reverse: by the progressive layering of the constitutive notes. When each chord is formed, the sound is sustained and undergoes to dynamic fluctuations (*e.g.* 40'07" – 40'26" and 41'49" – 42'35", Figure A.20, areas "a" and "d") or fast repetitions (*e.g.* 40'50" – 41'00", 41'34" – 41'45" and 41'37", areas "b", "c" and "e").¹⁶⁶ This repetition gradually slows down (41'37", "e") until the dissolution of the rhythmic character and the simultaneous reduction of light during the performance.

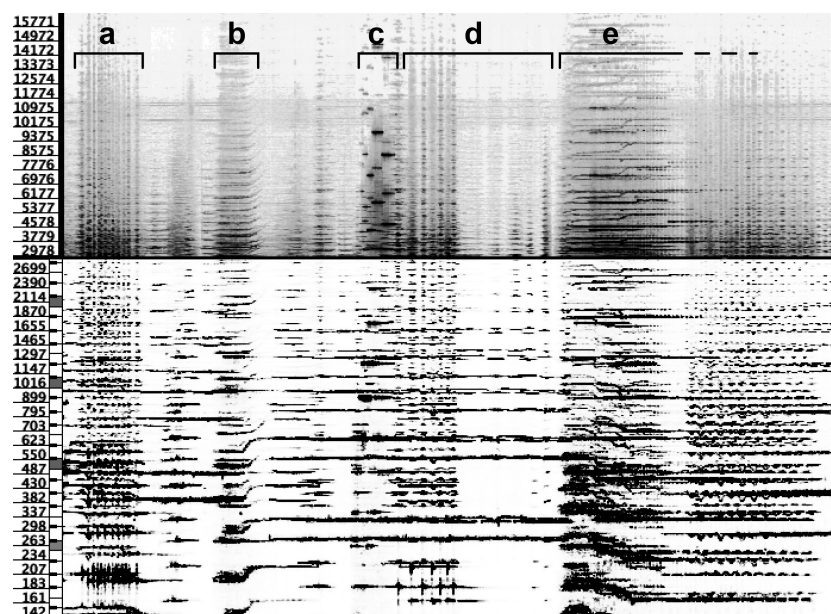


Figure A.20 Spectrograms [top: 3 – 16 kHz; bottom: 140 – 2800 Hz / 40'02" – 43'52"]
of in vain.

¹⁶⁶ The idea to *compose* the chord adding new notes corresponding to the natural harmonics of the fundamental, is a practice that Haas uses also in his *String Quartet n°2*, in particular in the section that start at 02'21", measure 29. Moreover, in this case, sound is subjected to different transformations (*e.g.* the regular repetition of elements, or the oscillation of continuous sounds): these articulations are also typical of some compositions of Lang's *DW*-series.

- [44'18" – 54'12"; bar 529]

This chapter of *in vain* corresponds to a single measure in the score and is characterised by a series of musical modules which are repeated following Haas' instructions.¹⁶⁷ At the begin the episode is characterised by continuous metallic beatings, strings and woodwind instruments. Sound evolves like a continuous stream of repeated elements which increase and decrease its intensity. From 47'30" to 48'08" (Figure A.21, section "a") strings play rhythmically chords (*ff*) moving up within a microtonal range while wind instruments maintain continuous notes (*ppp*) belongings to the natural harmonic series of C: the resulting effect is a sort of mass of sound that seems to try to tune.

From 48'18" a new harmonic cluster emerges: this time string performs sequential *glissandi* grounded on C's natural harmonics while horns and trombones plays a steady open chord of C, and irregular glissandi of harp emerge. Sound gives the impression to slowly tuning towards the natural harmonics of C and the recurrent *glissandi* gives the illusion of a permanent ascending movement (Figure A.21, "b"). At 51'45" the appearance of the glowing sound of tam-tam generates a sort of dynamic explosion ("c") and a break in the process of harmonic construction.

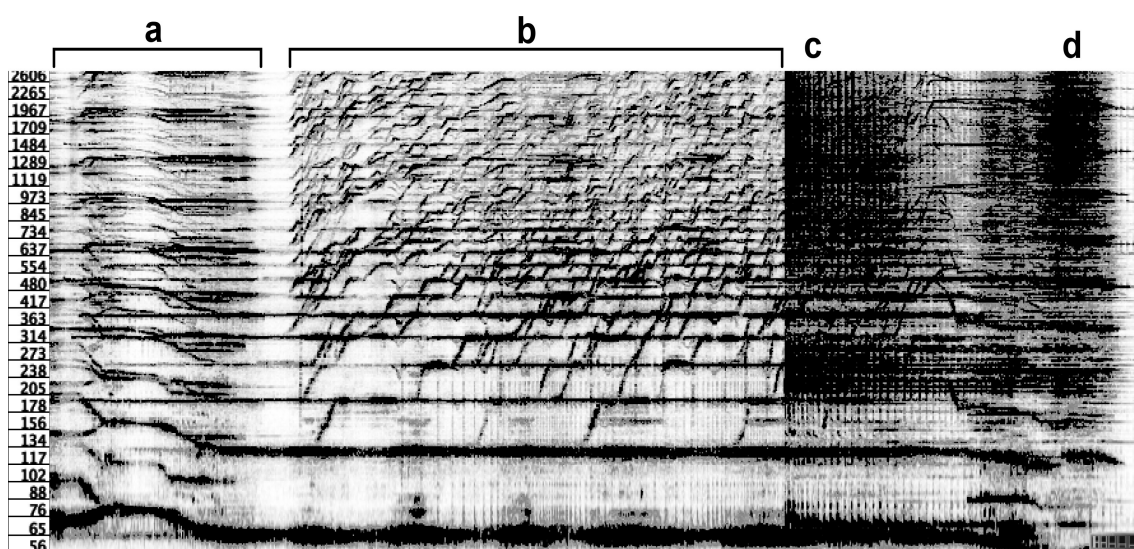


Figure A.21 Spectrogram [56 – 2700 Hz; / 47'24" – 54'08"] of *in vain*.

¹⁶⁷ This organization is also due to the fact that the episode should be played in complete darkness.

Music develops as a unique body of sound: the tam–tam is absorbed within the sonic mass which consists of a loud and complex collection of harmonic and inharmonic timbres (metallic, noisy, instrumental). The full–ensemble creates a dense sonic cluster which culminates with a noisy and dissonant chord at 53’43” (Figure A.21, “d”).

- [54’12” – end; bars 529 – 653]

The end of bar 529 is a slow return to the previous musical environment (and to the light during live performance): while the previous section (*i.e.* the central part of measure 529) consists of the “foundation” of a natural C chord, the chromatic sequence of chords (*i.e.* A, A $\flat$, F $\sharp$ F, E $\flat$, D, C, B...) which appears from 54’15”, moves back the listener towards a dynamism of harmony.

Precisely like a reverse movement of the episode at 24’20” [bars 240 – 343], the rapid harmonic scale (Figure A.9, letter “a”) gradually becomes a recurrent descending line which accelerate continuously until another intervention of tam-tam breaks the motion (“b”) and restores a new cycle (“a’ ”). The spectral analysis allows a clear parallel between the episode at 31’11” – 35’21” (Figure A.19) and the final episode (Figure A.22): Haas’ music sounds expressive and natural but encompasses a meticulous orchestration.

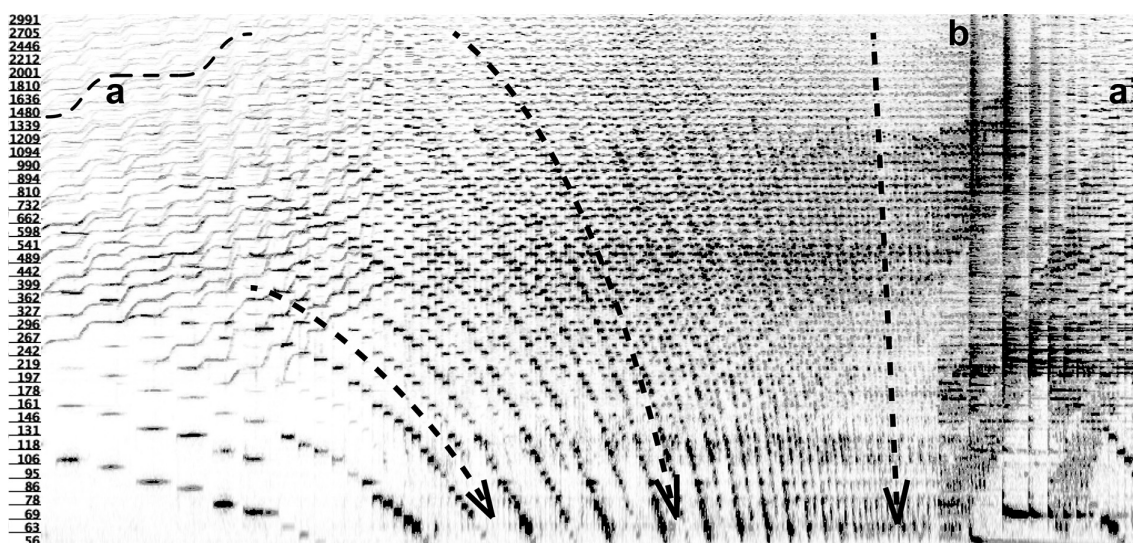


Figure A.22 Spectrogram [58 – 3000 Hz / 55’21” – 59’44”] of in vain.

The aural ambiguity here lies on the subtle transition between ascending *glissandi* (Figure A.22, region marked with letter “a”) of the notes corresponding to the natural harmonic series and the perception of the descending scale of each fundamental notes. For instance, the first violin from measure 530 plays a stepwise glissando from E5 to E $\flat$ 6 (measure 536) while the global chord descend from C to E (Table A.9).

Table A.9. Notes played by 1st violin in in vain, bars 530 – 535.

glissando of the 1st violin	natural harmonic of (fundamental note)
(E5) → F $\sharp$ 5	11 th (C)
(F $\sharp$ 5) → F $\sharp$ 5	12 th (B)
(F $\sharp$ 5) → A $\flat$ 5	7 th (B $\flat$)
(A $\flat$ 5) → B $\flat$ 5	17 th (A)
(B $\flat$ 5) → B $\sharp$ 5	10 th G
B $\sharp$ 5 → C $\sharp$ 6	12 th (F $\sharp$)

In this final part, every new cycle overlaps on top of the previous one: it starts with tam-tam interventions that globally form a series of sustained clusters of notes. This sequence clusters gradually transform into chords in fast successions which are converted themselves into rapid descending notes. Every new cycle is repeated more rapidly than the previous one and the piece winds up when the last cycle stops unexpectedly in midair leaving a suspended atmosphere.

- *Overview*

In vain is a huge composition that would probably deserve a more careful analysis. However, the aural, spectral and score examination carried out here allows some useful conclusions for this study to be drawn.

The overall structure of the piece includes symmetrical episodes and recurring patterns. Haas makes a large use of repetition to create larger structures, suspended musical episodes; more he explores some acoustical and musical illusions such as the ascending / descending tritone and the Shepard glissando. He uses microtonal

interactions and the piece in general show a continuous clash between natural harmonic series and equal temperament scale.

Haas exploits dynamic contrasts, noises and more in general a large and extended spectral range. He creates hypnotic reiterations, rhythmic and pulsating episodes; he accelerates the musical flow and challenges the perception. He makes a particular use of the *glissando* (i) to contrast a steady note with a microtonal movement; (ii) to create the sense of distance between different levels or (iii) to allow the perception move into a sort of *inner space* of a single note, asking the performer to play imperceptible *glissandi* around a note.

Besides the scrupulous notation *in vain* is a piece animated, dramatic, and full of vivid episodes. It is grounded in a sort of primordial need for listener of a harmonic foundation and this incessant research of a “tonal gravity” that occurs in the first and the final parts, it is a piece that communicates a disquiet and a loss of direction and equilibrium. At the same time, the appearance of just tuned harp (~09’00”) has not only a sonic effect which is totally bewildering, but also a sort of visual and semantic meaning. Is it this sound an alien body? Or is it part of a primitive language?

Within this study *in vain* takes on a particular importance and covers all common attributes identified in the selection of pieces.

A.2 Pan Sonic

Kesto [2004] (*selection of pieces*)

AUDIO: Vainio, M., & Väisänen, I. (2004). “Pan Sonic – Kesto 234.48:4” [CD] (Vol. BFFP 180BX-CD). UK: Blast First.

NOTE: In absence of a notated score the identification of tones was usually extrapolated from Sonic Visualiser spectrograms (A = 440Hz) and it is expressed with traditional notation (e.g. ♯, ♭, ♮, ♯, ♮) together with the corresponding frequency range. In some cases tones are modulated within a very small frequency range (e.g. by the use of tremolo effects); in these cases the tone is notated with the main corresponding note and

frequency, such –for instance– D[♯]4, ~317 Hz.

CD1

In general, CD1 is characterised by tight rhythms and rich, saturated and distorted spectra. Pieces of CD1 are typical of club-techno genres.

CD1-track 8) Keskeisvoima / Centralforce [08'49"]

- [00'00" – 01'20"]

The begin of the piece is characterised by the gradual appearance different sonic sources that constitute a complex arrangement. Globally, the sound seems to define a physical environment (even if probably recreated in studio): *i.e.* the sustained drone on bass frequencies give the impression to be captured within a field recording and sonic elements hold a long natural reverb typical of an interior space (*e.g.* large cave, or church).

An electronic rhythm slowly fades in and starting from 00'50" a delay–echo effect of the pulsation starts to emerge. When rhythmic component is fully established (~01'00") the bass drone in the background fades out and the double transition (*i.e.* the rhythm moving foreground and the drone fading out) generates a particular effect of *emergence*: music seems to move from an indistinct scenario close to the listener. The delay-echo of the electronic replaces the reverb of the first bass drone in a way that when electronic is completely present, it creates a new virtual space (with a different echo) that appears closer and more compact than the initial one. [(A), (D), I]

- [01'20" – 02'35"]

The rhythmic sequence becomes the fundamental structure to which high pitched electronic sounds are added. From 01'20" to 01'45", discrete interventions (2 – 4 secs) design a succession of musical elements that are not part of any tonal construction rather are assembled to enhance a microtonal tension (Figure A.23).

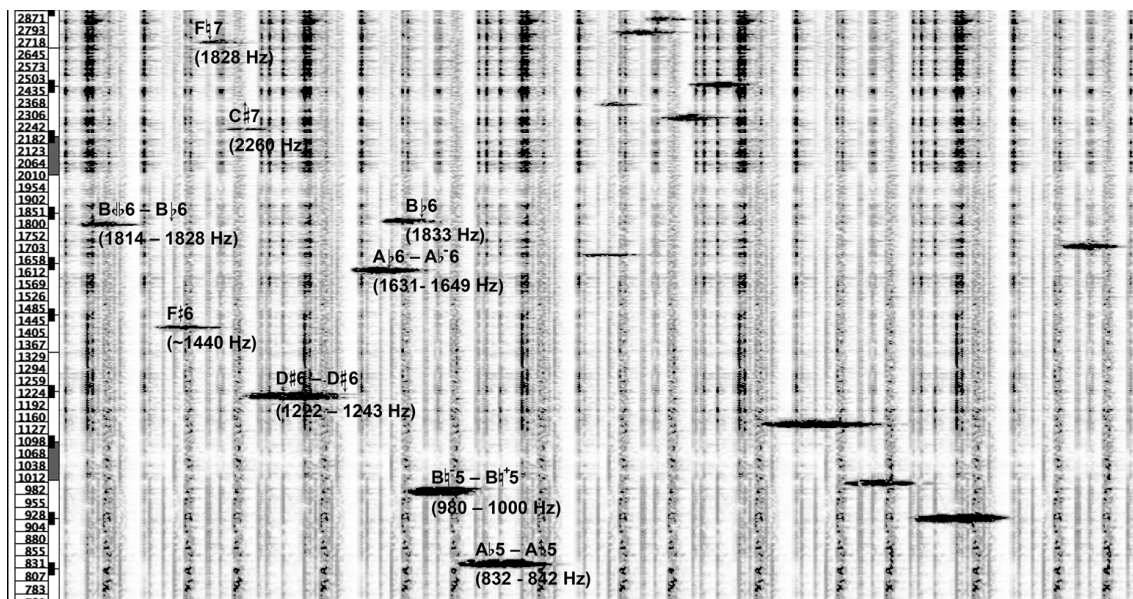


Figure A.23 Spectrogram [760 – 2870 Hz / 01'12'' – 02'21''] of Keskeisvoima.

The complete sequence¹⁶⁸ presents sonic interventions of different extents: some are very sharp others cover a sixth of tone (~ 20 Hz). All elements, when considered together, show that spectral range is treated as a continuous dimension and it is not conceived as a pitched-based quantized extent. In the end of the episode (02'24'' – 02'34'') the only fundamental rhythmic section remains and acts as a bridging element to the next episode. [A, B, D, (E), (F), I]

- [02'35'' – 06'04'']

The new episode (anticipated by a reduction of sonic elements) is characterised by the appearance of a dense and highly distorted sound that saturates the medium-high frequency range of the spectrum. After an initial glissando, the massive drone is set to an A $\sharp$ harmonic series (*i.e.* A $\sharp$ 3 (238 Hz); A $\sharp$ 4 (475 Hz); F $\sharp$ 5 (712 Hz); A $\sharp$ 5 (950 Hz); D $\sharp$ 6 (1193 Hz); F $\sharp$ 6 (1423 Hz); G $\sharp$ 6 (1660 Hz); A $\sharp$ 6 (1897 Hz); C $\sharp$ 7 (2134 Hz), Figure A.24).

¹⁶⁸ (B $\flat$ 6 – B $\flat$ 6 (1814 – 1828 Hz); F $\sharp$ 6 (~1440 Hz); F $\sharp$ 7 (~2750 Hz); C $\sharp$ 7 (~2260 Hz); A $\flat$ 6 – A $\flat$ 6 (1631 – 1649 Hz); D $\sharp$ 6 – D $\sharp$ 6 (1222 – 1243 Hz); B $\flat$ 6 (~1833 Hz) / B $\sharp$ 5 – B $\sharp$ 5 (980 – 1000 Hz); A $\flat$ 5 – A $\flat$ 5 (832 – 842 Hz); A $\sharp$ 6 (~1695 Hz); F $\sharp$ 7 (~2820 Hz); D $\sharp$ 7 (~2318 Hz); E $\flat$ 7 (~2489 Hz); D $\flat$ 6 – D $\flat$ 6 (1152 – 1168 Hz); B $\sharp$ 5 (1006 Hz); B $\flat$ 5 – B $\flat$ 5 (925 – 939 Hz); A $\sharp$ 6 (~1730 Hz))

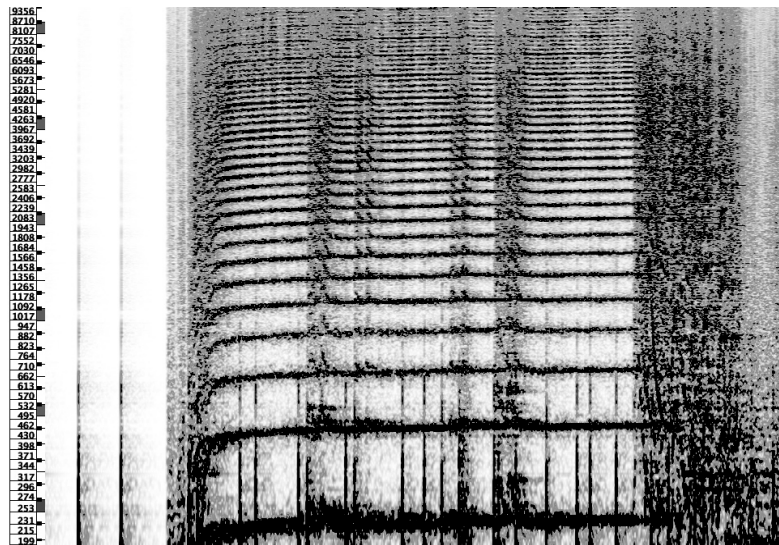


Figure A.24 Spectrogram [190 – 10000 Hz / 02'30'' – 02'50''] of Keskeisvoima.

While the rhythmic pattern of the previous episodes is maintained (according to the beat tempo of the track), the drone is interrupted by a noisy sound that gives the impression to place itself physically over the drone covering the main sonic material (02'48''; right side of Figure A.24) and leaving discernible only the bass pulsation. Later the dense sonic mass emerges again moving from A[♯]3 to C4, D[♯]4 and going back to A[♯]3. High frequencies interventions breaks the sonic stream that moves stepwise higher to F6 (03'20'') and a tight and dense noise interferes with the drone (from 03'37'') that starts again at A[♯]3 at 03'50''. Along all this episode the regular rhythm keeps into a metric grid the overflowing drone that occupies the large part of the spectrum.

From 03'50'' to 04'30'' the drone proceeds through sequential *glissandi* (A[♯]3, A3, B3, A[♯]3...) that take place in correspondence with high pitched events, in a way that these events seem to physically perturb the sonic flow (Figure A.25).¹⁶⁹

Another noisy short interlude (04'30'' – 04'45'') reinforces the fluctuating drone that reappears enriched with a new line of sound on the high frequency range.

¹⁶⁹ Even if formally distant, these successions of *glissandi* might recall several progressions of Haas. In particular the *String Quartet n°2* shows a comparable implementation: different tones are sustained and progress through parallel *glissandi* in sections of bars 106 – 129, 158 – 175 and 215 – 227 (Figures A.8, A.10 and A.11 respectively).

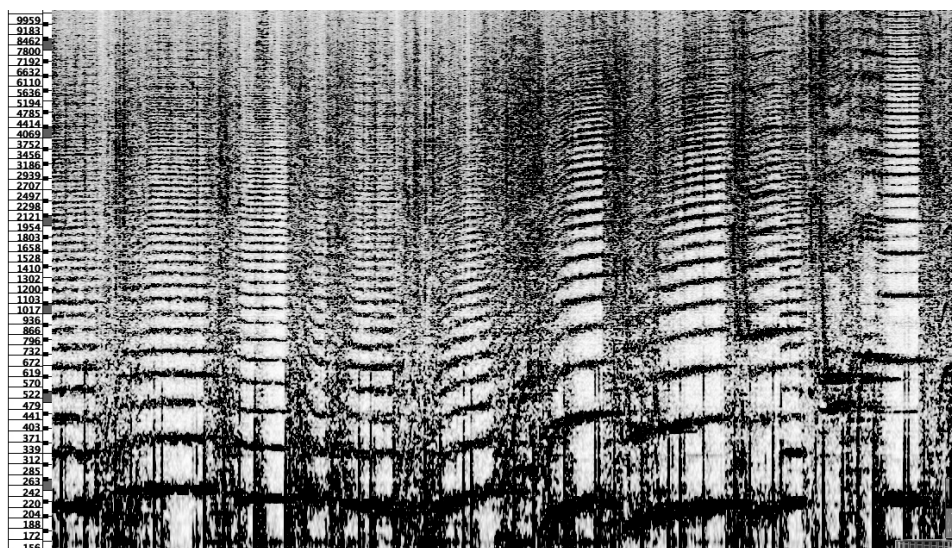


Figure A.25 Spectrogram [156 – 10000 Hz / 03'50'' – 04'30''] of Keskeisvoima.

The sonic flow continues to shift across various pitches reaching a high frequency (*i.e.* ~ F#4 at 05'00'') where the distorted sound creates a greater tension that persists along the next transitions (*i.e.* ~ C#3 and ~ G3). The musical scenes follow one another and the transitions from one scene to another are often characterised by a sort of ambiguity: for instance, the passage from F#4 to C#3 at 05'09'' is formally a descending movement but the complexity of spectra and the unnatural intensity of each partial make this transition to be perceived as an ascending motion to C#4; and similarly the next shift is perceived as a descending transition (from C#4 to G3) while the glissando starts from C#3 and ascends to G3 (Figure A.26). [A, B, (C), D, E, (at the end) F, (H), (I)]

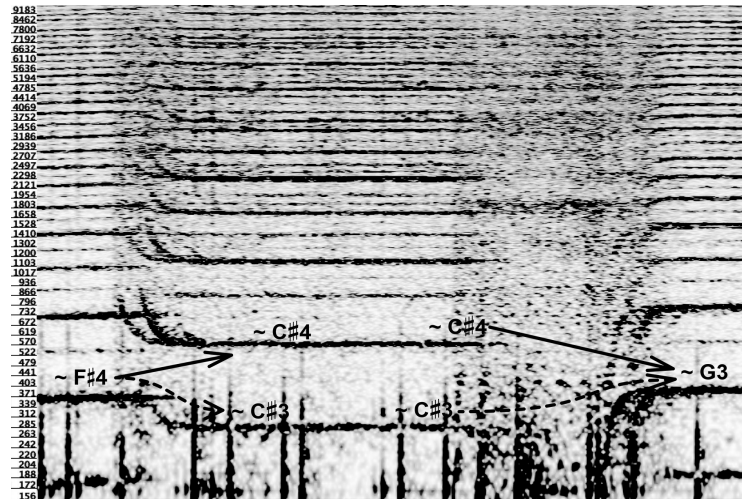


Figure A.26 Spectrogram [156 – 9200 Hz / 05'08" – 05'20"] of Keskeisvoima (dashed and plain lines indicate formal and perceived sonic movements respectively).

- [06'03" – 07'38"]

The drone dissolves itself after a noisy intervention (06'00") leaving a sort of "sonic emptiness" that is occupied exclusively by the bass rhythm. The episode recalling the initial episode (01'20" – 02'35") works as a new beginning where each element is progressively introduced a second time: (i-ii) the bass rhythm and the distorted beat (from 06'03"); (iii) the high pitched dry pulsation with the delay-echo effect (06'18"), (iv) the high pitched lines (06'23) and (v) the multiple delay effect applied on the fat pulsations (06'28"). [(A), B, D, (E), (G), I]

- [07'39" – end]

A new massive drone emerges (as occurred at 02'35") in a bass-medium frequency range, but this time it appears more restrained and its appearance occurs simultaneously with the end of rhythmic sequence. The sound is now lacking of a containing rhythmic matrix and gives the impression to be more fluid, it progresses from bass frequency with a slow (but inexorable) crescendo till the end. This *crescendo* is both dynamic and spectral, in the sense that the sound increase in intensity and spectral saturation (Figure A.27). [A, (B), (C), E, H, I]

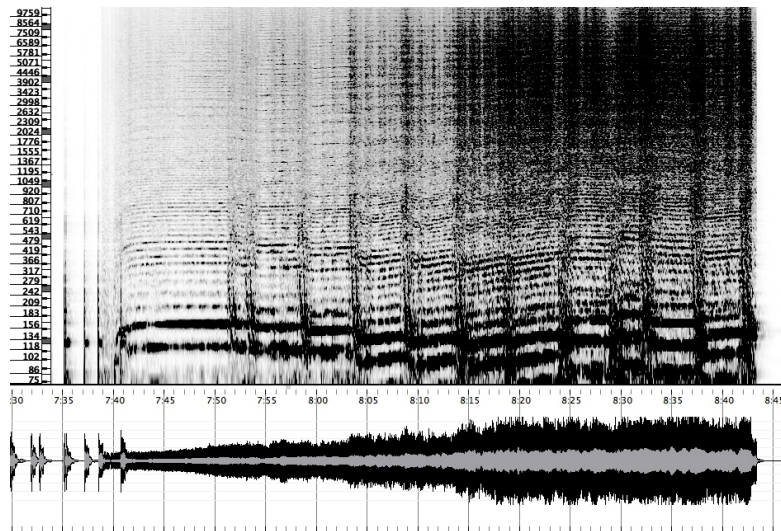


Figure A.27 Multilayer representation [top: spectrogram 75 – 9800 Hz; bottom waveform / 07'30" – end] of Keskeisvoima.

- *Overview*

Keskeisvoima is a piece constituted by two cells that are arranged in a ABAB' structure: where A is the empty scene mainly characterised by rhythmic elements and subtle high-pitched tones, while B represents a more extended section which the principal component is the dense drone together with rhythmic elements (of A) in background and noisy interventions. The reprise of B, works a *coda* in the sense the it differs from the original B in the absence of rhythm. More in detail, along the entire piece the drone undergoes successive reinforcements of spectral density (Figure A.28) till the climax at the end of the piece.

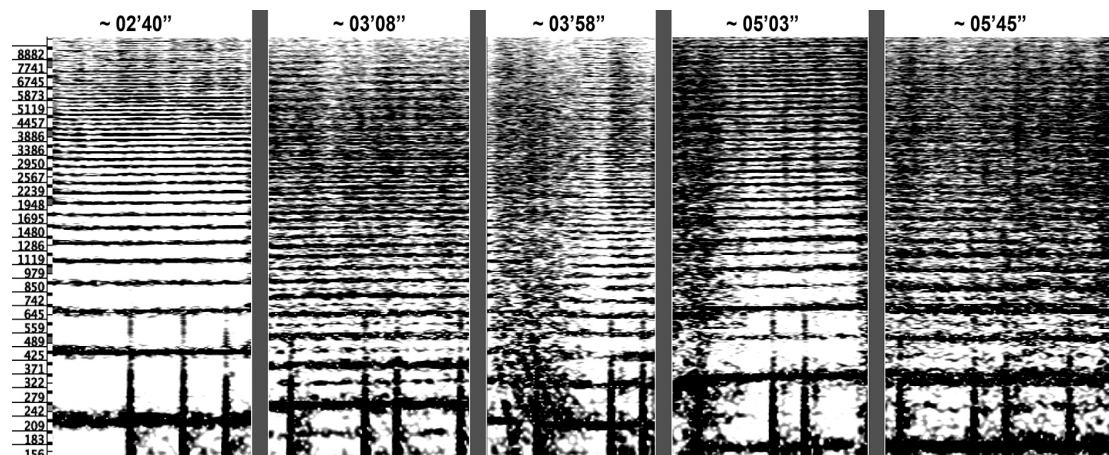


Figure A.28 Spectrograms [156 – 9200 Hz] of five excerpts of Keskeisvoima.

Musical elements that characterise this piece (and the single sections) are: the rhythmic nature of the piece (D), the repeated (but not regular) *glissandi* that are used as means for transition (C, E); the richness of sound that often occupy entire extents of the spectrum (A), the continuity of elements that are not immobile but more fluctuating (E) and the contrast between empty and full musical scenes (G, I).

CD1-track 11) Lautturi / Rafter [05'51"]

- [00'00" – 02'25"]

The episode begins with an extract of noise (twenty seconds, mainly centred in medium-bass frequency range, close to a filtered version of grey noise) after which a sharp transition initiates a section characterised by a regular beat and a continuous bass sound (centred in F1, ~44 Hz; C3, ~130 Hz; G[#]3, ~214 Hz and later D[#]4, ~302 Hz; G^b4, ~385 Hz; B^b4, ~475 Hz) that oscillates at different rates between the two stereo channels.¹⁷⁰

This passage consists of two different temporal cells that are overlapped and not synchronous: the linear beat and the cyclical rotation of the drone in the stereophonic space. The second cell (*i.e.* drone) has its rhythmic pattern in the regular shifting between channels that designs a periodicity: Pan Sonic use a stationary sound to generate a particular sense of cadence.

¹⁷⁰ This is one of the example within the selection that explores the musical use of stereo spatialisation. A similar use of this spatialisation occurs in Rioji Ikeda's *Headphonic 00*.

Starting from 01'05'' an electronic sound fades in: it makes regular ascending and descending *glissandi* creating periodic semicircles that span a large spectral compass (165 – 2630 Hz, E3 – E7). In this way, this episode is typical of two different circular movements: the bass drone that oscillates between stereo channels and the rotative *glissandi* that emerges at 01'05''. This double dynamism occurs in two distinct spatial dimensions: while the periodic *glissandi* takes place within a frequency vs. time space, the movement of the bass drone is grounded on a stable frequency and occurs within the stereophonic space. This episode ends leaving a short silence (1 – 2 sec) of transition. [A, (B), C, D, E, F, H, I]

- [02'25'' – 04'39'']

The second episode of *Lautturi* comes out from silence and all musical elements fade evenly in. A closed-packed combination of continuous sounds occupies a frequency range from 130 to 3500 Hz of which several tones emerge: C $\sharp$ 3 (~134 Hz), F $\sharp$ 4 – F $\sharp$ 4 (~371 – 380 Hz), E $\flat$ 5 (~606 Hz), F $\sharp$ 5 (~739 Hz), A $\sharp$ 5 (~880 Hz), B $\sharp$ 5 (~1016 Hz), C $\sharp$ 6 (~1050 Hz), E $\flat$ 6 (~1224 Hz), E $\flat$ 6 (~1278 Hz), C $\flat$ 7 (~2040 Hz), D7 (~2486 Hz). Simultaneously a pattern of reiterated *glissandi* is developed in high frequencies (4-19 kHz) (Figure A.29, left).

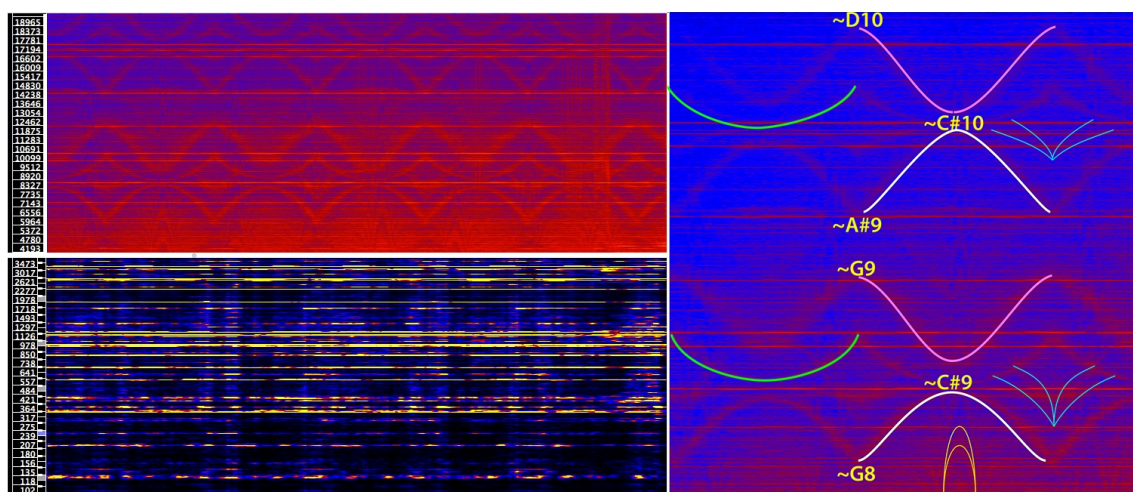


Figure A.29 Multiple Spectrograms [left inlet: bottom 102 – 3500 Hz; top 4100 – 19kHz / 02'55'' – 03'55''. Right inlet: 5000 – 20k / 02'41'' – 03'00''] of *Lautturi*.

In this way, this arrangement is perceived both as a steady sound made of a

microtonal cluster of sounds and an undulating profile that incorporate brilliance and ringing components (typical of sounds above 10 kHz). More in detail, the high-pitched *glissandi* are characterised by symmetrical movements that don't have a natural harmonic correlation: to a sound that goes from G8 and C#9 corresponds a specular one from A#9 to C#10 (Figure A.29, right inlet). The global effect, however, is that one of a reiterated motion that expands and shrink itself.

The episode evolves intensifying its dynamic and the distortion to inharmonic components, incorporating high frequency sound and overtones (04'00'' – 04'40''). [(A), (B), C, E, F, H, (I)]

- [04'40'' – end]

The closing episode is a noisy drone that is based on a bass frequency tone at ~75Hz (D $\sharp$ 2) that after two harsh interventions moves to ~83Hz (E $\flat$ +2). These contrasting events (04'50'', 04'58'', 05'06'' and 05'13'') have a plastic impact into the internal spaciousness of sound: they saturate the spectrum and when fade out, generate a sort of sonic emptiness. The piece ends with the same noise that appears at the begin.

- *Overview*

Lautturi is constituted by two clear musical sections, both typical of a static yet oscillating character. The first episode is constructed within a steady rhythmic structure (D) in which an interlaced pattern of circular fluctuations is developed. On the other hand, the second episode shows this dual nature (*i.e.* static and oscillating) displaying different sustained sounds within two distinct frequency ranges.

In this way, the piece is typified by a static nature (E) and a fluctuating character (B) that is at times created with the use of repeated *glissandi* (C, F). Along the entire piece the presence of noisy and high frequency sounds denotes the use of a rich spectra (A) and a sculptural conception of inner musical space (I).

One may speculate that the two parts of the piece (00'00'' – 02'25'' and 02'25'' – 04'39'') are both constituted of two oscillating forms, which formally belonging to different physical dimensions. In the first case, the two forms consist of the frequency *vs.* time profile (*i.e.* periodic *glissandi*) and the movement of sound in stereophonic

space; while in the second case, the periodic glissandi is combined with another movement occurring in dynamic (Figure A.30).

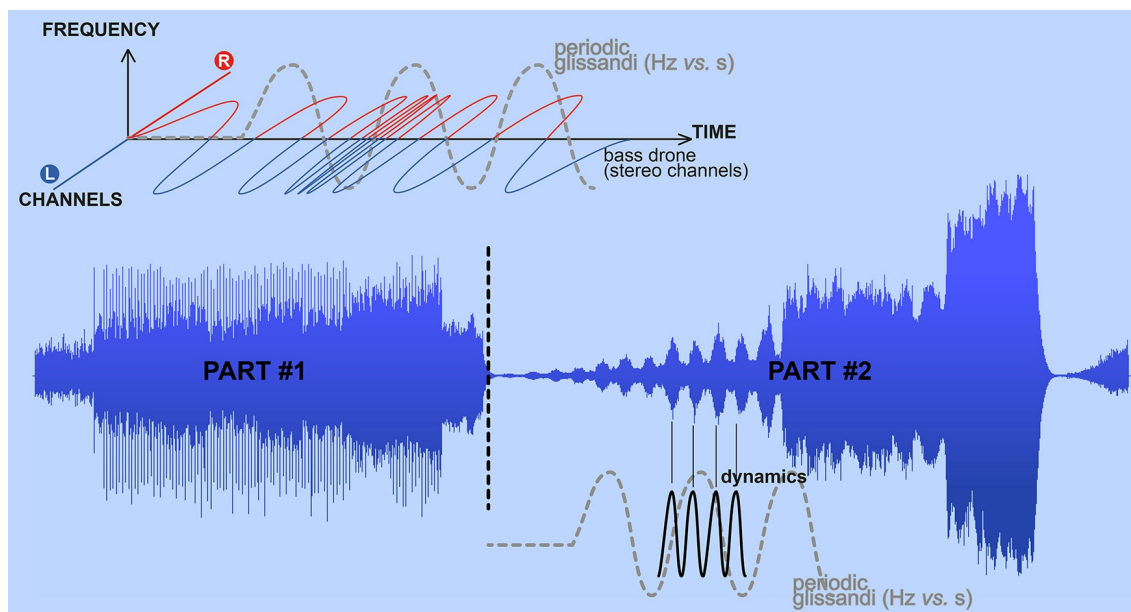


Figure A.30 Schematic representation of the two part of the sonogram of Lautturi.

CD2

The second CD contains pieces with a rhythmic structure that is more complex and abstract. Pieces of this set include elements more typical of glitch music (*i.e.* articulated and extended construction) rather than techno or club-based styles.

CD2-track 1) Etäisyys / Distance [05'43"]

- [00'00" – 00'48"]

The introduction of *Etäisyys* (Finnish name of 'distance') is characterised by the sparse presence of concrete sounds and noises that contain a specific reverberation. Except for the very first sound (00'05" – 00'09") that does not hold any effect, the other sounds seem jangling and resonate with a medium–bass reverberation. This effect depicts a clear virtual space: sounds of this initial episode appear to be recorded in a reverberating space, containing water or/and metallic walls. This movement between *dry* and *wet* spaces may remember the initial sounds of Ligeti's *Artikulation* and, as Windsor describes, "[t]his contrast between two possible environments creates the

possibility [...] as an interplay between the electronic (or synthetic) and the ‘natural’ ” (Windsor 2000, 25).

Starting from 00’28” a sustained block of high sounds (that recalls the second episode of *Lautturi*, see above) emerges and overlaps to the noises and this complex sonic elements fades out (00’48”) to leave a space to the very begin of the piece. [(A), B, E, I]

- [00’48” – end]

The episode is fundamentally constructed of distinct rhythmic elements that are interlaced and form a complex metrical structure: (i) a bass pulsation (00’49”); (ii) a dry beat (00’56”) and (iii) a cymbal intervention (01’05”). The resulting rhythm is a temporal unit divided in eleven beats in which the bass pulse marks twice per unit (red sign, Figure A.31), the dry beat consists of a more articulated metric (blue and black signs marking the 1st, 5th, 6th, 8th and 11th beat of the unit) and the cymbal interventions appears every five and six beats (purple sign).

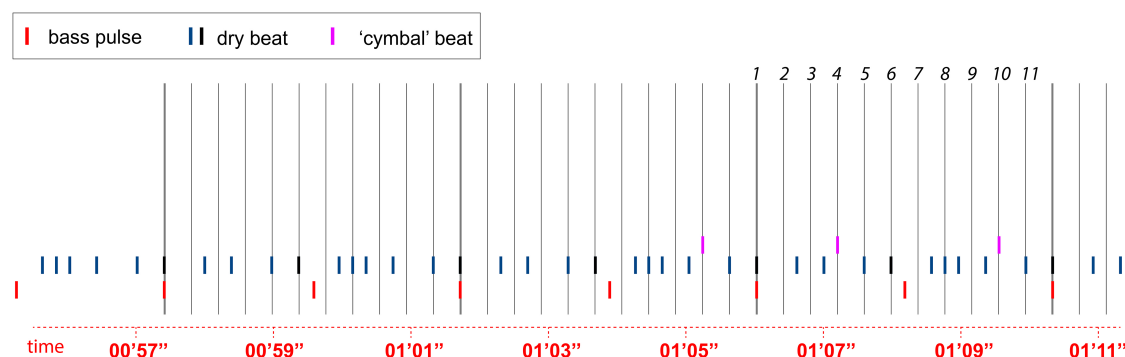


Figure A.31 Rhythmic structure of Etäisyys from 00’55” to 01’11”.

The result is a tight rhythmic structure which at the same time gives a sense imbalance typical of odd metrical tempo. From 01’15” concrete noises (similar to those of the introduction) overlap with the rhythmic texture bringing back the perception inside a virtual and figurative space. There is a clear depiction of sonic domains where distinct spectral regions are selectively occupied by different sonic forms. From 01’59” the complexity of sonic arrangement increases and continuous high tones progressively emerge. They create a dense and complex sound that is supported by the regularity of

rhythm. The pieces evolve increasing and decreasing the presence of high tones and noises: from 03'18" the only rhythmic elements open to a new beginning where noises and concrete sounds delineate one more time the spatial environment. From 03'43" glittering high tones start to thicken themselves designing a microtonal sonic surface (Figure A.32).

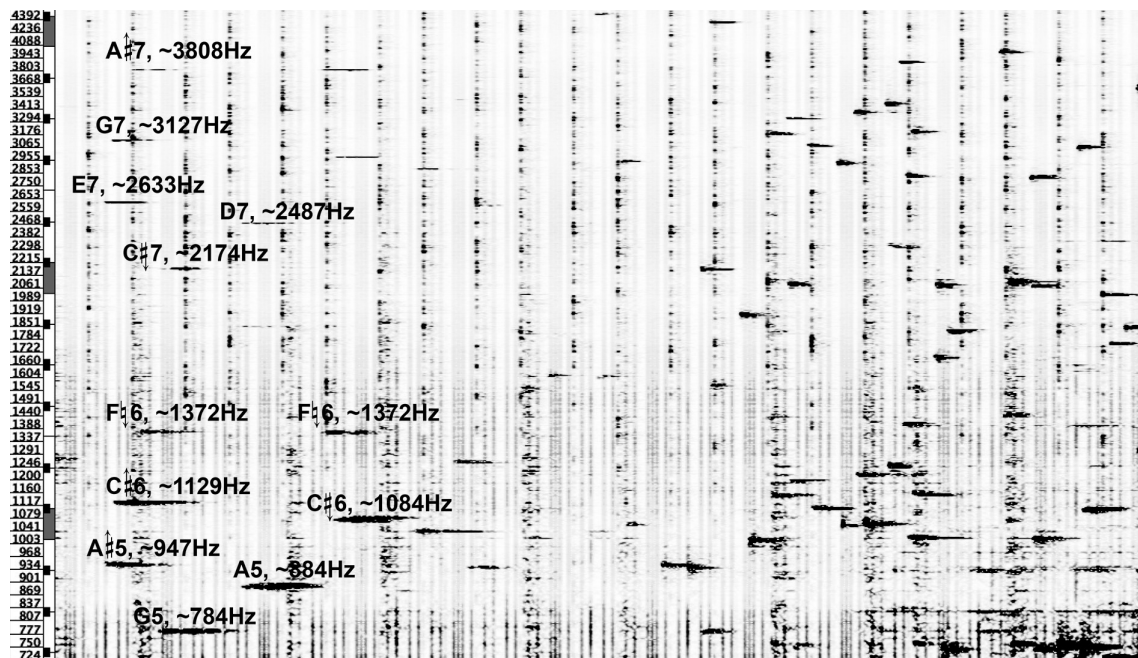


Figure A.32 Spectrogram [700 – 4400Hz / 03'42" – 04'30"] of Etäisyys.

The interventions intensify and overlap generating compacted groups of sounds (04'40" – 05'11"). This elaborate material fades out simultaneously with the rhythm leaving only sparse interventions of noises and concrete sounds (as in the introduction) that sequentially lose their reverberation effect and move the perception out of the virtual and resounding space. The end of the piece acts inversely of the begin: a way out from an imaginary environment with a specific resonating echo. [(A), (B), D, (E), F, H, I]

- Overview

The piece begins and ends with the same sonic material (*i.e.* noises and concrete sounds) and it is a sort of figurative movement inside (and outside) of a virtual space. Within this space, the central body of the piece is developed. It consists of a firm

rhythmic structure that works as a framework to support at times noises, concrete sounds, high and sustained tones. Essential elements of this pieces are the presence of a complex rhythm (D), and sculptural arrangement of sound events (I) that are reiterated in complex configuration (E) creating hypnotic effects (H). Moreover, the meticulous construction of high tones enriches the sound spectrum (A) with a microtonal character (B).

CD2-track 11) Prospekt Vernadskogo [02'23"]

- [00'00" – 00'28"]

The initial episode presents two types of percussive elements: a dry beat, at times more gentle or more harsh, with a decay that oscillates between the two stereo channels; and a bass pulse with a very short echo. Both elements delineate a sonic environment moving within a double dimensional space (*i.e.* the first moving in stereophonic extent *vs.* time, the second within a frequency *vs.* time) as it were observed for *Lautturi* (see Figure A.30). [D, E, F, I]

- [00'28" – 01'07"]

A sustained drone emerges on top of the rhythmic pattern and this continuous sound is simultaneously ascending and descending. In fact when it increases in pitch and volume, it occupies larger extents of spectrum and develops inner descending movements. The final perceptual result is a double effect of movement (Figure A.33).¹⁷¹

¹⁷¹ This type of construction is peculiar also of several episodes of *in vain* by G. F. Haas. Macro- and microscopic arrangements design a complex and structured sound in which two opposite movements are present at the same time and generate impossible geometries, such as infinite ascending motions (e.g. Figure A.15) or continuous accelerating effects (Figure A.22).

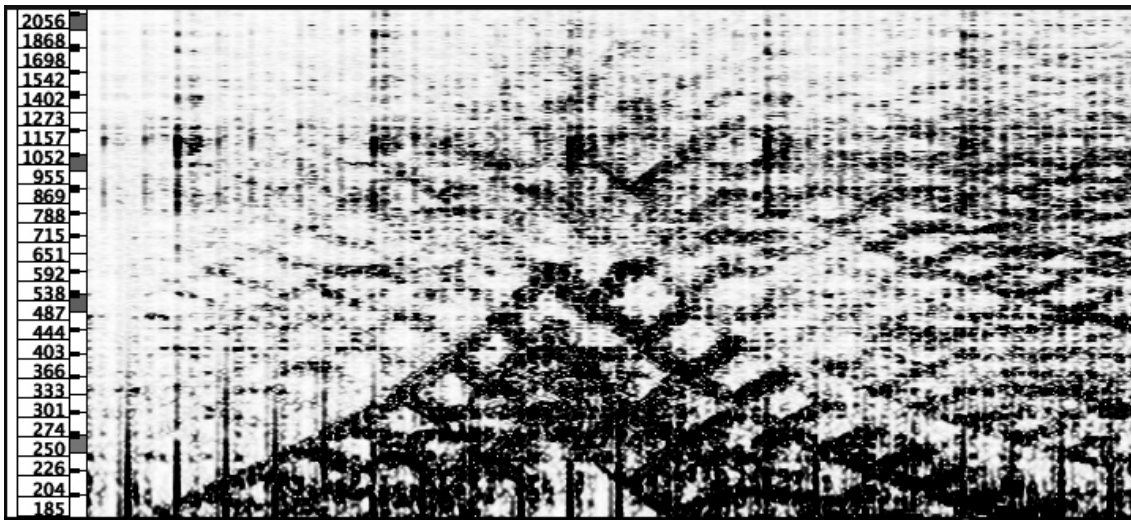


Figure A.33 Spectrogram [185 – 2100Hz / 00'26''– 00'58''] of *Prospekt Vernadskogo*.

This ambivalence generates a sense of uncertainty that is accentuated by the continuous fluctuations of percussive sounds. [(A), B, C, D, E, F, G, (H), I]

- [01'10'' – end]

The musical episode collapses into itself leaving the bass pulsation (the second element of the initial percussive texture) that stops and a gentle oscillating drone concludes the piece. [(A), B, D, E, F, G, (H), I]

- *Overview*

Prospekt Vernadskogo is a short piece based on a symmetrical glissando (ascending/descending) that contains in itself, its antithetical form. In this way, Pan Sonic creates a piece that is peculiar for its illusory and mesmeric characteristics (H) and they use different elements (*e.g.* spatial, temporal, pitch-based) to create this effect. Fundamental constituents of this composition are the use of reiterated *glissandi* (C, F) the fluctuation and the static character (B, E), the interplay between different sonic spaces (I) and the pulsated time (D).

CD3

Kesto's third CD contains pieces with extended development, few and sparse

elements, minimal constructions, silent episodes, slow rhythmic progressions. Pieces of this set include elements more typical of avant-garde and experimental music (*e.g.* Linjat is dedicated to Alvin Lucier).

CD3-track3) Ilmenemismuoto / Appearanceform [07'36"]

- [00'00" – 01'08"]

The initial part of *Ilmenemismuoto* is constituted of separated blocks of noise that cover a spectral range up to 14 kHz but contain inner harmonic lines in the range of 100 – 800 Hz. These characteristics make the noisy interventions rich of details: the sonic textures are fragmented with several interjections of silence and the harmonic line seems to continue even if it is no audible. This sort of progression may create the illusion of a continuous flow of sound that is fragmented (Figure A.34). This extreme dynamic contrast enhances the effect of a sort of physical consistency of sounds. [A, G, I]

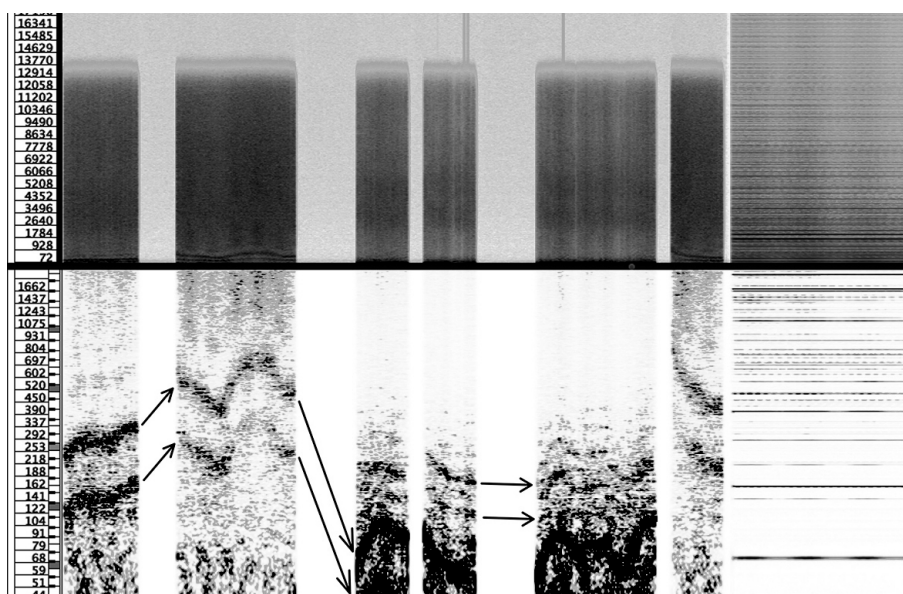


Figure A.34 Spectrogram [top: 72 – 17000 Hz; bottom 44 – 1700 Hz / 00'00" – 01'35"] of *Ilmenemismuoto*. Arrows highlight the stream of sound interspersed with blocks of silence.

- [01'08" – 03'41"]

A structured sound (made of several fundamental tones and overtones) appear at

01'08'' and decays very slowly for two minutes. From 02'30'' an almost inaudible pulsation in very high frequency range (~12 kHz) fades in. This succession of elements has a clear objective to move the listener between different perceptual situations: the two minutes decay of sound should allow listeners to adapt their perception to a lower intensity of sonic stimuli. This transition needs a very careful listening and proper listening conditions. [A, E, G, I]

- [03'42'' – 06'00'']

From 03'42'' a soft drone slowly emerges and introduces a sequences of high frequencies tones (in the range of 5 – 19 kHz, from 04'50'') with microscopic manipulation of harmonics, decays, and transitions. These sounds are made of very high overtones and possess a sort of unnatural glittering character typical of digital sounds. [A, B, E, (I)]

- [06'00''- end]

From 06'00'' the high frequency texture fades out and soft percussive interventions emerge. These sparse elements are accompanied with a dense drone on bass frequency range (first around E[♯]₃, ~168 Hz, then A[♯]₃, ~230 Hz). This episode when it is listened at a medium volume (*i.e.* that of the begin of the piece) may appear irregular and chaotic and having a nature of noisy interferences: high pulsations appear to creak and bass drone approximates to a noise. On the contrary, after a careful listening, a first type of pulsations (06'38'' – 06'48'') hold a very peculiar decay: high frequency echo is very short, while bass reverberation is dull and compressed. On the other hand, the bass drone is not continuous but interspersed and gives rise to unpredictable pulsations. From 06'50'' to 07'12'' the decay changes (together with the bass drone) and give the impression to move to another virtual space. There is a very accurate use of sonic material in distinct area of the spectrum. At 07'36'' the piece abruptly finishes. [(A), D, E, (G), (I)]

- *Overview*

Ilmenemismuoto holds very peculiar characteristics: it has very few and sparse sonic elements and a large use of silence. There is a clear research of different

perceptual levels: Pan Sonic work with contrasts and music moves from loud and dense situations towards almost imperceptible episodes, the very slow decay (that starts at 01'08'') serves this transition.

Clearly, the elements that are crucial in this piece are the dynamic contrasts (G), the richness of spectral range (A) and the sculptural positioning of sonic events (I). Other elements contribute to the nature of this piece, such as the creation of static masses of sound (E) and the plastic and automated reiteration of pulsations (D, F and H). Finally, the piece clearly gives an emphasis to the need of very good listening conditions: the lack of these circumstances would completely compromised the appreciation of the piece.

CD3-track5) Selittämätön / Inexplicable [09'07'']

- [00'00'' – 02'55'']

Selittämätön begins with a gradual appearance of a rich combination of continuous sounds based on a bass fundamental tone (40 – 43 Hz) with several additional harmonics (~83 Hz, E $\flat$ ²; ~118Hz, A $\sharp$ ²) and fluctuating notes (G $\flat$ ¹ and G $\sharp$ ²) together with a flickering sound (mainly centred at G $\sharp$ ⁴ / G $\sharp$ ⁵). The global effect is of a continuous element that oscillates at different rates. This fluctuation is even more evident after 02'00'' when the flickering sound fades out and sparse noises overlap with the drone. The episode is abruptly interrupted by a loud intervention: a noise interferes with the drone and breaks the continuous development of sound (02'57'' – 03'07'').¹⁷² [(A), (B), E, (H), (I)]

- [02'55'' – 06'00'']

The new episode starts with a sustained sound (based on C₂ / B₂ / C₃ / G₃) that progressively enlarges (04'08'') and reduces (04'50'') its spectral range. After 04'50'', a delicate drone emerges: it is centred on bass frequency range (G $\sharp$ ¹-G $\sharp$ ¹, 51 – 53 Hz; F $\sharp$ ², ~95 Hz; G₃, ~196 Hz; D $\flat$ ⁴, ~288 Hz; F $\sharp$ ⁴, ~380 Hz; A $\sharp$ ⁴, ~476 Hz; C $\sharp$ ⁵, ~570

¹⁷² This transition has interesting parallels with Riccardo Nova and Giovanni Verrando pieces (e.g. *Eleven* and *Dulle Griet*). Verrando and Nova's material is acoustic and electronic but the transition of musical elements is similar: continuous and static episodes (with microscopic manipulations and fluctuations) end and the sonic breaking elements are constituted of abrupt interventions that cover a large spectral extent.

Hz; E[♯]5, ~670 Hz). Each tones involves a large range of frequencies generating a massive effect of binaural beats created by neighbouring frequency interferences.

- [06'00" – end]

The previous drone fades out and a series of high frequency notes starts to appear. The sequence of notes is consistent but at every cycle each note shifts within a microtonal range (*i.e.* D6 [D[♭]6 – D[♮]6]; E6 [E[♭]6 – E[♮]6]; F6 [F6 – F[♭]6]; A[♯]6 [A[♮]6 – A[♯]6]; B6 [B[♭]6 – B[♮]6]), the temporal transition progressively changes, and the duration of each note (*i.e.* its decay) expands. From 07'57", notes from the lower octave appears (D5, E5, F5, A[♯]5) extending the cycle towards lower pitches and creating a sort of internal canon (Figure A.35). [A, B (mostly in the final part 06'10"), E, G, (H), I]

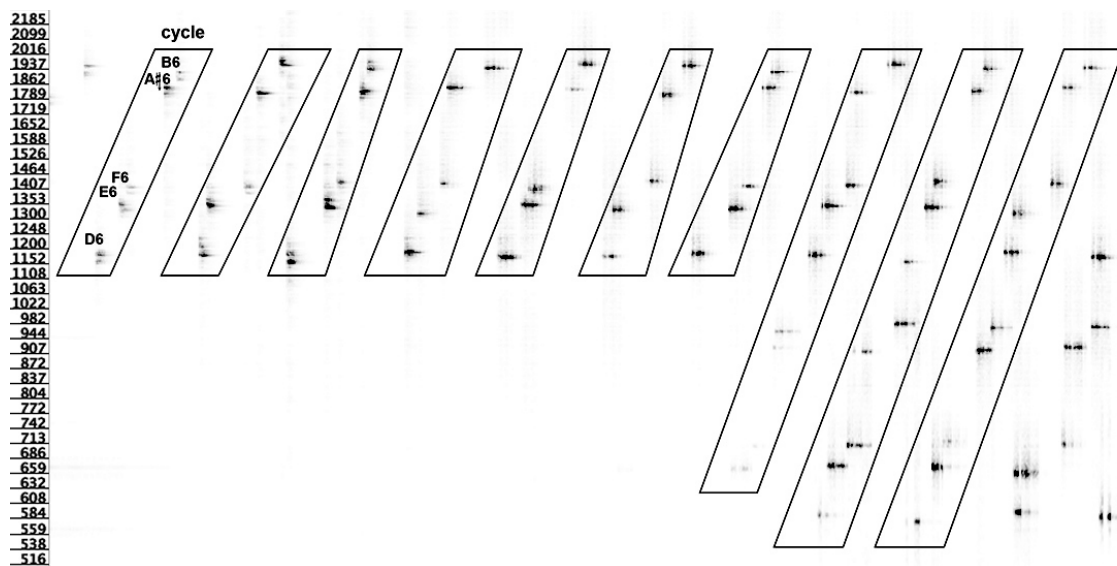


Figure A.35 Spectrogram [500 – 2200 Hz / 06'00" – 09'00"] of Selittämätön.

- Overview

Selittämätön is a piece structured in distinct episodes. Apart from the last episode, *Selittämätön* displays dense sonic textures, fluctuating in a stationary position. There is an important transition (02'50" – 03'07") that separates two initial sections: it works as a dynamic and structural *caesura*. After this passage the sound proceeds softly reiterating elements and creating hypnotic echoes. Primal elements of this piece are the simultaneous presence of a static and a fluctuating character (E, B), the hypnotic effect

created with sustained sounds and reiterated figures (H, E). There is also a clear use of microtonal interplay between sounds (B) and musical elements, occupying precise spectral areas, are plastically organized (I).

CD3-track6) Ilma / Air [09'38"]

- *[begin – end]*

Ilma starts with a continuous grainy noise with harsh electronic interferences that transforms into a deep bass drone that occupies a closed-packed region of spectra (28 – 580 Hz) and slowly cross-fades (02'00") with a series of continuous tones in the medium and high frequency ranges start to appear. This continuous flow of sound progresses with a cyclical dynamic figure (*i.e.* a regular *crescendo/diminuendo* unit at 03'04", 03'24", 03'45", 04'05"...) and a recurrent collection of tones based on an A open chord (E3 / A4 / E4 / A5 / E6 / A6). This aggregate of tones become gradually more dense, several tones comes in and out and the interlaced texture turns out to be so compacted that sounds of a continuous region of frequencies form a single sonic body that fluctuates dynamically at the same time (*e.g.* 04'26", Figure A.36).

From 07'40", the stream of sound moves away from the A chord (F $\flat$ 5 – C $\sharp$ 6, A $\sharp$ 4, F $\sharp$ 5, A $\sharp$ 4 – F $\flat$ 5, F $\flat$ 3 – B $\flat$ 3 – B $\flat$ 4 – D $\flat$ 5) and gradually descends to bass frequencies giving the impression to be submerged [A, (B), E, (F), G, (H), I].

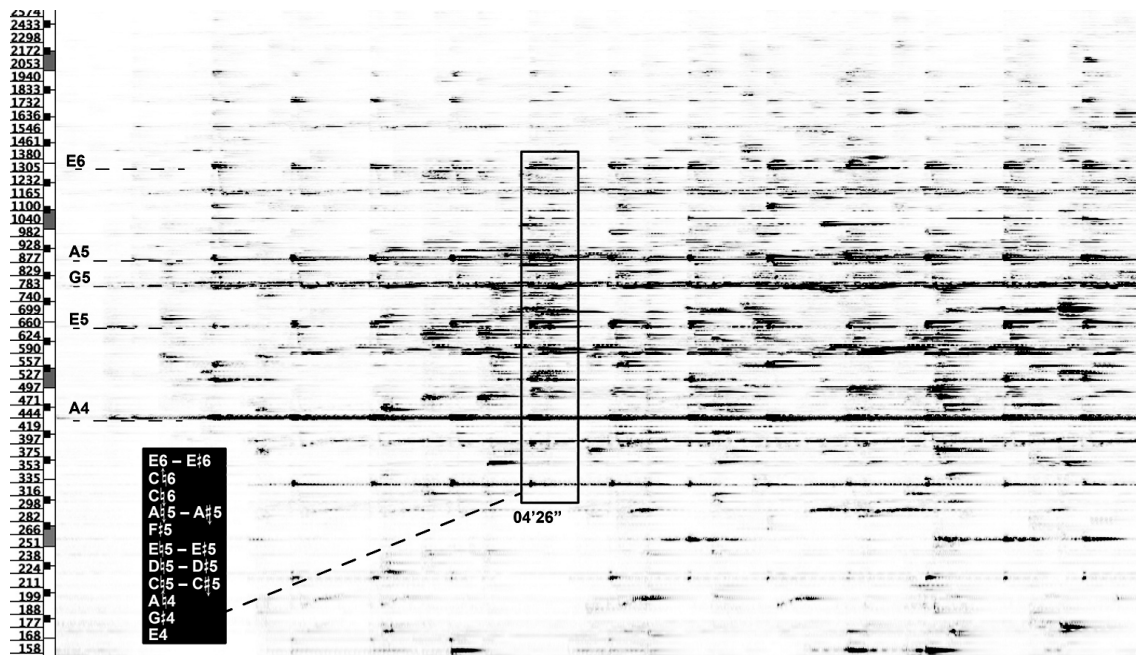


Figure A.36 Spectrogram [150 – 2500 Hz / 02'20" – 07'00"] of *Ilma*.

- *Overview*

After a short introduction, *Ilma* is based on a single coherent idea that is a dense and interspersed texture of continuous sounds that develops along the entire piece. The musical flow is regularly punctuated by dynamic peaks and this recurrent movement may recall the periodicity of marine waves.¹⁷³ Fundamental attributes of this pieces are the continuity of sound (E), the periodicity of its progression (E, H) and the minute composition of the sonic flow (B).

CD3-track8) *Linjat / Lines* [18'09"]

- *[begin – end]*

Linjat (dedicated to Alvin Lucier) starts with scattered sounds that are characterised by a very simple harmonic series approximating to pure tones.¹⁷⁴ The

¹⁷³ The structure of the piece may recall compositions of traditional spectral music, where sound is composed of layered tones that gradually change. Microtonal modulations occur within the dense sonic material that give the impression to go in different directions: sonic lines deviate and converge, emerge and disappear. Within the selected pieces of this study, the sonic result of *Ilma* is not far from Riccardo Nova's *Eleven* and several episodes of Haas' *in vain*.

¹⁷⁴ Nevertheless, spectral analysis confirm that in many cases sounds possess a series of overtones in the range of 2.5 – 10 kHz.

pieces is centred in D $\sharp$ and it develops microtonal transitions along different octaves (Figure A.37).

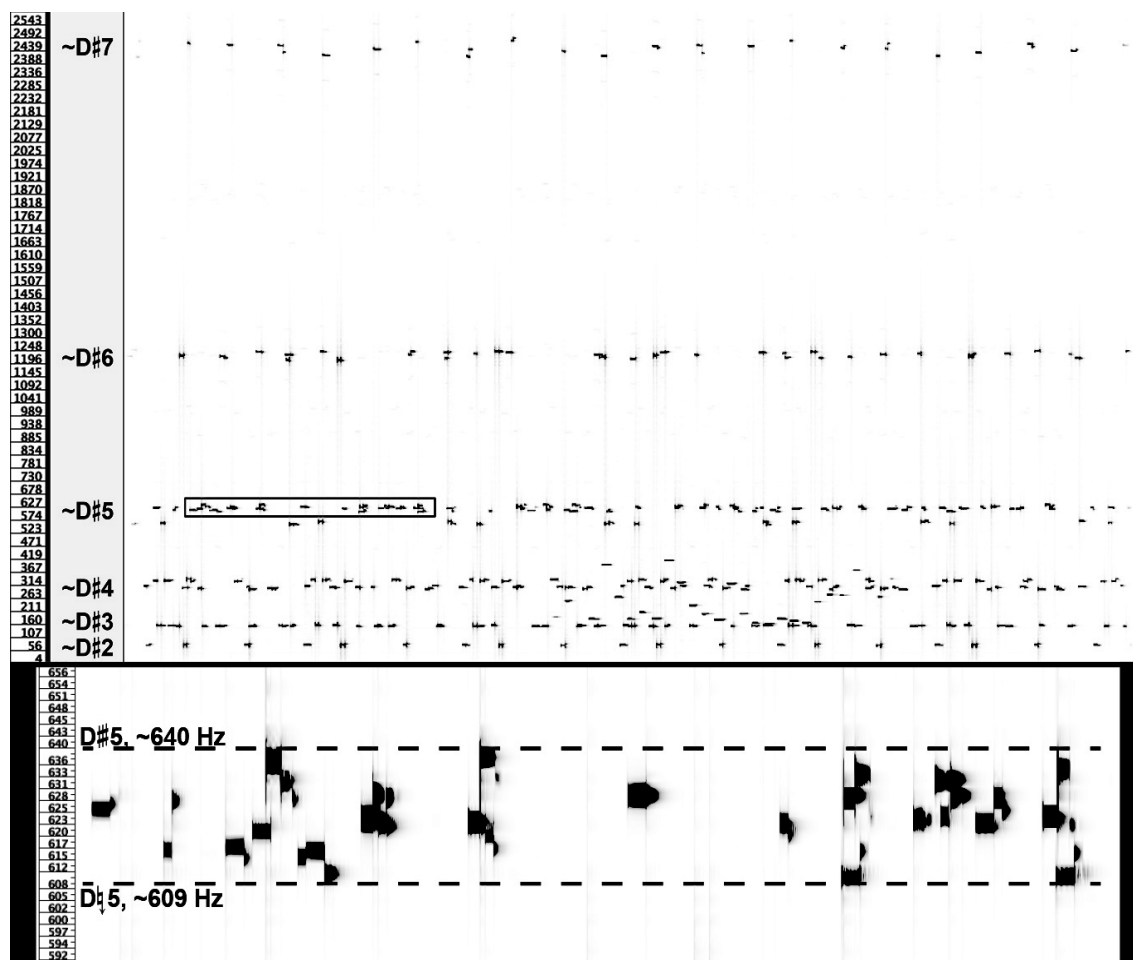


Figure A.37 Spectrogram [top: 4 – 2550 Hz / entire piece; bottom inlet: 617 – 656 Hz / 00'27" – 05'34"] of Linjat.

The sequence of tones passes through consonances reinforcing certain sounds across different octaves, and dissonances through a specific microtonal overlapping (Figure A.37, bottom inlet). There is the frequent presence of minimal fluctuations of sound generated by superimposition of neighbouring frequencies (*e.g.* 01'40" – 01'48"; 05'36" – 05'44"; 07'32" – 07'40").

The piece proceeds slowly and the progression appears in some ways discontinued even if the presence of a sort of microtonal convergence towards D $\sharp$. The global organization is sparse and detached recalling traditional compositions of twelve-

note style. However Pan Sonic often create compacted groups of tones (e.g. 05'49'' – 05'57'') that clash one another. This tendency is enhanced in the central part (*i.e.* 9 – 12 min) where tones are assembled in more complex configurations creating an almost continuous ever-changing flux of notes. From 15'00'' successions of tones becomes more sparse there are more silence and a few number of multiple chords.

- *Overview*

Linjat is peculiar for its duration, 18 minutes, that is more than the usual length for Pan Sonic's standards (apart from *Säteily*, see below). The piece develops a single and coherent aesthetic and proceeds within an apparent undetermined structure. On the contrary, as well represented by Figure A.37, Pan Sonic construct the sequence of sonic events within a rigid matrix: there are six levels of development (*i.e.* from D#2 to D#7) and tones of each level are arranged within a microtonal series. Between levels, tones follow one another conflicting, harmonizing, creating dense clusters or resounding alone. Occasionally there are tones that are not included within the D# frame (*i.e.* F#3, G#3, A#3, E4, G#4, C#5, F5): these *external* tones –when appear– create a sort of traditional harmonization within an almost microtonal piece.

Even if the spectral range is very reduced, the arrangement of sounds is tight and plastic (I); recurring elements come in succession (E) within an irregular design. The more evident elements of *Linjat* are the accurate microtonal construction (B) and the hypnotic and static character (H, E).

CD4

Kesto's fourth CD contains a single piece: it is in contrast with the other CDs, and it detaches itself because the Finnish duo confronts with a pieces of an unfamiliar size for their standard.

CD4-track1) Säteily / Radiation [61'16'']

- [00'00'' – 17'00'']

Säteily begins with a soft drone made of a complex combination of sustained tones which are mainly located in medium and high frequency ranges: soft tones appear

in bass frequency ranges (E2, G#2, A2, B2) while loudest tones are found between 169 and 1400 Hz (E#3, ~169 Hz; A#3, ~234 Hz; C#4, ~280 Hz; D#4, ~317 Hz; F4, ~350 Hz; A#4, ~468 Hz; A5, ~875 Hz; B#5, ~959 Hz; E6, ~1318 Hz; F6, ~1398 Hz). There is a rich presence of overtones in the range of 7 – 13 kHz (A#8, 7385 Hz; B8, 7904 Hz; F#9, 12 kHz; G#9, 13.3 kHz; Figure A.38).

In most cases, tones oscillate within a little spectral range: for instance the tone at C#4, ~280 Hz moves from C#4, 277 Hz to D#4, 290 Hz. This global movement generates a marked effect of instability. A progressive but very slow changeover of tones occurs creating a stream of sound that continuously renovates its sonic characteristics: for instance from 01'30" to 02'20" the tone at B8, 7904 Hz is replaced with an analogous at C#9, 8558 Hz; and a G#9, 13.3 kHz cross-fades with a G#9, 12.9 kHz (from 02'11" to 02'33").

The drone continues to develop: from 03'25" sound gradually moves from medium-high to medium-bass frequency (04'43") and then reaches again medium-high tones at 05'20" and 06'40".

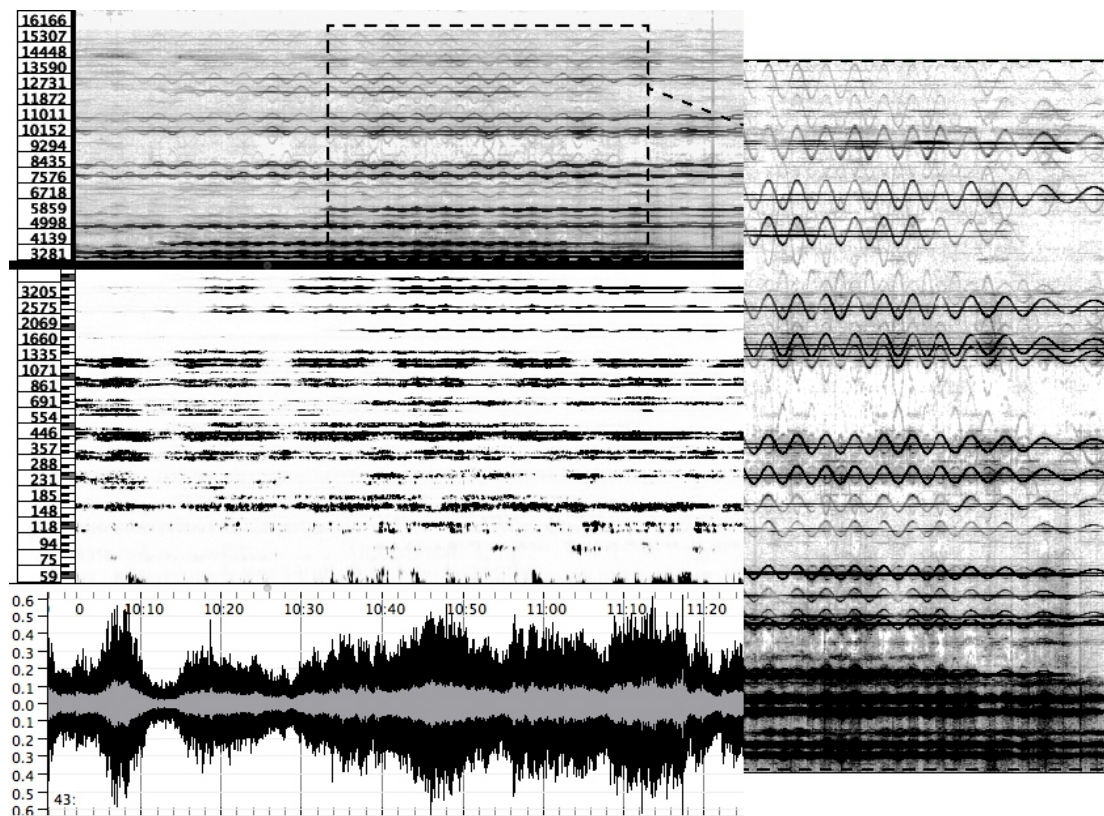


Figure A.38 Multilayered representation [top left: spectrogram 3.3 – 17 kHz; centre left: spectrogram 59 – 3300 Hz; bottom left: waveform / 10'05'' – 11'25''. Right inlet: spectrogram 2.5 – 15 kHz / 10'35'' – 11'10''] of Säteily.

At 08'10'' sound appears to converge towards a few number of tones (nearby F4, A#4, E5-F5, B5, E6) and this dense block of sound progresses until 10'11''. Then a rich combination of overtones fades in: they enlarge the sonic compass and change the global form of sound towards a more pronounced instability and oscillation (see right inlet, Figure A.38). Next, a similar transition (*i.e.* from an expanded drone to a more condensed profile and vice-versa) occurs and the central part in which sound is centred within a limited range of medium frequencies emerges from thirteen to fifteen minutes, then sound expands again towards high frequencies (including pitches such as G#7, ~3259 Hz; G#8, ~6153 Hz; ~D#9, ~9.8 – 10.2 kHz) fading out at 17'00''.

- [17'00'' – 23'54'']

The new section progresses similarly to the previous one while it integrates a great number of oscillating tones within a very large frequency range. From seventeen

to twenty-one minutes, a progressive growth takes place: sound assumes a wave motion that is generated by periodic changes in dynamic and frequency. This undulating motion continues also when sound starts to vanish and a just few number of tones are present (at 23'50'', F[♯]3, ~188 Hz; C5, ~527 Hz; F[♯]6, ~1456 Hz; B[♯]7, ~4050 Hz; D9, ~10 kHz; F[♯]9, ~12 kHz).

- [23'55'' – 29'50'']

The new episode emerges with a clear undulatory character (coming from previous section) alternating sonic events with thick and saturated sounds with more extended arrangements. A continuous expansion of spectrum is due to the sequential appearance of new pitches in medium and high frequency ranges: F7, ~2800Hz; G[♯]7, ~3310 Hz; A[♯]7, ~3660 Hz; A[♯]7, ~3850 Hz; C8, ~4208 Hz; C[♯]8, ~4270 Hz; C[♯]8, ~4270 Hz; D8, ~4713 Hz; E8, ~5263 Hz. The sound continues to develop a dynamic movement together with a micro-scale oscillation of frequency for each tone (Figure A.39). The music systematically moves to higher pitches and simultaneously fades out (29'50'').

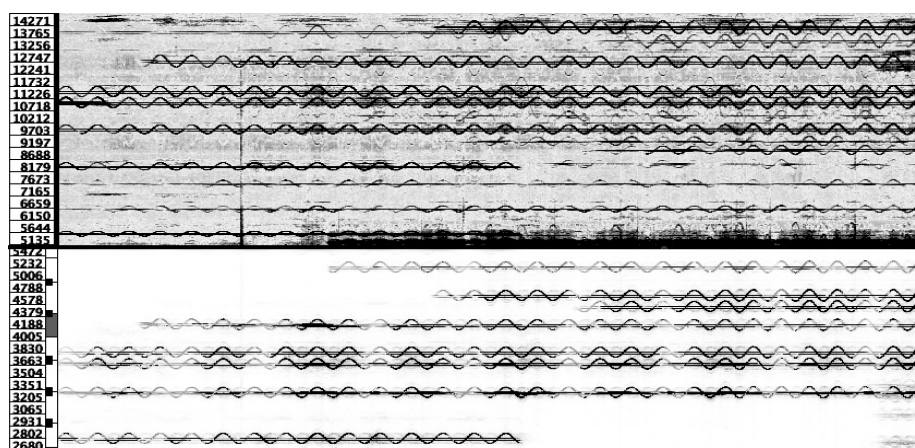


Figure A.39 Spectrogram [top: 5.1 – 14 kHz; bottom: 2.6 – 5.4 kHz / 26'10'' – 28'00'']
of Säteily.

- [29'51'' – 39'19'']

The sound appears very soft and subtle and gives the impression to be a sort of echo of louder previous episode (*i.e.* around twenty-seven and twenty-eight minutes). At

31'05'' a very slow glissando begin, the ascending motion is indiscernible but gives the vague sensation of a sliding movement: two tones, B $\sharp$ 4, ~484 Hz and E $\flat$ 6, ~1345 Hz, move up to C5, ~524 Hz and F $\sharp$ 6, ~1480 Hz correspondingly (32'27'', Figure A.40, three horizontal squares on the left side).¹⁷⁵

The music progresses continuously overlapping tones in medium and high ranges of frequencies. Regular modulations follow one another and –in some cases– these transitions are faster and more evident (e.g. from 33'30'' to 33'50'', Figure A.40, right vertical square).

Sound continues its metamorphosis: Pan sonic create at times stable musical scenes (e.g. 36'03'' or 38'28'') while in other cases they generate slow transitions between them (e.g. from 37'00'' to 38'06'').

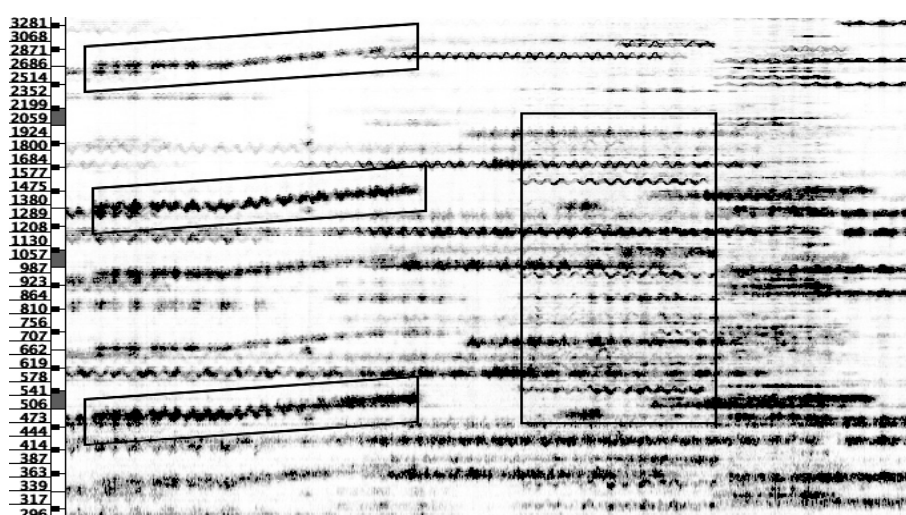


Figure A.40 Spectrogram [290 – 3200 Hz / 30'14'' – 36'08''] of Säteily.

- [39'19'' – 44'30'']

The next episode of *Säteily* appears as a slow echo of previous chapters, almost submerged into a very rich spectral construction. From 41'21'', the new sonic line emerges, high frequency tones disappear and the sound seems to concentrate in the medium range of spectrum becoming more present and concrete (43'04'').

¹⁷⁵ This long horizontal construction recalls some pieces of Lang (e.g. *DW8* and *DW17*) and Haas (e.g. *in vain*). Moreover, the parallel *glissandi* among different pitches is a technique frequently used by Haas in his pieces.

- [44'31" – 49'45"]

The global sound that emerges from 44'31" appears unnatural as it is generated by a digital manipulation. The reason of this impression rests on inner characteristics of single sounds: they are mainly located in the medium range of frequencies but some of them extend to high extents of the spectrum (*e.g.* F $\sharp$ 7, ~2723 Hz; B7, ~3943 Hz; B $\sharp$ 8, ~8042 Hz and F $\sharp$ 9, ~11.8 kHz). In this way, the sound lacks of stable fundamental tones in bass region and might generate the impression of an unnatural manipulation of sonic spectrum. From 47'33", the sonic texture becomes more simple and converges towards few pitches; it undergoes two transitions (*i.e.* 47'58" and 48'55") that generate additional fluctuations (*i.e.* binaural beats) and then it stabilizes (49'30") and continues steady.

- [49'45" – end]

From 49'45" the sonic mass grows and the concentration of sounding line within the range of 100 – 3600 Hz is very high (Figure A.41, area A). This dense mass of sound evolves and transforms while several tones fade in and out. At 54'44", the global sound narrows within a range of 100 – 1300 Hz and the dynamic starts to create recurrent profiles.¹⁷⁶

At 57'42" the music appears to vanish and leaves few tones resonating in the medium and bass range which almost reconstruct an E open chord (E $\sharp$ 3, ~168 Hz; B4, ~492 Hz; E $\sharp$ 6, ~1345 Hz, Figure A.41, area C). There is still a very high resonating tone at A $\sharp$ 9, ~14.5 kHz which creates a sort of dreamy atmosphere (Figure A.41, area B). During the final minutes, from 58'13", music accentuates its fluctuating character typical of many episodes of the piece: several tones in the medium and high region of spectra emerge and combine with the bass and very high sounds.

¹⁷⁶ There is here an interesting parallel with Haas' *String Quartet n°2*. In some part of Haas' piece, in fact, sound is dynamically controlled by sequential *crescendi* and *diminuendi*, creating a sort of repeated dynamic unit (*pp* < *mf* > *pp*; Figure A.4 and Figure A.41, area C).

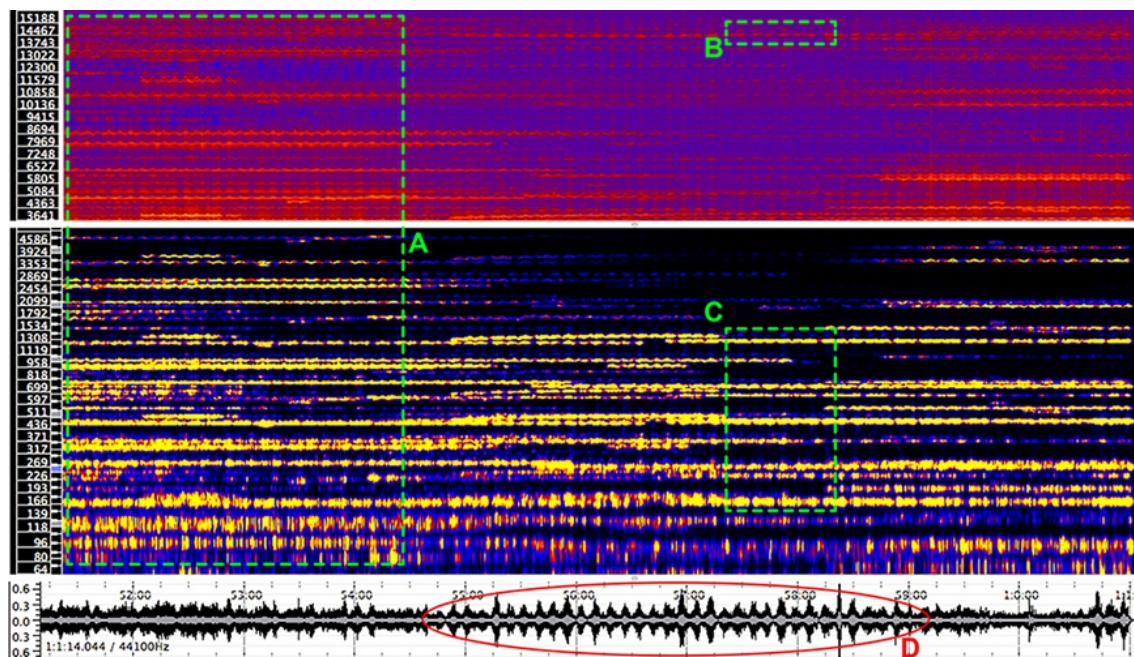


Figure A.41 Multilayered representation [top: spectrogram 3.6 – 15.5 kHz, centre: spectrogram 64 – 5000 Hz, bottom: waveform / 51'00" – end] of *Säteily*.

- Overview

Säteily is a piece clearly conceived as a minimalist composition (it is not a case that the piece is dedicated to Charlemagne Palestine): it is composed as a single indefinite and ever-changing drone. Throughout the evolution of *Säteily*, sound spectrum is usually transformed using slow processes and music gradually passes through different sonic scenes. The inner profile of tones is often composed by superimposition of steady and undulatory sounds (Figure A.39) while the global evolution consists of the succession of different combination of layered tones. Sometimes this layering of sounds is extended over the whole spectrum, other time it is concentrated on few main frequencies creating a sort of contraction of sonic space.

Frequently the dynamic generates additional throbs and create the impressions of a great instability. In many episodes, the music recalls spectralist (e.g. Murail's *Désintégrations* or Ligeti's *Atmosphere*) as well as minimalist compositions (e.g. Lucier or La Monte Young's pieces). Even if electronic source allows an enormous variety of timbre, in *Säteily*, the sound traverses a large spectral region yet remaining uniform in

terms of shapes and profiles.

The primal elements that characterise this pieces are the composition of static and dense masses of sound (E) which throb under dynamic and microtonal manipulations (B) and occasionally this accumulation of tones interfere one another creating pulsated and regular cadences (D). Sonic spectrum is extensively explores (A) and listener is immersed within a hypnotic (amniotic?) sonic environment.

A.3 Bernhard Lang

GENERAL NOTE: Lang's pieces selected for this study belong to the anthology *Differenz Und Wiederholung*. One of the primal characteristic of these compositions is the repetition of musical elements which are often constituted of complex articulation of components. This aspect has required the use of a particular terminology to articulate the hierarchical organisation and to make easier and clearer the analysis. Therefore, I refer to terms such as “*cell*”, “*unit*”, “*cluster*” as part of a specific hierarchical structure, as evidenced in Figure A.42:

- *cell* refers to the smallest musical element that is then repeated. It could be simple or, most often, articulated in a complex combination of short interventions. In some cases a repeated *cell* may consist just of a musical profile (and not of an exact group of sounds), in a way that the repetition of *cells* generate a larger sonic design (“cell#5” in the right inlet of Figure A.42).
- The *unit* is a series of repeated *cells*. It could be composed of a single *cell* (“cell#6” in Figure) and it usually contains starting and ending portions that demarcate its beginning and end.
- A *unit-cluster* (for brevity *u-cluster*) is a pattern of more *units*, which can themselves be identical or different (*e.g.* in Figure A.42, “unit-cluster 2” is composed of *units* of different size).

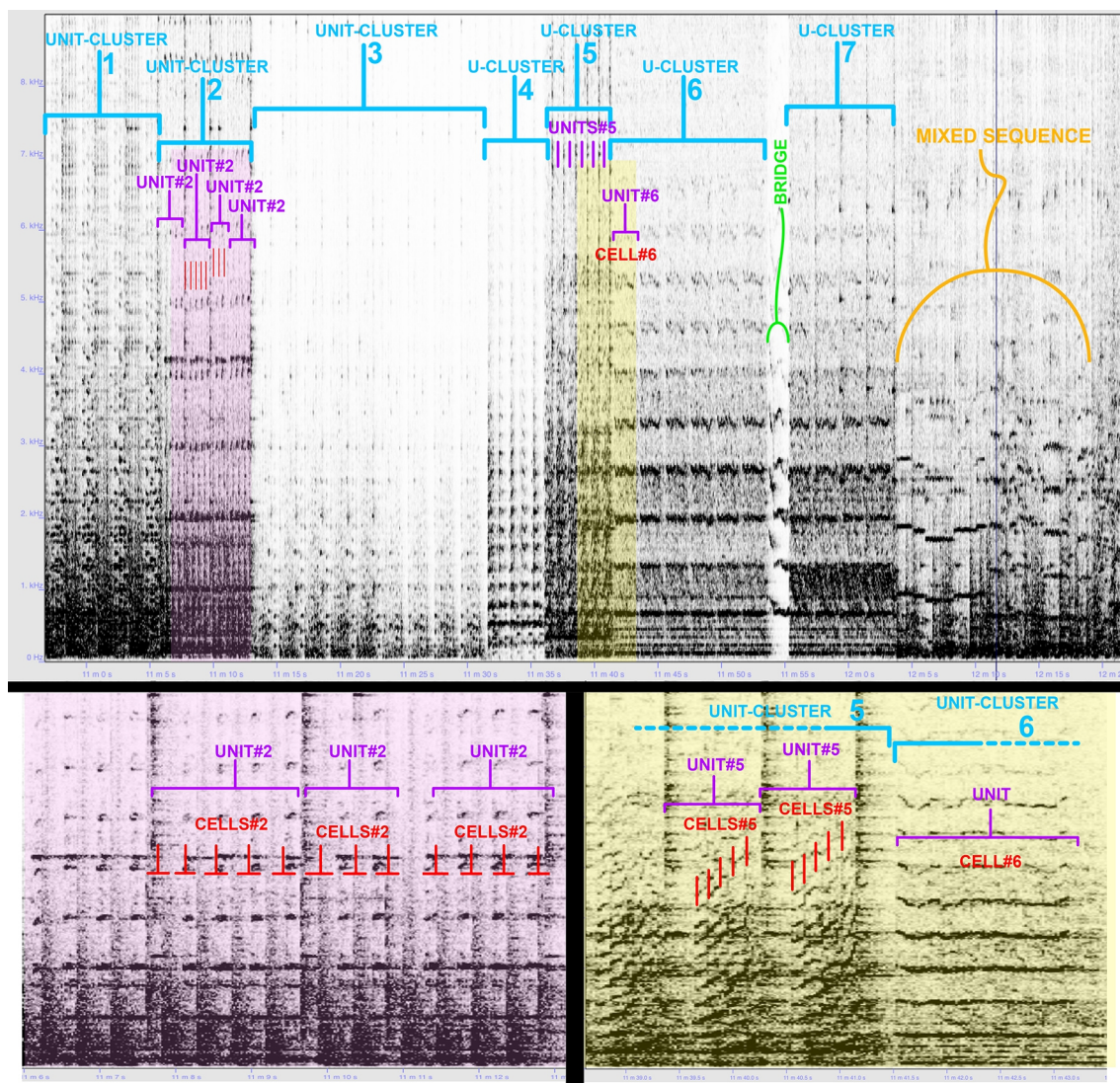


Figure A.42 Representation of spectrograms [top: 0 – 8.5 kHz, bottom inlets: enlarged images of the corresponding coloured areas in the main spectrogram / 10'55" – 12'20"] of DW14 to illustrate the nomenclature used in this analysis.

Sometimes single events works as bridging module or a fast turnover of very short unit-clusters produce polyrhythmic and mixed sequences.

More in general, within the large selection of Lang's pieces, these structures are flexible and often their combination is more various and elaborated; even so it turned out to be useful to use a consistent terminology in order to identify similar practices in different episodes. Lang's compositional approach is efficaciously represented with monochrome spectrograms over which coloured forms and symbols are embedded:

TIAALS software has been employed in this type of analysis.

Differenz / Wiederholung 2 (1999)

AUDIO [54'07'']: Klangforum Wien, Sylvain Cambreling. Edition Kairos (Austria, CD-0012112KAI)

NOTE: Being not possible to access to the score, the analysis has been carried through aural and spectral examination and the reading of the notes of original CD edition. CD-version is a live recording of the piece (Konzerthaus Wien, April 7 and 8, 2000). *Differenz / Wiederholung 2* (from now on *DW2*) is a multimedia piece that includes a music performance of an electronic instrumental ensemble and three singers as well as a video installation on multiple projection walls. *DW2* is based on texts by Gilles Deleuze, William Burroughs and Christian Loidl and the instrumentation includes: a Kurdish singer; a Rapper; a classical singer; an oboe, a clarinet, a tenor saxophone, two cellos, a double bass, a synthesizer (Yamaha 77/99), a snare drum and a full drum, a series of metal and wooden percussions and objects (included a washing machine barrel with pickups) and six plateaux of different characteristics, a marimba, an electric guitar, an electric violin.

• *GENERAL SCHEME*

Sections	sub-Sections	Attributes (<i>ordered from the most fitting</i>)
01 – Dead Repetitions	[00'00'' – 03'03''] [03'04'' – 05'08''] [05'09'' – 06'35''] [06'36'' – end]	F, A, H, D // G, C, I
02 – Habit	[00'05'' – 01'40''] [01'45'' – 05'40''] [05'41'' – 06'35'']	F, D, H // C // B, A, E
03 – The Ovens	[00'00'' – 02'34''] [02'35'' – 05'52''] [05'53'' – end]	E, F, A // C, H, B, G
04 – Image / Idea	[00'00'' – 01'19''] [01'20'' – 03'32''] [03'33'' – 04'27'']	E, I, D, B // H, C

	[04'48'' – end]	
05 – Prisoners	[00'00'' – 01'06''] [01'07'' – 03'53''] [03'54'' – end]	A, D, F, H // E
06 – Need	[00'00'' – 02'00''] [02'01'' – 03'58''] [03'58'' – end]	D, E, F, H // A, B, C
07 – Repetition And Difference	[00'00'' – 01'51''] [01'52'' – end]	G, A, D, F // H
08 – The Ovens Reconstruction	[00'00'' – end]	E, F, D, H // A

DW2 – 01 – Dead Repetitions [08'31'']

- [00'00'' – 03'03'']

The composition begins as an extended ensemble–jazz: drums and percussion beating tempo; double bass playing walking bass lines, guitar and wind instruments playing short and *solo* interventions. At the beginning the metering remains fairly continuous though changing timbre and passing from one instrument to another, so the organization of repeated mini u-clusters is not very evident. The rhythm of different u-clusters proceeds smoothly without any clear transition. These transitions become more and more evident when units gradually differ one another and are longer (01'36''). The units of each u-cluster are composed of repeated cells made of interlaced interventions of instruments (*i.e.* drums and percussion, bass and wind instruments).

There is a common polyrhythmic tendency within each single u-cluster and as soon as the metric seems established and becomes obsessive, a new element emerges breaking the reiteration and opening to a new unit-cluster. Generally wind instruments perform continuous sounds under which polyrhythmic pulsations create loops of different shapes. Units of different tempo and length follows one another and the general effect is of a frenetic succession that generate a sort of syncopated and chaotic stream of music. Occasionally unit-clusters recall one another (being composed of similar units) or one u-cluster anticipates another, for instance the one at 02'43'' – 02'45'' introduces a more extended similar one at 02'49'' – 03'02'': four distinct

elements (of drums, percussions, double bass and wind instruments, see Figure A.43) exemplify the common character of these unit-clusters.

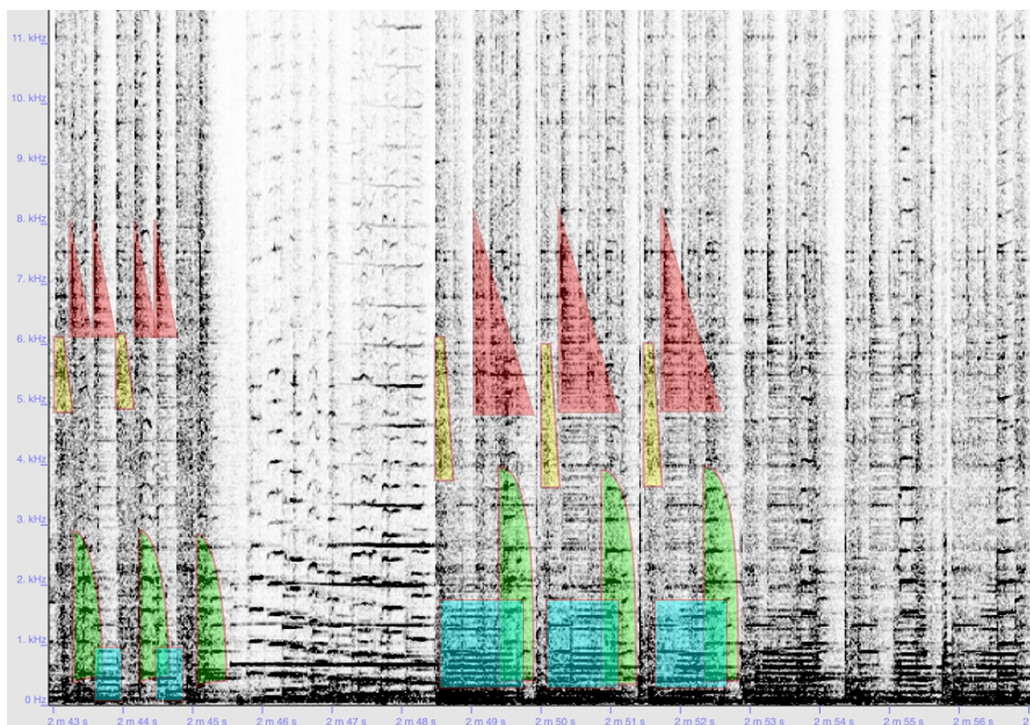


Figure A.43 Spectrogram [0 – 11.5 kHz / 02'43" – 02'57"] of DW2–Dead Repetition.

In most cases, the complexity of each cell rests on the fast combination of different timbres and the diversity of sonic elements that –taken separately– are quite simple (*e.g.* single notes, short sounds, simple drum's beat...): each cell is made up of many minimal elements whose combination forms complex units and u-clusters. These, in turn, having different lengths and speeds (*i.e.* loop length, rhythm and pulsation), form very complex and elaborate episodes.

- [03'03" – 05'08"]

The emergence of the voice clearly emphasizes a key element of this composition: the idea of reproducing a “broken disk” and a “defected device”. The vocal line is fragmented, each portion is repeated generating suspended loops (*e.g.* 03'40" – 03'50") until the mechanism is released and music proceeds. In fact, musical structure is much more complex than a simple reproduction of an “undetermined

glitch”: there are micro and interlaced modulations between repeating and changing elements. Frequently, cells of the same type appear expanded or modified in different u-clusters (“A” and “B” in Figure A.44).

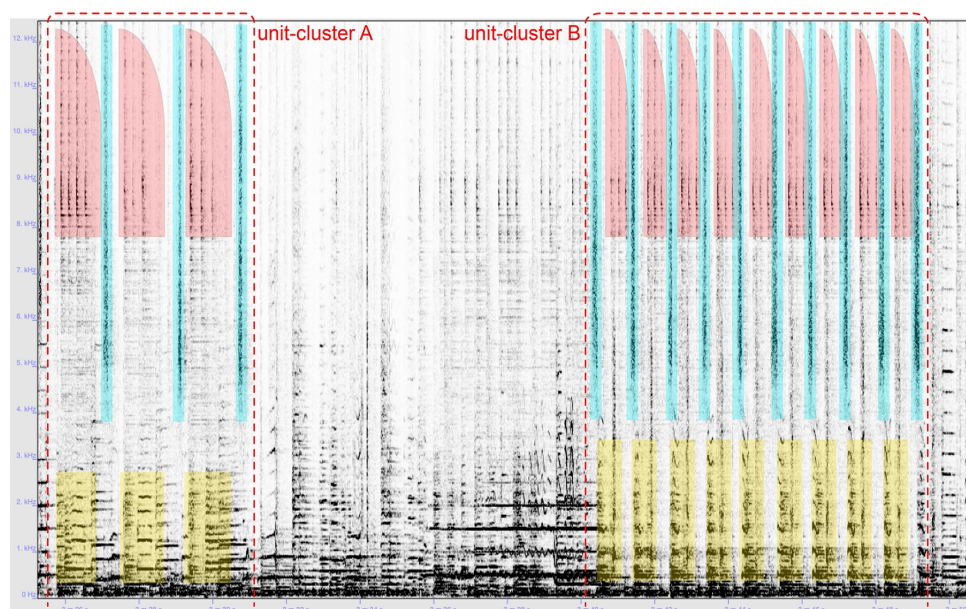


Figure A.44 Spectrogram [0 – 12.5 kHz / 03’25” – 03’50”] of DW2–Dead Repetition. Coloured areas indicate the same elements that compose cells of different clusters.

The first sonic result is that one of a defective mechanism, but a most careful listening allows to distinguish a more articulated composition. On the one hand, the comparison between the loop at 04’02” and the successive one in which the voice first sings a fragment of a word (“*trou-*”) and then the complete word (“*trousers*”), is a good example of this broken mechanism typical of Lang’s elaboration of glitch’s aesthetic. On the other hand, at 04’29” the singer recites “you drag yourself into bed” and initiates a new loop consisting of an instrumental descending movement. The voice, here, works as leading element that influences the instrumental parts, thus revealing a more elaborated design.

Later (from 04’30”) the vocal line continues to have a leading role in the musical evolution but proceeds linearly and does not take part in the instrumental evolution of loops which continues to create interlaced repetitions. Nevertheless the text reveals a strict connection with the musical forms.

It is so wearisome. First you put on your shirt, then your trousers; you drag yourself into bed at night and in the morning drag yourself out again; and always you put one foot in front of the other. There is little hope that it will ever change. Millions have always done it like that and millions will do so after us. Moreover, since we're made up of two halves which both do the same thing, everything's done twice. It's all very boring and very, very sad (notes of original CD, (Deleuze [1968] 2004, 4)).

- [05'09" – 06'35"]

This episode begins with an instrumental section made of u-clusters which work as a bridge between the two major episodes and recall broken mechanisms of clocks or other devices. At 05'24" a new part with the voice begins: instruments and voice develop a sequence of short fragments that are at times more cyclical and continuous.

- [06'35" – 08'31"]

There is a long instrumental progression in which the unit-clusters become more intense, rich and complex. It is very clear the use of common elements between repeated units: a single musical component or a cell is repeated equally through two different units. This episode starts with a few percussive elements, and Lang gradually adds wind instruments, noises and the full ensemble that generate an increased tension. From 07'22" the saxophone substitutes the voice as a soloist and the end of the section has a similar atmosphere of the beginning of the piece (*e.g.* typical of the sound of the electric guitar with the *wha-wha* effect) almost creating a circular structure.

- *Overview*

The first track of *DW2* consists of very short u-clusters in repetition: in some cases they follow one another maintaining rhythmic and dynamic elements, other times the transition is abrupt.

The extended instrumentation allows a huge variety of timbres (wind instruments, voices, percussion of all kinds); rhythmic elements create fragmented arrangements which are at the same time repetitive and unexpected. The iteration of different short units works as mini u-clusters has a hypnotic function: the unit is often very short and its repetition provides a rhythm but also produces a very high number of iterations. Hence the redundant and *trance* effect does not arise, in this case, from the duration of musical episode rather from its fragmentation. The *turntablism* aesthetic is

present in the idea of the *glitch* that breaks the musical evolution and suspends the music outside the narrative flow in such a way that the sound produces a hypnotic effect.

The main attributes of this track are the richness of timbre (A), the repetition of different modules (E) and their hypnotic effect (H), the presence of rhythm and pulsated episodes (D). The u-clusters follow one another creating dynamic contrasts (G) and within each unit (that includes repeated *glissandi*, (C)) the cells are at times composed to emphasize the morphological arrangement of sonic elements (I).

DW2 – 02 – Habit [07'20'']

- [00'05'' – 01'40'']

Drum and double bass create a initial scene that is characterised by both a static atmosphere and a pulsated nature typical of jazz and improvised sessions. The continuous *glissandi* of the electric guitar develop a sort of oscillating and dreamy atmosphere while wind instruments interfere with sustained tones.

- [01'45'' – 05'40'']

The presence of a spoken voice soloist enhances the *performative* character of the episode and music serves the dramaturgy of the text.

From 02'57'', Lang creates a sort of plastic interaction between two voices using regular and irregular modules (*i.e.* the classical singer which repeats the same word “*habit*” and the spoken voice which continues to recite the text). The cell here is a complex combination of elements (a single cell lasts over five seconds): keyboards play an almost improvised pattern of lines, wind instruments play continuous notes and percussions mark regular and sparse pulsations. The u-cluster is interrupted by an intervention (*i.e.* a u-cluster from 03'35'' to 03'45'' and a similar one at 03'59'' – 04'05'' , Figure A.45) that due to its simplicity and regularity, works as a sort of temporal suspension of musical flow.

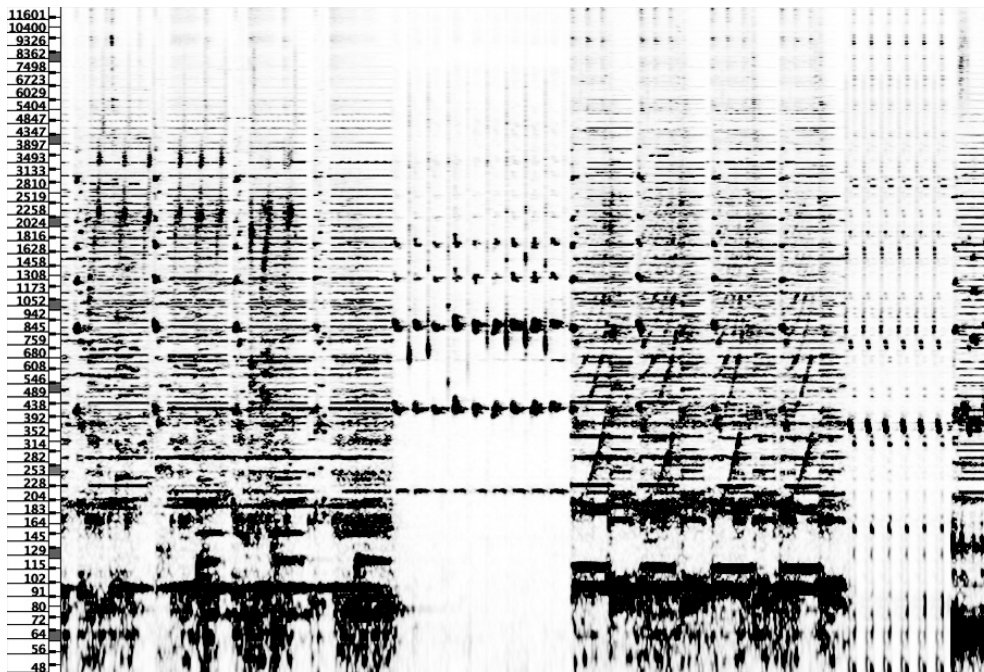


Figure A.45 Spectrogram [48 – 11600 Hz / 03'18" – 04'06"] of DW2–Habit.

At 04'45" music is characterised by distinct sonic levels: (i) an instrumental background (drone), (ii) a singing voice, (iii) an instrumental foreground (accompanying the singer), and (iv) a spoken voice. These levels coexist together forming a complex sequences cell and the spoken voice unfolding evenly across different units works as connecting element.

- [05'40" – 06'35"]

The new unit-cluster maintains the same metric and evolution of the previous, but is characterised by the absence of voices. Each unit/cell consists of a layered construction of continuous tones over which an oboe line designs a soloist contour. The u-cluster progressively move towards medium and higher frequency ranges yet keeping its static profile (Figure A.46). The global sound is statically developed being formed by the superimposition of sustained tones.¹⁷⁷

¹⁷⁷ There is an interesting similarity with certain episodes of Haas and Pan Sonic's pieces. The reiteration of sustained patterns of sound which generate a sort of suspended temporal flow is typical of several composition within the selection of pieces (e.g. Figure A.12).

- [06'35" – end]

The ending episode of the *DW2–Habit* presents the same elements of the beginning with the hypnotic progression of *glissandi* played by the guitar (Figure A.46).

- *Overview*

DW2–Habit shows how Lang's compositional approach in u-clusters, units and cells extends towards a more elaborated musical discourse. The leading role of spoken voice within the musical evolution increases the impression of a performative and theatrical piece: sound serves the dramaturgy and the meaning of the text. Nevertheless, keeping the focus on sonic material, this is more complex and often composed with layered combinations of tones. Besides the typical elements of Lang's anthology *Differenz Und Wiederholung*, that are centred on repetitive elements (E, D, H), there is an intense use of systematic glissandi (C), and in many cases the unit consists in a dense mass of sounds (A, B, E, Figure A.46).

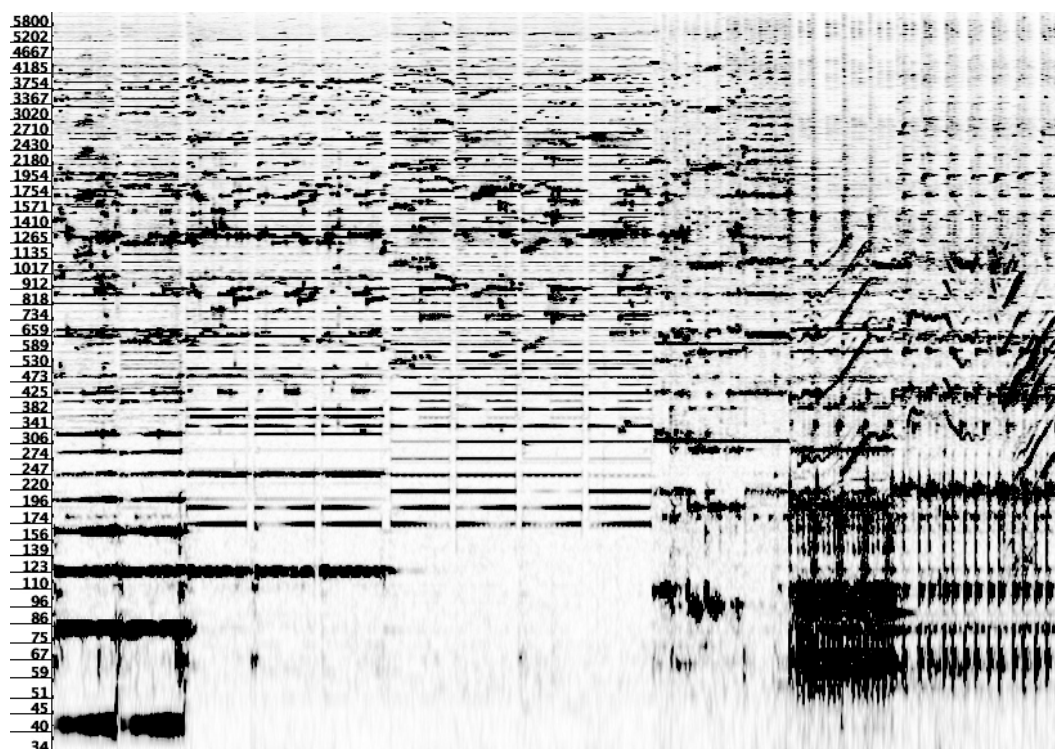


Figure A.46 Spectrogram [34 – 6000 Hz / 05'49" – 06'53"] of *DW2–Habit*.

DW2 – 03 – The Ovens [07'05'']

- [00'00'' – 02'34'']

DW2–The Ovens is a mixed section characterised by frequent changes of rhythm, timbre and dynamic. The u-cluster's organisation is better seen as a fast turnover of short repeated units (that often consist of a single sonic cell) all kept together by the continue presence of the soloist Kurdish singer. Globally, the stream of music of this episode appears similar to improvised sessions in which groups of instrument accompany the singer. However, Bernhard Lang is known as a very meticulous composer (Sanio 2010; Hiekel and Utz 2016, 539) and a more careful listening allows the recognition of defined metrics and written sequences. The accurate interplay of different types of sound (vocal and instrumental, electric and acoustic, harmonic and noisy) creates a tight arrangement that behaves as a unique ever-changing mass of sound.

- [02'35'' – 05'52'']

There is a progressive multiplication of vocal lines: from 02'35'' the entrance of the spoken voice joins the initial Kurdish singer and at 03'40'' the female voice starts to emerge. At 02'35'' a series of sound elements in the bass frequency range (*i.e.* drums and bass interventions) disappears and the sonic material converge with a medium range of frequencies (Figure A.47). From 03'11'' the electronic interventions become more frequent with an intense interplay with acoustic instruments. From 04'43'' the sequence of events become more chaotic: they start to be perceived globally rather than as a succession of singularities. There is a static yet polyrhythmic structure which gives a sense of both immobile and chaotic nature: it seems an attempt to simulate the chaos of an urban metropolis.

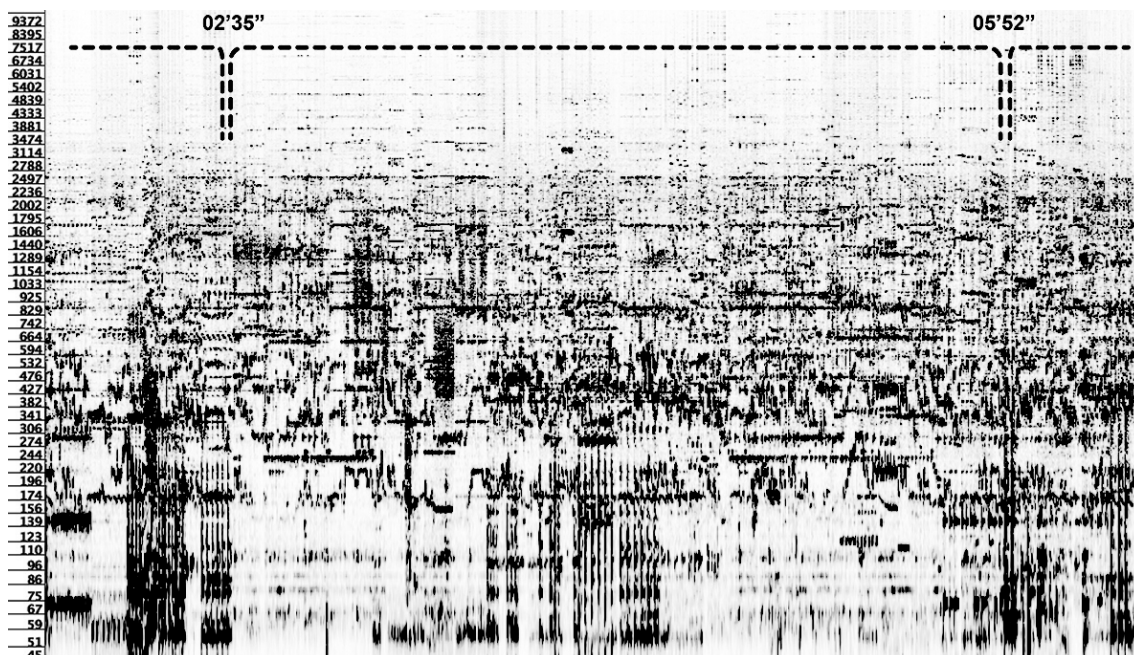


Figure A.47 Spectrogram [45 – 9400 Hz / 01'48'' – 06'27''] of DW2–The Ovens.

- [05'52'' – end]

Two beats of drum at 05'52'' open to the ending episode which shows more clear transitions between u-clusters even if the musical flow continues to be chaotic. Percussive instruments have a more important role in defining u-clusters and close to the end, music progressively becomes more simple, the Kurdish singer emerges as the leading voice and the articulation of sounds tends to become sparse and simple.

- Overview

DW2–The Ovens, similarly to many works of Bernhard Lang, is more easily conceived from an overall perspective: there is a unified idea of sound which integrates microscopic workings of infinite sonic details and nuances that escape from the perception. Lang, in particular in the central section (02'35'' – 05'52''), uses a dense sonic palette to form composed structures that are audible as unique sonic shapes and in a way might recall several past examples of figures such Schoenberg (*Klangfarbenmelodie*), Varèse, Xenakis. This complex conception of sound could be seen as a musical material that is turbulent but non-teleological (E): listener is immersed in a sort self-generating sonic environment (E, H).

The premises of this study allow to focus on the aural analysis in order to extract useful elements for comparative purposes; however one cannot ignore the fact that *DW2* is a piece conceived for instrumental ensemble, three voices and a video projection. These characteristics acquire a particular sense in *DW2–The Ovens* which shows a spectacular interplay between singers and interpreters and partially give an explanation for the intense character of the piece.

DW2 – 04 – Image/Idea (Harmonia Differentia Minima) [06'50'']

- [00'00'' – 01'19'']

DW2–Image/Idea begins with a series of sustained tones grounded on $E\sharp^1_1$, ~42 Hz; $E\sharp^2_2$, ~84 Hz; $E\sharp^3_3$, ~166 Hz; A5, 880 Hz; A6, 1757 Hz; and some overtones in the range of 5.5 and 11 kHz. The resulting drone is extremely primitive and crude: it starts with sounds whose frequencies are exact multiples of the fundamentals. Lang's exploit minimal differences in wavelengths to generate interferences (Figure A.48), the initial tones progressively change and diverge from the original frequency, (*e.g.* at 00'11'' the tone at 84 Hz enlarges to 86 Hz, $F\sharp^2_2$). These modulations, producing binaural beats in spectral regions of 120, 200 and 240 Hz (Figure A.48), increase (*i.e.* make large the distance between fundamental and modulating frequencies, see dashed arrows in Figure) in the way that they create faster oscillations until 01'19'' when the restoration of a simple chord occurs. In this first episode, a single intervention of a voice ("*What is an image?*") is discernible in the background.

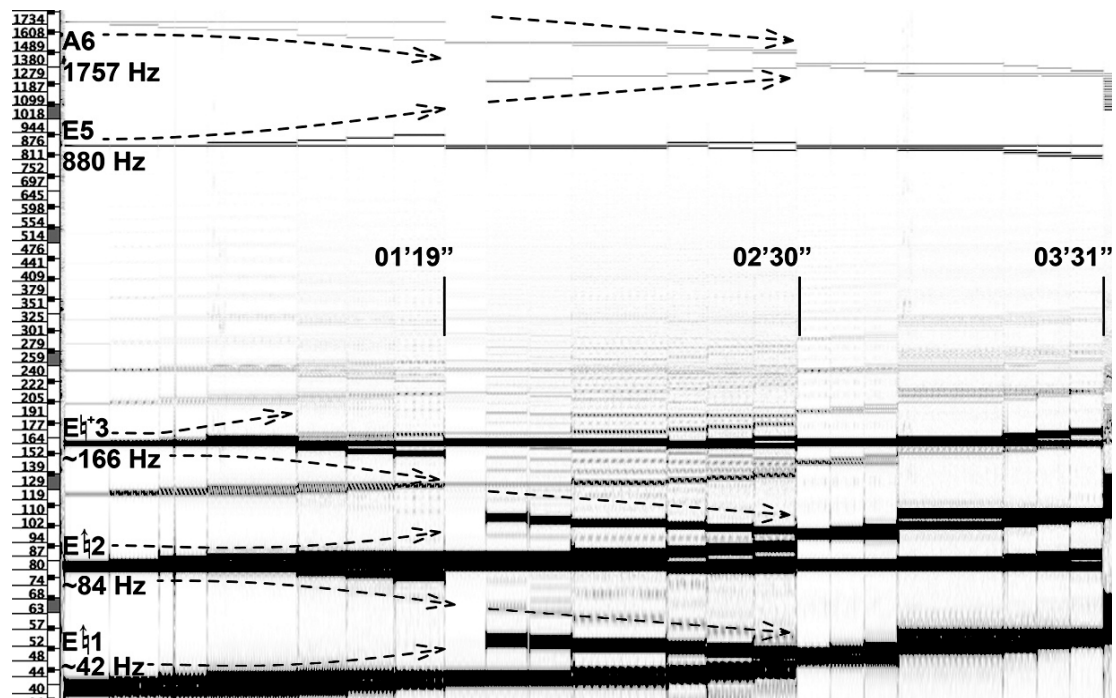


Figure A.48 Spectrogram [36 – 1740 Hz / 00'03'' – 03'32''] of DW2– Image/Idea.

- [01'20'' – 03'32'']

The complexity of chord intensifies in the second episode: every nine seconds a new layer of tones is added and the resulting sound becomes more thick and compacted. In this second episode, however, the movement is inverse: from 01'27'' the new tones converge stepwise until 02'30'' but at the same time the fundamental tones split themselves creating a double series of beats.¹⁷⁸

- [03'32'' – 04'27'']

The new episode that begins at 03'32'', reaffirms the static nature of the piece but in this case the sound proceeds steady: tones do not split or converge but persist in the same range of frequencies. It is a block of sound that incorporates noises in high frequencies and appears to be like a sort of self-activating intervention.

¹⁷⁸ The similarities with Pan Sonic and Rioji Ikeda pieces (e.g. *Linjat*, “+.” and “–.”, Figure A.83 and A.86) are evident and consist in the accuracy with which tones are selected in order to create sonic interferences.

- [04'28'' – end]

From 04'28'' the movement of tones is restored, but the sound is more rich in medium/high frequencies (800-1200 Hz). A new isolated intervention of a spoken voice occurs but it is immersed within the sonic mass that pervades the space. Music continues to develop similarly to the first parts (interrupted only twice for stationary vocal interjections at 05'38'' – 05'53'' and 06'22'' – 06'36'') until the end.

- *Overview*

DW2–Image/Idea is a pure electronic static block with beats and microtonal variations. The rhythm is generated by binaural beats rather than by acoustic instruments. These pulsations change quickly and form short sections with different cadences. In a way, these short portions work as mini u-clusters. At times, a reciting voice appears but remains submerged within the mass of sound. The latter does not reflect a sonic *presence* rather one may have a sense of emptiness that evokes a sort of impersonal vacuum. The immobile sections at 05'38'' and 06'22'' recalls the mechanical sound of a flat encephalogram: from the pulsation of previous sections to a flat profile (death?).

The key elements of this part are clearly the static nature (E) and the plastic use of tones, as tools to generate beats (I, D).¹⁷⁹ There is of course a scrupulous use of microtonality (B) and gradual pitch movements (C, even if in this case they do not proceed in *glissando*) and a global hypnotic effect (H).

DW2 – 05 – Prisoners [05'41'']

- [00'00'' – 01'06'']

In *DW2–Prisoners*, Lang comes back to the structure made of short u-clusters of the first sections (e.g. *DW2–The Ovens*). Drums, percussions and double bass design a complex rhythmic texture and wind instruments and voice play in foreground. Several u-clusters, made of fast repetition of units/cells, follow one another. At 00'32'' a sharp

¹⁷⁹ In this sense, a parallel could be drawn with Alvin Lucier's music and also to Riccardo Nova's conception of sound as a "final result of the superimposition of the pulsations that compose it" (see Chapter IV).

intervention of voice introduces a new u-cluster with a leading role of the female singer. At times (00'41'' – 00'46'') new blocks interrupt the sequence of short u-clusters interfering with the linear temporality of music.

- [01'06'' – 03'53'']

From 01'06'' the speaking voice emerges on top of a frenetic sequence of short loops of the singer and instruments. This evolution sometimes becomes more simple (e.g. 02'47'') and then restarts adding new elements. From 02'58'' to 03'44'' the density of interventions increases creating a stream of sound composed by a great number of microscopic parts: sound is an accumulation of elements which are indeterminable and turbulent and could be perceived only as a global sonic mass.

- [03'53'' – end]

In the final section of *DW2–Prisoners* music becomes more simple, the fast turnover of short u-clusters is replaced by slower and more extended u-clusters characterised by a few number of instruments. In these u-clusters, voices (*i.e.* speaking voice, classical and Kurdish singing) emerge and move to foreground. The u-cluster from 03'59'' to 04'17'' includes sequential progressions of sound in bass and medium frequencies which diverge creating the impression of a repeated event that from a single point splits in opposite directions (Figure A.49). This section contains a series of well defined u-clusters, easily discernible.

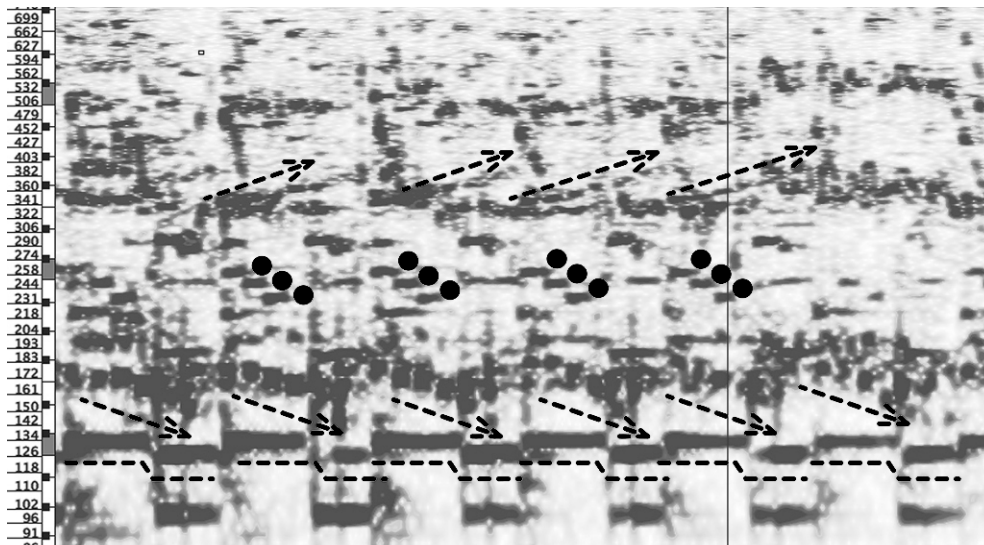


Figure A.49 Spectrogram [85 – 700 Hz / 03'58'' – 04'14''] of DW2–Prisoners (original greyscale of spectrogram is adjusted to favour the recognition of black marks).

- *Overview*

DW2–Prisoners is characterised by a mixed form in which a series of micro events generates a dense sonic material. In the central part of the piece, this material reaches an extremely chaotic development (*i.e.* 02'58'' to 03'44'') while at the end the music returns to essential elements and the repetition of units becomes more regular and mechanic.

Similarly to *DW2–The Ovens*, the richness of timbre (A), the rhythmic and hypnotic structure (D, E, H) are key element of this piece. However, the central part could be perceived as a musical aggregation that, even with the presence of the speaking voice, may be perceived as static (E). If the episode is considered from a pure aural perspective, disregarding the contextual and performative elements, the listener found himself immersed in a single and indistinct corpus of sound.

DW2 – 06 – Need [06'35'']

- [00'00'' – 02'00'']

DW2–Need starts with a sustained drone based on A minor chord with a C2 as fundamental tone (*i.e.* double bass) and a series of *glissandi* of voice and wind instruments in medium/high frequencies. There is a harmonic layering of sounds (*i.e.*

C2, 65 Hz; A2, 110 Hz; C3, 131 Hz; A3, 220 Hz; C4, 261; E4, 330 Hz) to which is added a series of modulations (C#3, 138 Hz; F#3, 185 Hz) and microtonal interventions (G#5, 847 Hz; F#6, 1423 Hz, Figure A.50). Double bass marks a slow cadence and when every unit begins, new tones enrich the density of sound. From 01'17'' the Kurdish voice emerges while the complexity of the sonic texture increases.

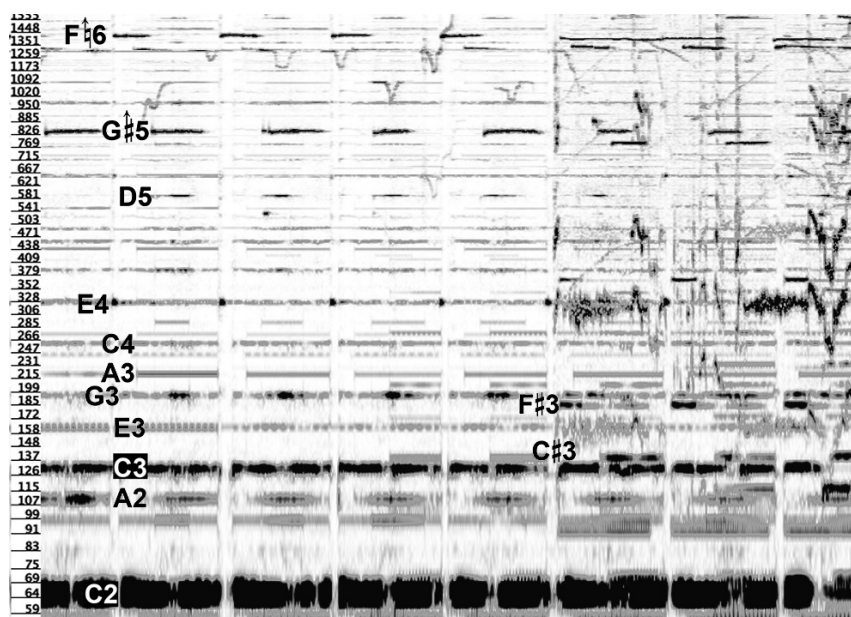


Figure A.50 Spectrogram [83 – 1450 Hz / 00'37'' – 01'38''] of DW2-Need.

- [02'00'' – 03'58'']

The Kurdish singer characterizes the begin of a new episode. The soloist voice emerges on top of a very soft background of strings and become progressively more rich. At 02'25'' the speaking voice enters and music becomes more intense: Lang uses microtonal interferences, *glissandi* and sustained tones. Again at 03'00'' the instrumental sound fades out leaving voices in foreground and a new u-cluster (with the same metric of the previous one) begins. Music unfolds with a gradual reappearance of the instrumental sound which consists of continuous tones while voices move on top of this static texture.

- [03'58'' – end]

Synthesizers enters with scattered and repeated interventions, and from 04'29'' a

simple unit emerges. Music is almost characterised by the continuous sound of synthesizers, strings and wind instruments (which occasionally plays *glissandi*) and sparse percussions together with Kurdish and speaking voices. Similarly to the begin, at the end of *DW2–Need*, the instrumental timbre moves forward with a continuous (and repeated) sequence of sounds.

- *Overview*

DW2–Need could be considered as a “one u-cluster piece”: even if the piece is characterised by different episodes constituted by different units, the consistency of a regular rhythm (D) ensures the homogeneity of the repeated module. Sound is static (E), periodic (E, H), rich in spectral exploration (A, B) and soloist lines (of voices and wind instruments) move frequently in *glissando* (C).¹⁸⁰

DW2 – 07 – Repetition And Difference [05’05’’]

- [00’00’’ – 01’51’’]

DW2–Repetition And Difference get back to the atmosphere of first tracks. In this case, the interplay between instruments and voices is more closer to an improvised session than to a written piece: drums, percussions, double bass, electric guitar (with *wha–wha* effect), saxophone and especially clarinet fulfil typical roles of a jazz ensemble. The succession of short u-clusters gives the impression of a chaotic sequence of event that occasionally stops as it were in a stop–motion. The density and the energetic characters become more and more intense and when voice enters (01’51’’) the evolution of u-clusters turns out to be more organised.

- [01’52’’ – end]

In this episode, several u-clusters (02’09’’ – 02’23’’ and 02’49’’ – 02’56’’) are more extended and works as temporal suspension of the turbulent musical flow of the previous section. Lang exploits rhythmic contrasts: music temporality is cut, suspended almost dissolved. From 02’56 the improvised style of the begin is restored (this time

¹⁸⁰ This track of *DW2* has peculiar sonic characteristics which are in common in many composition selected for this study. In particular the superimposition of tones within a regular metric is a practice that it is found in Haas, Pan Sonic, Nova and Raime’s pieces.

with the voice until 03'18''): the interplay among clarinet, saxophone and electric guitar guides the global evolution of the piece, but the nature of the music continues to be strongly chaotic and recalls atmosphere of free-jazz.

- *Overview*

DW2–Repetition And Difference is a piece that approximate more to an improvised session: instruments and voice play an energetic series of short modules and the flow of music seems to be out of control. The presence of static u-clusters that interrupt this evolution break the linearity of time and create musical pauses. There is a very rich use of different sounds (A), dynamic contrast (G) and polyrhythmic structures (D, E). In some way the continuous and disordered evolution of music might generate a sort of trance in the listeners (H).

DW2 – 08 – The Ovens Reconstruction [07'00'']

- *[begin – end]*

At the begin, a mechanical u-cluster fades in: the global sound, made of repeated elements of drums, strings, electronics and modulated voices, replicates an automated process. Sound is continuous and gives the impression to undergo a digital procession that generates additional effects (*e.g.* ping-pong echoes between stereo channels). From 01'18'' the hypnotic reiteration of a new u-cluster is sustained and sound material becomes more dense and rich. In this case, the intensity of sound does not coincide with a chaotic evolution as it were for *DW2–The Ovens*, rather the sonic material is strictly ordered and organised and every new element occupies a precise location in the spectrum. A third episode starts at 02'33'', but the entire evolution of music is rhythmically and dynamically consistent in a way that these transitions do not interrupt the temporality but reaffirm the musical motion. Manipulated voices are regularly dispersed in the stereophonic space and every new unit progressively reinforces the coherence of the piece (*e.g.* the rhythmic pulsation that emerges at 02'57''). The resulting sound is a combination of distorted voices, regular instrumental interventions and bass pulsations. The begin of a new episode (03'37'') changes the metric of the pieces: music becomes an indefinite mass of sounds (with regular intrusions of voices

and drums) that oscillates between the two stereo-channels.¹⁸¹

At 04'35'' and at 05'28'' the sound manipulation becomes more prominent: music is completely distorted in a way that no sound of the traditional ensemble is discernible. From 05'28'' the sonic material collapses: it consists of noise and random masses of frequencies and reaches a full saturated field of noises.

- *Overview*

The last piece of *DW2* (*The Ovens Reconstruction*) is composed as a continuous extended loop (*i.e.* a single u-cluster) which evolves in different forms keeping a unified shape. Instruments and voices here do not assume leading or supporting roles but are part of a unique compositional mechanism. The piece could be seen as a gradual movement from harmonic to noisy frequencies. In this piece, Lang creates a sound which is made of many minuscule components but is conceived as a unique entity.

DW2–The Ovens Reconstruction is characterised by its consistency, the continuity (E) of a single idea of sound which reiterates elements (F, D), hypnotizes (H), and reaches frequency ranges typical of digital electronic manipulation (*i.e.* 20 – 18 kHz, A).

DW2: Final remarks

As previously mentioned *DW2* includes an instrumental ensemble, the three voices and a video performance and it is a composition ideally conceived to be seen live. It is difficult to ignore the strong connection between musical forms (*i.e.* based on repetition of elements) and the meaning of texts recited by the singers. However, the music itself holds a strong character that allows aural and spectral inspections to be powerful analyses to extract useful elements for comparative purposes that are expected for this study.

The *DW2*'s instrumentation is addressed to produce a large variety of timbre and includes a great number of percussive elements. In fact, many musical episodes consist of complex sonic textures of several instruments that repeatedly overlap. These generate

¹⁸¹ In this part, the piece might recall the sound of certain pieces of Pan Sonic, in which the stereophonic movement is a practice to confuse the perception (*e.g.* *Lautturi*, Figure A.30).

a sort of *pointillist* aggregation of sounds. An important part of the work is the creation of mechanisms typical of the turntablism aesthetics (*i.e.* loops, periodic u-clusters, suspended blocks of repeated elements that mimic the glitches of turntable's stylus).

DW 3 (2000)

AUDIO [22'48'']: *DW8/DW15/DW3*. Germany: Col legno, Bayerischer Rundfunk, BR-Klassik, WWE- 20090-CD.

NOTE: The analysis has been carried through aural and spectral examination and the digital version¹⁸² of the score. Lang' notation (in accord with the Helmholtz-Ellis) extends towards quarter, sixth and double-sixths tones; he explains several vibrato techniques and uses specific symbols to indicate different types of repetition (*e.g.* he illustrates the practice of *asynchronous repetition* that works as follows: "the instrument repeats its own cycle n-times. Those whose finishes first wait for the others and then goes to the next step"¹⁸³). CD-version is a live recording of the piece (March 23th, 2004 at Carl-Orff-Saal / Gasteig, Munich). *DW3* (2000) is a piece composed for flute, accordion and cello.

• *GENERAL SCHEME*

Sections	Attributes (<i>ordered from the most fitting</i>)
00'00" – 01'03"	F, D, H // A, G, I
01'04" – 03'02"	A, F, D // H, E, B
03'03" – 03'44"	D, F, H // E, A, B
03'45" – 04'46"	F, E, D, B, H // A
04'47" – 05'40"	F, G, D, A, B // H, E

¹⁸² Manuscript purchased at <https://shop.musicaustria.at/sheetmusic/lang-bernhard/dw-3>.

¹⁸³ "Asynchrone Wiederholungen: die Instrumente wiederholen ihre Schleife n-mal. Die Instrument, die früher fertig werden, warten auf die anderen und gehen dann in den nächsten Abschnitt." (Bernhard Lang, *DW3* score, my translation).

05'41" – 08'25"	D, F // H, B, E, I // C, A, G
08'26" – 11'34"	E, B // F, H // A
11'35" – 14'30"	A, E, B, F // H, G, D
14'31" – 16'18"	D, F, C // H, B, I, G
16'19" – 19'14"	E, H, B, A // C, I, F
19'15" – end	F, B // A, E, H, D // I

- [00'00" – 01'03"]

The begin of *DW3* is based on several repeated u-clusters centred on C6 note. Flute, cello (plays C4, from 00'37") and accordion play this note with different attacks, decays, dynamics, and rhythmic structures. Different combinations of instrumental interventions create units/cells that recall automated mechanisms. The intensity of instrumental attacks generates a very rich harmonic series, especially from 00'54" (Figure A.51).

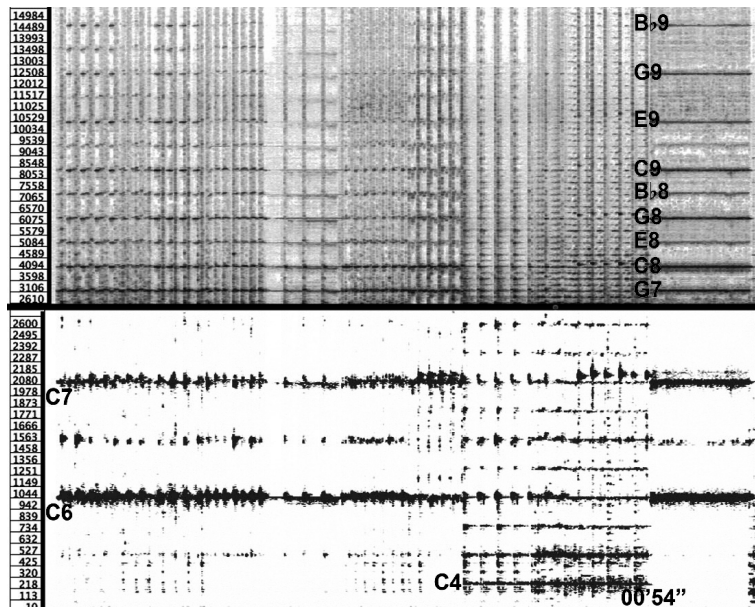


Figure A.51 Spectrograms [top: 2.6 – 15 kHz; bottom: 80 – 2650 Hz / 00'00" – 01'05"] of DW3.

- [01'04" – 03'02"]

The new episode begins with a unit-cluster where cello starts playing microtonal passages (e.g. F2, G2, G[♯]2, A_b2, A_♯2, A_b2) within repeated polyrhythmic structures. Flute and accordion interplay with cello within a sequence of short u-clusters made of few elements. Then from 02'00" a more dense series of modules follow one another. Certain u-clusters are made of single units/cells or a repetition of very short units (i.e. constituted of a single bar). Lang uses a scrupulous notation of instrumental techniques (e.g. multiphonics, whistle-tones, percussive techniques) to create a large palette of different timbres. A series of u-clusters begins (02'52") with sequences of notes (*mf*) repeated several times within a short time: flute plays airy sounds (i.e. "*luftreicher Klang (rauchig)*" in the original score) while cello and accordion interplay one another.

- [03'03" – 03'44"]

The begin of the new episode consists of rhythmic interventions of cello on top of which flute and accordion play long notes. This repeated module incorporates different u-clusters (identifiable in the score) but it is perceived as a unique musical form that progressively expands in timbre, construction and dynamic. Every new cycle

is more elaborated, lasts longer and creates an increased tension in the music until the climax at 03'34".

- [03'45" – 04'46"]

A new rhythmic u-cluster (*i.e.* 03'45") starts this time with accordion and cello and it is constituted of a segmented succession of notes. At 04'03" the development is abruptly interrupted by a single-bar u-cluster (repeated fifteen times, measure 57) that creates a sort of rupture in the temporal flow. Lang creates u-clusters with different metric and incidence: the section at 04'22" contains a very rich spectral exploration and it is characterised by sustained sounds together with microtonal sequences of notes of accordion and cello (there is a specific use of sixth and double-sixth of tones).

- [04'47" – 05'40"]

This new episode contains rhythmic u-clusters that differ in dynamic and intensity. The first episodes with a few cello elements is followed by a complex block that introduces a flute line (05'08" – 05'17"). This sequence of notes played by the flute becomes the central element of the next u-clusters (from 05'18") where flute acquires a leading role (Figure A.52).

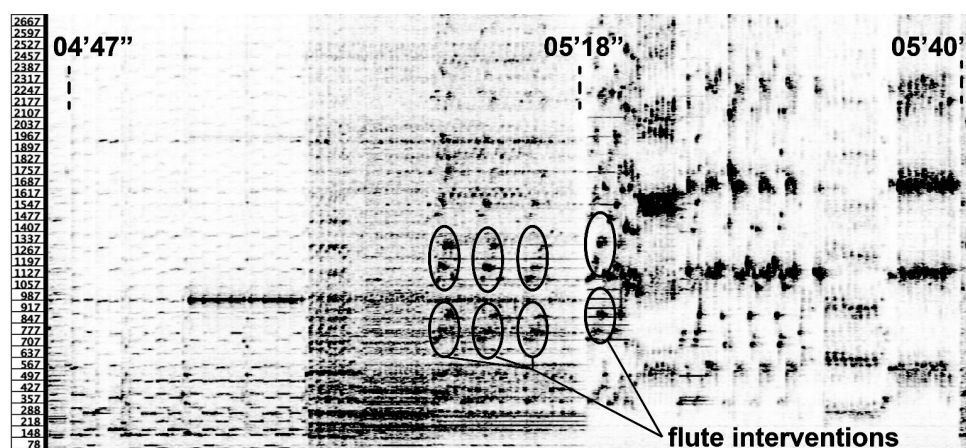


Figure A.52 Spectrogram [70 – 2700 Hz / 04'44" – 05'42"] of DW3.

- [05'41" – 08'25"]

The episode begins with a regular rhythm of cello that works as common rhythmic frame for different u-clusters. At 06'01" flute and accordion unite the musical

structure playing sustained notes in a dynamic *crescendo* until 06'26". A new sequence of u-clusters, similar to that one at 02'52", begins and consists in a series of elements that are more regular, last longer. Instruments' interplay is more traditional: the unit of each u-cluster is constituted of discrete elements which reiterate identical for the entire u-cluster. At 07'25 a gradual reduction of musical elements gives rise to a more hypnotic section in which repeated *glissandi* emerge from a series of sustained sounds and after which a new u-cluster reinstates the rhythmic cadence.

- [08'26" – 11'34"]

From 08'26" a more static episode starts. It consists of long units made of continuous sound obtained by superimposing several tones. There is a frequent use of tremolo and the sound extends over a large spectral range. Contrasts of dynamics characterise the transition between u-clusters. From 10'45", Lang settles a new rhythm that continues to be sustained by continuous notes and the episode fades out with a minimal drone.¹⁸⁴

- [11'35" – 14'30"]

Lang constructs a long succession of very different u-clusters which are mostly consolidated by the continuity of sound. There are differences in dynamic, tempo, and rhythm but the units here comply with a continuous progression, in every cell appears at least one element that maintains the sonic flow. U-clusters are dissimilar but their combination acts in accordance with a global idea of horizontal development.

- [14'31" – 16'18"]

A new episode with scattered elements begins. Different rhythmic modules are present here and there is an interesting use of instrumental roles: from 15'28" to 15'43" a systematic *glissando* is the main component of the repeated cell. At the end of the episode the rhythmic component becomes more important.

- [16'18" – 19'14"]

A series of delicate u-clusters characterises an episode that works as a

¹⁸⁴ The final block, from 11'13", recalls a static electronic sound typical of Ikeda and Pan Sonic's pieces.

connecting part: from 17'15" the accordion initiates a new section. This section, at the begin, includes diverse rhythmic u-clusters and later incorporates static elements (*e.g.* 17'52" – 18'04" and 18'24" – 18'40"). From 18'40" Lang composes a u-cluster characteristic for an interlaced *pitched-based* motion that progresses both stepwise and continuous (*i.e. glissandi*) in different directions (Figure A.53).

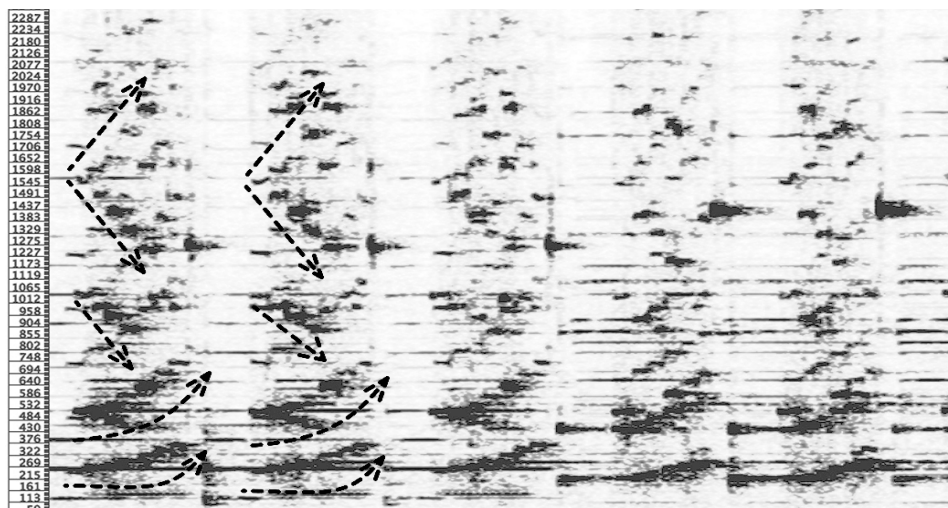


Figure A.53 Spectrogram [60 – 2300 Hz / 18'42" – 18'50"] of DW3 (original greyscale is adjusted to favour the recognition of dashed arrows).

- [19'15" – end]

In the last episode, Lang takes benefit of contrasts. Sometimes u-clusters constituted by a few number of scattered elements (*e.g.* 19'14" – 19'33" or 21'02" – 21'11") are followed by others made of tight layering of sounds (*e.g.* 19'33" – 19'55" or 21'24" – 21'34"). Other times, horizontal constructions of continuous sounds (*e.g.* 19'55" – 19'59") are replaced by fast successions of very short elements (*e.g.* 20'00" – 20'04"). From 21'36" a more extended series of sustained sounds forms a sequence u-clusters (interrupted just by a short episode at 22'16") which progress quietly until the end of the piece.

- Overview

DW3 is a piece inspired by Lang's previous works for solo instruments (flute,

cello and accordion)¹⁸⁵ and in many episodes the u-clusters are constructed with a clear distinction of the three instruments (I). In most of cases, there is a fast transition of short u-clusters made of a few number of repeated units. However, since many u-clusters are similar, longer sections might sound more consistent. Globally, *DW3* shows a great variety of timbre (A), considering the small number of instruments, and it develops a large selection of musical forms. Lang superimposes sounds (B, E), uses dynamic and temporal contrasts (G), rhythmic and repeated figures (D, F) and occasionally creates hypnotic atmospheres (H) with the benefit of *glissandi* (C) and pitch-based movements.

U-clusters, however, are mainly very short (in the order of 10 – 15 seconds) and music is characterised by a fast turnover of different episodes. This characteristic detaches *DW3* from the most typical practices that are common in the selection of pieces.

DW 7 (2002)

AUDIO [24'23'']¹⁸⁶: Internet URL: <http://youtu.be/XJr8hr1EK8Q?list=RDXJr8hr1EK8Q> (part 1); <http://youtu.be/bGvbJbnawzI?list=RDXJr8hr1EK8Q> (part 2); <http://youtu.be/ZMxsyosaVNg?list=RDXJr8hr1EK8Q> (part 3) (last access July 2017).

NOTE: It was not possible to examine the score or the original audio support; the analysis of audio material (downloaded separately from internet and assembled together in a unique audio track) has been carried through aural and spectral examination. The piece lasts over twenty minutes and the analysis led to a division of large musical

¹⁸⁵ The following text from linear notes of the original CD edition has been taken into account during the analysis: "Having completed three solo works, *Schrift 1-3* for flute, cello and accordion, the thought occurred to me of writing a trio for this combination of instruments. At first it was planned to re-arrange *DW1* but soon an entirely new piece emerged, one which shared many musical ideas with its predecessor. As in the entire *D/W-series*, the inner logic of how loops are built up is subjected to phenomenological investigation. In this process, differentiated segments telling their own story alternate with microscopic forms drawn from single events [hence the German title "*Differenz/Wiederholung*"]. The middle section of the work simulates granular loops, an effect which can be compared to the flickering image obtained when the pause button is pushed on a video recorder. *DW3* was written during a period spent working on *Theater der Wiederholungen*, which explains why a short fragment of song appears towards the close, a passage which might well have been taken from a piece of music theatre." (Bernhard Lang, linear notes of the original CD edition. Translation: Graham Lack).

¹⁸⁶ Mp3 format, 44.1 kHz, 16 bit, 320 kbps, stereo, total time 24'23" [as wave format for audio support].

episodes. *DW7* is a piece composed for large orchestra and loop-generator¹⁸⁷.

- *GENERAL SCHEME*

Sections	Attributes (<i>ordered from the most fitting</i>)
00'00'' – 04'00''	F, A, G, D, I // B, C, E, H
04'01'' – 07'10''	F, E, B, A, D, // H, I
07'11'' – 08'45''	G, D, F // A, H, E
08'46'' – 09'30''	E, H, A, B // D, F
09'31'' – 11'30''	H, E, F, I, D // A, C
11'31'' – 14'06''	F, D, H, G // A, C, I
14'07'' – 16'04''	E, C, F, D, B // A, I
16'05'' – 19'35''	D, F, G, H, B // A, E, I, C
19'36'' – end	G, D, C, F // H, A, E

¹⁸⁷ The loop generator creates real-time echoes of the instrumental sound.

- [00'00" – 04'00"]

DW7 begins with a soft texture of sound constituted by repeated *glissandi* of strings. There is an extended drone (00'00" – 00'30") that fades in and the successive sequence of u-clusters, played by the full orchestra, pops up in rapid succession. Here, the sound is orchestrated as a sort of jazz-ensemble: drums and percussions mark rhythmic section and wind instruments play on top of it. However at 00'59" the u-cluster at 00'59" is characterised by the fusion of instrumental sounds into a unified sonic corpus: the note played by strings (*i.e.* F#5, dashed regions, bottom spectrogram of Figure A.54) merges with the high interventions of percussions (*i.e.* ~10 kHz, dashed regions, top spectrogram).

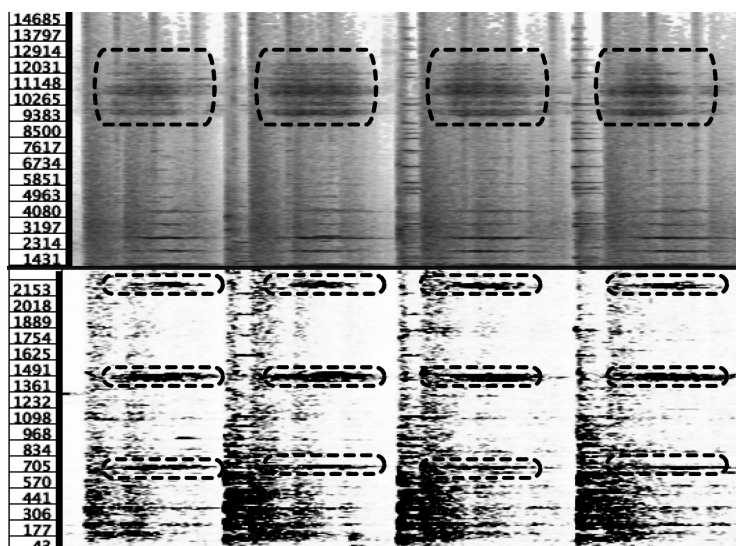


Figure A.54 Spectrograms [top: 1.4 – 14.8 kHz; bottom: 80 – 2200 Hz / 00'59" – 01'10"] of *DW7*.

Later, the section from 01'27" to 01'39" (and similarly from 02'18" to 02'27") is characteristic for a specific arrangement of sounds within the spectral space: the sustained C#5 played by wind instruments provide the essential background for string interventions that appear in foreground. From 01'40" a series of full-orchestral u-clusters emerges: there is a clear contrast of dynamic, rhythm, and spectral density. The u-cluster that begins 02'41" is created by the loop generator and the sonic result is of a cyclical echo that regenerates a filtered version of the orchestral sound. One more time,

at 02'52" the reiteration of descending elements confirms that the use of this form is a common practice in Lang's compositional approach. The large sonic palette allows the construction of complex units (*e.g.* at 03'39") which constitute more elaborate u-clusters.

- [04'01" – 07'10"]

The entire episode is characterised by a series of u-clusters which are extended, typical of a gradual superimposition of sustained tones. There is a complex and rich use of sound spectrum: for instance the three blocks from 04'06" to 04'50" are evidence of a sort of plastic conception of sonic space. These u-clusters incorporate both an extensive diffusion of sounds within a large range of frequencies (*i.e.* unit-clusters #1 and #3, Figure A.55) and a very focused layering of specific tones (*i.e.* unit-cluster #2).

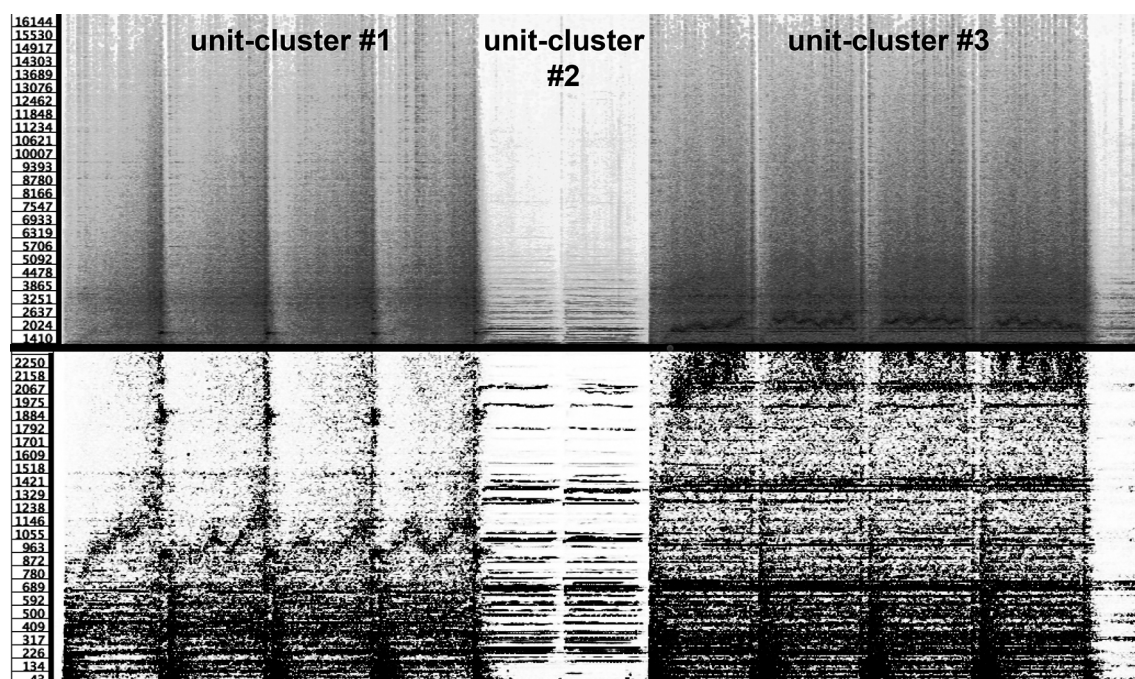


Figure A.55 Spectrograms [top: 1.4 – 15.5 kHz; bottom: 40 – 2200 Hz / 04'05" – 04'55"] of DW7.

The long u-clusters that start at 04'50" are characterised by a very slow accumulation of elements: every new cell shows an increasing number of layers of sound. The music is cyclical, reiterated and hypnotic: the first cell is composed by several tone at a medium and bass range of frequencies (*i.e.* A1, ~55 Hz; ~F4, 353 –

359 Hz; ~F#4, 372 – 378 Hz; ~F#5, 713 – 718 Hz; F#5 – F#5, 737 – 760 Hz) then the sound expands towards medium frequencies adding numerous tones within a microtonal range (A#5, 932 Hz; Bb5, 971 Hz; D6, 1195 Hz; D#6, 760 Hz; Gb6 – G#6, 1665 – 1698 Hz; G#6, 1686 Hz; A#6, 1866 Hz; Figure A.56).

A subsequent u-cluster behaves similarly and form gradually a massive aggregate of tones. The orchestra progresses solemnly: percussions (*i.e.* timpani) mark the cadence of cell and sustained notes of strings and wind instruments (*i.e.* French horns in particular) design a dense sonic material.¹⁸⁸

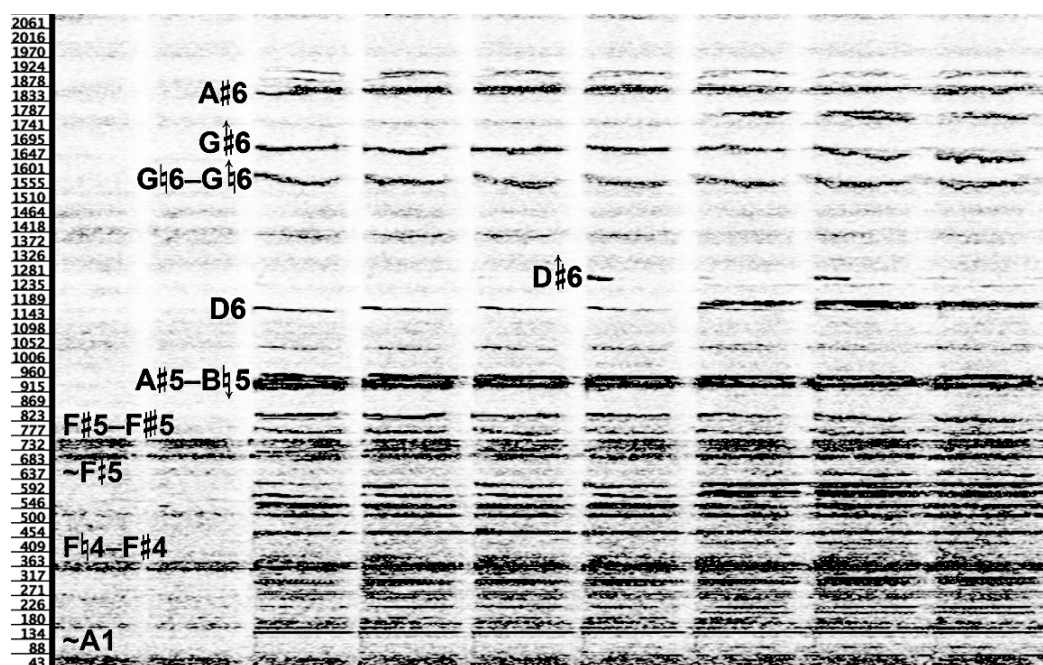


Figure A.56 Spectrogram [43 – 2100 Hz / 04'54'' – 05'32''] of DW7.

- [07'11'' – 08'45'']

From 07'11'' a polyrhythmic sequence of short musical u-clusters occurs: the full orchestra is involved generating a turbulent musical episode which occupies a large spectral region. The successive part (07'51'') is more quiet and meditative, Lang creates

¹⁸⁸ Globally, this long episode made of extended forms which reiterate themselves with slight alterations and gradual evolution is similar to Raime's construction (*e.g.* *Passed Over Trail*). There each track might corresponds to a single Lang's cluster, music is composed step by step and at every cycle new elements are added.

a unit that holds diverse sonic elements with a hierarchical relationships (e.g. percussions, string, wind instruments, keyboards) and grows progressively until the end of the episode: the high-pitched chords of keyboard appears in foreground and is gradually submerged by the sound of other instruments that increase in intensity.¹⁸⁹

- [08'46" – 09'30"]

This episode consists of a unit/cell with a long sustained profile composed by superimposition of repeated sonic lines. Intensity of the drone increases and sound appears continuous but unstable: rhythmic interventions of strings and keyboards (manipulated in real-time by loop generator) create a fragmented horizontal contour (Cluster #a, Figure A.57).

- [09'31" – 11'30"]

A contrasting episode follow the previous one (Cluster #b, Figure A.57), from 09'31" a simple unit/cell is repeated and gradually enriched: it consists of a coherent block of long notes (played by strings and wind instruments). This recurrent sound works as a base element of the cell and provides a support for an isolated intervention of keyboard (that recalls the element of 07'51", letter "k" and green region in Figure A.57). The musical cell grows with the appearance of drums, bass and percussions which delineate a rhythmic structure and wind instruments (letters "p" and "w", respectively, Figure A.57).

¹⁸⁹ The high notes of keyboards detach themselves with a sort of ecstatic aural background. They might bring to mind the harp's chord of Haas' *in vain* (i.e. bar 76, ~09'00"). It is not the case of the use of similar practices, since here the keyboard's intervention is embedded within a repetitive unit, but the resulting sound of the single cell may recall Haas' episode.

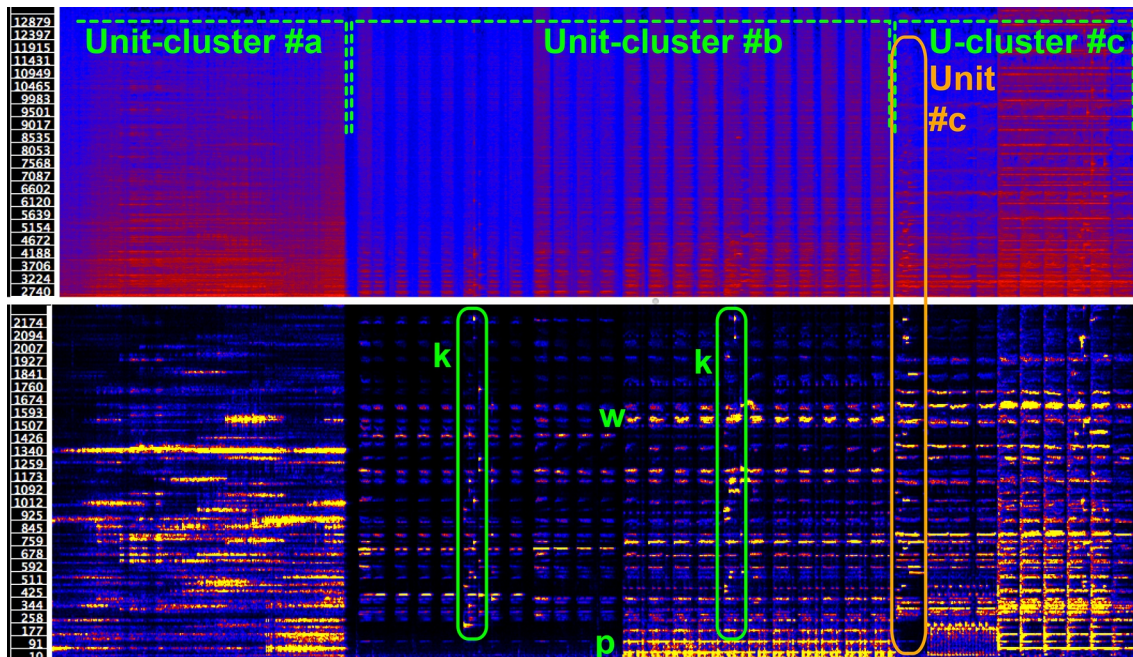


Figure A.57 Spectrograms [top: 2.7 – 13 kHz; bottom: 15 – 2200 Hz / 09'00" – 11'31"] of DW7.

The progression is interrupted (10'53") by a loud chords that extend over a large range of frequencies and contains several group of tones (Unit #c, orange region in Figure A.57) which are closely set in a microtonal and dissonant form. This element initiates a new u-cluster that evolves until 11'30", with the massive inclusion of percussive elements which enhance the spectral timbre towards high and very high frequencies (~10 kHz, Cluster #c, Figure A.57). Music is solemn and majestic.

- [11'31" – 14'06"]

From 11'31", Lang introduces a series of contrasting u-clusters (*i.e.* fast, slow, empty and full of sounds), he exploits the opposition of dynamics and uses reiterated *glissando* in different modes within repeated cells (*i.e.* 11'49", 11'58", 12'09", see Figure A.58).

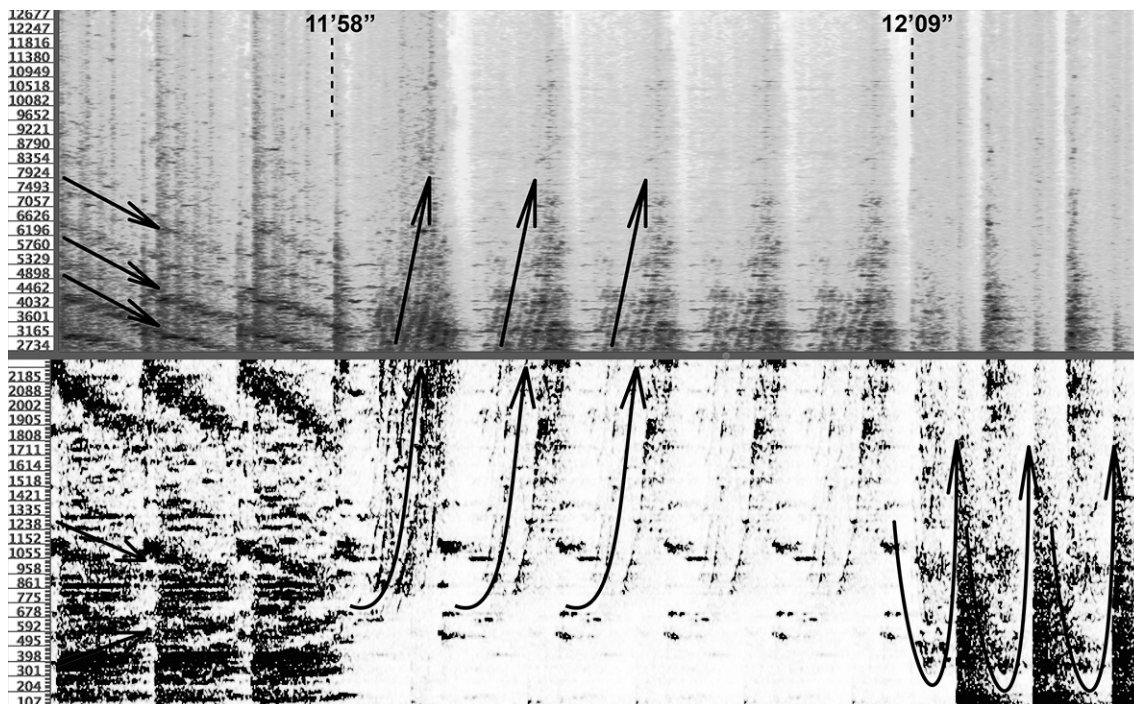


Figure A.58 Spectrograms [top: 2.7 – 13 kHz; bottom: 15 – 2200 Hz / 11'52'' – 12'14''] of DW7 (original greyscale is adjusted to favour the recognition of black arrows).

Music turns to be constituted by short and energetic u-clusters in which the full orchestra is involved and the tension of the music increases.¹⁹⁰ From 13'02'' a very pronounced polyrhythmic figure is characteristic of a new u-cluster (it recalls rhythmic jazz pattern, as five vs. four) and the next modules also show rich patterns of drums. The u-cluster from 13'33'' possesses a long unit (repeated three times until 14'06'') that lasts twelve seconds and is characterised by a complex musical development. Music appears powerful and rhythmic.

- [14'07'' – 16'04'']

The new episode starts with a texture of high frequency sounds. Percussions and strings design a continuous high-pitched profile which is made of cyclical units and when they stop playing the absence of sound creates a sort of empty space in the

¹⁹⁰ The cluster from 12'27'' has a very peculiar form and the single cell could be easily compared with repeated patterns of Raime (e.g. *Told & Collapsed* and *If Anywhere Was Here...*). In both cases, the unit includes a regular pulsation with pronounced echo (here Lang makes use of a delay effect –conceivably generated by the loop device– applied to the drums); several scattered elements that emerge over a continuous sonic texture and create a counterpointed flow of sounds.

spectrum. The next u-cluster is a long sustained drone of strings with discrete interventions of wind instruments. This long section is characterised by a few number of sound elements. These elements return periodically from 15'20'' while strings delineate reiterated *glissandi* in medium and high frequencies.

- [16'05'' – 19'35'']

A new dynamic contrast defines the begin of this episode. The u-cluster at 16'05'', characterised by a polyrhythmic structure and a complex orchestration is repeated at 16'21'': the loop generator produces a sort of echo that is fragmented and unstable. The original unit of the previous u-cluster are here shortened and distorted and this manipulation is protracted in the successive module played, this time, by the orchestra. The next blocks (16'51'') consist of a steady repetition of short tones at different pitches and this element introduces the following u-cluster that, differently from the previous ones, is a fluid movement of sound. In this u-cluster, each unit begins with a soft bass pulsation and the strings, percussions and wind instruments expand the sounds towards higher ranges of spectrum through long notes. Music recalls a sort of fluid entity: sound progressively occupies large regions of spectral space and create an enveloping effect.

From 17'36'', a new u-cluster follows the previous one and is typical of recurrent units of long notes which are interspersed in a small range of frequencies. Lang constructs a series of u-clusters that are all characterised by a soft and subtle atmosphere. For instance from 19'00'' the *sound* of this episode extends over the entire spectral range with delicate sounds played by strings and wind instruments. The unit here contains two asynchronous events: a pulsation of percussions and the entrance of strings (marked in Figure A.59 as vertical orange lines labelled with “p” and “s” respectively). These events coming in succession complicate the identification of the repeated cell. Lang uses scattered and continuous elements (both as linear or wavy forms) to enrich the musical discourse: keyboard's interventions and wind instruments *glissandi* (in Figure as orange circles and curvy arrows correspondingly) follow one another within the cell. The final effect is of a dense combination of elements reinforced with a microtonal sequence of sounds. This is a brilliant example of how Lang creates a

musical episode where rhythm and stasis coexists and in which several attributes common among the pieces considered in this study.

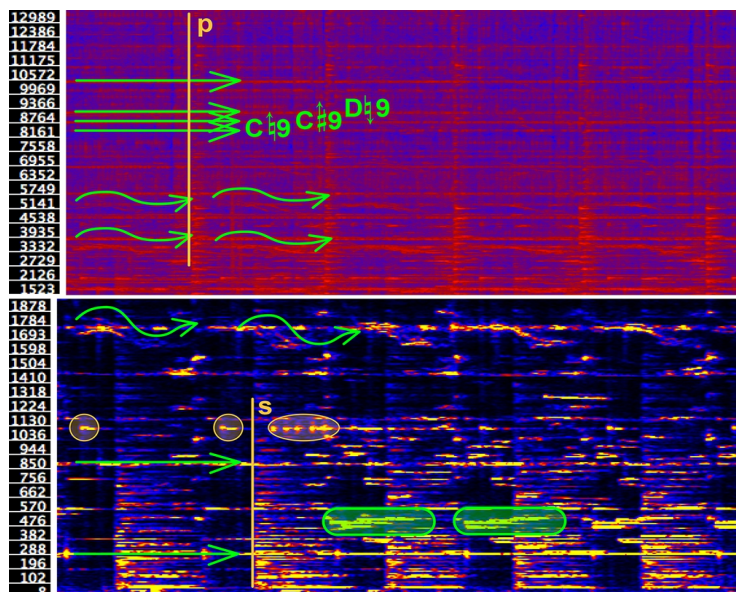


Figure A.59 Spectrograms [top: 1.5 – 13 kHz; bottom: 10 – 1900 Hz / 19'00" – 19'26"] of DW7.

- [19'36" – end]

A new part opens with a fast and energetic rhythmic sequence, and Lang uses again a series of contrasts (*i.e.* dynamic, temporal and sonic) to develop this part. U-clusters in which the full-orchestra is involved follow more delicate u-clusters characterised by continuous periodic *glissandi* and scattered elements (20'10"). From 21'14" to 22'04" there is a gradual development where the sound grows and shrink itself. The concept of repetition is maintained but the orchestral sound is transformed as a unique material which moves and enlarges in the space. The global sound (interrupted only by a short rhythmic interjections at 22'06") continues to give rise to different musical arrangements which are at times steady and minimal (22'09" – 22'20"), dense and ascending (22'21" – 22'32"), hypnotic and cyclical (22'33" – 22'46"). At the final point the sound, as a soft continuous texture of strings, fade out almost disappearing.

- Overview

DW7 is a composition that includes episodes of different kind. However, the

frenetic succession of micro u-clusters, common in *DW2* and *DW3*, is rare. Lang takes advantage of the all timbric possibilities creating more articulated u-clusters which frequently possess repeated units made of a single and extended cell. The loop generator further enhances the modalities of repetition with effects of echoes, distortion and fragmentation. It is undoubtedly a piece that approximates to the other pieces of the selection (in particular to Haas and Raime's works): it contains dramatic and powerful episodes but since it does not include voices and extra-musical elements (*i.e.* poetry, as in *DW2*) could more easily be considered within the common aesthetic that I propose. *DW7* possesses globally all key elements that were extrapolated from the analysis.

DW 8 (2003)

AUDIO [28'03'']: (*DW8/DW15/DW3*. Germany: Col legno, Bayerischer Rundfunk, BR-Klassik, WWE- 20090-CD.

NOTE: The analysis has been carried through aural and spectral examination and the digital version of the score. CD-version is a live recording of the piece (March 5th, 2004 at Herkulessaal der Residenz, Munich). The following text from linear notes of the original CD edition has been taken into account during the analysis:

[...] The piece *DW8* draws on passages from *DW11* played by Symphonieorchester des Bayerischen Rundfunks and recorded to vinyl before being mixed by the two turntable artists in live performance, there entries being given a defined structure. The orchestra becomes a kind of gigantic record player, the plethora of loops and more well-known sounds emerge in a context of repetition and may be perceived or understood anew (Lang 2004).

DW8 is a piece composed for orchestra and two turntable soloists.

• *GENERAL SCHEME*

Sections	Attributes (<i>ordered from the most fitting</i>)
00'00'' – 11'38''	E, F, H, I // A, B, C
11'39'' – 14'28''	G, D, F // H, I, A // D, C, E
14'29'' – 15'56''	F, H, E // D, B

15'57" – 20'10"	A, E, H, F // D, I, G, B
20'11" – end	F, E, B, H, I // C, D, A, G

- [00'00" – 11'38"]

The sound slowly emerges with a repetitive line of strings (possibly generated from a pre-recorded material emitted in real-time). This repeated figure works as a musical background for the noisy and very short interventions of two turntablists. These insertions are mostly improvised and the resulting music would mimic –as Lang himself have declared– a turntable mechanism: a cyclical music profile (*i.e.* unit) interrupted with unpredictable “mistakes”.

During the soloist intervention at 01'21", it is possible to recognize a very short fragment of pre-recorded trumpet's sound anticipated by turntablists: the live solo of B♭ trumpet would start a few seconds later (01'25") thus proving that turntablists play in real-time the pre-recorded orchestral version of the piece. The sculptural arrangement of sounds is characterised by a sonic texture in the background and several elements in the foreground. Very short and scattered notes of harp and strings (*i.e.* violins and violas) join the trumpet (from 02'00") and gradually horns, clarinet and percussions enrich the repeated unit.

There is a progressive enlargement of sonic material that proceeds solemnly even when at 05'17" the disappearance of trumpet creates a suspended atmosphere. The original unit is maintained (the cadence is sustained with a regular intervention of wind instruments, Figure A.60, green areas) but it loses several elements (*e.g.* trumpet, horns, regular interventions of harp and percussions, Figure A.60, black arrows) and is enriched of new rhythmic and more dynamic ones.

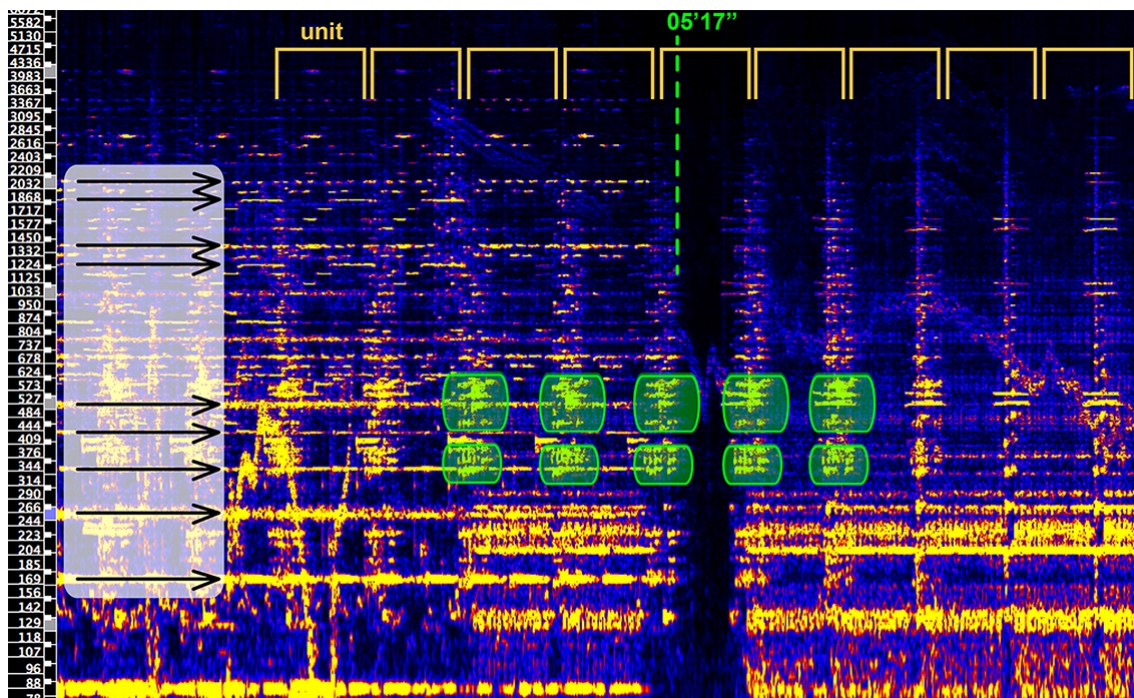


Figure A.60 Spectrogram [80 – 5800 Hz / 04'27'' – 05'57''] of DW8.

Violins construct a complex texture in high pitches that is reinforced with wind instruments and works as bridging element toward a new u-cluster (*i.e.* 07'00'') that emerges more clearly at 07'54'' with the appearance of piano (Figure A.61). The continuous high-pitched sound starts a very slow descending movement in which the intricate design of notes moves down both through stepwise and *glissando* lines and then vanishes leaving the series of regular elements of the original u-cluster.¹⁹¹

In this episode, Lang uses the typical construction of repeated elements (*i.e.* unit-clusters, units, cells) but he superimposes a larger form, *i.e.* a continuous sound and the descending movement, and he combines different musical figures to create a more complex structure. He composes this bridging element, distinctive for its duration, pitch and shape, to interconnect two different u-clusters (Figure A.61).

¹⁹¹ This part (07'58'' – 08'58'') might recall several episodes of Haas' *in vain* in which the global movement of sound that is perceivable as a macroscopic design is actually achieved through a meticulous and microscopic orchestration (see Figures A.15 and A.22).

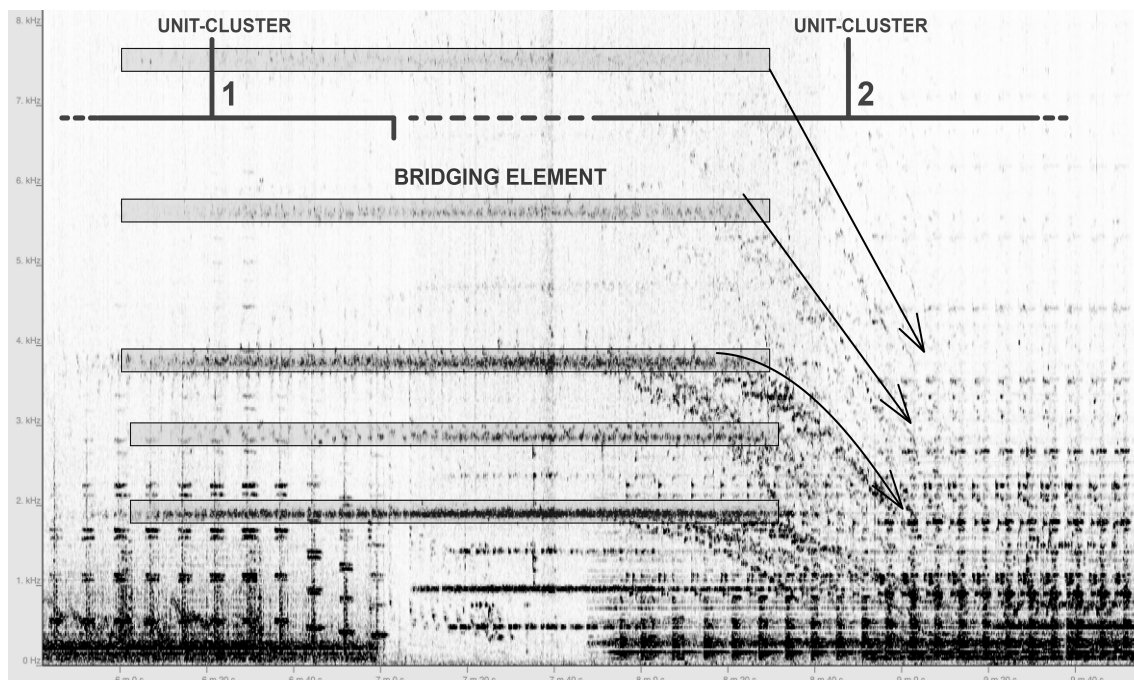


Figure A.61 Spectrogram [0 – 8.2 kHz / 05'50" – 09'40"] of DW8.

The new u-cluster becomes more complex and articulated (*i.e.* with a semi-improvised interplay of turntablists and wind instruments) and finally fades out until 11'38".

- [11'39" – 14'28"]

The new episode begins with a brusque dynamic change: the new u-cluster is fast, rhythmic and it is generated by short units that do not change progressively (as it occurred for the previous u-clusters) but display a tight and regular form. This u-cluster holds some characteristics typical of previous Lang's work (*i.e.* DW2 and DW3) but it also maintain certain aspects that are typical of *DW8*: for instance, in the transition between u-clusters, at 12'38", several elements are preserved and the temporal dimension of the unit is maintained. The latter is an additive time signature of $8/4 + 1/8$ which is differently developed by percussions (line 1, Figure A.62) and later by strings and wind instruments (line 2, Figure A.62). After 12'38" this second rhythmic structure is left and from 12'58" xylophone and marimba appear adding a new polyrhythmic profile. The episode is mainly grounded on rhythmic elements and brings to mind pieces of early minimalism (*e.g.* Reich, Andriessen) in which fast repetitions generate

suspended and non-teleological profiles. However the musical conception, here, is more sculptural: sounds continue to hold a precise location in terms of dynamic, spectral region and a clear role in the musical development.

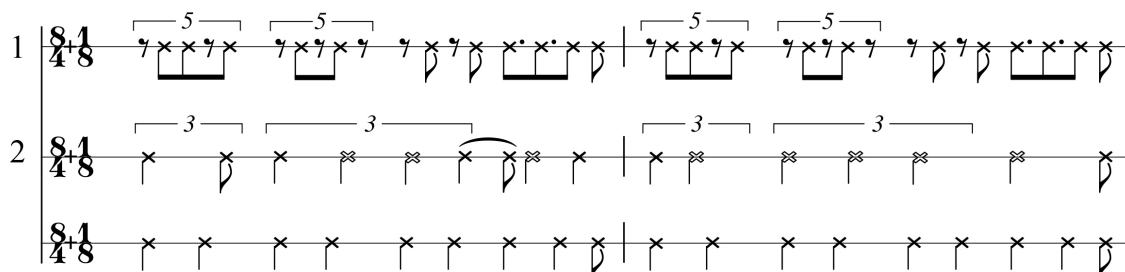


Figure A.62 Schematic representation of rhythmic structures of the episode.

From 13'20" several musical elements of the begin of the episodes appears and the complexity of the unit increases. Extended descending *glissandi* and new percussive sounds create a dense musical material of different timbres (*i.e.* harmonic and inharmonic) that cover a large range of frequencies until the end of the episode.

- [14'29" – 15'56"]

This relatively short section acts as interlude between two longer sections and is typically characterised by the obsessive repetition of musical elements within a single unit. A background cell is reiterated during the entire u-cluster which has a clear hypnotic effect and the elements are repeated fading in and out identically.

- [15'57" – 20'10"]

The section from 15'57" to 18'05" is a free improvisation of two soloists turntablists. The musical material is then a manipulated version of the orchestral sound that is at times filtered, looped and distorted. The turntablists use orchestral elements: they maintain a musical coherence with regular repetitions but create a complex collection of deformed (*i.e.* detuned fragments of instrumental sounds) and irregular interventions adding noises, echoes and high-pitched glissandi. In this way, the overall sound is very rich in spectral exploration, rhythmic and unstable. The deformation of traditional orchestral sound and the unpredictability of development enhance the effect of a giant mechanism that produce sound, as a "gigantic record player" (Lang 2004).

From 18'07'' the full orchestra (together with the turntablists) reappears and initiates a dense u-cluster. Horns mark a regular unit over which percussions design a noisy and polyrhythmic texture.

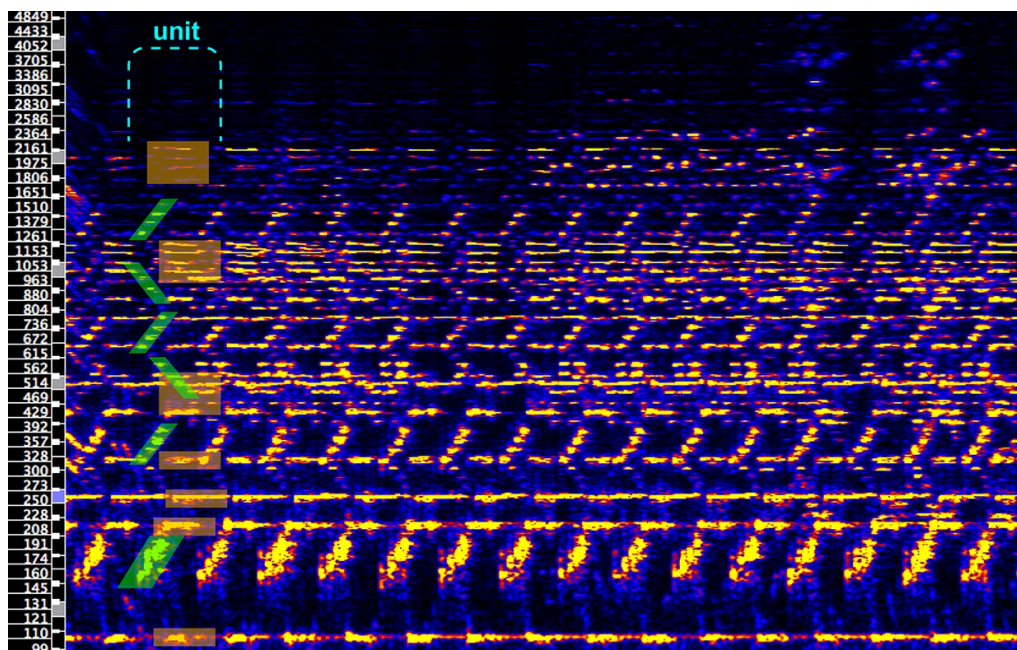


Figure A.63 Spectrogram [95 – 5000 Hz / 20'19'' – 21'22''] of DW8.

- [20'10'' – end]

The final episodes is characterised by the return to a more solemn atmosphere similar to the first part of the piece. The transitions between u-clusters are gradual and music develops itself progressively. The first extended u-cluster (20'12'' – 22'18'') is grounded on the recurrent alternation of ascending and descending elements and continuous tones (Figure A.63, green and orange areas, respectively) in which the orchestral roles are divided and each element is located within a precise domain of spectra, time and dynamic.

From 22'19'' a new u-cluster starts with a short phrase of piano as a sort of repeated sample. On the background a sustained sound occupies a bass frequency region and the piano interventions give the impression of a kind of advertising jingle. The atmosphere is suspended and music is enigmatic, made of silent interludes and characteristic of distinct elements, plastically inserted in the sonic space. For instance,

the u-cluster at 24'20" consists of a unit made of regular beats of percussions at very high pitches, few notes of piano, and soft repeated notes of harp and double basses. To these elements turntablists add their improvisations made of soft interjections of manipulated orchestral sounds. From 26'57" the u-cluster of the begin of the piece reappears and the line of trumpet emerges in the foreground: the piece ends in the same way as it has started and giving the impression of a cyclical repetition.

- *Overview*

DW8 embodies a concept of development based on very long repeated units that progressively change and become more complex. Here the unit is not the constitutive element of short u-clusters in succession, rather it is an elemental component of larger musical episodes. The changes occur gradually rather than abruptly. The attention in *DW8* stays focused on (i) the richness of sound and spectral exploration, (ii) the use of sustained and layered sound within a microtonal range of frequencies, (iii) the recurrent presence ascending and descending movements, and (iv) the rhythm and the formation of dense masses of sound. Typical of all pieces of the *DW*-series are the reiteration of elements and the hypnotic effect. There is, here, a limited use of dynamic contrasts since the music is more gradually developed, but the sculptural arrangement of sonic element is evident in many episode of the composition (A-I). Moreover, the simultaneous presence of both the original and manipulated orchestral sound gives the sensation of a sonic material with a kind of dual nature.

DW9 – Puppe Tulpe (2003)

AUDIO [30'06"]: *DW14 + DW9*. Germany: Cavalli Records – CCD 452.

NOTE: The analysis has been carried through aural and spectral examination¹⁹². CD-version is a live recording of the piece (June 17th 2006 at Casa da Música, Porto.). *DW9* is a piece composed for voice, viola, cello, double bass, flute, clarinet, trumpet, trombone, percussions and piano and based on texts of P. C. Loidl.

¹⁹² An available version of the score is embedded with the youtube video: www.youtube.com/watch?v=HrQ8VFb8uUM, last access July 7th, 2017.

• *GENERAL SCHEME*

	Sections	Attributes <i>(ordered from the most fitting)</i>
I	00'00'' – 05'01''	F, H, D, B // G, E, I
	05'02'' – 08'24''	E, H, A, B // F, D
	08'25'' – 14'21''	D, F, G, H / A, B
II	00'00'' – end''	F, D, H // I
III	00'00'' – 03'04''	F, G, H, D // A, I, E
	03'05'' – end	A, F, B, E, H, C // G, I

DW9 – I [14'21'']

• [00'00'' – 05'01'']

The very begin of *DW9* shows a u-cluster made of units of different size. In this case, the units are not composed by identical cells (see Figure A.42) and each cell is constructed by a different combinations of the same sonic elements. In this way, music does not appear generated from a mechanical defect of an automated process, instead it gives the impression that performers stumble or partially improvise.

The u-cluster that begins at 00'56'' is more regular and displays short interventions of wind instruments while strings and percussions form a continuous texture. From 01'08'', music becomes more varied and u-clusters follow one another in sequence of sounds and combinations that approximate more to a mechanic montage of musical components. Some of them are typical of rhythmic constructions while others explore microtonal relations of sustained notes (01'33'' – 01'43''). Lang exploits the contrast between sections (sometimes made of u-clusters of the same temporal unit) of different type: from 01'33'' until 05'01'' there is strong opposition between rhythmic and continuous loops (Figure A.64, black and grey regions on top, marked as “R” and

“C” respectively).

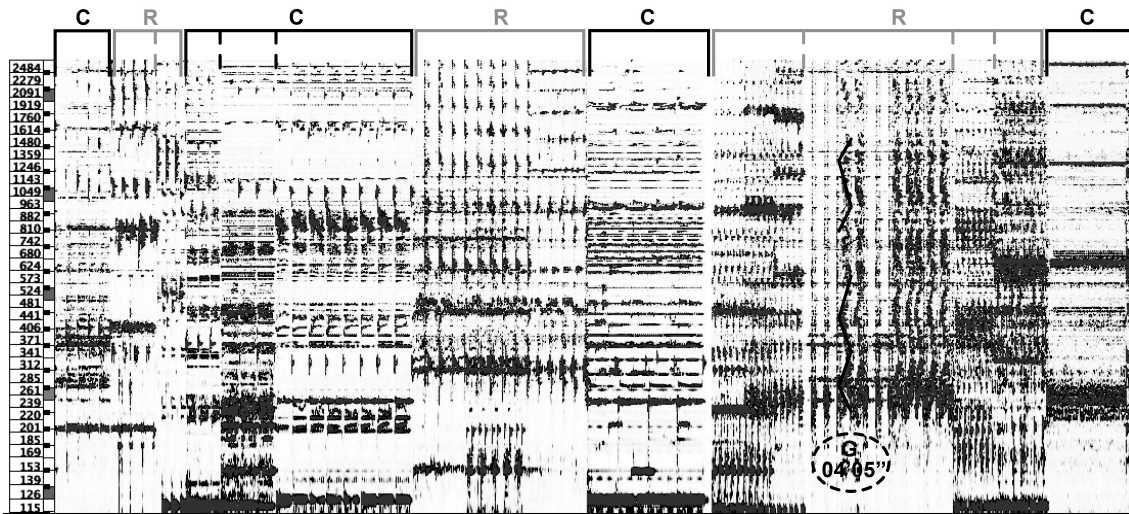


Figure A.64 Spectrogram [110 – 2500 Hz / 01'33" – 05'01"] of DW9.

This long sequence exhibits many typical elements of Lang's *DW*-series. In particular this part shows some similarities with *DW2* and *DW3* in which singular instruments within small ensembles, plays precise roles within the repeated cell: the unit at 04'05" composed of both an ascending and descending movement is a representative example with pieces of this type (*i.e.* dashed circle marked as "G" in Figure A.64).

- [05'02" – 08'24"]

Contrary to what is observed for the previous section, this new section of *DW9* has a development similar to that one of *DW7* and *DW8*: a single u-cluster is gradually composed. At every cycle, the unit incorporates new elements becoming progressively more complex (Table A.10).

Table A.10 Unit-cluster construction at 05'02" of DW9.

time	description	cycle
05'02"	tam–tam, synthesizer, cello and trombone define a regular metric	3
05'22"	bass flute (sustained note)	3
05'38"	cello (a regular F#5 in the second half of the unit)	3
05'53"	trumpet (sustained note), piano (irregular cell, 5:4 every two	3

	cycles), viola (short irregular intervention), synth (sustained dissonant unit-cluster every two cycles)	
06'08"	bass clarinet (regular motif), piano and synth (intensify their previous patterns)	3

- [08'25" – 14'21"]

This episode returns gradually to an animated atmosphere with the appearance of *pointillistic* interventions of voice within short u-clusters and fast transitions. There is an important role of rhythm: sometimes instrument and voices repeat obsessively short units (08'49" – 09'18"), other time they interlace themselves within polyrhythmic structures (09'19" – 09'38" and 09'59" – 10'11") or they compose cycle of regular beats based on different timbre (09'43" – 09'58"). From 10'35" the turnover of u-clusters accentuates the opposition between soft airy noises and resonant sounds and the music develops an energetic succession of short u-clusters.

DW9 – II [06'32"]

- [00'00" – end]

This second episode of *DW9* is mainly characterised by the soloist part of voice. Similarly to *DW2*, here there is a strict relation between word's meaning and sound. As previously mentioned, Lang's *DW*-series holds a large collection of contextual information; however, within this study, this material has been considered only partially in order to be consistent with the focus of this research and to favour a more coherent comparison within a such diverse collection of pieces. In this part, Lang juxtaposes silent and loud elements of voice, breathy sounds, and spoken words. He uses frequently the repetition of long phrases as well as very short phonemes. Occasionally percussions and drums (*i.e.* 02'28") enrich and reinforce the repetition of voice. The idea is to emphasize dramatic and *performative* aspects and the repetition of phrases and words gives prominence to specific portions of the text.

DW9 – III [09'13'']

- [00'00'' – 03'04'']

This sequence comes back to very fast and dynamic transitions of short sonic elements and thigh rhythms. From 00'43'' a more meditative section interrupts the rhythm and from 01'31'' a series of u-clusters characterised by few sparse sounds begins. These loops continue to be fast and animated but the sounds of each instrument are detached and separated one another in the spectral area.

Starting from 02'12'' it is interesting how Lang construct an irregular u-cluster, (from 02'20'' – 02'26'') in which the sequence of sounds that compose every new cell is not identical. In this example, Lang modifies progressively the cell and even preserves some elements of one u-cluster to another.

- [03'05'' – end]

This episode is characterised by a music that is more indistinct and quiet. u-clusters are composed by sustained sounds and few scattered elements. These suspended atmosphere is irregularly interrupted by fast and contrasting sequences of other mini u-clusters (*e.g.* the block at 03'52'' – 04'07'' represents the first interfering group of three rapid u-clusters after which the soft atmosphere is restored). The new u-cluster that begins at 04'08'' consists of a dense mass of superimposed layers of sounds. It is mainly centred around C4, but contains several groups of tones within a microtonal range of frequencies (*i.e.* F2, 87 Hz; A#2, 117 Hz; B2, 123 Hz; C3, 131 Hz; C#3, 139 Hz; D3, 147 Hz; D#3, 156 Hz; F3, 175 Hz; C4, 262 Hz; E4, 331 Hz; G4, 392 Hz; G#4, 402 Hz; G#4, 408 Hz; G#4, 422 Hz; A4, 440 Hz; A#4, 467 Hz; C5, 523 Hz; ~E5, 656 – 667 Hz; G5, 784 Hz; see Figure A.65).

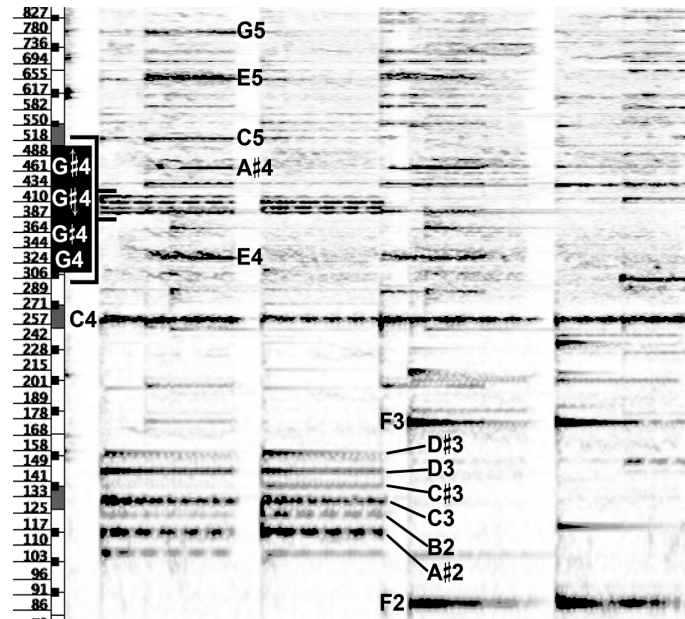


Figure A.65 Spectrogram [82 – 835 Hz / 04'23" – 05'14"] of DW9-III.

From 05'30" to 05'50" a second block of rhythmic u-clusters interrupts the soft musical stream. There are contrasts in tempo, rhythm and dynamic before a new static u-cluster emerges at 05'51". This holds similar characteristics to some episodes of *DW7* and *DW8*: units are regular, made of continuous layered sounds and progressively become more complex and dense.

At 07'01", the repeated module consists only of a noisy and bass drone centred at 84 Hz and a high pulsation at 3.5 kHz (Figure A.66, spectral region labelled as "a" and "b" respectively). The arrangement of the successive sounds (strings and wind instruments) is located within these two sonic limits (*i.e.* region "c"). Sound is scattered in a large spectral range (*i.e.* percussive sounds at 3 – 15 kHz, region "d"). In the last part, Lang maximizes the timbric possibilities of traditional instruments, giving the impression that they are being electronically manipulated, and at the end of the piece (07'50") descending *glissandi* dissolve into silence mimicking the failure of a mechanical device (region "e").

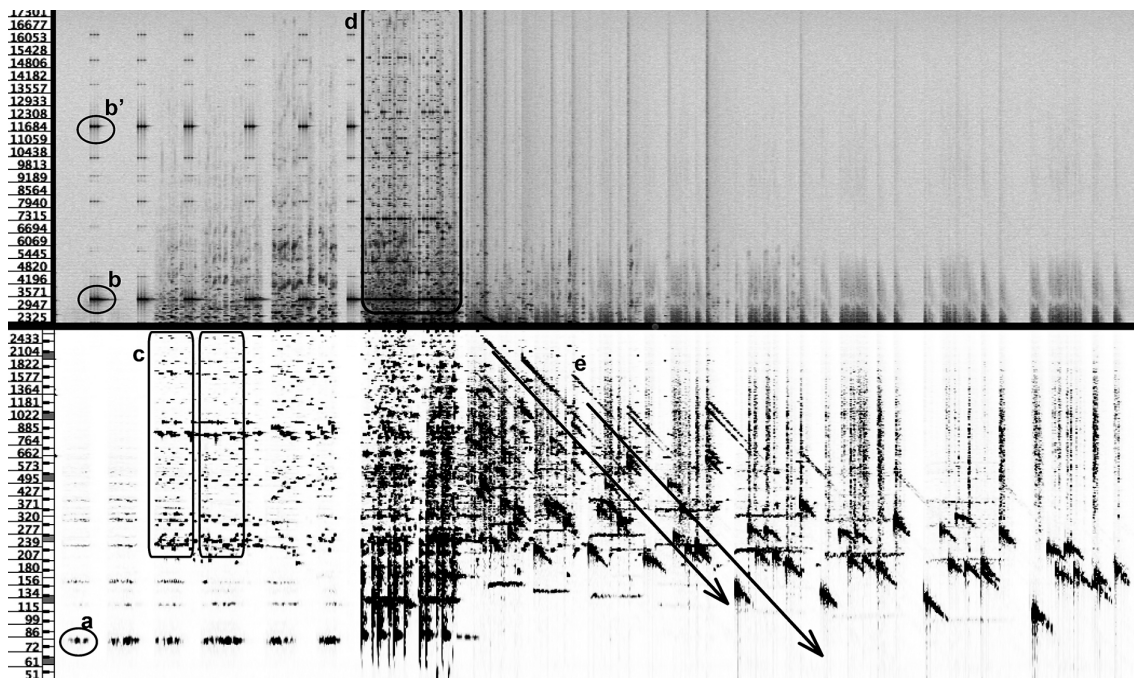


Figure A.66 Spectrograms [top: 2.3 – 17.3 kHz, bottom: 50 – 2400 Hz / 07'00" – 09'09"] of DW9.

General Overview

In reproducing the glitch aesthetic through a large number of transitions between u-clusters orchestrated within a small ensemble, *DW9* shows similarities with *DW2* and *DW3*. Moreover, *DW9* includes u-clusters which are gradually developed and where there is a precise arrangement of sounds based on their timbric characteristics, as occurs in *DW7* and *DW8*. *DW9* is a piece that incorporates traits typical of previous Lang's pieces (*e.g.* small ensemble with voice containing slow evolutions and fast changes). Despite the presence of voice and the extra-sonic elements, there is a clear focus on sonic aspects throughout the piece and this allows for the comparative purposes of this study.

DW14 (2005)

AUDIO [38'15"]: *DW14* + *DW9*. Germany: Cavalli Records – CCD 452.

NOTE: The analysis has been carried through aural and spectral examination. CD-version is a live recording of the piece (December 10th, 2005 at Wiener

Konzerthaus, Wien). *DW14* is a piece composed for jazz trio (saxophone, bass and drums) and Loop Orchestra.

- *GENERAL SCHEME*

	Sections	Attributes (<i>ordered from the most fitting</i>)
I	00'00'' – 04'39''	D, F, G // A, E, I, H
	04'40'' – 12'19''	A, F, B, I // D, E, H, G
	12'20'' – 15'36''	D, E, H // F, B, A
II	00'00'' – 08'26''	E, A, H, I // D, F, B, G, C
	08'27'' – 16'22''	H, E, F, A, B // D, I
	16'23'' – 18'13''	E, B, H, A // F, D
III	00'00'' – 04'26''	F, D, G // H, B, A, E

DW14 – I [15'36'']

- [00'00'' – 04'39'']

The first episode of *DW14* begins very soft with rhythmic and noisy sounds of saxophone. The first orchestral intervention (at 00'35'') emerges in the background and reveals that saxophone's sound is hugely amplified with the respects of that one of ensemble. The succession of u-clusters is less systematic with the respects of some previous pieces of *DW*-series. Rather the musical evolution is made of different and short interventions occasionally repeated and musical roles are associated to specific instruments. Thus the structure appears more traditional and sometimes close to a free-jazz aesthetic due to the presence of a soloist saxophone until 04'40''. However the music proceeds linearly: strings design a continuous background over which the saxophone plays its solo.

- [04'40" – 12'19"]

A u-cluster starts with a regular unit made of a simple construction of double-bass and wind instruments and progressively becomes more complex with the introduction of the three soloists instruments (*i.e.* sax, drums and double bass). The episode mimics phrases typical of free-jazz language, the unit changes and the temporal metric collapses at 07'42" leading to a free-form episode. Several musical fragments of the original unit emerge from time to time but Lang creates a sort of free-form sonic stream that is dense, inharmonic and polyrhythmic and gradually fades out.

From 09'20" a new chapter shows the saxophone playing in foreground a free-form solo over a continuous texture of percussions, strings and wind instruments. Music holds an improvised character and from 11'04" saxophone and string design a quiet episode with a tense interplay between scattered sounds of saxophone (Figure A.67, round regions) and sustained notes of strings (often merged into microtonal groups, Figure A.67, rectangular regions).¹⁹³

¹⁹³ The composition of an interlaced combination of scattered sounds with a limited harmonic series may recall Pan Sonic's *Linjat* where electronic sounds are placed at different frequency ranges (Figure A.37): in both cases, sounds are located within a restricted spectral region creating a pointillistic sonic patchwork.

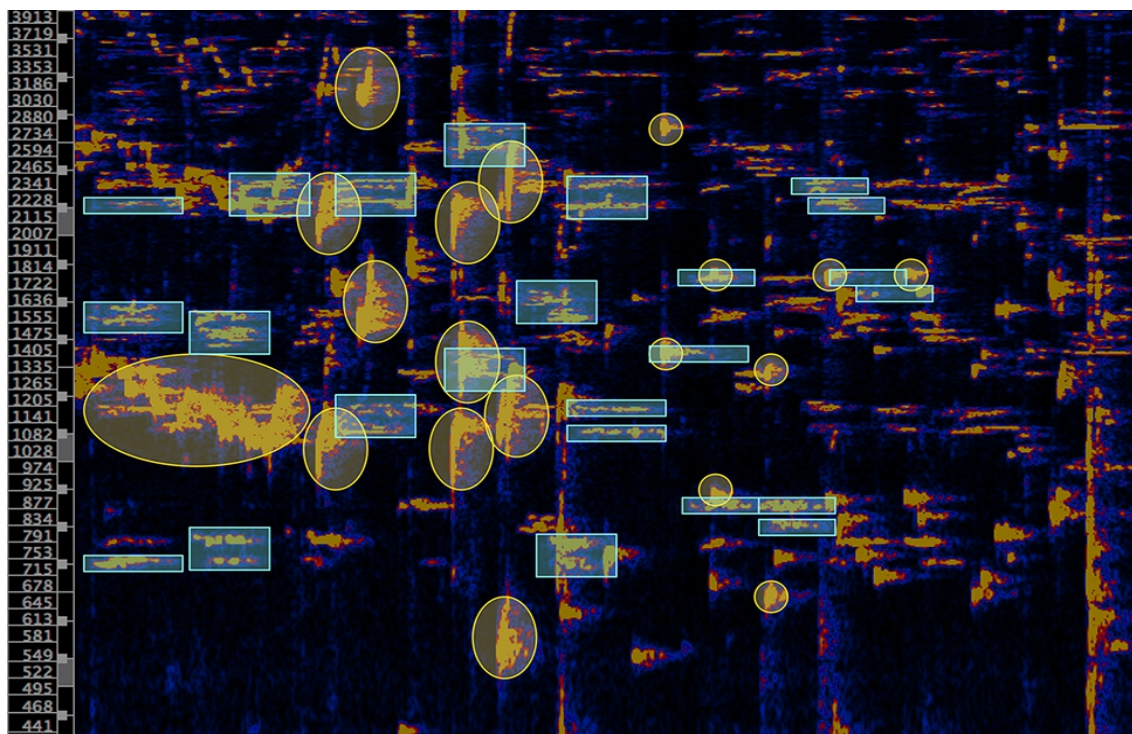


Figure A.67 Spectrogram [440 – 4000 Hz / 11'09" – 11'30"] of DW14-I (*original colour of spectrogram are adjusted to favour the recognition of marks*).

The solo of saxophone fades out leaving a long silence until 12'19".

- [12'20" – 15'35"]

The new episodes begins with a steady rhythm of drums that is reinforced by wind instruments and continuous tones of saxophones which create a tight aggregate of sound that proceed like a march. The interruptions of saxophones which sometimes break off the rhythm, consist of a regular series of six chords that moves in a microtonal range along a medium range of frequencies (*i.e.* 130 – 2200 Hz, see Figure A.68, top inlet). Saxophone plays *sforzato* notes and this distortion creates inharmonic sounds and a large series of overtones.

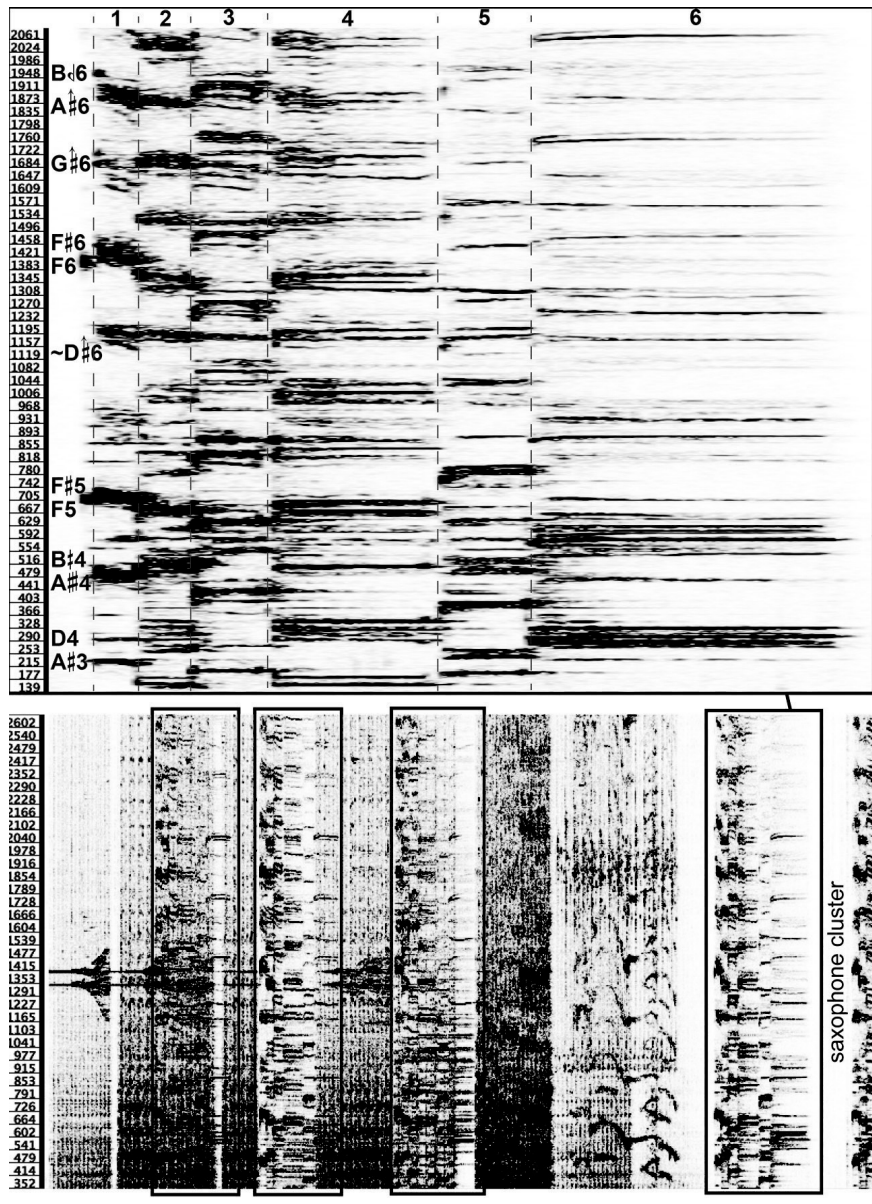


Figure A.68 Spectrograms [top: (inlet) 139 – 2100 Hz / 14'15'' – 14'32''. Bottom: 350 – 2600 Hz / 12'20'' – 14'42''] of DW14-I.

The u-cluster of saxophone dissipates itself and the episodes fades out with an echo of strings. Again here, Lang uses a sort of sculptural arrangement of sounds and the interposition of u-clusters/units of different timbres creates interferences and rich masses of sounds.

DW14 – II [18'13'']

- [00'00'' – 08'26'']

New episodes is characterised by the alternation of rhythmic u-clusters typical jazz-blues styles, mainly based on temporal frames played by bass and percussions (Figure A.69, these types of u-clusters are labelled (a)) and other u-clusters more dilated that work as pauses out of rhythmic structure (sections (b) and (c)). From 02'21'' to 03'22'' for instance, the rhythm is interrupted by a quite interlude consisting in a few elements played by saxophone and percussions. From 03'23'', the atmosphere is solemn and lyrical. Saxophone plays *sforzato* notes and this technique generates an extended series of overtones (04'03'' – 04'24'', see Figure A.69, top spectrogram and also later at 06'41'' – 07'07''). The spectral exploration, the dynamic contrast and the plastic arrangement of sounds are maximized.¹⁹⁴

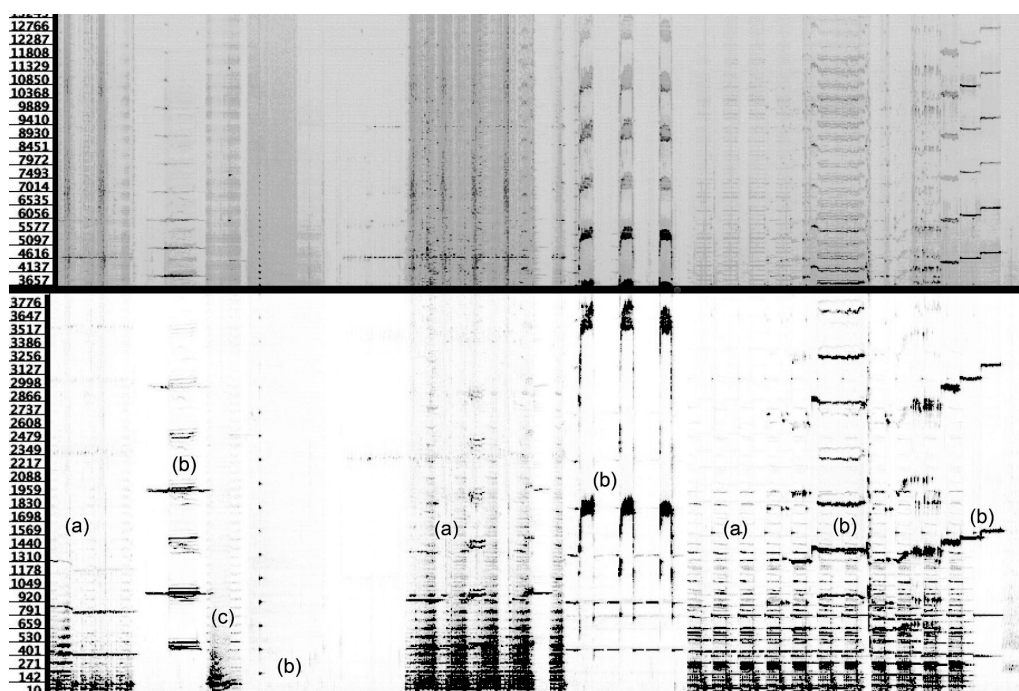


Figure A.69 Spectrograms [top: 3.6 – 13 kHz; bottom: 10 – 4000 Hz / 02'00'' – 05'48''] of DW14-II.

¹⁹⁴ The atmosphere is solemn and lyrical and even if the instrumentation recalls jazz orchestra, the incessant slow rhythm, bass pulsation and the large sonic spectrum might remember the atmosphere of some pieces of Raime (e.g. *Told & Collapsed*).

At 05'42" a very soft continuous texture of strings accompanies the rhythmic bass and the soloist saxophones and after a full-orchestral interventions saturates the sonic space and the episode closes with a free-improvised section that introduces elements of the successive episode.

- [08'27" – 16'22"]

The new episode recalling the gradual evolutions of *DW7* and *DW8* consists of rhythmic elements of double-bass (playing walking bass line and bringing to mind the jazz's aesthetic) and a soft drone with a series of sustained notes of wind instruments. The sound becomes progressively more complex and rich: new sonic layers are added and the solo saxophone plays high-pitched phrases. From 13'31" a new u-cluster begins with the three soloist instruments bass, saxophone and drums that develop a jazz improvisation.

- [16'23" – 18'13"]

A very delicate drone characterises this new episode. Music is soft and continuous, and the sound of loop orchestra appears distorted. The atmosphere is suspended and hypnotic and one may have the impression to perceive a unique sound with many constitutive elements (*e.g.* bass pulsations, electric drone, wind instruments and high-pitched tones) and the aural effect is similar to some pieces of Pan Sonic, Ryoji Ikeda and Raime (Figure A.70).

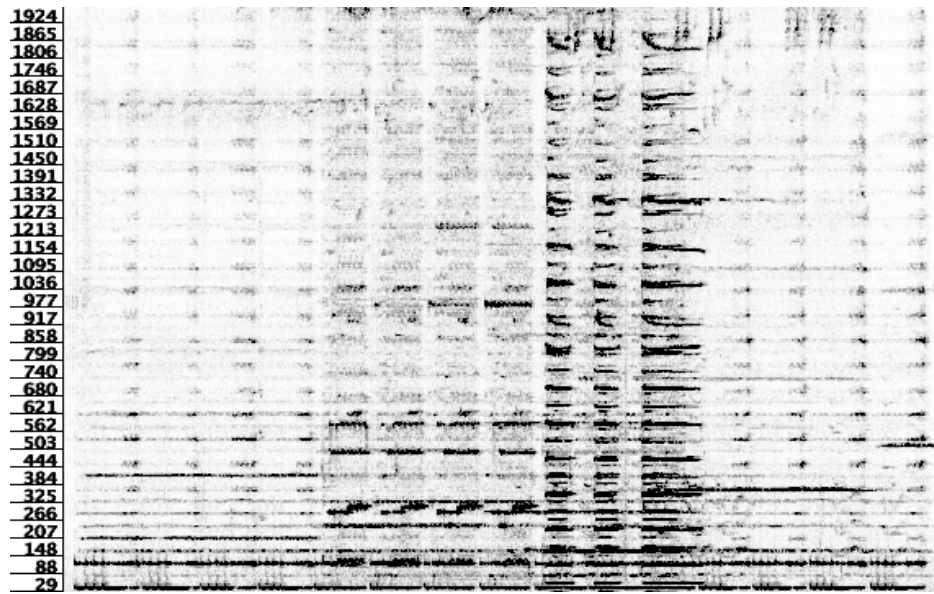


Figure A.70 Spectrograms [29 – 2000 Hz / 16'21" – 18'01"] of DW14-II.

DW14 – III [04'26"]

- [00'00" – 04'26"]

This last part holds a very fast polyrhythmic structure close to that one of *DW2* and *DW3*: mini u-clusters made of short repetition of a single unit. There is a fast transition of different rhythmic sections, soloist instruments maintains a primal role until the very end (03'29") where a final *coda* emerges with a soft sound, almost static and characterised by mechanical repetitions that fade out.

- Overview

With respect to the other *DW* pieces, *DW14* is a piece with only minor similarities to the perspective I am considering. *DW14* is closer to a jazz aesthetic: it includes blues-style rhythmic sequences, solo episodes, and improvised parts. Sometimes the music encompasses dynamic and spectral contrasts; other times there are cyclical and static episodes where the sound develops more gradually, adding layers of continuous tones similar to a spectralist approach. However, it encompasses dynamic and spectral contrasts (G, A), a sculptural arrangement of interventions (I) and sometimes there are cyclical episodes with a static nature (E) where sound is developed gradually and composed adding closed-packed sonic layers similarly to a spectralist

approach (B). The later parts of the piece have more characteristics in common with pieces by Raime and Pan Sonic but, overall, *DW14* is more concerned with a contrast between an improvised aesthetic and the mechanical repetition of musical elements.

DW15 “Songs/Preludes” (2003)

AUDIO [25’12’’]: *DW8/DW15/DW3*. Germany: Col legno, Bayerischer Rundfunk, BR-Klassik, WWE- 20090-CD.

NOTE: The analysis has been carried through aural and spectral examination. CD-version is a live recording of the piece (March 23th, 2004 at Carl–Orff–Saal / Gasteig, Munich). The following text from linear notes of the original CD edition has been taken into account during the analysis:

[DW15] is a dramatic inscape comprising works song-like in form. The loop technique present in the earlier works is taken forward a notch, the aim being to complete a larger song cycle, the *Songbooks*. The vocal part represent, in an imaginary way, a number of whispered inner voices, ones associated with the uttering of demons, just like those transcribed in the medieval “Grimoires”. These voices can only be heard in trance, where the subject is in an exalted state of awakened sleep. The writing for the zither is overlaid with an electronic texture and thus takes on a kind of double instrumentation. [...]

DW15 is a piece composed for electronic zither, voice, and cd-recording.

- *DW15 – First song (06’03’’)*

The *First song* is almost characterised by short u-clusters created by the complex interplay between zither, electronics and voice. Zither and bass pulsations design a rhythmic framework while voice plays more continuous sounds. The repeated unit creates an irregular rhythm that gives the impression to stumble like a sort of defective mechanism. Several times (*e.g.* at 01’13’’ and 02’22’’) the zither and electronic pulses create rhythmic sequences reinforcing the development of the unit. On the other hand, the voice may generate utterances which work as constitutive elements of the unit (Figure A.71, area labelled as “b”) or behave as continuous element to unify different u-clusters (area labelled as “a”). [A, D, F, H, I]

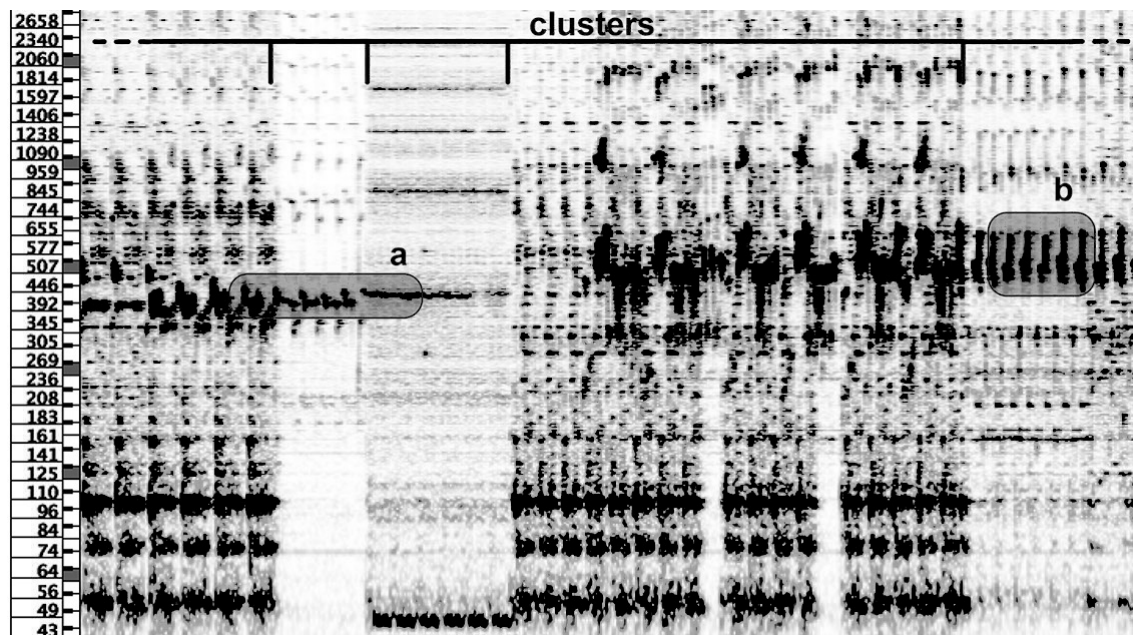


Figure A.71 Spectrogram [40 – 2700 Hz / 01'45" – 03'17"] of DW15–First Song.

- DW15 – Second song (10'52")

The *Second song* of DW15 is typical of static and long sounds. The global atmosphere is hypnotic and the electronics takes on a primal role in creating deep bass and oscillating sounds. The development is horizontal and sounds are continuous and overlay one another. Lang makes a peculiar use of the vocal utterances: some short breathy sounds (*i.e.* aspirated consonants) appear over a continuous texture of sounds and generate an expansion of spectrum towards high frequencies (Figure A.72, regions “v1” and “v3”); other vocalizations occupy medium and high frequency ranges (“v2”). On the other hand, e-zither and electronics cover medium and bass frequencies (*e.g.* Figure A.72, regions “z” and the bass drone at ~60 Hz in the left section of the Figure).

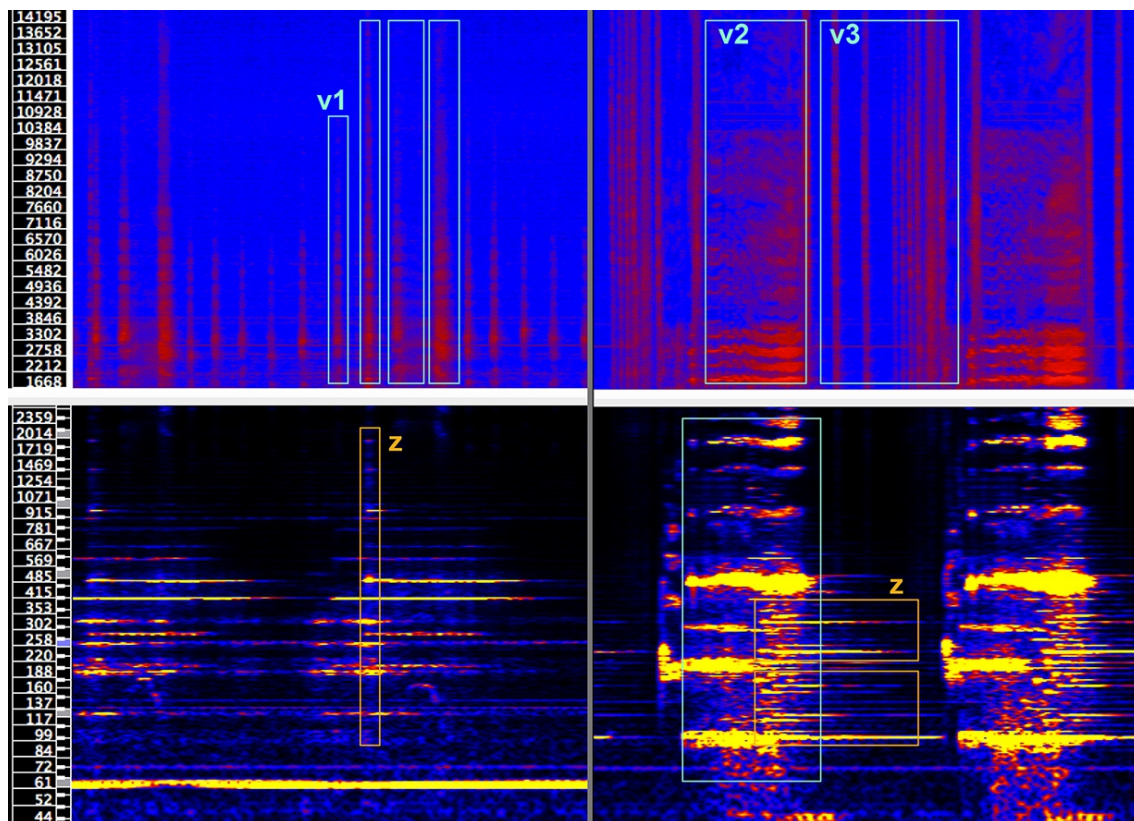


Figure A.72 Spectrograms [top: 1.6 – 14.2 kHz; bottom: 44 – 2400 Hz. (left) 01'35'' – 02'03''; (right) 03'09'' – 03'37''] of DW15–Second Song.

From 06'40'' to 08'00'' a u-cluster is gradually developed. A very slow sequence of units in which zither and electronic create a dense mass of sound, exemplifies well some of the common attributes of this study (Figure A.73): the presence of a rich sonic spectrum (A, from 55 Hz to 13 kHz) and several tones overlaid in a microtonal arrangement that interfere one another (B, e.g. tones 270 – 317 Hz, C $\sharp$ 4 – D $\sharp$ 4). There is a very slow regular cadence (D) made of the reiteration of musical elements (E) which generate hypnotic effect that is amplified by the obsessive oscillation of electronic sounds (H). Moreover, the creation of static masses of sound (E) and the presence of a plastic arrangement of different sonic events (I) typify this episode as well. *DW15–Second song* is a piece with an evident ecstatic nature: sound is cyclical and non-teleological.

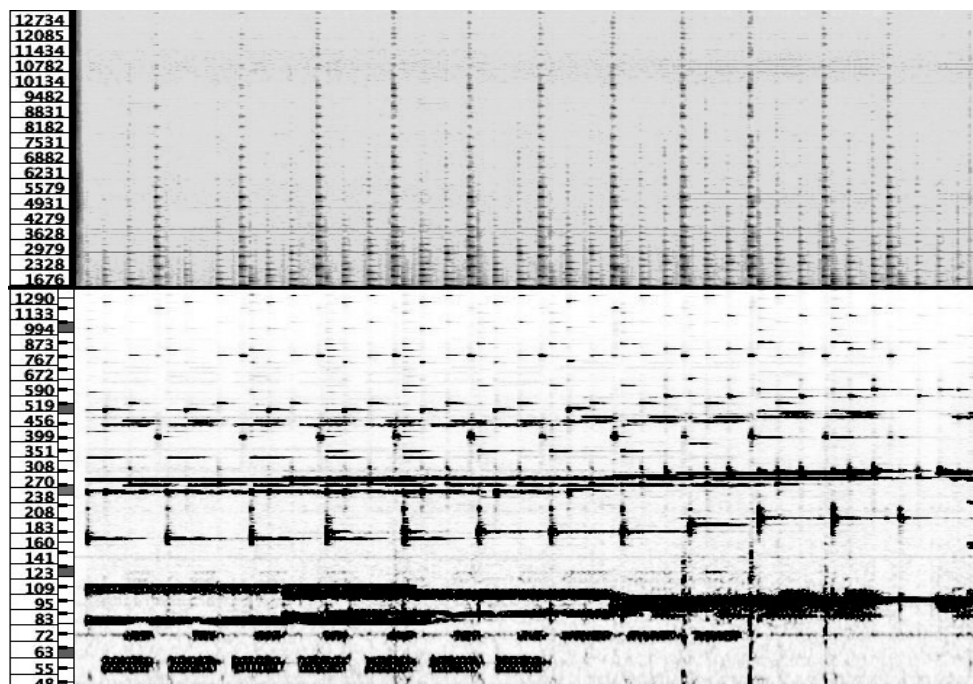


Figure A.73 Spectrograms [top: 1.6 – 13 kHz; bottom: 44 – 1300 Hz / 06'39'' – 08'00''] of DW15–Second Song.

- *DW15 – Third Song (04'23'')*

In opposition to the previous song, this third song of *DW15* has a structure made of pointillistic construction of mini u-clusters and fragmented vocal insertions. This section includes musical elements that approximate well to classical vocal songs and episodes of *recitativo*. Zither and voice construct at the begin an interlaced movement, then –from 02'20''– the pure sonic elements are left behind to favour textual and narrative elements typical of a song. [(F)]

- *DW15 – Fourth Song (03'55'')*

This song has mainly a rhythmic character made of short u-clusters in a rapid turnover. There is a prevalence of fast polyrhythmic structures that may recall for very short period some sequences of techno music (*e.g.* 00'00'' – 00'07''; 00'47'' – 00'51''). However, the voice holds a strong semantic character and even if the singing is decomposed and fragmented, the original idea of *songbook* is still discernible. There is still an idea of sculptural positioning of musical elements in a way that percussive

sounds, voice and zither are frequently part of a defined musical configuration (e.g. 01'16'' – 01'55''). However, the glitch aesthetic is present: despite the fact that the piece should replicate the idea of a songbook many u-clusters includes irregular units and create an effect of a mechanic flaw (e.g. 02'19'' – 02'30''). [(A), D, F, G, H, (I)]

- *Overview*

The peculiar instrumentation of *DW15* makes this piece characteristic for its timbre: the sound of e-zither is mainly high-pitched, sharp with a short decay, the voice acts sometimes as connecting element between different u-clusters, other times may emerge with short utterances reinforcing rhythmic structure. The four songs of *DW15* includes very different episodes and Lang maximizes the oppositions of elements: for instance the *second song* has an ecstatic nature while the *third* and *fourth songs* reflect a strong narrative and dramaturgy. For this reason, *DW15* is a piece in which some episodes includes many traits in common within the selection of pieces, whereas others detaches themselves from the common aesthetic of this study.

DW17: Doubles/Schatten II (2004)

AUDIO [46'37'']: *DW17: Doubles/Schatten II*. Germany: Col legno, WWE 1SACD 20613.

NOTE: The analysis has been carried through aural and spectral examination. *DW17:Doubles/Schatten II* (from now *DW17*) is a piece for electric viola, electric cello and surround orchestra.

- *GENERAL SCHEME*

Sections	Attributes (ordered from the most fitting)
00'00'' – 04'53''	D, A, F, G, E // B, H, I
04'54'' – 08'15''	F, D, G // A, B, E, H, I
08'16'' – 13'55''	F, B, G, D // A, C, I

13'56" – 16'28"	D, F, E, B // A, H
16'29" – 19'47"	E, B, F, A, H // I, D
19'48" – 23'45"	E, B, H // A
23'46" – 24'55"	F, H // D, A, G
24'56" – 39'04"	E, B, H, I, A // C, G
39'05" – end	F, G, D // A, H, I

- [00'00" – 04'53"]

The first episode of *DW17* is characterised by a separation between musical plans and instruments. The initial rhythmic section (*i.e.* bass and percussions) provides the metric of the unit while the full-orchestra fades in with a dense texture of sounds that periodically reiterates, developing at times cyclical *glissandi* of strings (Figure A.74).¹⁹⁵

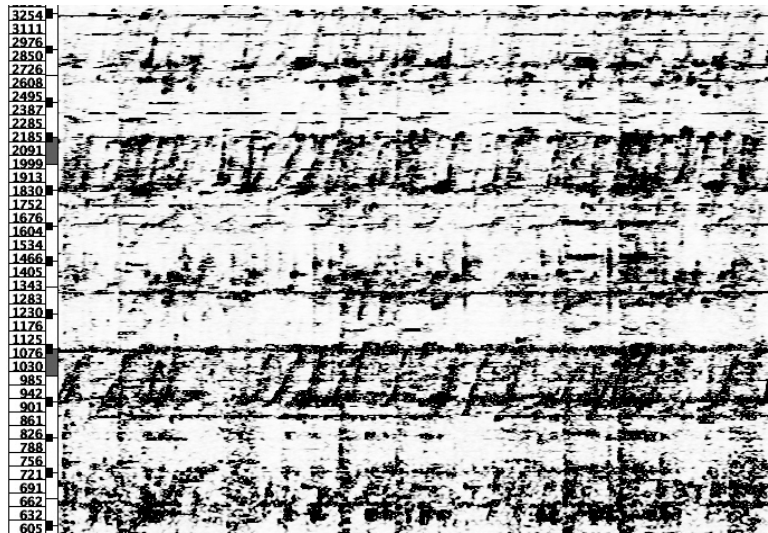


Figure A.74 Spectrogram [600 – 3300 Hz / 01'40" – 02'08"] of *DW17*

¹⁹⁵ It is interesting to notice the similarities of the repeated glissando of strings in this section with the corresponding one in Haas' *String quartet n° 2* (Figure A.10): both are composed as a systematic movement from two particular notes.

There is a global dynamic *crescendo* and wind instruments (*i.e.* horns) and percussions emerge marking the rhythm and leaving the sonic texture of strings in the background. The development is solemn and powerful (more complex at every cycle) and the repetition of the rhythmic cell (*i.e.* wind instruments and percussion) creates a recurring pattern that is dynamically loud but works as framework for various sonic phrases of electronic viola and cello (e.g. 03'30" – 04'55").

- [04'54" – 08'15"]

The rhythmic pattern changes giving the impression of a new start with renewed elements of bass and drums. The orchestra play short sequences of repeated units which approximate to a sort of pop-style or soundtrack. The orchestra delineates sequence of mini u-clusters that are loud and energetic and possess a high dramaturgy. Lang uses clichés of other styles (e.g. music for movies), but he decomposes these stereotypes: music is fragmented and always recalls the flawed repetition of glitch aesthetic. There is an intense interplay between strings and wind instruments. From 05'44" to 06'51", the obsessive repetition of the same short unit on top of a previous rhythmic u-cluster gives rise to an episode that develops different polyrhythmic structures. The soloists emerge from time to time as connecting components between two distinct u-clusters (e.g. 06'50" – 06'57" and 07'07" – 07'46").

- [08'16" – 13'55"]

This section evolves more freely: u-clusters are more differentiated. There are dynamic and spectral contrasts: for instance at 09'33", one dense and rhythmic u-cluster is followed by a soft loop (Figure A.75, transition between u-clusters "1" and "2"); then a regular dynamic *crescendo/diminuendo* (u-cluster "3") that characterises a compulsive repetition over which the soloist e-violin plays, comes before a dense full-orchestral u-cluster ("4").

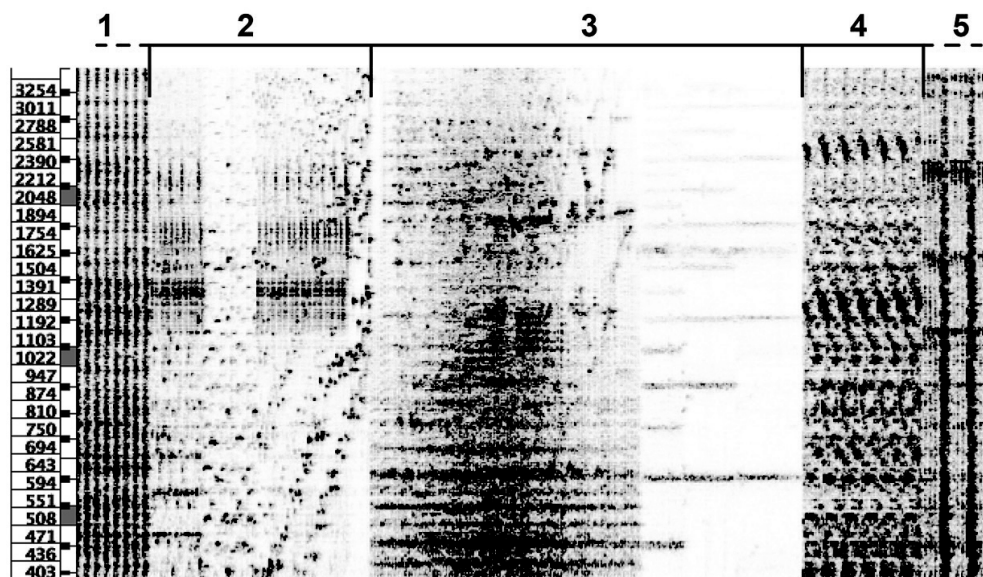


Figure A.75 Spectrogram [400 – 3300 Hz / 09'26'' – 11'19''] of DW17.

The former (u-cluster “3”) has a compact (and microtonal) sonic layering whereas the following (u-cluster “4”) is typical of a scattered distribution of sonic elements. The u-cluster at 12'36'' consists of the superimposition of two distinct repeated units: the first is based on the obsessive repetition of a short rhythmic pulsation while the second is made of sustained sounds of wind instruments. When the u-cluster fades out the two units behave differently and the rhythm disappears leaving emerge the second unit.

- [13'56'' – 16'28'']

This episode begins softly without percussions and the repeated cell is constituted by string and wind instruments that gradually emerge. The u-cluster is developed progressively (as in case of other orchestral pieces of the series, such as *DW7* and *DW8*) and the global sound is formed by sequential addition of tones (within a strict microtonal range) starting from bass frequencies towards higher tones. The sonic texture is made of recurrent events (*i.e.* rhythmic intervention of horns and continuous sound of strings) and more extended phrases of e-violon and cello which extends through various units. The entire section is a giant crescendo culminating in a new rhythmic and full-orchestral section which end at 16'28''.

- [16'29" – 19'47"]

A new bass line introduces a new episode with similar traits of the opening one (00'00" – 04'56"): a recurring sequence of chords constitute the body of the cell and wind instruments emerge composing a sonic aggregate (Figure A.76) which holds a melodic pattern as a hypnotic and detuned jingle (17'35" – 19'45"). This sequence of chords is indeed constituted by subtle microtonal movements around several notes (Figure A.76, inlet).

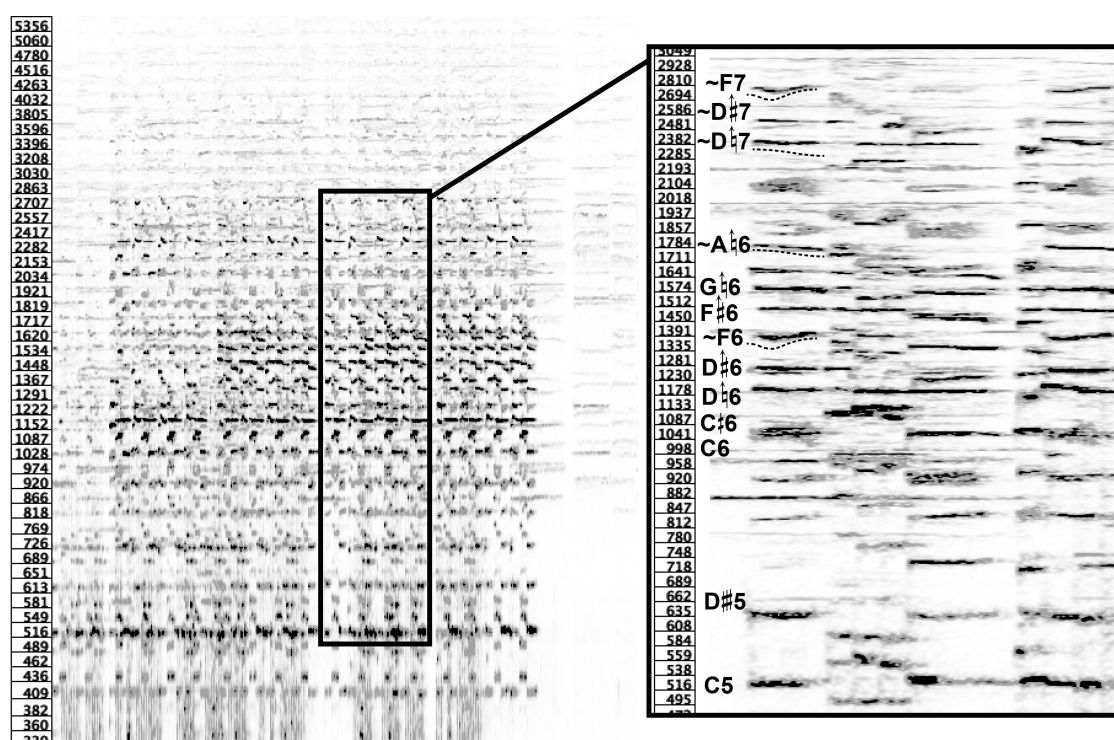


Figure A.76 Spectrograms [340 – 5500 Hz / 17'14" – 20'44". Inlet: 490 – 3100 Hz / 18'40" – 18'51"] of DW17.

- [19'48" – 23'45"]

From 19'48", Lang composes a quiet section which consists of a series of blocks of sustained sounds (in the range of 800 – 6000 Hz). Musical structure approximates to that one typical of spectralism where each aggregate of tones depicts a new timbre. Sound "is carried" by a succession of fragile chords where the liminal nature of music lives in the imperceptible presence of overtones that continue to appear

and disappear. The pause at 22'42'', introduces a new series of sonic lines characterised by a few number of tones mainly around A#, F and D# (Figure A.77).

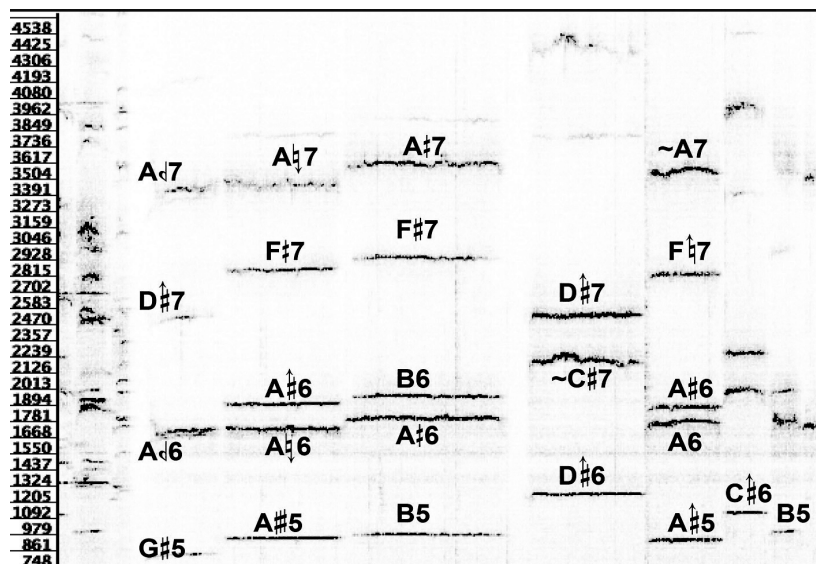


Figure A.77 Spectrogram [750 – 4650 Hz / 22'31'' – 23'43''] of DW17 (gain has been normalized to +20dB allow the detection of lines).

- [23'46'' – 24'55'']

This section is a block of three u-clusters with dynamic and spectral contrasts: fast rhythms and dense spectra (*i.e.* 23'46'' – 23'58'' and 24'24'' – 24'55'') are alternated with bass drone of percussions and wind instruments (23'59'' – 24'23'').

- [24'56'' – 39'04'']

This long episode is characterised by a series of static situations where different drones follow one another in a sort of atemporal succession. Lang enhances the contrasts leaving long pauses of silence or short interruptions of scattered percussions (*e.g.* from 28'20'' to 28'34'). The type of sound comes close to spectralist aesthetic as well as structural minimalism, even if each drone does not last more than two or three minutes. For this reason we cannot talk about hypnotic effect of sound duration rather here the lack of narrative leaves a suspended atmosphere. The sequence that begins at 29'35'' is a soft dense drone that extend over a very large portion of sound spectrum (*i.e.* 20 Hz – 16kHz) and is marked by sparse interventions of percussions. The sonic

matter is almost impalpable: it is an indefinite drone with few scattered elements that emerge from time to time.

From 33'40" the organization of sounds start to be more defined. Dynamic and spectral contrasts exemplify well these transitions and music gives the impression to come from a remote place: sound is both acoustic and electric, original and manipulated.¹⁹⁶

Several elements are recurrent: (i) a regular noisy pulsation, (ii) an ascending movement of notes and (iii) a sequence of two tones in opposition. Each element occupies a discrete portion of sonic spectra and the positioning of events has a clear spatial and sculptural perspective. From 35'06" a new regular u-cluster begins with a firm beat of percussion and strings. Strings design a soft texture made of cyclical *glissandi* and then at 36'23" wind instruments reinforce the unit. Here, there is another good example of a u-cluster composed by a unit which progressively changes in sonic qualities keeping the same tempo: from 37'18", for instance, the unit consists only on a single pulse that marks the tempo.

From 37'28" to 39'00", Lang continues to work with the opposition of elements: on the one hand he uses few interventions with silent episodes, on the other hand he composes full-orchestral u-clusters (with the frequent use of repeated *glissandi*).

- [39'05" – end]

This last part recovers the initial aesthetic made of fast rhythm, short u-clusters, obsessive repetitions and fragmented evolutions (e.g. 40'02" – 40'28"). Several loops of this section shows u-clusters generated by the loop-orchestra; thus including samples of pre-recorded material. For instance the episode from 42'39" might recall typical traditional motifs of orchestra that are differently interrupted by various interjections until 43'20". From 44'05" a new u-cluster begins. Here, the soloists instruments improvise with a highly distorted sound (which reminds heavy metal styles) over the

¹⁹⁶ This section has some similarities with Nova's *Eleven* piece where the ensemble generates a complex *sound* which behaves as it were a unique entity: sometimes it creates strong contrasts leaving empty spaces of silence, other times it saturates the spectrum with a dense and extended sonic mass.

full-orchestra and then a static u-cluster that contain an ascending *glissando*, concludes the piece (Figure A.78).

- *Overview*

DW17 lasts for over forty minutes and globally it is typified by two distinct aspects: on the one hand, there is the fast turnover of mini u-cluster with a full orchestration and dynamic and spectral contrasts (*i.e.* initial and final parts); on the other hand, the central part (19'50'' – 39'00'') is characterised by a static nature where episodes consist of sustained and overlaid sounds and music is gradually developed.

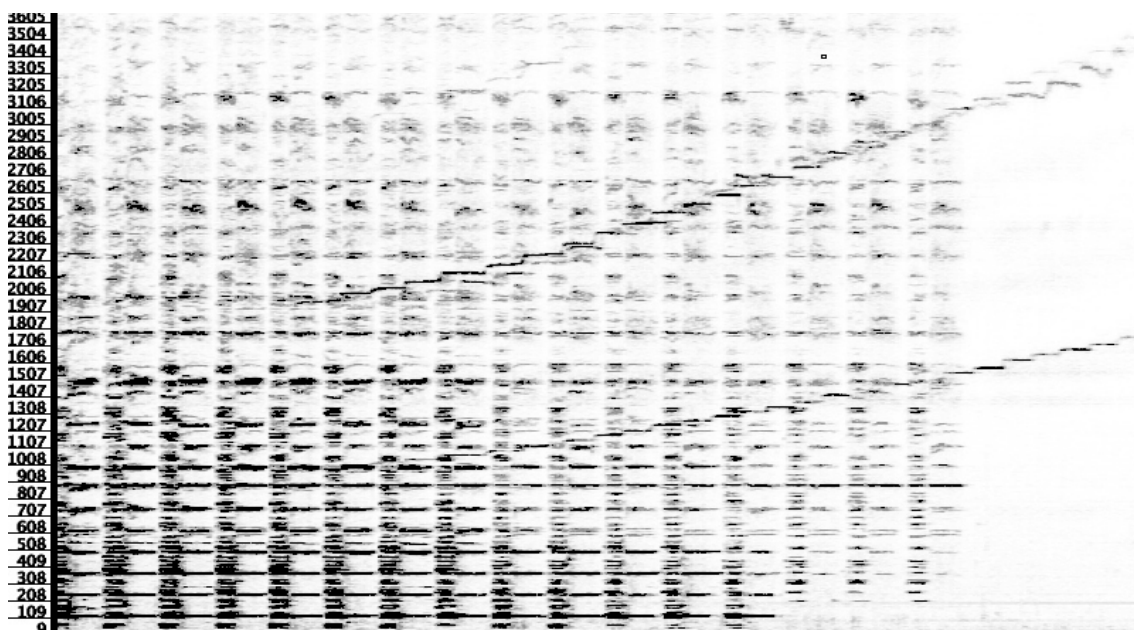


Figure A.78 Spectrogram [20 – 2700 Hz / 44'44'' – 46'20''] of *DW17*.

This piece encompasses many characteristics in common within the selection and shares similar practices with *Raime* (*i.e.* the u-cluster 14'40'' where sound is developed by layering tones and at 35'15''), *Haas* and *Nova*; common sonorities with *Rioji Ikeda* and *Pan Sonic* (*i.e.* from 25'30'' and at 33'00'').

A.4 Ryoji Ikeda

AUDIO: Ikeda R. (1996). “Ryoji Ikeda +/-” [CD]. UK: Touch – TO:30-CD.

NOTE: In absence of a notated score and in order to be consistent with other

analyses, the identification of tones was carried out through spectral analysis and expressed with traditional microtonal notation (*e.g.* ♯, ♭, ♯, ♯, ♯) together with the corresponding frequency range. In “+/-” Ikeda makes often use of few raw sounds, mainly generated by oscillators and digital manipulation; in many cases the analysis has started with the identification of these sounds –listed and numbered at the begin of the text– and then the study passes to examine the interconnection between them.

Headphonics [1995]

Track 1) Headphonics 00 [03’12’’]

Main sonic elements (Figure A.79):

(I) at 00’00’’, a tone [B5, 990 Hz]; continuous square pulse alternated between stereo channels;

(II) at 00’19’’, a dry beat [10 – 9000 Hz, duration: ~370 ms], every ~5 seconds (between channels);

(III) at 00’40’’, noisy insertions [2000 – 19000 Hz, duration: ~418 ms];

(IV) at 00’41’’, tones [G#9, 13.5 kHz, A#9, 14.9 kHz], duration: ~650 ms;

(V) at 01’17’’, bass pulse at [G1, 44 Hz; D♯3, 149 Hz; F♯8, 5464 Hz, F♯9, 10981 Hz; duration: ~1 s];

(VI) at 01’57’’, a noisy crackling pulse [2000 – 19000 Hz] synchronous with bass pulse (*i.e.* element V);

(VII) at 02’34’’, sharp continuous tone [C8, 4168 Hz].

• *[begin – end]*

The piece begins with a single tone (*i.e.* element I) that moves between the two stereo channels.¹⁹⁷ The resulting sonic impact is bewildering and the successive

¹⁹⁷ A similar construction appears in Pan Sonic’s *Lautturi* (Figure A.30). Here, Ikeda does not move a continuous sound, rather he applies a square pulse split between channels

appearance of the other sonic elements stabilize the perception. The entrance of bass impulse moves in fact the equilibrium toward a bass spectral region. In this way, Ikeda at the begin exploits the complex effect of the starting element, then he provides additional structural components to create a final sound that result more rich and balanced. This piece has a progressive construction: each new element is maintained until the end. First at 01'17'' (element V) then at 01'57'' (VI) and finally at 02'34'' (VII) the piece gains additional components, sonic perspective changes focusing on different sonic elements and each sound acquires a sort of new role when an additional element appears. Interestingly, for instance, how the noisy element VI gives the impression of a recurring flaw typical of glitch aesthetic.

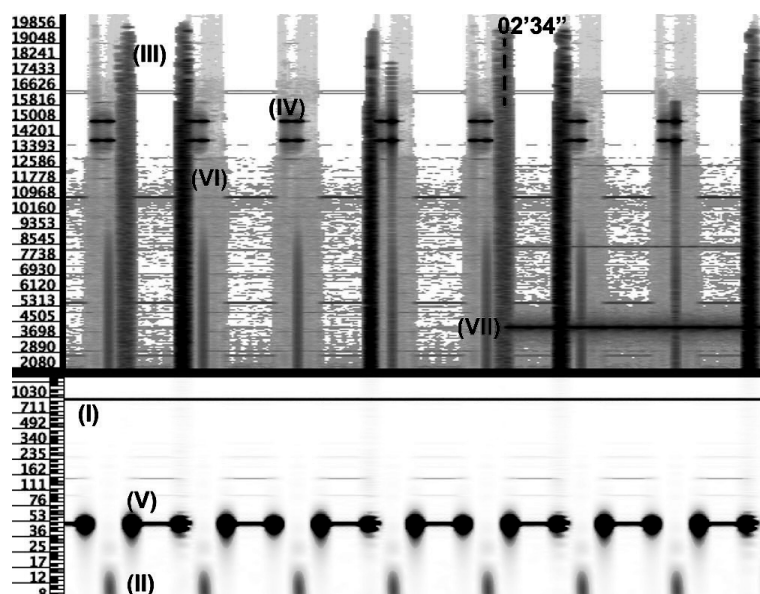


Figure A.79 Spectrograms [top: 2 – 20 kHz; bottom: 10 – 1300 Hz / 02'23'' – 02'40''] of Stereophonics 00.

The central idea is to work with simple sounds that belong to distant kinds of timbre, combining them in a way that the resulting texture is innovative and unexpected. [A, D, (E), F, H, I]

Track 2) Headphonics 01 [03'12'']

Principal sonic elements (in *italic* the elements in common with the previous track, *Headphonics 00*):

(I) at 00'00'', a tone [B5, 990 Hz]; continuous square pulse alternated (it replicates component I of the track Headphonics 00);

(II) at 00'00'', fat bass rhythmic pulsation [centred in G1, 49 Hz];

(III) at 00'19'', a tone [C#6, 1110 Hz; G#7, 3340 Hz] discrete and regular;

(IV) at 00'35'', a noise [~9 – 20 kHz], continuous high-pitched percussive;

(V) at 00'59'', a very dry beat [10 – 9000 Hz, duration: ~370 ms], (it replicates component II of the track Headphonics 00);

(VI) at 01'07'', a noisy insertion [2000 – 19000 Hz, duration: ~418 ms] (it replicates component III of the track Headphonics 00);

(VII) at 01'18'', tones [A9, 13.9 kHz; A+9, 14.9 kHz], duration: ~650 ms (it replicates component IV of the track Headphonics 00);

(VIII) at 01'37'', noisy crackling pulse [2000 – 19000 Hz];

(IX) at 01'55'', sharp continuous tone [C8, 4168 Hz] (it replicates component VII of the track Headphonics 00);

(X) at 02'35'', noisy crackling pulse [2000 – 19000 Hz] (it replicates component VI of the track Headphonics 00).

• [begin – end]

At the begin the bass rhythmic line (element II) and the synchronous tone (element III) –which is audible when the bass pulsation is suspended– generate a strong effect that may recall club-based aesthetic. However, the piece proceeds adding new elements (*i.e.* mainly repeating the sequence of the previous piece) which generate a dense and various combinations of sonic events. For instance, the asynchronous interplay between elements I and II/IV result in a complex polyrhythmic structure that creates irregular episodes. The initial structure (*i.e.* elements I-III) is preserved until the end in a way that one may have the impression of a self-generated music in which the noisy insertions works as structural defects. [A, D, (E), F, H, I]

Track 3) Headphonics 10 [04'16'']

Principal sonic elements (in *italic* the elements coming from the previous track *Headphonics 00*):

(I) at 00'00'', a tone [B5, 990 Hz]; continuous square pulse alternated (it replicates component I of the track *Headphonics 00*);

(II) at 00'00'', regular interventions (based on C[♯]4, D[♯]4, D^{##}4, Figure A.80);

(III) at 00'19'', a tone [C[♯]6, 1110 Hz; G[♯]7, 3340 Hz] (it is similar component III of the track *Headphonics 01* but now the tone has a decay of nine sec);

(IV) at 00'38'', a bass beat [centred in G[♯]1, 52 Hz], synchronous with elements II/III;

(V) at 00'59'', a very dry beat [10 – 9000 Hz, duration: ~370 ms], (it replicates component II of the track *Headphonics 00*);

(VI) at 01'07'', a noisy insertion [2000 – 19000 Hz, duration: ~418 ms] (it replicates component III of the track *Headphonics 00*);

(VII) at 01'16'', bass line [in the range of 45 – 162 Hz];

(VIII) 01'40'', high tone [A8, 7033 Hz] appearing in reverse;

(XI) 01'43'', high tone [D9, 9375 Hz] appearing in reverse;

(X) at 02'05'', tones [C5, 523 Hz, C[♯]5, 554 Hz], continuous with a slow fade in;

(XI) at 02'34'', sharp continuous tone [C8, 4168 Hz] (it replicates component VII of the track *Headphonics 00*);

(XII) at 03'33'', tones [A[♭]5, 862 Hz; D[♭]6, 1220 Hz, E[♭]6, 1293 Hz], continuous with a slow fade in;

(XIII) at 03'55'', tones [G[♯]5, 833 Hz; D6, 1117 Hz, D[♯]6, 1247 Hz], continuous with a slow fade in;

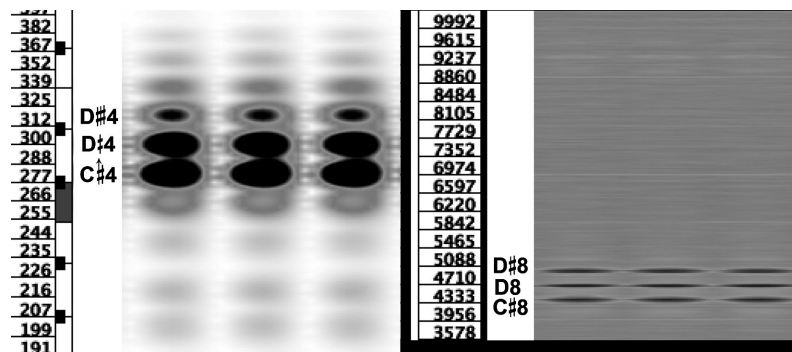


Figure A.80 Spectrograms [left: 190–385 Hz; right: 3.5–10 kHz / 00'00"–00'02"]
of *Headphonics*–10.

- [begin – end]

Similarly to the two previous pieces of *Headphonics* series, this piece preserve the progressive construction of elements. The first part (until 01'16'') contains strong rhythmic components: the bass line that starts from 01'16'' creates an intense dynamism within a linear and uniform framework. However, this base line ends at 03'31 (and – within the *Headphonics* series– this is the unique case of an element that does not last until the end of the piece) and new continuous tones emerge (*i.e.* elements XII and XIII) creating a multilayered mass of sound.¹⁹⁸ Close to the end of the piece, sounds form a rich and dense aggregate which has interesting microtonal traits (Figure A.81).

Overview (*Headphonics*–series)

As the title suggests, the three piece of *Headphonics*–series hold characteristics for the specific listening with headphone: the oscillation within the stereophonic space is more evident in this particular condition of listening. The global effect is that the repetition of different elements which are overlaid in complex structures, provides a multiple listening perspective: when the piece has reached its highest level of complexity, one may easily listen at the global sonic result but at times one could be able to isolate single elements of the composition. This ability to isolate components is facilitated by the fact that each element is presented and added gradually.

¹⁹⁸ In the central part of the piece (ca. 02'47'') there are a significant number of sonic elements of different types and this recurrent structure may appear similar to certain complex clusters created by Bernhard Lang in his *DW*–series (*e.g.* *DW8*, around 06'15'').

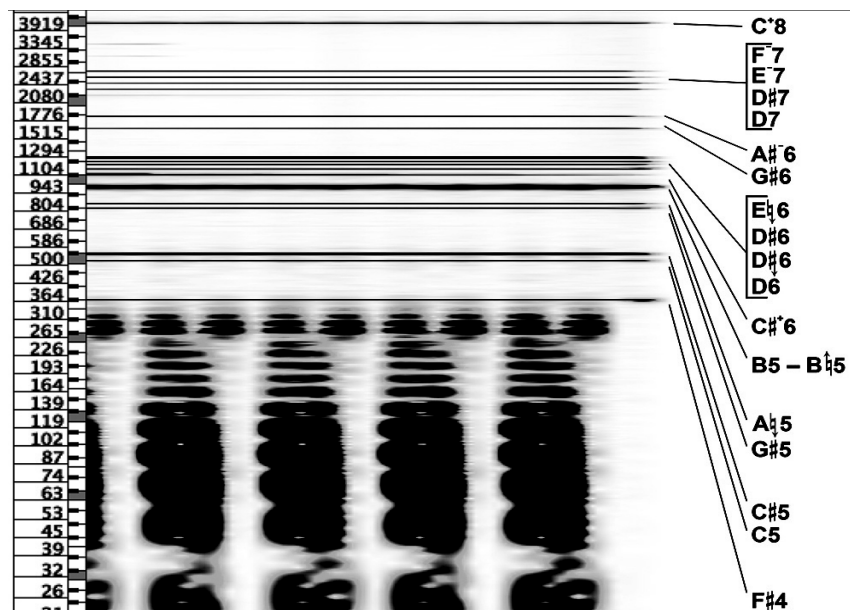


Figure A.81 Spectrogram [23 – 4000 Hz / 04'06'' – 04'09''] of Headphonics-10.

+ / – [1996]

Track 4) + [02'50'']

- [begin – end]

The piece consists of a single sonic element which is differently filtered during the entire evolution. At the begin, an electronic pulsation appears in combination with a soft bass drone (20 Hz, 31 Hz, 42 Hz...) and a dense high-pitched line at ~14.3 kHz (Figure A.82, letter “a”); from 00'15'' the high profile gradually descends to 12.6 kHz (00'35'', “b”). From 00'40'' there is a very slow release of the filter of frequencies: the original sound is gradually liberated and the pulsation becomes more dry. Dynamic increases and from 01'49'', the bass drone which is constituted by regular tones, all separated by 11 Hz, comes to be more intense (“c”). The sound emerges polarized towards high and bass frequency ranges, this effect is emphasised when filter is again applied in high frequency from 02'08'' to 02'22'' (Figure A.82, “d”).

The global effect is of a slow and incessant emersion: sound is uniform, it has always the same form, but it appears every time different from itself. Ikeda reveals each time different traits of the same element. [A, D, E, F, H, I]

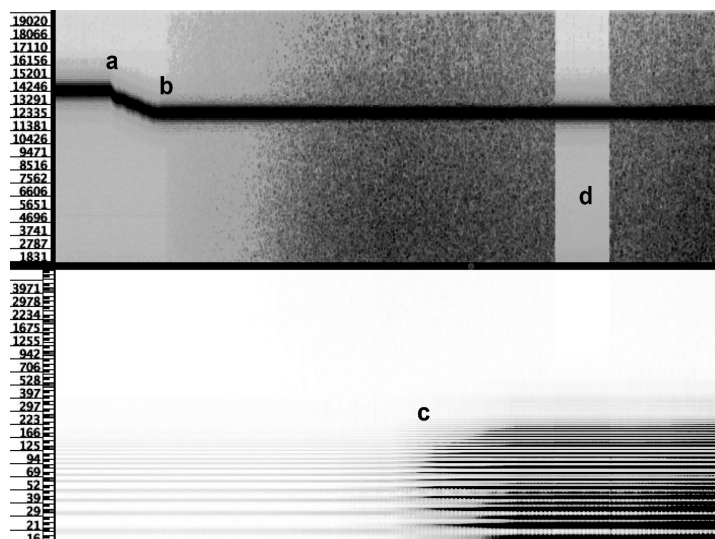


Figure A.82 Spectrograms [top: 1.8 – 19.5 kHz; bottom: 16 – 4000 Hz] of “+”.

Track 5) +. [05’07”]

- [begin – end]

The initial beat replicates the same element of the previous track but here a more articulated design is developed in the high frequency region of spectrum. Similarly to the previous track, also “+.” is conceived as a stable sound differently modulated by filters and effects. From 00’10” to 00’32” (and later from 03’04” to 03’39”) a specular glissando splits the initial sound at 8.5 kHz into two different tones and this movement gives the impression of a simultaneous ascending and descending motion (Figure A.83, arrows “a”).

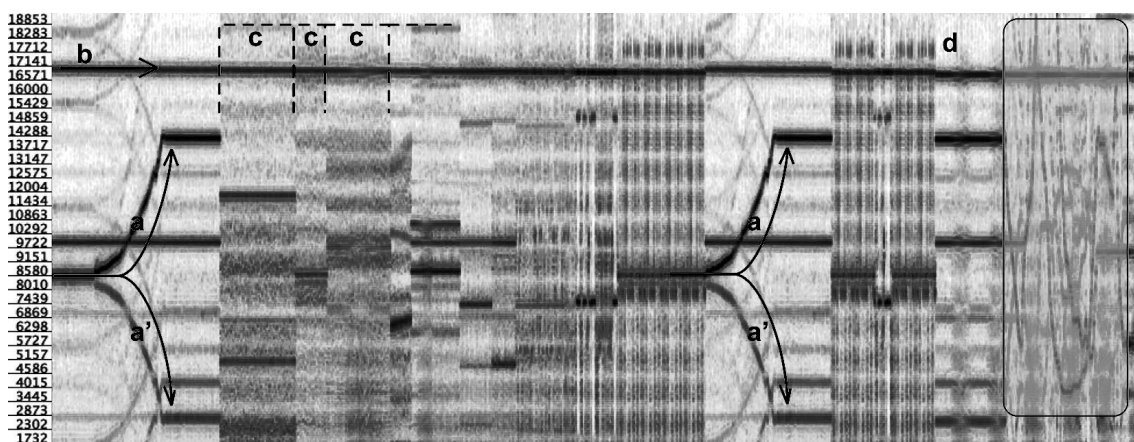


Figure A.83 Spectrogram [1.7 – 19 kHz] of “+.”.

From 00'49" the pattern of frequencies start to change except for a high-pitched tone (~17 kHz, Figure A.83, arrow "b") and the dense set of bass lines emerges (20 – 137 Hz, not visible in Figure A.83). These continuous elements preserve the stream of sound. The alternation of group of high tones continues, sometimes the transition is gradual other time is immediate. Every time the *colour* of the same pulsation is modified (*e.g.* 02'24"– 03'04", Figure A.83, sections "c") and the various tones interfere one another creating complex patterns of rhythm and different spectral densities. The final part (04'09", "d") shows the initial atmosphere which consists of a uniform pulsation; but here a new type of modulation starts at 04'28" showing irregular *glissandi* in high pitches (Figure A.83 highlighted area on the right side). [A, C, D, E, F, H, (I)]

Track 6) +.. [10'55"]

- [*begin – end*]

The third piece of the series "+/-" follows the same structure of the previous pieces: Ikeda composes a unified sound that is modified in its inner characteristic while keeping its unity and structure. In this case, sound consists of a very fast mechanical pulsation (ca. 62 pulses every 5 seconds) which works more as a permanent matter that is filtered and manipulated. The analysis of spectrum from 2 to 18 kHz displays a very rich evolution of sonic lines which is yet submerged within an apparently uniform profile. The piece shows several fundamental tones: as in the previous pieces a bass group of bass tones until ~200 Hz (B0, 29 Hz; E1, 41 Hz, G#1, 52 Hz; C2, 66 Hz..., Figure A.84, letter "a") and two high sounds centred in B[♯]8, 8 kHz and F[♯]9, 12 kHz (Figure A.84, letter "b"). The latter disappears at 01'50" when a series of new patterns emerge. These patterns maintain the bass drones and are more polarized towards very high frequencies: in this way they reveal more clearly the bass character of the complex sound and add brighter harmonics (Figure A.84, letter "c"). These changes are sometimes evident while other times are almost inaudible. Ikeda explores the range between 3 – 19 kHz typical of high- and overtones, and even if this manipulation is very clear from spectral analysis, the listener is challenged to notice and distinguish minimal differences within an apparent unchanging structure.

A central part (03'44" – 06'27", letter "d") of the piece exhibits a more distributed use of sounds: pulsation becomes more fat and dense in high frequencies. Later, when the sonic patten is further modified: the rhythmic line appears more simple (07'35" – 07'42", letter "e") and reveals that the pulsation is split between stereo channels in a similar way as it occurs in other pieces of the selection. When rhythm gets again more complicated (07'43"), one may notice the progressive appearance of new elements. From 09'10" to 09'33" a very slow (almost imperceptible) *glissando* occurs, but due to the very high spectral range (*i.e.* three blocks at 5, 10, 16 kHz) this ascending movement (clear in spectral analysis, see Figure A.84, letter "f") is aurally perceived as sound colour would gradually brighten rather than as a pitched progression. [A, (D/E), H]

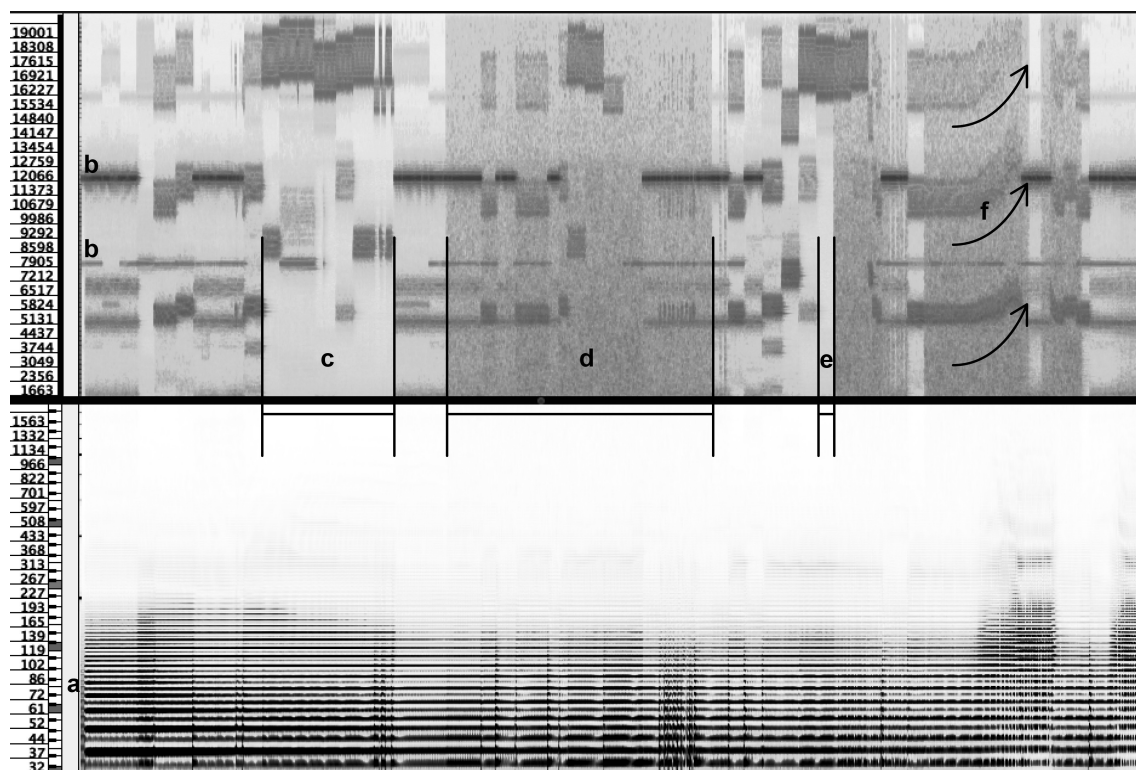


Figure A.84 Spectrograms [top: 1.6 – 20 kHz; bottom: 35 – 1600 Hz] of “+..”.

Overview (+ series)

The “+” series (*i.e.* pieces “+”, “+.” and “+..”) are mainly created based on the same idea: to use a pulse which is very fast, regular, based on a systematic series of bass

frequencies (see Figures A.81, A.82 and A.83) and to modify it in different manners. The pulse works as a continuous element (E), it does not mark a real rhythm rather it delimits a framework in which the music evolution occurs. There is an extreme use of spectral contrasts (A) and the mechanical repetition of the same elements (E) generates hypnotic effects (H). This is not similar to that one generated by suspended atmospheres of sustained sounds (*e.g.* Haas, Pan Sonic or Lang); rather this hypnotic impact is generated by the extreme use of repetition and the qualities of sonic material: when “+..” is listened with headphones the long exposition to the fast pulsation (split between stereophonic field) arrive to disturb the perception. The ever-changing compulsive repetition is bewildering: listener tends to subdivide the pulses by two (*i.e.* focusing on a single stereo channel) or he try to organize them following different patterns.

Track 7) – [06’36’]’

- *[begin – end]*

The first piece of “+/-” with a minus sign in its title exhibits different traits compared with the previous pieces (*i.e.* tracks 4–6). This piece is characterised by horizontal lines that interplay one another. There are three distinct blocks of tones (Figure A.85): (I) from 00’00” to 01’30” (and at the end at 04’55”), an electronic sound corresponding to an almost perfect semitone emerges (it is generated by two lines centred in A $\sharp$ 5, 943 Hz; e B $\flat$ 5, 1001 Hz); (II) from ~00’55”, a group of sounds at B4, 949 Hz; D $\flat$ 5, 576 Hz; D5, 589 Hz; F $\flat$ 5, 686 Hz; (III) from 01’55”, another pattern starts to develop close to ~G $\sharp$ 0, 26 Hz; ~A1, 55Hz; ~A2, 110 Hz; ~G $\flat$ 3, 190 Hz.

From 02’40”, the bass drone at 26 Hz broadens until 22 Hz (thus occupying a larger range of frequencies corresponding to F0 to A $\flat$ 0) and that one centred in A1 expands to A $\sharp$ 1, 59 Hz. This transformation generates a binaural beat (~180 bpm). This rhythm continues until 03’28” where another modulation occurs: the previous tones broaden towards A $\sharp$ 0, 29 Hz and G $\sharp$ 1, 52 Hz respectively, generating a new slower beat at ~72 bpm. This modulation slowly fades out from 04’44” and the beat –created by the interaction of neighbouring frequencies– disappears (Figure A.85). At the same time the higher tones (element (I)) reappear and last until the end.

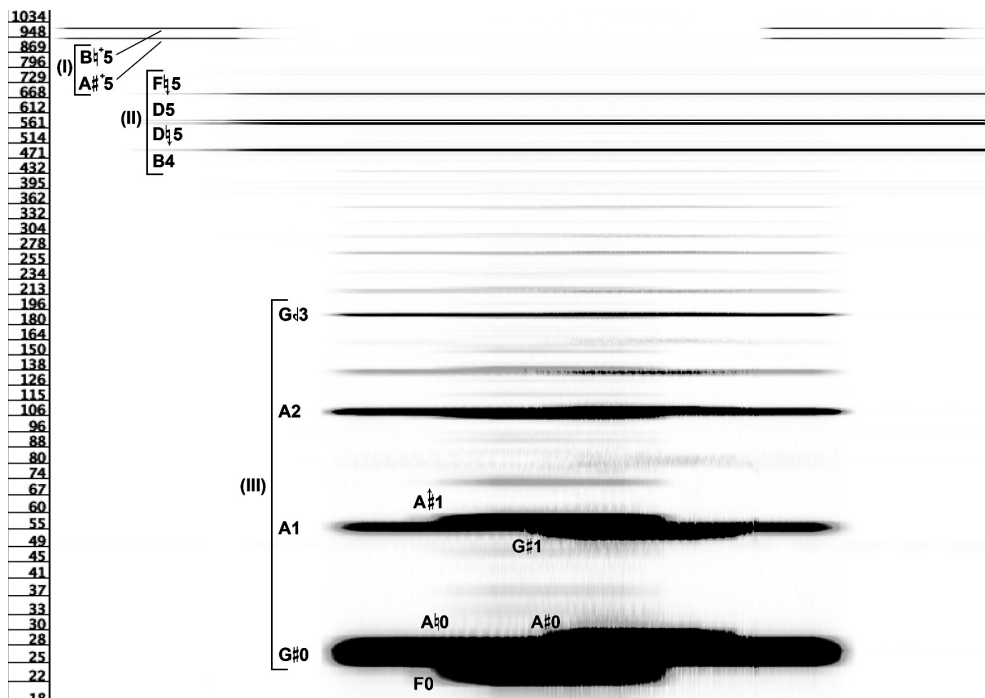


Figure A.85 Spectrogram [20 – 1080 Hz] of “–” .

Track 8) –. [11’51”]

- [begin – end]

The piece begins with a regular beat ($\sim C\sharp 6$, 1068 Hz) that might recall a clock alarm then after fifty seconds a bass drone emerges. The “timbric distance” between the two elements (*i.e.* regular beat and bass drone) is so marked that they delineate a very large sonic space. The piece develops a continuous succession of different blocks of sounds. Spectral analysis allows us to identify recurrent elements that characterise three blocks¹⁹⁹ (Figure A.86):

Element (I) (Figure A.86, green regions): from 00’50” to 01’55”; there is a bass drone centred in $C\flat 1$, 33 Hz; $G\flat 1$, 49 Hz; $C\flat 3$, 130 Hz; $A\sharp 4$, 452 Hz; $C\sharp 5$, 561 Hz. The same group of sounds –enriched with several medium and high tones– appears several times from 03’55” to 04’55” (Figure A.86, circle “a”); from 06’53” to 07’55” (circle “d”) and at the end from 09’52” where this group of sounds is reinforced by the

¹⁹⁹ The evolution of blocks is so dilated that might be undetectable by normal listening, but a general sense of cyclical repetition of same sonic elements is present.

introduction of additional tones from 2 – 5 kHz (circle “e”).

Element (II) (Figure A.86, orange regions): from 02’10” to 01’55”; there is a dense series of tones based on A $\sharp$ 2, 113 Hz; A $\sharp$ 3, 226; with a central block of C1, 33 Hz; F $\sharp$ 4, 378 Hz; G4, 391 Hz; G $\sharp$ 4, 405 Hz. This block emerges again from 05’11” to 06’40” with additional tones (*e.g.* F3, A $\sharp$ 5, E6, Figure A.86, circles “b”) and from 08’12” to 09’34”.

Element (III) (Figure A.86, pale blue region): from 06’34” to 06’55”, a short drone originated by medium and high tones (*i.e.* A $\sharp$ 3, B3, C $\sharp$ 4, D $\flat$ 6, D $\sharp$ 6, E $\flat$ 6, F $\flat$ 6) supports the second transition between blocks (II) and (I).

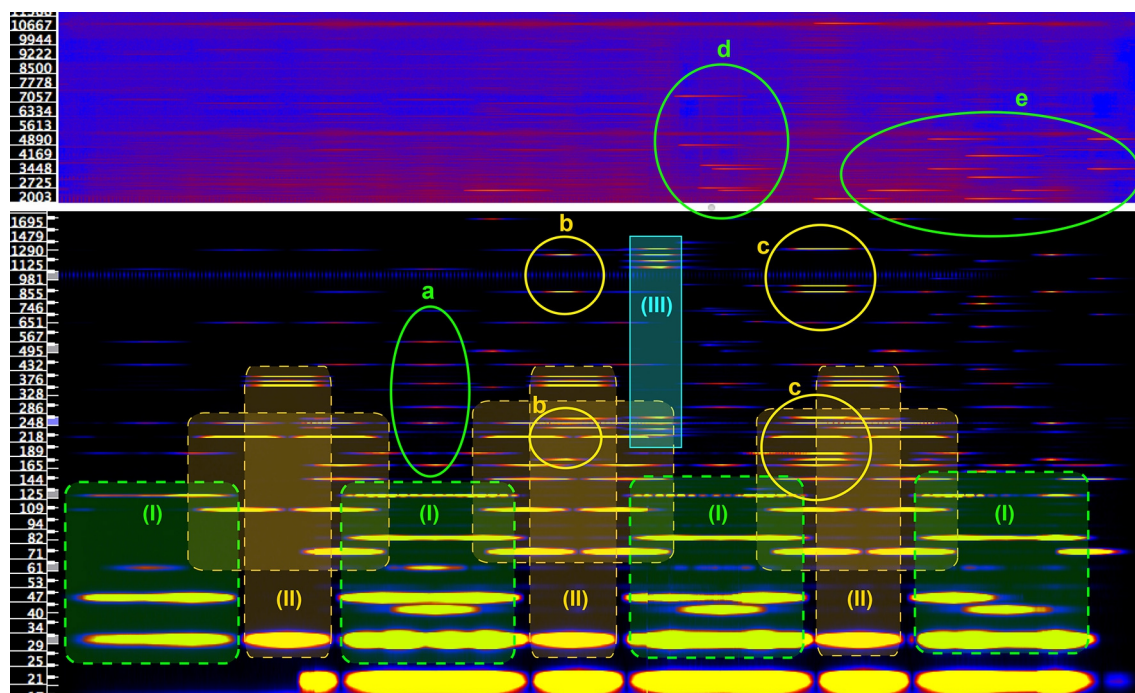


Figure A.86 Spectrograms [top: 2 – 11 kHz; bottom: 19 – 1700 Hz / 00’50” to end] of “+..”.

In general “-.” evolves towards a high density of sound and Ikeda introduces two bass drones out of the audible range of frequency (*i.e.* 11 and 18 Hz) which give the impression of a fluctuating and breathing resonance. In the central part of the piece, the initial beat may remember a heart rate measuring device that is immersed in a sort of

dense sonic matter.²⁰⁰ Close to the end, Ikeda enriches the sound with higher frequencies enhancing the static and hypnotic effect: sound polarizes towards the highest and lowest extents. [A, B, E, F, H, I]

Track 9) –.. [13’24’']

- [begin – end]

Similarly to the previous two pieces of the series “–”, this piece is characterised by a flat evolution and it starts with a collection of sustained sounds at a very high range of frequencies (*i.e.* C $\sharp$ 9, 8.6 kHz; G9, 12.5 kHz; C $\sharp$ 10, 17.1 kHz; Figure A.87, top spectrogram).

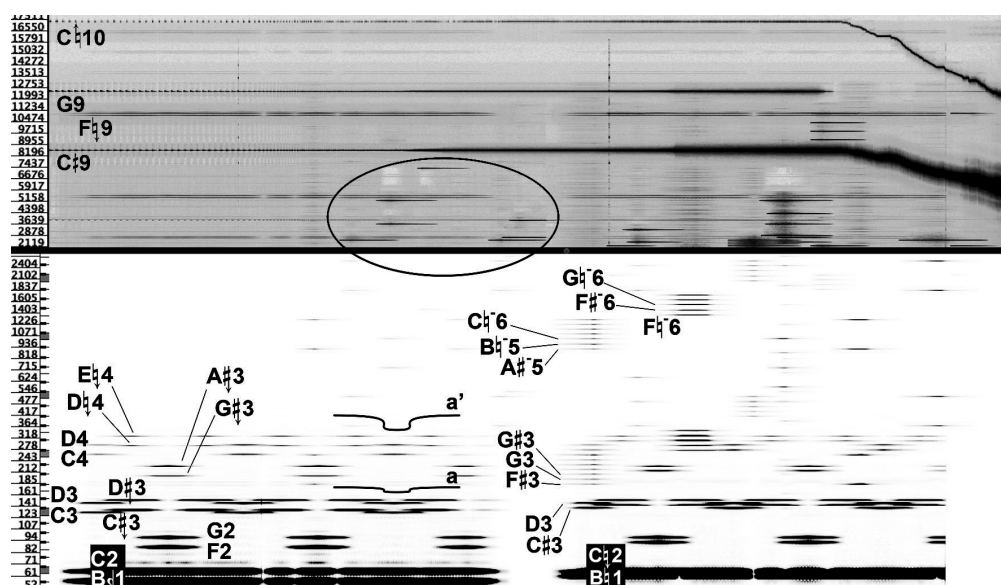


Figure A.87 Spectrograms [top: 2.1 – 17 kHz; bottom: 50 – 2500 Hz / 00’52’’ – end] of “–..”.

The first half (00’49’’ – 06’36’’) of the piece is characterised by a soft drone structured as a combination of sounds separated in groups of two by an exact tone (*i.e.* two hundreds cents). There is an interesting profile of two pairs of drones which from C3/D3 and C4/D4 move upward to C $\sharp$ 3/D $\sharp$ 3 and D $\sharp$ 4/E $\sharp$ 4 and then to F2/G2 and G $\sharp$ 3/A $\sharp$ 3 respectively; their behaviour is parallel but not equivalent (*i.e.* the higher line

²⁰⁰ There is a fascinating parallel with Lang’s *DW2–Image/Idea* where binaural beats are exploited to generate rhythmic profiles and an immobile atmosphere mimic a sort of vacuum of sound.

does not react as the natural partial of the lower line) and the resulting aural effect appears unnatural (Figure A.87, profiles labelled as “a” and “a’ ”). However the transition of sounds is very slow and the long crossfading between sounds makes difficult the recognition of this movement. The bass lines merge together creating a fluctuating and resonant mass over which dispersed high sounds appear (e.g. 04’58”, Figure A.87, circle).

From 06’25” an acute element consisting in high-pitched notes works as a transition towards the second half of the piece. This starts from 07’15” and is characterised by a higher density of layers of sounds. The global structure is similar to the first episode but here each pair of notes is separated by a semitone (*i.e.* hundred cents) rather than a tone. In this way, there is a general effect of higher dissonance and – similarly to the previous part– the sonic lines behaves autonomously in terms of harmonic relationships. The initial high-pitched lines at C $\sharp$ 9, 8.6 kHz and C $\sharp$ 10, 17.1 kHz gradually increases in dynamic and from 10’56” they start an irregular descending movement (barely perceivable due to the high frequencies) which arrives to end the piece: bass sounds disappear leaving –from 12’22” to the end– a high pulsating sound. [A, B, (C), E, F, H, I]

Track 10) +– [01’05”]

- [begin – end]

The last track of “+–” is a one minute coda where Ikeda takes to extremes his exploration of aural perception. The piece “+–” consists of a single sonic element: a fix sound at 16 kHz (*i.e.* B $\sharp$ 9) with several minor lines. The general result is of a very soft sound which is almost inaudible but it provides an aura, a shadow of sound which acts as a sort of *potential* of a sound.

Overview (– series)

Similarly to the “+” series (*i.e.* tracks 4 – 6), the three pieces that are part of “–” series (*i.e.* pieces “–”, “–.” and “–..”) hold homogeneous properties: they all have a plane development made of sustained sounds and are characterised by an increasing complexity (conceivably indicated in the title by the dot(s)). In general, this type of

construction (*i.e.* the idea to compose a unique sound by layering different continuous tones and creating a permanent ever-changing sonic flow) is common with many other pieces considered in this study and approximates to several practices within (structural) minimalism (*i.e.* Riley, Lucier, Niblock) and spectralism (*i.e.* Murail, Haas). Moreover, Ikeda explores the extremes of the audible spectrum (sometimes he incorporates impulses out of these limits) in a way that what we commonly would define a “silent episode” actually contains sounds which stay in the threshold of audibility. These are clearly visible in the spectral analysis but become perceivable only as sort of sonic shadows, colours and indistinct impressions. They represent a sort of potentials of a *sound* what are called –in the traditional way– the liminal characteristics (*e.g.* the instability of harmonics, overtones, crackles and rustles), the traces and the ephemeral elements. The exploration of these components, even if carried out with different strategies, is another common aspect that typifies composers within this study.

A.5 Giovanni Verrando

Dulle Griet [2009-2010]

AUDIO [06’33’’: Verrando, G. 2013. *Dulle Griet* (2009), *Triptych #2* (2008). On Mdi ensemble, RepertorioZero – *Dulle Griet*. France: AEON 1328-CD.

NOTE: The analysis has been carried through aural and spectral examination. *Dulle Griet* is a piece for amplified ensemble: bass flute, bass and B♭ clarinets, master keyboard (connected to a computer), percussion, violin and cello; plus various additional instruments (many instrumentalists play additional objects and toy-instruments).

• GENERAL SCHEME

Sections	Attributes (<i>ordered from the most fitting</i>)
00’00’’ – 03’28’’	G, E, A, I // B, H
03’29’’ – 04’50’’	E, B // C, A, H, F

04'51'' – end

G, E, A, I // B, H

- [00'00'' – 03'28'']

The first part of the piece is characterised by two contrasting elements: on the one hand, there are very soft episodes which are composed by interlaced musical lines of strings, bass electronic sounds, scattered noises both electric and acoustic (*i.e.* element I, Figure A.88, label “(I)”). On the other hand, loud interjections of the entire ensemble create a dense mass of sound which is both harmonic and inharmonic (*i.e.* element II). At the begin, a bass electronic drone (centred in 33 Hz, 49 Hz and 69 Hz and including almost imperceptible electric glitches, *e.g.* at 00'28'' and 00'32'', Figure A.88) is interrupted by twenty seconds (00'46'' – 01'06'') of a contrasting element (II). The latter holds a frenetic interplay between strings, objects and electronics: these generate a sound that is at the same time percussive (*i.e.* acoustic) and continuous (*i.e.* electric). It progresses with a fast turnover of different timbres, all of them occupying an extended range of frequencies. The successive quiet part consists of continuous (noisy) sounds of strings with the presence of a few number of scattered interventions of clarinet, objects and electronics.

From 02'12'' a second block of the noisy element abruptly emerges: the dynamic and spectral contrast is taken to extremes, the sound is distorted and saturates the spectrum. When it vanishes (02'32''), it leaves the soft texture of string, similar as it were before (with an identifiable line of bass flute alternating F5 and G#5). This development gives the impression that the loud insertion materializes in the sonic space as an almost physical presence. The sonic texture from 02'32'' incorporates several elements which are differently placed in the spectrum: from acoustic timbres of strings

and wind instruments to bass electronic pulses.²⁰¹

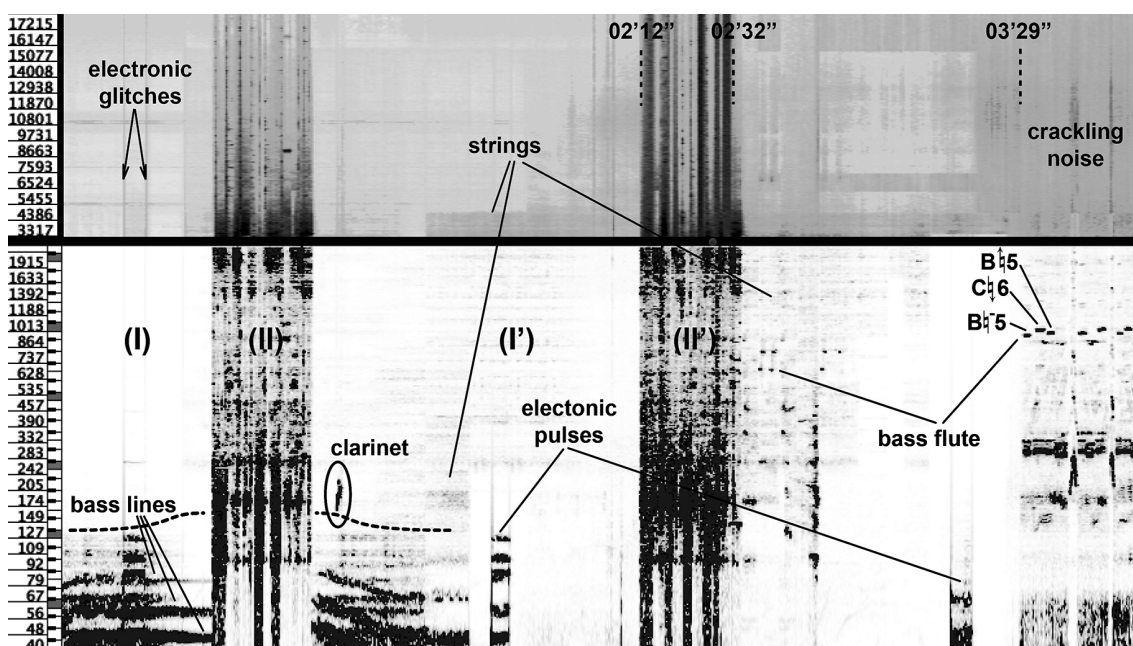


Figure A.88 Spectrograms [top: 3.3 – 17.5 kHz; bottom: 40 – 2000 Hz / 00'00" – 03'54"] of Dulle Griet.

- [03'29" – 04'50"]

The central part of *Dulle Griet* is a sort of interlude composed by an intricate combination of sounds of strings and wind instruments with a crackling noise. These create an ever-changing profile where some lines move upward or downward with a fast succession of *glissandi*, others consist of sustained notes and form layered aggregates. Noises move in a high range of frequencies (*i.e.* 5 – 17 kHz), while bass flute plays microtonal phrases around 1000 Hz (*i.e.* B $\flat$ 5, 985 Hz; C $\sharp$ 6, 1028 Hz; B $\sharp$ 5, 1005 Hz, Figure A.88).

- [04'51" – end]

The last part of the piece presents analogous elements of the first part. A noisy

²⁰¹ In some cases (*i.e.* 02'32" – 03'28"), musical elements succeed one another taking on distinct roles based on timbric characteristics thus acquiring a specific place within the inner sonic space. In particular, the electronic bass pulse at 03'14" (and before at 01'41") recalls Pan Sonic's interventions: its presence is so much specific that demarcates not only a sonic position but also a sculptural character within the musical development (Figure A.88).

block shows similar traits of the previous ones (05'28'') and the successive episode recalls the similar parts of the begin with the bass flute playing F5 and G#5.

- *Overview*

In *Dulle Griet*, Verrando condenses in few minutes some characteristics of his aesthetic: the subtle equilibrium between harmonic and inharmonic and between acoustic and electric sounds. Moreover, he exploits opposition in dynamic and spectral density. Sometimes, he composes episodes where different instruments generate sounds with clear timbric qualities which are distributed in the spectrum (*i.e.* 02'32'' – 03'29''). Other times, as for instance from 03'29'' to 04'27'', he creates a sort of “complex sonic entities” in which the sounds of different instruments are merged together to create a unique sound. Each entity oscillates between melodic lines and noise in a sort of tense equilibrium always ready to collapse. The atmosphere is quite electric and *bruitist*, the sound of the instruments is often almost unrecognisable.²⁰²

Verrando creates a sound composed of different elements coming from distant sources (*e.g.* acoustic instruments, pure electronics or electroacoustic, noisy objects), but he is able to merge different sonic substances creating a unified corpus of sound. *Dulle Griet* incorporates many attributes in common with the other pieces of the selection, such as the presence of a rich and dense spectrum (A, B), the use of dynamic and spectral contrasts (G; I) and the exploitation of continuous and layered sounds (E, H).

Triptych #2 [2008]

AUDIO [10'50'']: Verrando, G. 2013. *Dulle Griet* (2009), *Triptych #2* (2008). On Mdi ensemble, RepertorioZero – *Dulle Griet*. France: AEON 1328-CD.

NOTE: The analysis has been carried through aural and spectral examination. *Triptych #2* (2008) is a piece for electric ensemble (electric guitar, master keyboard with samples, percussion, electric string quartet) The title refers to previous piece of

²⁰² In several occasions, one may find interesting parallel with Bernhard Lang. The evolution of *Dulle Griet* made of fast transitions between loud insertions and quiet episodes may recall Lang's compositional approach of *DW*-series formed by sequence of clusters, repeated units and cells.

Verrando, *Triptych* for orchestra (2005).

- *GENERAL SCHEME*

Sections	Attributes (ordered from the most fitting)
Musikplastik #2	G, E, A, I // B, H
Harmonic Domains #3	A, F, E, B, G // H, C, I
Filtering #5	A, E, H, G // H, B, I

- 1. *Musikplastik #2 [02'47"]*

Musikplastik #2 is characterised by two main musical scenes which alternate one another: a continuous and homogenous episodes and a louder and more noisy part which fades in and out. This succession occurs twice in the piece and for this reason the entire evolution of *Musikplastik #2* may be represented with a ABA'B' structure (Figure A.89).

The first scene (00'00" – 00'42" and 01'16" – 01'46" Figure A.89, regions labelled as "A" and "A' ") starts with an indistinct noisy drone with some percussive elements. The sound is static but shows irregular components which give the ambivalent impression of a continuous *and* dynamic matter. The evolution is interrupted by short passage of noise (00'13" – 00'16") and then from 00'48" the second part begins. This next scene is characterised by a series of different "patterns of noise". Verrando develops three different inharmonic aggregates: the first centred in 2 – 4 kHz and 7.1 – 7.8 kHz; the second in 7 – 11 kHz and 15 – 18 kHz and the third, similar to the first one plus an inharmonic aggregate in the region between 10 and 15 kHz (Figure A.89, orange region labelled as "b" and right inlet). Then a dynamic (*i.e. crescendo/diminuendo*) noise covers the entire spectral area until 12 kHz.

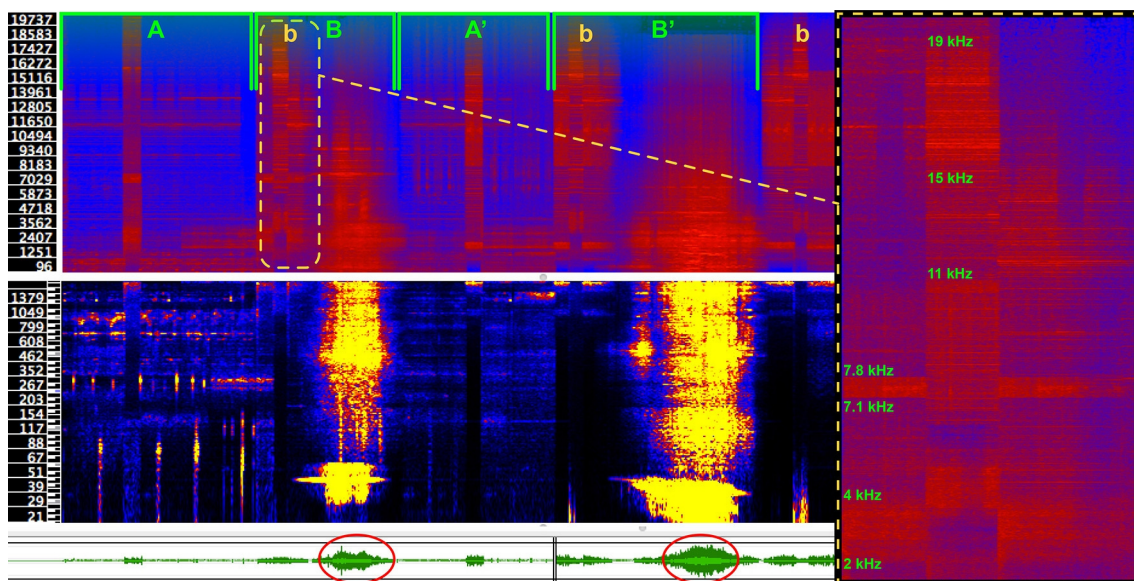


Figure A.89 Spectrograms [top: 0.1 – 20 kHz; bottom: 20 – 1500 Hz; inlet: 1.4 – 19.5 kHz] of *Triptych#2: Musikplastik #2*.

The first chapter of *Triptych#2* shows how Verrando creates fixed sonic portraits, each one with its own degree of inharmonicity.²⁰³

Sound, here, is conceived as a tight combination of timbres (*i.e.* acoustic, electroacoustic and electronic) in which the portion of inharmonic elements is on average very high (*e.g.* instrument are played to enhance noisy effects and electronic is often distorted). Music appears to be played (or emitted) close to the listener. In a way that, the listener may have the impression to own a sort of hand lens to explore the internal sonic matter.

- 2. *Harmonic Domains #3* [04'26'']

Similarly to the previous movement, the second part of *Triptych#2* presents a structure made of oppositions of dynamic and spectral density. It begins with distinct blocks of sustained sounds which follow one another covering different regions of spectrum. For instance, Verrando interposes to the initial chords of strings (*i.e.* centred in an open chord of E) a series of interruptions of electronic and electroacoustic sounds

²⁰³ In a similar way as Lang does for his clusters, Verrando combines sequences of sonic scenes: sometimes he inserts a short scene within the slow evolution of a longer one (*e.g.* from 00'13'' – 00'16'' within the scene "A"); other times he composes a succession of different brief episodes.

which, even if they include several elements of the E chord, acts as interferences. However the return of E4 gives a sense of continuity until the new scene starts (*i.e.* 00'39"). This loud episode is characterised by fast repetition of *sforzato* chords by strings that generates a dense concentration of notes and harmonics: *i.e.* F $\sharp$ 4 – F $\sharp$ 4; A $\flat$ 4 – A $\sharp$ 4; B $\flat$ 4 – B $\sharp$ 4; $\sim$ D5, $\sim$ D $\sharp$ 5; $\sim$ E5; $\sim$ A5; $\sim$ B5; C $\sharp$ 6; D6; E6; F $\sharp$ 6; G $\sharp$ 6; A6; B6; C $\sharp$ 7; D $\flat$ 7 – D7; E7. Moreover, the rhythmic accentuation expands the sound to higher ranges of spectrum (Figure A.90).

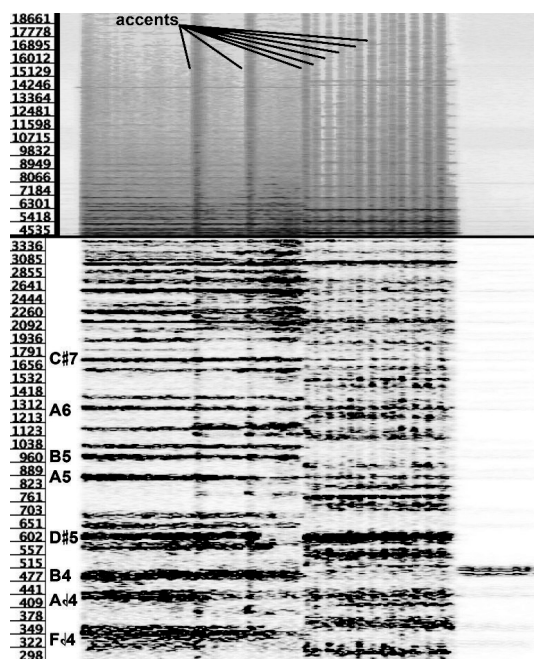


Figure A.90 Spectrograms [top: 4.5 – 19 kHz; bottom: 300 – 3500 Hz / 00'39" – 01'05"] of Triptych#2: Harmonic Domains #3.

The piece proceeds with the continuation of these two contrasting sections: from 01'01" to 01'38" (and later at 02'09") the soft initial atmosphere returns with a microtonal movement of strings and electronics which develop a very subtle interplay; while from 01'38" to 02'08" (and later at 03'09") an animated section played by strings recall the previous excerpt. In the quiet episode, Verrando uses *glissando* within a sort of sequential progression from lower to higher pitches. From 02'27", strings play a series of sustained notes, *carrying* the sonic stream over towards higher frequencies and noisy components (Figure A.91).

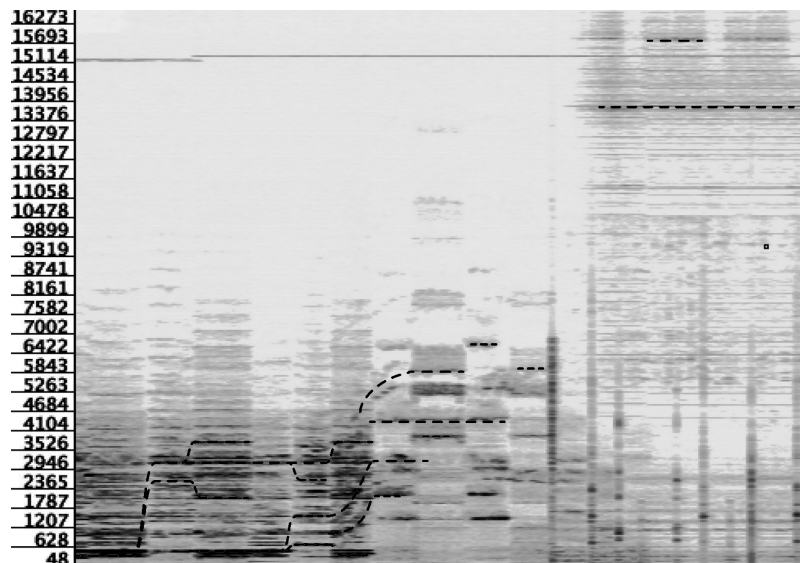


Figure A.91 Spectrogram [50 – 17000 Hz / 02'27'' – 03'02''] of *Triptych#2*:
Harmonic Domains #3.

The final section includes a fast turnover of different timbric patterns: the integration of acoustic and electronic sounds results in “complex timbres” which are made of a closed-packed layering of sounds.²⁰⁴

- 3. *Filtering #5* [03'37]

In this last episode of *Triptych#2*, Verrando focuses on the combination of electronic and acoustic sounds into a unique sonic material which –especially in *Filtering #5*– is characteristic of its noisy and distorted qualities. The title itself of this movement suggests that Verrando explores specific and limited portions of the sonic spectrum (the spectral analysis allows the detection of this process). The initial sound for instance comes from a noisy element at 8 –11 kHz that is integrated with a soft chord played by strings (E6, A6, D#7, E7). Different fragments follow one another (sometimes the transition is marked by a dry beat) in order to originate contrasts (dynamic and spectral) or are combined in a larger block of similar timbres (e.g. 01'05'' – 01'18'').

²⁰⁴ From 03'09'', one may find clear evidences of a similar compositional perspective with Lang's *DW*-series, such for instance in the contrasting sequences of short clusters, the fast repetition of pulses/notes and the rich use of spectrum.

From 01'18'' the quiet episode shows a delicate interaction between acoustic and electronic sounds: strings delineate a sort of sonic field to which electronic sounds join. They reinforce the lines of instrumental sound as well as filling the space in between and then –after a percussive intervention– the electronic sound is left alone (Figure A.92).

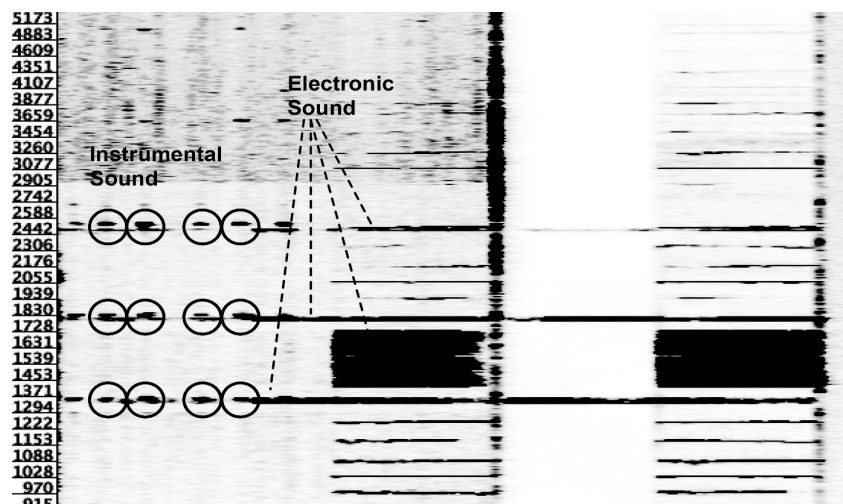


Figure A.92 Spectrogram [0.9 – 5.5 kHz / 01'20'' – 01'42''] of Triptych#2: Filtering#5.

The quiet progression of noisy patterns reveals fine sonic details of several fragments. When the immediate explosion of a loud event occurs (02'20''), it gives the impression that the previous sequence of soft sounds was a sort of restrained sound under a tension ready to detonate. In the final part, Verrando plays with noises: he uses different filters to compose noises of different nature; he opens up and reduces spectral spaces and densities and the sound appears to come closer or go away.

Overview

In *Triptych#2* and *Dulle Griet*, specific sounds correspond to particular sections and the attention here is focused on the spectral material. Verrando conceives each sonic scene looking at the sound matter itself: each scene is not representative for notes, melodies, specific rhythms or any other element, rather every details is part of a more large and complex idea of timbre/sound. This is typical of a clear equilibrium between harmonic and inharmonic ingredients. For this reason many attributes common among

the selected pieces are present, but these traits are just characteristics of a single unified idea of sound. For instance, Verrando does not use microtonality to develop musical phrases; he exploits instead microtonal interferences for a higher conception of sound.

A.6 Raime

If Anywhere Was Here He Would Know Where We Are.

[2010]

AUDIO [05'48'']: Andrews, J. and Halstead, T. 2010. *Raime – If Anywhere Was Here He Would Know Where We Are*. UK: Blackest Ever Black – BLACKEST002-Vinyl.

Pieces of Raime and generally those of dubstep and basic-channel style are conceived as a unique form which usually develops gradually. *If Anywhere Was...* starts with a tight rhythm. Pulses are clearly manipulated with the addition of an echo in order to recreate right away the impression of a physical space in which music resonates: the pulse sounds close to the listener but its echo seems to come from a distance.

From 00'30'', overlaid tones –constituting a soft drone– appear at C#3 and G#4 and at 00'56'' a bass sound emerges (~C♭1, ~30 Hz, ~E♭1, ~40 Hz and B♭1, 61 Hz). An additional pulsation which is more fat compared with the initial dry rhythm, comes out at 01'12'' and the sequence of sustained tones expands toward higher frequencies, converging toward a tone centred in G#4. The next measure by contrast includes tones in G5, G#3, and G#4. The global sound progressively thickens and new lines appear (Figure A.93).

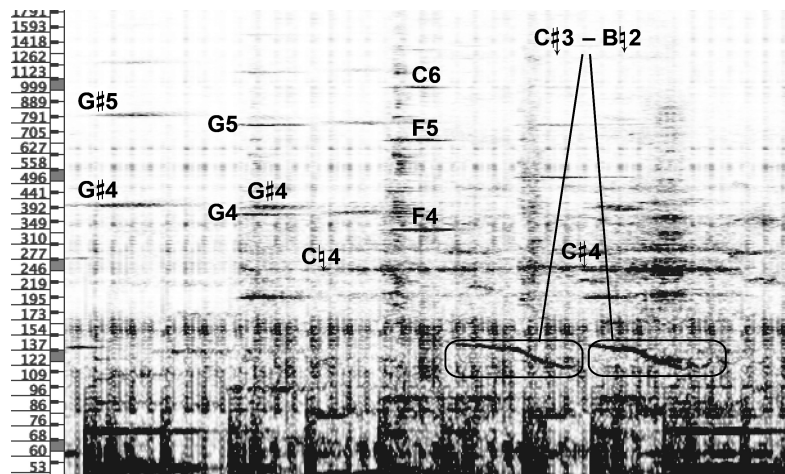


Figure A.93 Spectrogram [55 – 1800 Hz / 01'13" – 02'18"] of *If Anywhere Was...*
(original greyscale of spectrogram is adjusted to favour the recognition of marks).

From 02'27" and 02'34" new pulsations appear: they hold echoes with different delays compared with the initial beats and when they merge with the original rhythm this forms a polyrhythmic structure. The sound becomes more complex with several additional events and even if music could work as good support to accompany dancing and entertaining, the sonic material reveals a complex combination of elements. Moreover, from 03'55" to 04'17" (and again from 04'33" to 04'56"), a high drone based on Eb5 comes together with a periodic repetition of a descending sound from G#3 to Gb3 (Figure A.94).

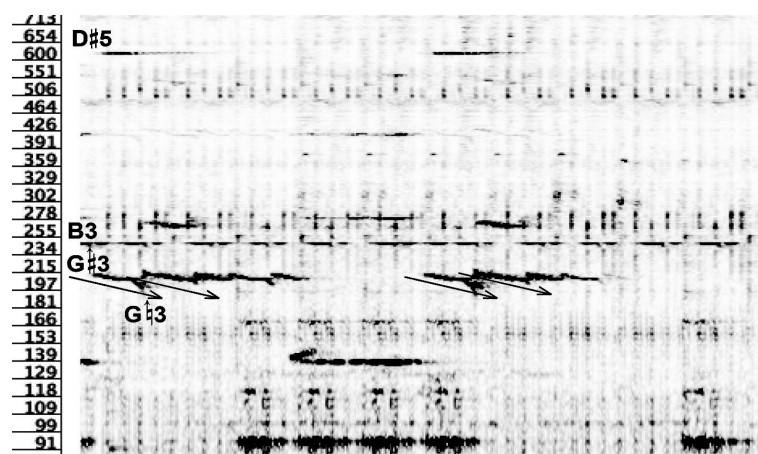


Figure A.94 Spectrogram [90 – 750 Hz / 03'52" – 05'11"] of *If Anywhere Was...*

The sound that initially consists in few rhythmic components becomes a rich

pulsating body and when it arrives close to the end, it leaves gradually behind each unit and reduces itself to essentials.

- *Overview*

The piece *If Anywhere Was...* encompasses typical characteristics of Raime's music: it is centred on various musical elements such as the rhythm (D), the dynamic (G), and in some ways harmonic and melodic elements (A) which follow a standard organization of IDM's offshoots. However, all these elements work as constituents of a larger sonic image. They merge and interfere one another: the pulsations, for instance, do not only mark a regular metric but they have a specific location in the spectrum, an accurate temporal and spatial decay and have a precise relation with other sonic events.

Told & Collapsed [2011]

AUDIO [06'01'']: Andrews, J. and Halstead, T. 2011. *Raime – Hennail*. UK: Blackest Ever Black – BLACKEST005-Vinyl.

Told & Collapsed's rhythmic structure is based on a tonal bass line of A minor (*i.e.* A1/A2/E3/A3; C2/C3 and B1/F2/B2 with a sustained drone of the relative 9th, B3/B4) which alternates until 01'30'' with an analogous structure based on A $\flat$ minor with a drone at higher octave A $\flat$ 3/A $\flat$ 4. The rhythm is not fast but the concentration of different events within a single bar is high.

From 01'45'' music becomes more intricate: several elements are added both in medium and bass frequency ranges (Figure A.95, spectral regions labelled as "a"). A high-pitched drone lasts along several bars (*e.g.* from 01'59'' to 02'30'' the D $\sharp$ 5 spans different harmonic patterns, Figure A.95) favouring the perception of a unique sonic flow even if marked by a regular rhythm. From 02'30'', a continuous line of a synthesizer emerges in the foreground: this sound holds a rich harmonic series. The first fundamental at A $\sharp$ 5 (932 Hz) covers overtones until 10 kHz (*i.e.* A $\sharp$ 6, 1865 Hz; F7, 2796; A $\sharp$ 7, 3729 Hz; D8, 4655 Hz; F8, 5587; G $\sharp$ 8, 6523 Hz; A $\sharp$ 8, 7459 Hz; C9, 8373 Hz; D9, 9392 Hz, Figure A.95, spectral region labelled as "b") and Raime enriches the

music adding new percussions, noises and additional bass pulses. On the one hand, new elements thicken the musical material and fortify the impression of a unique mass of sound in which the initial pulsations are by now submerged by several layers of sound. On the other hand, the emergence of a new rhythmic element at 03'00" seems to reaffirm the cadence and support the typical characteristics of dance music (Figure A.95, "c"). The intensity of music continues to build up (*i.e.* incorporating noises and scattered interventions, "d") until 04'52" when a short vocal interjection gives rise to a reduction of events until the end ("e").

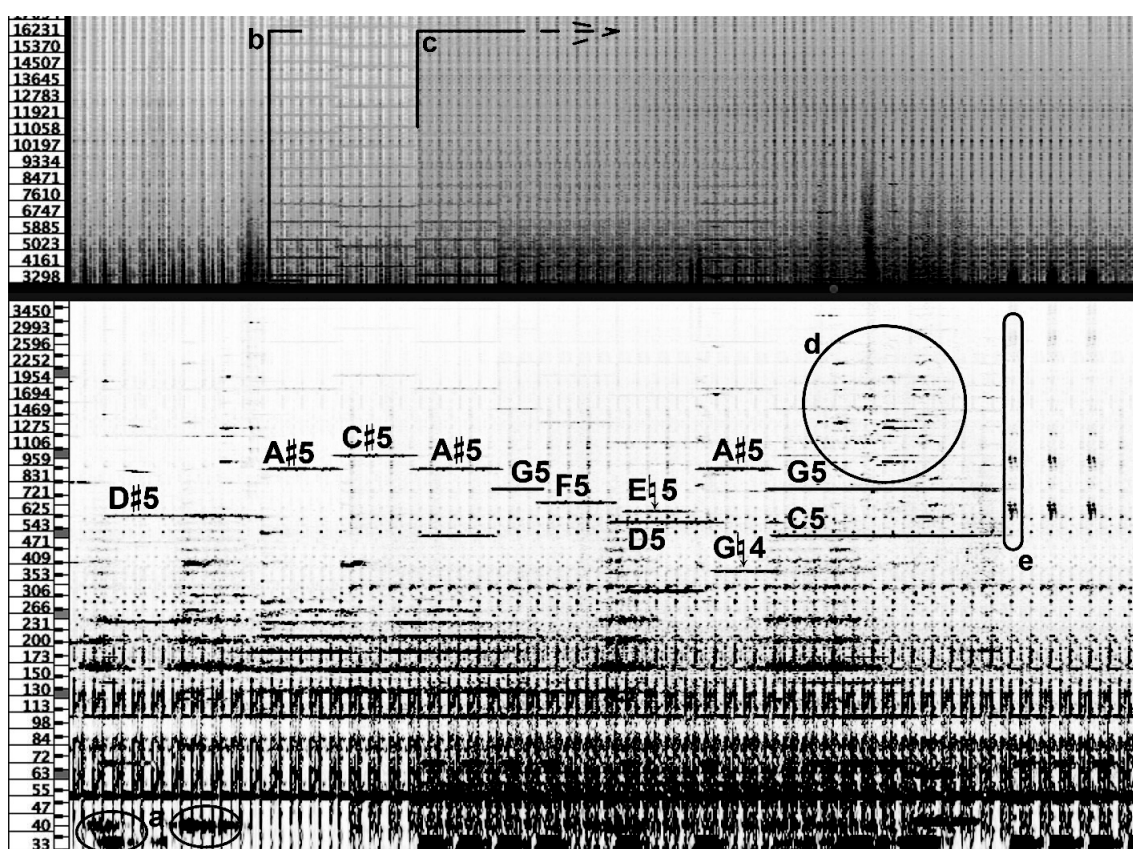


Figure A.95 Spectrograms [top: 3.3 – 17 kHz; bottom: 30 – 3500 Hz / 01'52" – 05'19"] of *Told & Collapsed*.

- *Overview*

Told & Collapsed is grounded on a rigid rhythmic framework but the progressive development of the piece leads to a complex sound in which the beats are not musically separated from continuous and harmonic events. The variety of regular

pulsing elements is huge and includes (i) drums and percussions having echoes with different delay-times, (ii) electric bass or bass synth, (iii) distorted utterances, (iv) sounds of bells and thunders (conveniently manipulated). All these types of sounds not only define the measure of the piece but also form a rich articulation of events that merge together with the continuous sounds.²⁰⁵

Moreover, even if the piece holds a more traditional harmonic construction, the tonal base (*i.e.* the initial pattern in A minor played by the electric bass) is very weak since the sequence of high-pitched lines –which pass through D $\sharp$, A $\sharp$ and C $\sharp$ – do not follow a conventional scheme and is discontinued by microtonal interventions.

The piece moves clearly within a series clichés typical of IDM but offers a rich variety of sonic elements which allow a good comparison with other pieces of the selection. Raime use a material coming from an extended frequency range, they explore the effect of layering sounds to create static and continuous sonic masses and work in detail with the repetition of events in order to create rhythmic and hypnotic effects. Each sound possess a precise role and character within the whole sonic spectra and its placement is carefully arranged in a sort of sculptural organization. [A, B, D, E, F, H, I]

Passed Over Trail [2012]

AUDIO [04'30'']: Andrews, J. and Halstead, T. 2012. *Raime – Quarter Turns Over A Living Line*. UK: Blackest Ever Black – BLACKEST001-CD.

Passed Over Trail is a piece conceived with a single musical unit that is periodically repeated. The unit progressively evolves adding new elements.²⁰⁶

The starting unit consists of a rapid materialization (*i.e.* fade in and out) of two bass sounds (Figure A.96). The first one is based on $\sim$ D1, $\sim$ 35 Hz ($\sim$ G $\sharp$ 1, $\sim$ 48 Hz; $\sim$ B1,

²⁰⁵ An interesting parallel may emerge with several musical patterns of Bernhard Lang (*e.g.* in *DW7* the cluster at 12'27'').

²⁰⁶ This structure has strong analogies with the compositional approach of Bernhard Lang, in particular *DW7* and *DW8*. In these pieces Lang constructs a complex arrangement through a sequential development of a repeated unit (Figures A.55 and A.56).

~62 Hz; ~G $\sharp$ 2, ~96 Hz; D $\flat$ 3, 144 Hz; ~G $\sharp$ 3, ~193 Hz; and ~B $\sharp$ 3, ~242 Hz): the sound is fat and indistinct and includes a group of secondary sounds. The spectral image shows the presence of acoustic signals in the region around 80 – 120 Hz and at a lower level from 3 – 8 kHz (Figure A.96). These sounds generate noisy and vibrating effects which accompanies the bass tones and create the impression of a *response* of physical objects (such as walls or panels) to sound: the latter resonates within a physical (or virtually recreated) space.

The second sound of the repeated unit is another large bass sound which emerges at B0/C1, ~31 Hz with the corresponding first partial at B1/C2, ~62 Hz. This sonic event does not incorporate other sounds and results more clear and well defined compared to the first one. However, the bass sounds cover an area from 28 to 34 Hz thus generating a series of interferences and fluctuating effects.

Furthermore, the entire unit (*i.e.* first and second bass events) shows an additional continuous sound in the high frequency range, at F $\flat$ 8, 5.5 kHz and F $\flat$ 9, 11 kHz.

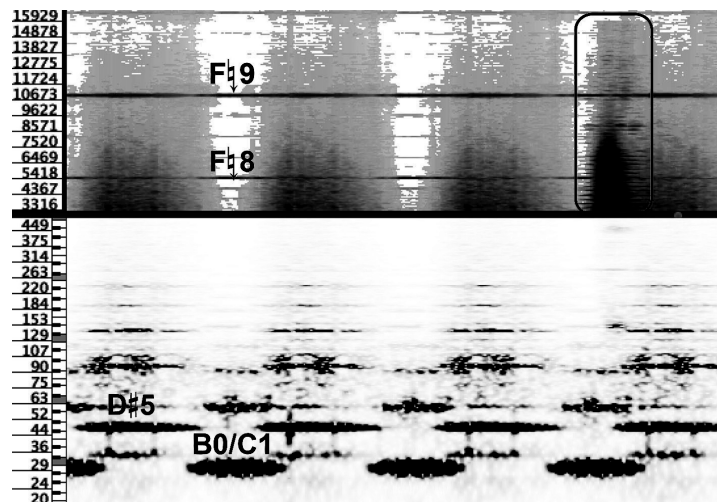


Figure A.96 Spectrograms [top: 3.3 – 16 kHz; bottom: 20 – 500 Hz / 00'27" – 01'00"]
of Passed Over Trail.

Gradually more elements emerge: these new events fortify both the continuity of flow (*e.g.* a soft drone at A5 fades in from 00'45") and the singularity of the unit (*e.g.* a sonorous bell marks the begin of the unit at 00'53", Figure A.96, marked area).

From 01'11'' a high line appears in correspondence to the sound of the bell designing an elemental recurring melodic cycle that consists of a sequence of chords: F $\sharp$ 5/F $\sharp$ 6/C $\sharp$ 7/F $\sharp$ 7 (01'11'' and 01'30''); D $\sharp$ 5/D $\sharp$ 6/A $\sharp$ 6/D $\sharp$ 7 (01'21'') and A $\sharp$ 4/A $\sharp$ 5/A $\sharp$ 6 (01'38''). The transition of the unit is emphasized by (i) a distorted wave of sound which anticipates the begin of the unit (*i.e.* 01'36'') and (ii) an indistinct sound of screaming voices which coincides with the sound of bell (*i.e.* 02'14'') until 03'10'' when it starts to appear irregularly.

In the final part of the piece, a combination of synthesizer sounds enriches the sonic material, and a melodic line between A $\sharp$ 5 and F $\sharp$ 5 closes the piece.

- *Overview*

Differently from other pieces of Raime, *Passed Over Trail* is not composed starting from a pure rhythmic pattern, but it develops a periodic unit that resembles a sort of wave. This sonic form grows and throbs. There are several interrupting elements which liven up the music, but the overall sound is grounded in such a solid bass line that one still experiences a consistent sonic flow that contains only occasional ripples forming on the surface.

The hypnotic repetition of an elemental unit is the essence of the piece and the scattered elements are precisely located in the sonic spectrum. Raime use an extended frequency range and exploit interferences of neighbouring frequencies (in particular of the bass sounds). Even if a clear rhythm is absent, there is a sense of regular cadence. Music seems to behave in between of a progressive development and a static position. [A, B, D, E, F, G, H, I]

The Walker In Blast And Bottle [2012]

AUDIO [05'11'']: Andrews, J. and Halstead, T. 2012. *Raime – Quarter Turns Over A Living Line*. UK: Blackest Ever Black – BLACKEST001-CD.

The Walker In Blast And Bottle starts with a basic rhythmic frame (*i.e.* dry beats with an embedded melodic line in C $\sharp$ 5, D5, C $\sharp$ 5 and F5) and a bass pulses on G. From

00'50'', a sequence of complex chords begins generating strong spectral and dynamic contrasts (*e.g.* the bass pulse originally at the first beat of the measure moves to the third). At every new cycle (*i.e.* 8-beats bar) small differences emerge: for instance at 01'06'' the main chord lacks of basses (Figure A.97, marked area as “a”) and at 01'22'' the fundamental note changes from G1 to E1 (“b”). Each chord is in fact a complex aggregate of notes which embodies fine combinations of different harmonic series (Figure A.97, area “c”).

In the medium frequency range, continuous drones consolidate the entire structure creating a permanent presence of sound. In particular from 01'18'' a line at F#5 fades in and then some groups of sounds (*i.e.* the areas “d” and “e” in Figure A.97 and the sequence of G#4 and G#5) moves ascending and descending within a microtonal range. The entire episode that fades in from 01'50'' enlarges the sonic spectrum towards medium and high regions and these sounds contribute to move the entire character of the piece –which was initially more concrete– in the direction of an ecstatic aura.

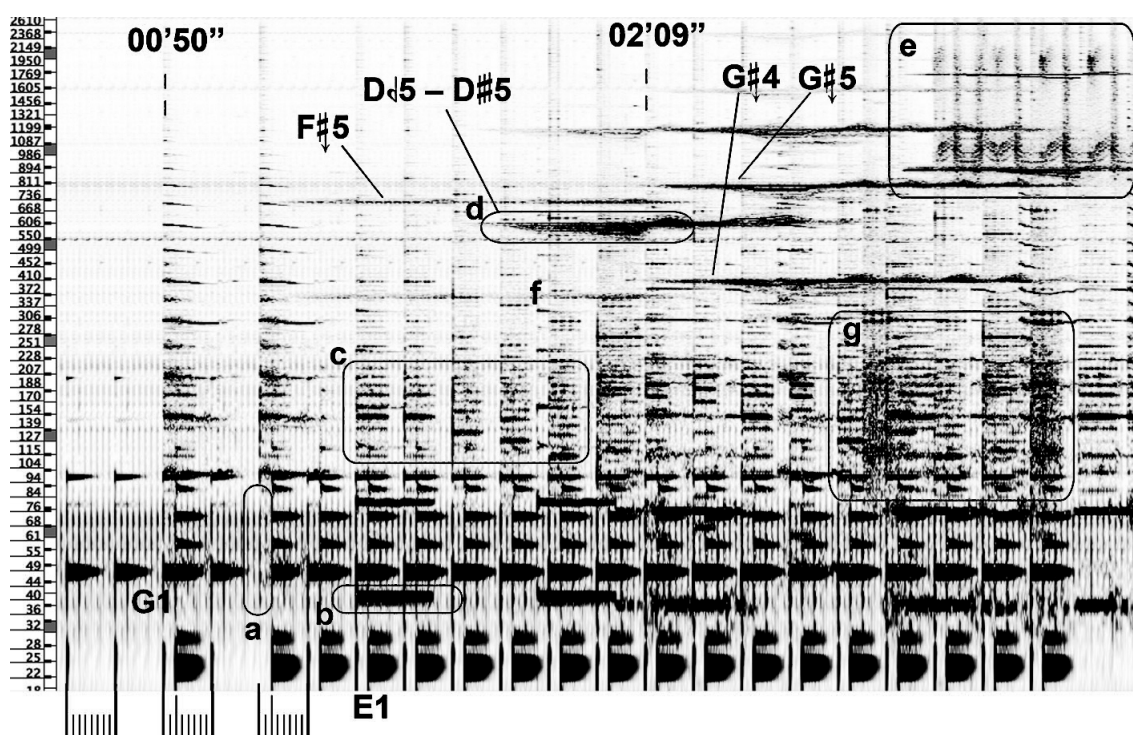


Figure A.97 Spectrogram [20 – 2650 Hz / 00'32'' – 03'32''] of The Walker In Blast And Bottle.

The rhythm maintain the original measure but sometimes several chords and pulses enter at irregular intervals, such as the bass at 01'52" (Figure A.97, letter "f") and the section from 02'43" to 03'20" (region labelled as "g").

In the final part, the sound reaches a high complexity and music seems to dissolve into a pulsating drone: high tones generate recurring microtonal *glissandi* and the chords start to be more distorted and split between the two stereo channels creating a hypnotic effect in perception.²⁰⁷

- *Overview*

In this piece, the exploration seems to be focused on the small differences that characterise each chords and on the richness of sound of the central part. The initial rhythm (*i.e.* 8-beats) is simple and serves only to establish a framework of recognition: the listener makes use of this supporting structure when –from 02'43"– additional chords start to appear unevenly and sonic material starts to be more intricate.

In a way, Raime start with a very precise and definite music and arrive to a complex and indistinct mass of sound. In the final part, Raime make a large use of distortion and spatialisation, giving the impression that the sound is starting to collapse and degrade. The rhythmic structure is immersed within a rich combination of loud chords, drones, *glissandi*, noises and distorted voices (Figure A.98) and sound spatialisation is in this case precisely used to give the impression that sound comes from different directions. [A–I]

²⁰⁷ This practice has been found both in Pan Sonic and Ryoji Ikeda pieces (*i.e.* *Lautturi*, Figure A.30 and *Headphonics 00*; respectively).

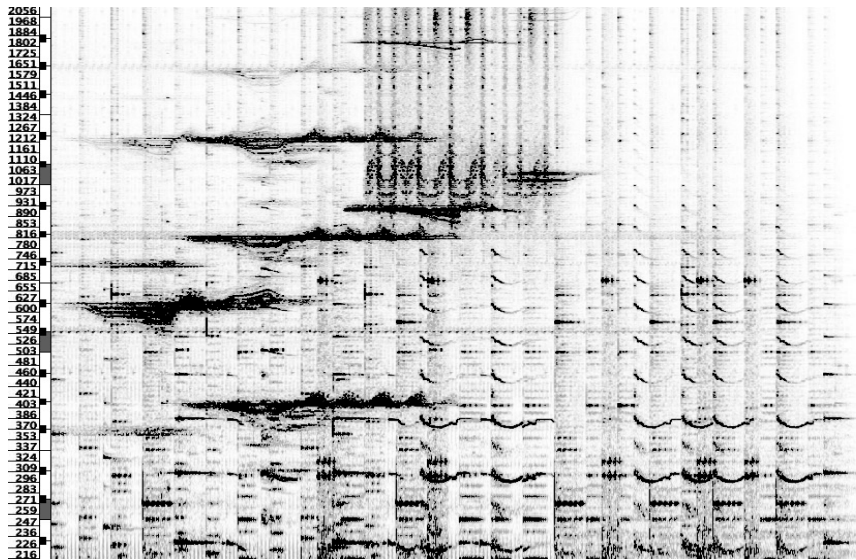


Figure A.98 Spectrogram [216 – 2100 Hz / 01'39" – end] of The Walker In Blast And Bottle.

A.7 Riccardo Nova

Eleven [2011]

AUDIO [20'16'"]: Nova, Riccardo 2005. *Art Zoyd Studio & Musiques Nouvelles Ensemble, Expériences De Vol 4–5–6*. France: In-Possible Records – EXP01CD.

NOTE: The analysis has been carried through aural and spectral examination. The piece (originally entitled *Eleven (420:11@destruction generating deity)*) was performed on November 30th 2004 at the Théâtre Marni in Brussels (at Netd@ys Festival) by the electro-pop group Art Zoyd and the Ensemble Musique Nouvelles conducted by Jean-Paul Dessy, at the fifth concert in the series “Expériences De Vol”. *Eleven* is a composition for strings, percussion, electric keyboards and theremin.

• GENERAL SCHEME

Sections	Attributes (ordered from the most fitting)
00'00" – 03'00"	E, D, H, A // F, B // I

03'01" – 06'02"	E, H, A, B, F // C, G // I
06'03" – 09'03"	A, I, E, B, C, G // H
09'04" – 13'33"	E, H, I // B, A, C // F, G
13'34" – 16'33"	G, A, C, E, I // B, F
16'34" – end	A, G, I, E // B, C, H

- [00'00" – 03'00"]

Eleven begins with a continuous pattern of electronics that is based on B $\flat$ 4, 458 Hz (being the harmonic series B $\flat$ 5, 912 Hz; F $\sharp$ 6, 1371 Hz; B $\flat$ 6, 1833 Hz; D $\sharp$ 7, 2287 Hz; F $\sharp$ 7, 2749 Hz) and is supported by an electronic pulse repeated mechanically centred around $\sim$ B $\flat$ 0/ $\sim$ B $\flat$ 1. The continuous line fluctuates dynamically and is progressively reinforced by amplified strings and occasionally short phrases of cello emerge. Strings and electronic sound own a marked resonance conceivably generated by a realtime effect applied to the instrumental sound. There is a slow *crescendo* until the end of the episode that involves the bass drone and it abruptly ends leaving the B $\flat$ 4 of the string as a connecting element for the next episode.

- [03'01" – 06'02"]

The new episode starts with a bass drone of a C open chord (*i.e.* C1/C2/G2C3...). Strings design a rapid movement made of irregular *glissandi*. This series of movements forms a rich texture which overlaps generating a complex series of interferences (Figure A.99).

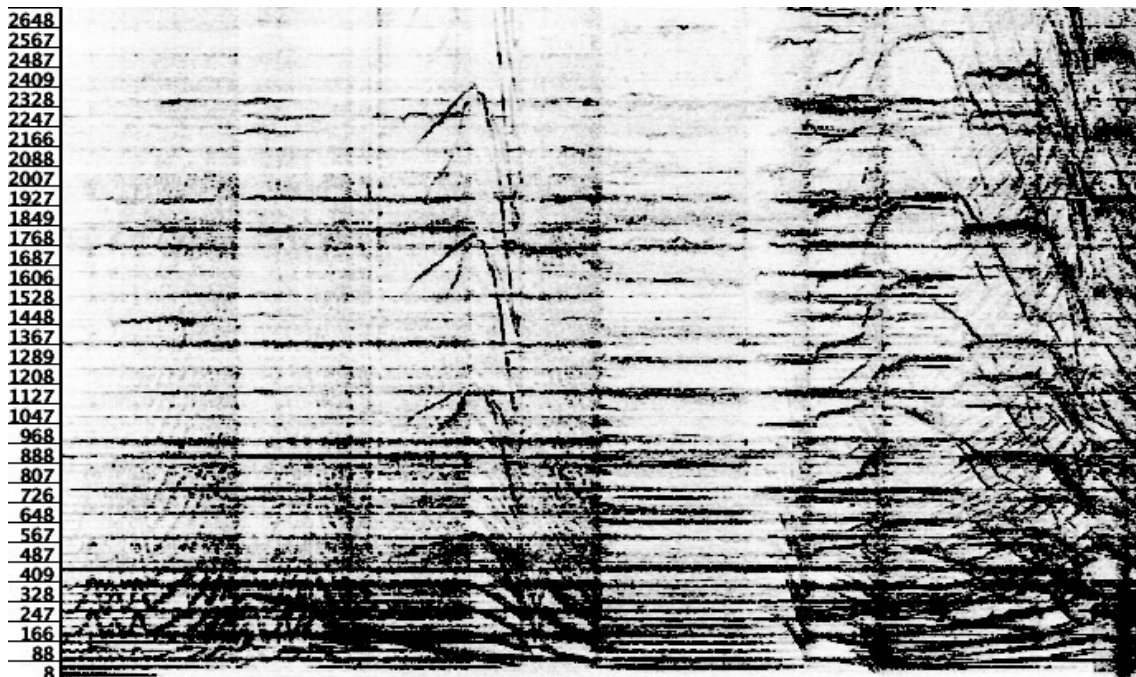


Figure A.99 Spectrogram [10 – 2700 Hz / 03'48" – 05'15"] of Eleven.

From 04'58" an ascending and descending *glissando* accompanied by a *crescendo* of intensity culminates in a loud and animated part with the intervention of distorted electronics. This fragment is the climax of a gradual intensification of sonic elements of dynamic, timbre and spectral density.

- [06'03" – 09'03"]

The new musical episode rapidly moves from a quiet to a dramatic atmosphere: strings increase their presence and intensity, and the episode quickly leads to a new climax that fades out with a descending *glissando* (07'25").²⁰⁸

The next section starts with a quiet episode which is interrupted by contrasting elements and after a short silence (08'10" – 08'16") a long and incessant *crescendo* begins. First, a cyclical *glissando* of strings introduces a dynamic movement (Figure A.100, arrows labelled with "a") then wind instruments and electronics develop a cluster of sounds which extends toward a high frequency range (Figure A.100, regions labelled with "b"). The full ensemble is gradually submerged by a noisy and distorted

²⁰⁸This *glissando* (and the following episode from 08'17" to 08'32") may recall Haas' practices in his *String Quartet n°2*.

sound of electronics which saturate the entire spectrum.

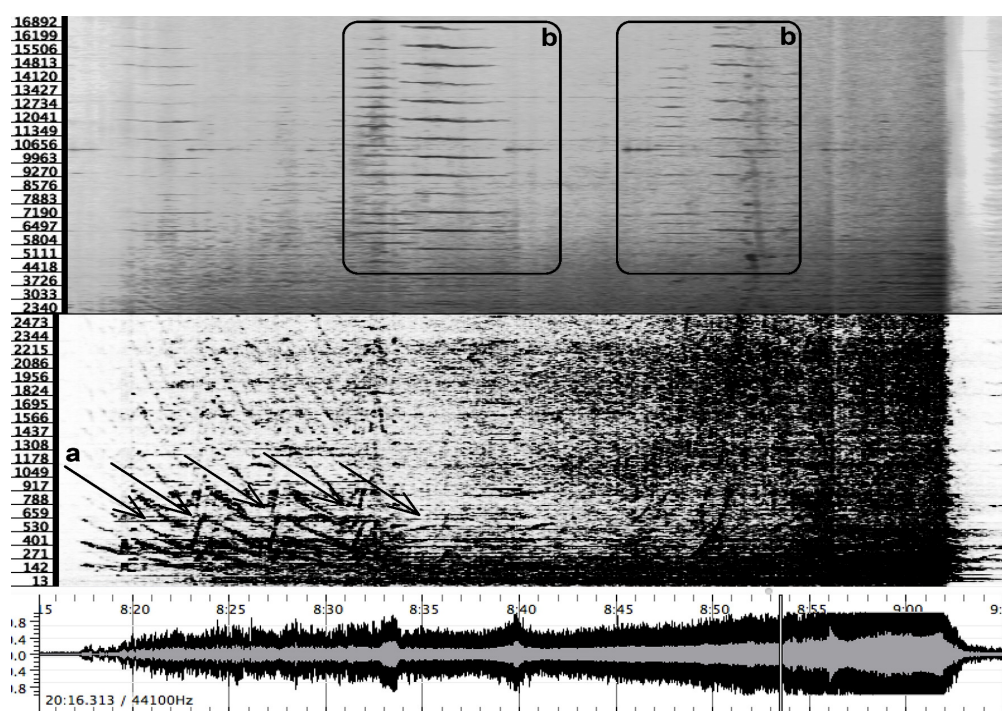


Figure A.100 Multilayer representation [top spectrogram: 2.3 – 17 kHz; centre spectrogram: 20 – 2500 Hz; bottom waveform / 08'16" – 09'05"] of Eleven.

- [09'04" – 13'33"]

The episode that starts from 09'04" is initially characterised by a very quiet and flat development. Nova constructs a series of phrases which terminate with dynamic *climax*. Each phrase shows a continuous evolution where sound is sustained and formed by a fine layering of several sonic lines. Here the dynamic discontinuity is the key aspect of this episode and reveals an original use of the sonic material.

From 10'32" a new episode fades in and shows a stepwise motion that takes place both in dynamic and frequency dimensions (*i.e.* a repeated *crescendo* and a sequential *glissandi*, Figure A.101, red arrows labelled as "b" and green arrows labelled as "a", respectively). Aural and spectral examination reveal that the dynamic *crescendo* gives rise to an expansion of spectra towards higher regions (Figure A.101, green areas

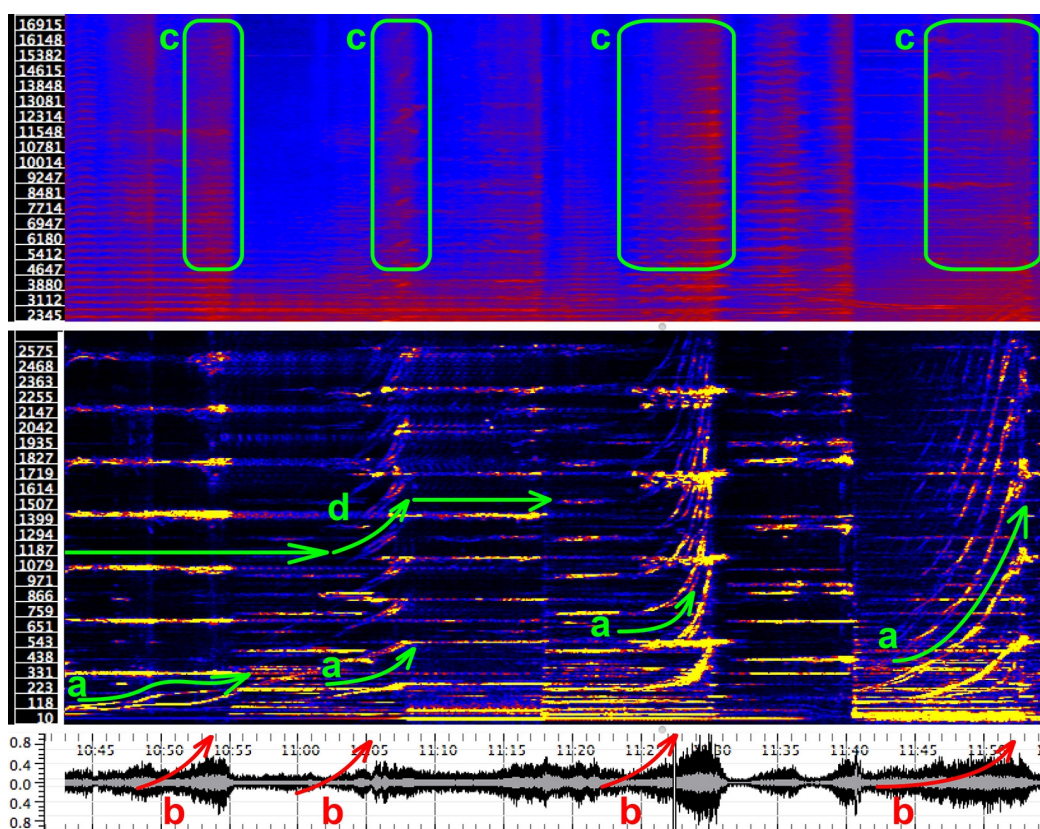


Figure A.101 Multilayer representation [top spectrogram: 2.3 – 17 kHz; centre spectrogram: 20 – 2600 Hz; bottom waveform / 10'42" – 11'53"] of Eleven.

The episode shows an intense evolution: strings delineate a complex texture of lines that sometimes move in parallel, descending or ascending, other time progress in different direction creating an elaborated combination. The evolution includes short contrasting interruptions (similar to those used by Lang) in which the spectral density, the intensity and dynamic are maximized by the electronic manipulation of sound (e.g. 12'34 – 12'38" and 13'02" – 13'33").

- [13'34" – 16'33"]

This part includes three similar episodes where the complex sonic articulation of the ensemble intensifies and culminates with a very loud climax that vanishes abruptly.

²⁰⁹ Moreover, this succession of *glissandi* played by strings which is alternated with steady notes may call to mind the similar practice of Haas in his *String Quartet n°2* (Figure A.10).

The movement of strings is cumulative: they trace musical lines which may recall waves; they move sequentially with *glissandi* or create continuous sounds in a way that they seems to overlap one another (e.g. 14'20" – 14'40"). The second episode appears more like a sharp intervention rather than a gradual *crescendo*, but the form of the episode is consistent with the general evolution of the piece made of contrasting sections. Here Riccardo Nova exploits the contrasts: he includes a large variety of details to compose a sound that increases in dynamic and spectral dimension as it were a unique body that grows and suddenly disappear leaving a sort of *hollow* presence.

- [16'34" – end]

The final chapter of *Eleven* begins with a suspended interlude where one may distinguish voices and a few interventions by the strings followed by a continuous sound made of overlaid notes (e.g. the pattern of tones from 17'07" to 17'29" is C4 / G4 / G#4 / A#4 / G5 / G#5 – A#5 / A#5 / G#6 / B6 / C7) which slowly fades in. From 18'02", a pulsating electronic bass drone (G1 / A2) starts to emerge, submerging the residual instrumental sounds. This sonic matter becomes dense and distorted until the end where sound abruptly ceases.

- *Overview*

Riccardo Nova composes *Eleven* as unique musical project commissioned by the electronic music group Art Zoyd and the Ensemble Musique Nouvelles from Brussels. The global appearance of the piece is like a periodic structure that is repeated: starting from a horizontal and static profile (B, E, F, H), instruments design different combinations that evolve and come to a climax. The instrumental phrases work as elemental materials: they delineate fluxes (e.g. ascending, descending, thickening), they converge or diverge and they immediately disappear leaving an emptiness of matter (G, I). Nevertheless these events always are part of more extensive sonic conception which grows in dynamic, spectral extent and movements (A, C). In this case, one may observe that Nova possesses a *plastic* approach in composing a unified sound. The presence of sound is organic, instruments and electronic merge together and generate material interferences rather than create a discursive interplay made of relationships, differences or imitations. Sound is conceived as a unique material entity.

B. Listening Questionnaire

B.1 Supplementary material

The majority of participants (N=75, 46 male and 29 female; age, M = 36.2, SD = 32.3) reported a prior professional (or semiprofessional) link to music (N=67, 89%), through being students of music or musicology (53%), musicians (69%) and scholars (17%). The survey consists of a listening session combined with a questionnaire and was carried out both through a web-based platform (24%, *i.e.* via personal and academic contacts, and social networks) as well as physically attended survey events (76%, *i.e.* within academic contexts).

B.1.1 Perceptual evaluation #1

The majority of participants sorted the samples based on musical genre and instrumental and timbre-based categorizations. Focusing on this specific *subset* of data, it has been possible to combine similar classifications such as “instrumental”, “acoustic instrumental” and “ensemble based” for groups that include the same pieces and this organization allows to arrange the criteria in eight major families (Figure B.1, I-VIII).²¹⁰ Within these types, samples #1, #4-#6 and #9 were sorted according to a restricted number of main criteria, whereas the classification criteria for extracts #2, #3, #7 and #8 were more varied (Figure B.1).

²¹⁰ Even if some groups are labelled using slightly different expressions, such as “noise”, “noise, space”, “scattered” and “contrast”; the presence of the same pieces into each group indicates that these groups reasonably belong to the same family of description if they are globally considered.

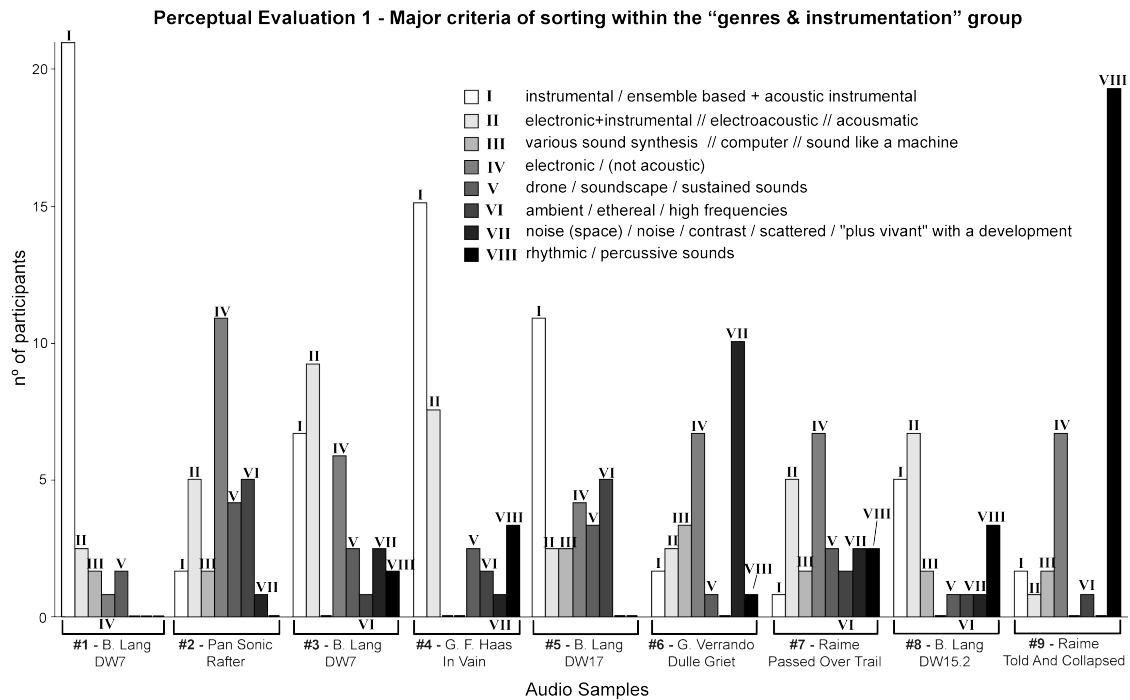


Figure B.1 Major sorting criteria (I-VIII) used in the PE1 within those participants who have classified sample based on genres and instrumentation.

B.1.2 Perceptual evaluation #2.

Globally, the results of this task reveal that the semantic descriptors were evenly distributed in the case of samples #2, #3, #4 and #7 ($22.8 < \sigma^2 < 29.8$), whereas for extracts #5, #6 and #9 the response was more polarized ($86.8 < \sigma^2 < 329.0$) (Figure B.2).

The results of this survey could be compared with the analysis (Table III.3, column *Attributes*). In general, there is a good agreement between the listeners' responses and analysis: in particular, in case of samples #1, #5-7 and #9, the association is in an accordance (80-100%) with the theoretical examinations. Nevertheless the comparison reveals some problems.

In the case of sample #2, the semantic descriptors E, H, B (*i.e.* “compact / fluctuating”, “static / continuous” and “hypnotic / enveloping”) were selected in accordance with the analysis, but descriptor I (“sculptural / spatial”) appears to be the an important descriptor selected by the listeners in this study whereas in the analysis this is

considered a minor attribute. One possible reason for this difference could lie in the double meaning of the adjective *spatial* contained in the descriptor I. On the one hand, the term *spatial* refers to an extended area or volume; on the other hand, it might be interpreted as an attribute of cosmic issues. This ambivalence might have an influence on this unexpected result: while the questionnaire asked for the presence of a virtual spaciousness of listening, the participant might have looked for induced metaphorical associations with extraterrestrial explorations.

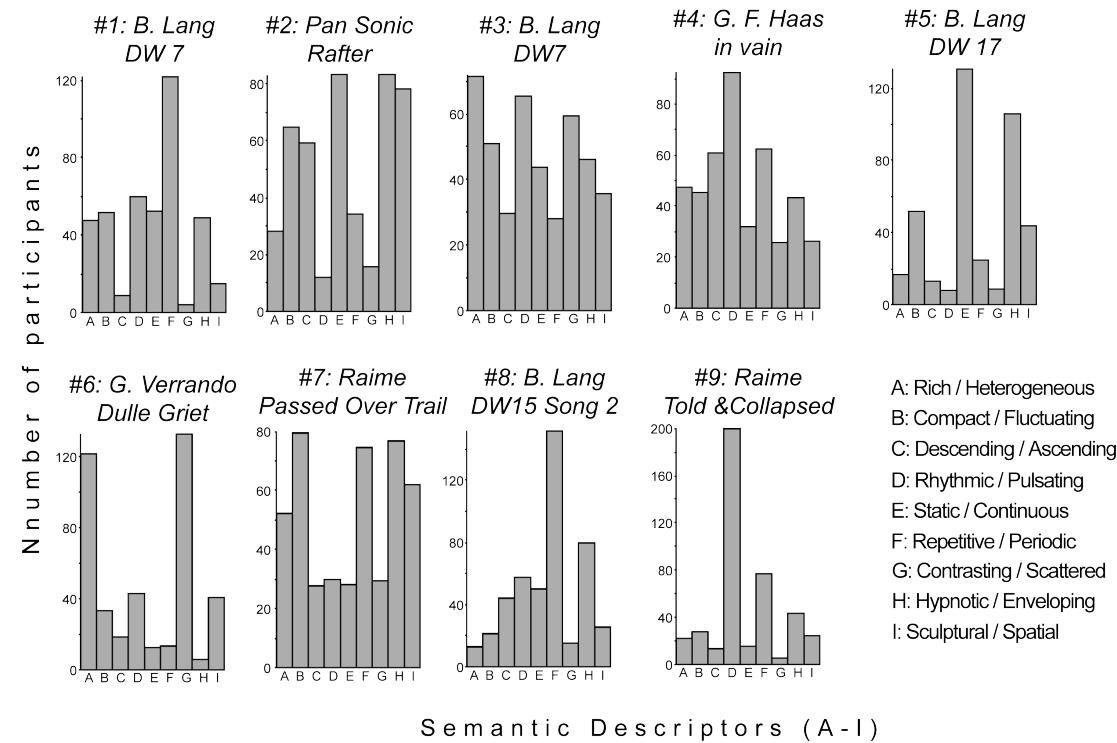


Figure B.2 Perceptual Evaluation 2 (number of participants vs. semantic descriptors).

In the case of sample #4, descriptors D and C (*i.e.* “rhythmic / pulsating” and “descending / ascending”) turn out to be important characteristics for both the empirical and analytical approaches, but the responses regarding descriptors H (“hypnotic / enveloping”) and G (“contrasting / scattered”) are in contrast to the theoretical study. Attribute H was the third most often chosen attribute for sample #4 while it is absent in the analysis; and descriptor G is an important attribute in theoretical analysis but it has been barely selected by the participants of this study. Sample #4 (taken from *in vain* by Haas), starts with a rich flow of orchestral sounds and continues with great dynamics

and timbric contrasts mostly generated from percussive interventions. It can be hard to listen for hypnotic effects of music (*i.e.* descriptor H) within this extract, even if the sound of tam–tam percussion could evoke a sort of eastern mesmeric atmosphere. Nevertheless, the adjective *hypnotic* has a large semantic area and might be preferred when other options are not completely clear. In fact, while the attribute H is the third most popular response among all participants, it is only the sixth most often chosen when only professional participants are considered. Similarly, the unexpected response for descriptor G depends on the experience of the participants: audio sample #4 has clearly various oppositions of dynamics and if the result is considered within the group of musicians and students, choice G becomes the third most often given answer while it ranks in the eighth position when considering all participants.

- *Perceptual evaluation 2: weighted correction*

The data of Perceptual Evaluation 2 have to be weighted considering the order of introduction, so that the first preference would be evaluated as more important than the successive ones. However, for some listeners, the exercise appears to be demanding and the risk that the participants did not succeed to put in exact order their preferences should be considered. Moreover, participants are asked to select up to five descriptors. The results show a significant decrease of the answers with more than three descriptors: the 93% (medium values for all samples) of participants provided at least one choice, then the 85% and 62% of participants gave two and three preferences respectively, and finally only the 28% and the 7% provided four and five answers for each sample (Figure B.3, plain line). Hence, the possibility to consider only the data coming from the first three preferences could be evaluated.

Moreover, a careful examination of the results indicate that the number of chosen descriptors is not greatly related to the typology of listeners: one may expect that a trained listener is able to give a more profound description of such type of music providing an extended list of adjectives. On the other hand, experienced participants could be capable to identify better a small number of appropriate indicators than those lacking experience who might need more alternatives to answer. It is an ambivalent possibility and the results show a minor tendency of skilled participants to describe the

audio sample with more descriptors (Figure B.3, dashed lines).

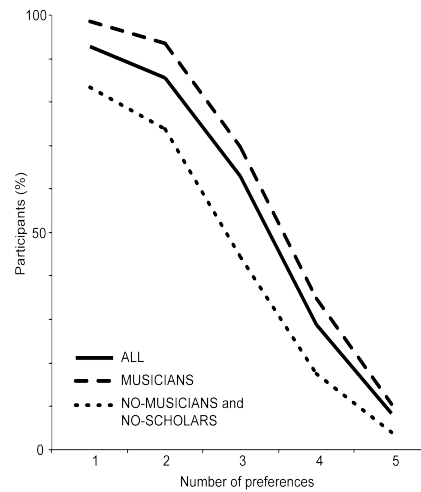


Figure B.3 Percentage (%) of participants vs. n° of preferences in PE2.

I studied the results with two sets of weighted factors: • correction 1 (with the following weighted factors: 1.8 (1st preference), 1.5 (2nd preference), 1.3 (3rd preference), 1.1 (4th preference), 1 (5th preference)); • correction 2 with respectively 3, 2, 1.5, 1.3, 1. Moreover, I examined the different results considering three and five of preferences (Figure B.4). The results adjusted with weighted factors appear in general slightly more clear and the correction method no. 2 that provide a higher significance to the first preference, seems to be more appropriate in most of the cases.

There is not a great benefit in considering exclusively three preferences: the exclusion of the two last choices does not clarify the profiles and in some cases the examination of all answers provides good distinctions. Hence, the global evaluation of the results of the PE2 (visible in Figure B.2) has been carried out considering five answers and applying to the data the weighted correction no. 2.

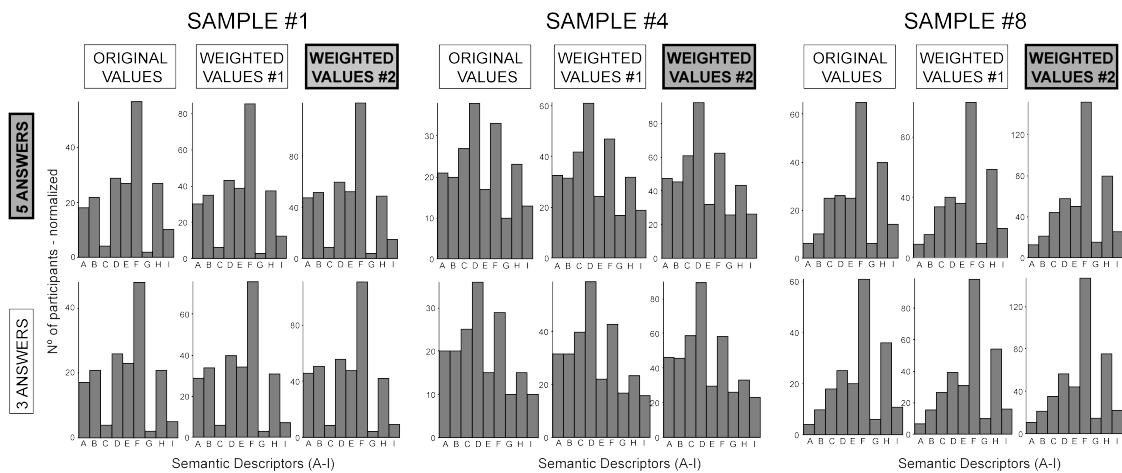


Figure B.4 Visual representation of the treatment of data: with different weighted corrections and number of preferences (for samples #1, #4 and #8).

B.2 Questionnaire

Here below is copied the complete text of the questionnaire (the text in *italic* refers only to the web-based version).

Welcome!

This is an academic study to evaluate the perception of sound in different genres of contemporary music. The overall listening test procedure, including instructions, lasted around 30 minutes for the majority of the subjects. If you want to participate, it is strongly recommended to

-do not rush, to take your time and take a break in case you feel signs of fatigue;

-dedicate a close attention;

-set the best listening conditions: good emission system (loudspeakers or high-quality headphones), a relaxed standing and a silent location.

Thank you for your participation!

[STARTING QUESTIONS]

1. Please select your age group

< 20	
20-29	
30-39	
40-49	
50-59	
60-69	
> 70	

2. Do you have any professional link with art or music? (Y/N)

3. If yes, which one (student, scholar, musician,... any additional detailed information, here, is well appreciated)?

4. How frequently do you listen music (not accidentally) in everyday life (hrs/day or hrs/week)?

5. Which type of music do you like or listen more frequently? (put a mark inside the corresponding box, you can choose until 5 types)

Classical music (baroque, classic, romantic, early 20 th century)	Dance
Contemporary classical music	Techno / Dub
Rock-Pop	Indie / Experimental Rock / Post-Rock
Folk	Abstract Electronic / Experimental / Acousmatic
Ethnic / world music / reggae / fusion	Other:
Historic Jazz	
Contemporary Jazz / Free Jazz / Free Improv	

5a. Please [play] the following sample to set the volume of your system to be pleasant but adequately high to perceive all details of sound. [This demo-selection contains a similar random mix of the audio excerpts you will listen during the questionnaire and it has been prepared also for you to familiarize with such types of sound.]

5b. Which is your current audio system?

<i>Headphones (earbuds or low quality)</i>	
<i>Headphones (full-size / hi-fi)</i>	
<i>Computer internal loudspeakers</i>	
<i>external loudspeakers (lo-fi)</i>	
<i>external loudspeakers (hi-fi)</i>	
<i>Other:</i>	

[AUDIO SELECTION IS PLAYED BACK] OPEN THIS [LINK] *This audio track contains 9 short extracts: 1-9. Feel free to re-play the audio samples at any time during the questionnaire and to take notes during listening (recommended).*

6. Are you familiar with these types of sound?

Yes, with all samples	
Yes, with most of the samples	
Yes, with some of the sample	
I am familiar with just a few samples	
I am not familiar with the sound of any sample	

[PERCEPTUAL EVALUATION 1]

7. Without any additional information, please sort the audio samples into classes; and then indicate which criterion do you apply. (Use any criterion you find more appropriate. In case, you find the selection of excerpts homogeneous, you could indicate a single group and try to describe the common characteristic you perceived). *Feel free to write in one of the following languages English / French / German / Italian / Spanish / Portuguese)*

GROUP 1 <i>(for example: samples n° 2,3,6)</i>	GROUP 2	GROUP 3
GROUP 4	GROUP 5	GROUP 6

Audio samples in GROUP 1 are....

Audio samples in GROUP 2 are....

Audio samples in GROUP 3 are....

Audio samples in GROUP 4 are....

Audio samples in GROUP 5 are....

Audio samples in GROUP 6 are....

[PERCEPTUAL EVALUATION #2]

8. Here below you will find a table with a list of sound characteristics (from "A" to "I"), please associate these characteristics to audio excerpts. You could select up to 5 characteristic(s) for each sample, starting from the most fitting. (Each class has two adjectives that describe the sound characteristics. *You can play the selection as often as you need*).

(A) RICH / EXTENDED	(B) COMPACT / FLUCTUATING	(C) DESCENDING / ASCENDING
(D) RHYTHMIC / PULSATING	(E) STATIC / CONTINUOUS	(F) REPETITIVE / PERIODIC
(G) CONTRASTING / SCATTERED	(H) HYPNOTIC / ENVELOPING	(I) SCULPTURAL / SPATIAL

Audio sample #1: ... *(for example: B, H, E, I)*

Audio sample #2: ...

Audio sample #3: ...

Audio sample #4: ...

Audio sample #5: ...

Audio sample #6: ...

Audio sample #7: ...

Audio sample #8: ...

Audio sample #9: ...

9. Did you find difficult to globally assigned the pieces? (Y/N)

10. Did you find difficult to understand the characteristics of any particular class? (Please indicate the corresponding letter)

11. Did you find difficult to treat any particular piece? (please indicate the n° of the piece you found difficult to associate)

[III. FINAL QUESTIONS]

12. How much attention do you dedicate to the listening?

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

13. How much did you like the questionnaires?

	very much									nothing
	10	9	8	7	6	5	4	3	2	1
<i>The type of inquiries</i>										
<i>The audio samples</i>										
<i>The whole questionnaire</i>										

14. Do you have any further comment? (Please feel free to use this space to write down any additional comment or suggestion)

15. Would you be interested in knowing more about the study and the result of the questionnaire? If yes, please write down your email address below.

C. Interviews and exchanges²¹¹

The following text has been sent as opening note, before the series of questions:

About this research

This doctoral project concerns the study of various genres of today's experimental music that focus on the sound its characteristics, its complexity and shape. These aspects are explored within the several passages: from the conception of music, to its composition, diffusion and perception.

Considering a selection of pieces coming from very different styles of music, a goal of this study is to compare these compositions in term of sonic perspectives.

Project's structure

1) Analysis of pieces (auditory, morphological and score analyses);

2) Discussion with composers and performers;

3) Listening sessions and questionnaire.

The discussion will concern the pieces selected for the study, but also more general considerations about author's aesthetic and perspectives. It is intended to look at (i) the author's perceptual intentions; (ii) the means to achieve them; (iii) how these intentions should reach the listener; (iv) the author's past and present artistic influences.

C.1 Georgia Privitera – Maurice Quartett (Haas)

About the music Haas my study focuses mainly on the String Quartet n°2 and in vain, but since my approach is not analytical but more comparative and focuses on sound and its perception, it seems reasonable to ask for your contribution in particular as performer of Haas' music and in general as enthusiastic interpreters of contemporary music...

Q: It seems to me that in a piece like the String Quartet no. 3 – Im iij Noct (due to the specific listening circumstances) the importance of reciprocal listening almost arrives to prevail over the execution of its own part. Am I wrong?

²¹¹ All material included in this appendix is provided with the permission of the authors.

GP: Listening to each other is not prevalent over the execution but it represents a sort of fifth element of the quartet. Mutual listening is omnipresent and connects ourselves. It is something that is above us both hierarchically and physically, this is an energy capable of shaping the space inside and outside of us. It has not to do with any instrumental technique or method but with an extreme sensorial research.

Q: In front of a score with traditional notation, there is a point in the learning process, after which you take control of a technical freedom that opens the interpretive development in full consciousness. How do you reach the same degree of freedom in this type of piece, where the unpredictability and the performance conditions are radically different (e.g. no visual interaction between you and the physical distance might sometimes be a problem)...?

GP: The degree of freedom is reached assuming, through the technical study, all the material that Haas leaves us and the resulting sonic and imaginative world. We need to become means/bodies through which to expand this sound, and the sound must be internalized, and become part of us to minimize the gap between technical gesture, freedom and enlightenment.

Q: I would like to discuss the various elements of this score (A-Q), but it is not -in reality- one aspect of my study; but I have a curiosity: in this piece how are the roles between you developed? I mean, is there still a leadership? In a piece made of musical “proposals / invitations”, “refusals” or “acceptances”, do you have discovered different attitudes within the quartet (maybe someone has shown himself more inclined to move within a such free musical space)? or the first violin and the cello maintain to some extent a distinct profile, as traditionally happens?

GP: There are not traditional leadership within the quartet, there is a total freedom within this field of “invitations”, “proposals”, “refusals” that has to do with the emotional and transitory status of each of us during the performance. We cannot talk about traditional leadership, rather it is possible to envisage a sort of “sonic leadership” when a fundamental sound is carried on.

Q: Regarding the sound (which is the central point for me). Beyond the more technical aspects of writing, it seems that Haas succeed in creating complex-unified-

sounds formed by the acoustic interleaving of your sounds. There is a rich work on timbre and microtonality, but what emerges –from listener point of view– is a “warm” sound, corporeal, dense and “materic”. It seems to me that Haas conveys to the listener the pure sonic part of his writing, leaving behind/hidden the construction, the lines, and the complex timbric elaboration. What is your idea as performer and listener of Haas’ music?

GP: Our idea is that Haas, through his writing and harmonic research, consciously or unconsciously succeeds in reaching to something of ancestral and primordial. The incessant use of harmonic spectra created with a clear “simplicity” without any kind of formal difficulty leads us to recover something that exists already inside and outside us, it already is. It is a reflection, a listening, it is something like to stay within the sound with the sound. A sound that we know already without being aware of it we grasp a preconscious memory. In that moment we are a whole body, we are nature.

Q: In addition to the use of microtonality, I find that other elements are specific in Haas’ music, for example, the dynamic contrasts (creating sound full and empty), the use of repetition (e.g. in vain) to create larger structures and hypnotic effects, which are also obtained by the use of sustained drones. But all these elements are developed in favour of the perceptual result, which is a sort of primal imperative... What is your idea about this (you may have already been answered in the previous question)?

GP: The frequent use of cyclic forms and recurrent repetitions, often performed in *accelerando*, characterize some aspects of his pieces together with the quadraphonic perception derived from the position of the performers, all these elements contribute to that perceptual “being” (that I mentioned in the previous question), which is hypnotic and abandoned that is the primal perceptual aspect of the [*String Quartet no. 3*].

Q: Did you get in touch directly with Haas? If yes, of course I would be very curious to know the reasons that led you to contact him and the feedbacks that you have had from him (if you can summarize the discussion in some way).

Unfortunately we were unable to contact Haas. At first it did not seem so simple and after a bit of months we gave up. But who knows in the future!

Q: Regarding music temporality. For Im iij Noct, Haas writes: “Many rests (including grand pauses)”. Analyzing in vain there is a peculiar view of time: non-linear, an exploration of the vertical sound, almost the desire to create a stasis within a movement and create a sort of sonic eternal present. Also in Im iij. Noct, Haas seems to create musical episodes at different rates. For listeners this aspect is quite present, but how does it work for performers? Does the successions of “invitations”/ “refusal” preserve a sort of linear process?

When we play *Im iij Noct* we strive to leave behind our temporal codes that usually mark every instant of our daily life or our normal playing (and this is why every performance has a different duration). It is important to stay away from any sort of predictable and temporal cadence while avoiding any artificial construction of this non-sequentiality, and on the contrary drawing on our inner and corporeal freedom.

Q: Listening in the dark is innovative. What I found amazing is the huge difference between normal darkness and total darkness. Sometimes it happened to me to listen in the dark, but after a while I get used to the context and find (look for?) visible profiles, distinguishing again the space around me, creating a new physical reality. In Im iij. Noct is total darkness (or so it was for me during your performance), there is no visual support. In this state of blindness a sound moves differently: on the one hand sound becomes pure abstract perception, on the other hand, paradoxically, becomes more concrete, real, physical. For you, as an interpreter, will be different... but are your concentration and the mutual listening modified by this state of “blindness”?

As performers, we share the same altered state like every listener. There is a “profound perceptual democracy” between performer and audience and this is the reason why someone talks about “collective practice”. We noticed that the state of blindness strongly changes our perception of the physical space. Listening becomes a means of orientation, the space itself shrinks and the four corners of the room seem to move inexorably closer to us. It is no longer just an acoustic listening but also a kind of energetic one in that there are strong interactions with the audience. I would definitely say that the audience takes on an active role during the performance.

Q: In this piece, and in the music of Haas in general, what kind of metaphor

would you use to describe the evolution of sound (choose more than one option if you want)?

~~a progression of episodes~~

~~a series of objects~~

~~a sequence of images~~

~~a process of filling and removal~~

~~a layering process~~

~~a movement in space~~

~~a continuous flow~~

an expansion/reduction of space

~~other:~~

Q: After your performance of Im iij. Noct, what I thought is that it was difficult to separate the sound from its perception in the dark. In your opinion, is this a kind of piece that one could also appreciate outside of live performance (for example by listening to a CD)?

Personally I am skeptical about listening to a piece like this outside of the physical-emotional condition.

Q: I would include Haas' music within perceptual studies (i.e. questionnaires and listening sessions). Do you think, it is important to provide information to listeners about music (title, instrumentation, structural characteristics, aesthetic / historical background ...)? Do you think the perception and appreciation may be influenced? Have you ever felt the need to provide more details to the public?

As Maurice Quartet we are carrying out in Turin and Pinerolo, both as performers and as organizers, a long and rewarding work of formation of a public always more sensitive and attentive. This is because for years we include to our concerts some words that could help, far from any didactic ambition, but to help the perception and empower listeners with some useful details. For Haas the issue is more complex. In

the case of *Im iij Noct*, we preferred to give just a few pieces of information, as indicated in the score, we advise the audience about the darkened conditions of listening and the approximate duration of the performance to steer clear of any type of traumatic or provocative situation, something that Haas absolutely does not look for. The important is to set a comfortable environment for the audience in order to avoid that the concert be seen as an intrusion or a sort of violence; but the listening should not be guided. On the hand, this approach led –after the concert– to a very rich and interesting exchange with the audience: it creates condition for stimulating debates and interchanges of ideas about perception. We collected these feedbacks from different contexts exploiting them as a new source of inspiration.

Q: My study strives to show the connections among figures such Scelsi, Grisey, Ligeti, Romitelli, Verrando, Haas and aims to approximate this idea of Scelsi's approach to "the inner life of sound" with the instinctive materiality of the experimental electronic music of today, as the glitch, electroacoustic, the basic-channel style, the minimal techno of people such as Pan Sonic, Ryoji Ikeda and Raime among others. Do you follow the experimental/underground scene?

I follow the experimental scene and the names you mention are part of my daily listening, and as an interpreter, I can only say that they have helped me to understand even more the sound world to which we belong, and as an interpreter for inspiration. It's a parallel that I live personally and as a listener and as an artist.

C.2 Riccardo Nova

In my project I examine how to study different genres of experimental music today, especially trying to analyze the sound characteristics. Within a selection of pieces (of composers such as G. F. Haas, Bernhard Lang, Giovanni Verrando and performers such as Pan Sonic, R. Ikeda and Raime) I chose your composition, Eleven, I've got to listen online and then in the record of the Art Zoyd Ensemble. Eleven holds particular characteristics (especially instrumental) that incorporate different aspects that I would discuss with you.

Q: I am particularly interested in your approach to the musical material

through the exploration of sound and its characteristics. I refer for example to the Scelsi's approach to sound, the sound-Klang, complex and "materic" and the exploration of the inner space of sound. It seems to me in Eleven there are evidences of this perspective. I don't want to simplify, but I'm curious to know, first of all, your idea of sound.

RN: I don't think I have a real answer to this question. Each time I try to study more in detail the constitutive aspects of sound but the more I explore this matter the more I realize that a conclusive answer does not exist. At the moment, I am interested in analysing the vertical timbre/spectra/chords and clusters that I transform within polyrhythmic multi-layered structures. Ultimately an interval is the relation between two frequencies that we usually describe with old definitions (5th, 3rd, diminished, major, minor etc.) and that has in its DNA a specific rhythmic pulsation which is not always clear and needs, in order to be revealed, a peculiar knowledge of acoustic phenomena. For instance: a perfect fifth holds a specific sound that every musician recognizes. To label this relationship, he/she use a name that does not have nothing to do with the physical nature of this particular phenomenon. What makes it identifiable? In my opinion it is the rhythmic pulsation generated from the ratio of its constitutive frequencies... that is, in this case, a triplet over a duplet (3:2). Obviously, in this example I simplified the argument, actually everything is more complicated since I work with instrumental timbre (the timbre of the clarinet, for instance, generates a really unique rhythmic sequence that is 15:13:11:9:7:5:3:1). If we enter in the domain of inharmonic (non periodic) sounds the complexity become huge, irrational numbers enter into the game still it is helpful to see this complexity as a deviation from the more intelligible order of the relation between natural numbers. I study complex vertical structures that create polyrhythmic hyper complex relationships. In other words: the sound could be seen as the final result of the superimposition of the pulsations that compose it. This argument is valid for both the instrumental timbre and the orchestral "color" being it harmonic or inharmonic. (In this regard I find amazing the writings of Henry Cowell, considering the date on which they were written!).

Q: Even if it is no longer a novelty, there is a growing interest in the perceptual

dimension of a composition. Nowadays, among composers not only the structural, technical and instrumental aspects are taken into consideration, but also a sort of perceptual intention assumes a great importance and affects many compositional steps. If you could simplify the discussion, which perceptual intention do you have? What is the idea of sound you want it to be perceived?

RN: First of all, I fix a fundamental unit to which every aspect will relate, then I try to shape these relationships. In the case of *Eleven*, the title refers exactly to this fundamental unit: a cyclic meter of 11/2 that will remain unchanged during the piece even if it will be elaborated in different ways. I think that the idea of cyclical nature is evident, in particular in the first part of the piece then the piece becomes more complex but this idea that every episode has a constant relationship with the fundamental cycle stays unvaried. The Sanskrit grammar and poetry were the main source of inspiration for this approach. Some time the purely abstract structural data has a prominent role in the creative process in other circumstances I start with a more concrete idea: a single sound, an orchestral timbre. Finally, though, the composition has to take into consideration both performer and listeners perceptions.

Q: Regarding the composition in which traditional and electronic instruments mix together (e.g. Eleven) sometimes it seems to grasp the intention to create a “unique voice”, a unique sound, while other times your intention appears to be to define spaces and separate the fields of action between instrumental ensemble and electronic sounds. Am I wrong?

RN: I have often realized the electronic part by pre-recording a base sequence of the piece and then reworking and manipulating it using various techniques to finally create a fixed electronic part. This method has the advantage of the integration between electronic and instrumental parts, as you have rightly grasped. On the contrary, it has the disadvantage in the fact that being it fixed, the execution needs specific clicks and then it loses a little bit of freedom. In other cases, I have tried to separate the acoustic sound from the electronic starting with synthetic sounds (usually additive synthesis) or even using concrete sounds. At the begin of *Eleven* I think is evident the opposition between the acoustic sound of the cello and a pre-recorded sound of the electric guitar and finally

a bass sound created *ad hoc*, which discloses the pulsation of the fundamental unity.

Q: While listening to Eleven one can perceive virtual spaces with different musical tensions, and defined geometries: from the one hand horizontal continuous planes in which I feel a very sharp and “liminal” sound material, on the other hand there are contrasting evolutions and clear cuts with dynamic and timbric oppositions. In other words, first a sound material that I would define spectral, second a form of events that follow one another in an almost figurative way, it seems to listen to an almost solid sonic evolution. Are these aspects of the form and substance that you share?

RN: I think one of the main problem we try to solve in the past [with Fausto Romitelli] was exactly to try to articulate the timbre. Murail, Grisey and also Hass composed (I refer here to their first period) with extended timbric layers, but they articulate very little: they were totally focused on the “sound” that they did not care too much about the “gesture” nor with the “figure”... I remember Donatoni criticized Grisey, Murail and their fellow composers exactly for this lack of “gestures” and “figures”. With Fausto, we had long talks about these problems. I don’t know if the spectrum could be identified as the substance. I think that substance is more related to this research of the unity which I mentioned in the 2nd question. My timbre colors are a second step and I use them to create hierarchies and polarize the subunits within a fundamental unit. Maybe what you say it may be true with regard to the Fausto’s music (in my opinion is an aspect overlooked and should be investigated more).

Q: The electronics works as an independent instrument but also manipulates acoustic sounds (creating echoes and resonances). Is this dual use of electronic material also distinct in the compositional process? How do you develop in the general the electronic part of your pieces? Do you work in collaboration with electronics performers or you write completely that part by yourself?

RN: I partially answered this question above. Usually I compose the electronic part by myself. I like in particular to start with the addition of simple sounds (sine waves) to create complex timbres. During live shows with Pan Sonic, they manipulated in real time the electronic part that I was sending them and overlapping also their own

materials. In particular, with Pan Sonic I realized “Thirteen 13 x 8 the ultimate reality” for 7 soloists, electronic orchestra and techno duo.

Q: The pieces that I consider in this study (Haas, B. Lang, Verrando, Pan Sonic ...) apart from having –in my opinion– a common approach to sound matter, they maintain a peculiar relationship with musical temporality. In addition to the musical episodes rich of dynamic contrasts and energetic evolutions, there is often an idea of cyclical time, a vertical exploration of sound (to use a Grisey’s expression), almost a will to create a stasis within a movement and the desire to create an eternal present of sound. This element appears, in my opinion, also in Eleven; but this idea of non-linear time is undoubtedly a specific characteristic of certain eastern traditions. Knowing your unique relationship with India, I am very interested to know your idea of musical time. Do you think that this temporal characteristic is present also in some genres of experimental music today?

RN: In Indian music, there are two main categories of time: A) the free time, which it does not refer to any specific unit of measurement, which is fluid and is that one we usually call “*tempo rubato*”; B) the time based on a defined unit of measurement, the pulsed time, this vision has its root in the *vedic* verse and in the *vedic* “obsession” with meters which were considered as powerful weapons and very precious gift. The Sanskrit grammar is totally embedded with this idea of time: in the order of it’s alphabet we can find the prodrome of this vision and the *vedic* poets did developed this cyclic idea till it maximum possibilities. For almost twenty years I am interested in the pulsed time and in its organization into larger units (meters). Even when apparently my music seems to relate to a fluid time, the pulse is always present if only implied. I am interested in the rhythmic complexity only if it is related to a simple and explicit figure. This is evident, for example, in a 2004 piece for trumpet and three percussionists which is titled *Ma’s sequence 7*. For me *cyclicity* does not only appear with the return of certain situations / gestures / sounds but also with the precise relationship between the specific durations and the global duration: the time in which each event occurs must have a precise relationship with the general time and with the events that precede and follow it. Every moment has a hierarchical relationship with everything else. When

viewed through a magnifying glass, sound becomes pulsation. Recently I am also exploring the time without a regular pulse and trying to use it as an opposition to the pulsed time/meter.

Q: Often in Eleven (but also in other pieces) I notice a use of distorted sound, either electronic or instrumental. Interventions are abrupt and “acid” and sometimes there are rhythmic patterns... you collaborated with Pan Sonic in the past, what is your relationship with the non-academic experimental music (electronic, glitch, techno...)?

RN: In 1999, with Massimiliano Viel we founded a group that was producing techno music. In particular we moved toward the IDM’s field. So I would say that I was always interested in what was happening in the underground electronic field. The first performance of *Eleven* also included a video that was made by the Milanese collective OTOLAB that maybe you already know. Recently I have often cooperated with them. I think that the most interesting things are happening in those contexts. What is interesting is the non academic view of the musicians which operate in these domain, this is very interesting for me because I am obliged to rethink my knowledge, my technical vocabulary and interact with a musical sensibility which is quite far for someone like me with a classical background. Often the academic preparation becomes a wall that prevent a more vast vision of music. This was an important topic for the group of musicians that were gravitating around SINCRONIE in the late 90s and later on: we were more fascinated with the sound which we could hear in the underground electronic scene rather than with the old fashioned acoustic chamber sound which was still prominent in the “contemporary” music festivals around Europe. I remember that when *Drones 1.2* was performed in Paris lot of “academic” composers were quite critical of the extensive use of distortion (in that occasion all strings were amplified and distorted with several *Marshall* guitar amp) and high volumes...I was very happy with the result and so was Fausto (it was one of the last time we listened together a recording) and all fellows composer involved with SINCRONIE (Massimiliano Viel, Giovanni Verrando) when I first showed them the live recording: it was so far away from that “dry” academic sound that we mostly hate. I guess it was quite natural for us to look at what was happening in the techno scene and in particular in the underground

movement.

Q: You, Giovanni Verrando and Fausto Romitelli are often mentioned together as pioneers, leaders of innovative musical openings and innovator of a post-spectralist aesthetic. What is really interesting to me, is your intent to integrate acoustic and electronic sounds. Many people both in the academic and independent communities explore these aspects, but often repeating clichés of the past. It seems to me that the three of you have carried very serious but also very explicit paths and you have opened towards different musical contexts. (no question here, but any comments that may emerge from these lines is useful and welcome!)

RN: At the end of the 1990 we felt the narrow limits in which academia was moving. It was around that time that we decided to found SINCRONIE. The idea was to go beyond the empty forms of the traditional concert to experience instead of new forms of presentation also interacting with musicians from different backgrounds. Before working with Pan Sonic we have realized a project with Staalplaat soundsystem and also with the collective OTOLAB of Milan. They were events where the various pieces were merged one into another, often with the public in the centre surrounded by several stages (the ICTUS ensemble was directly inspired by our events when they were developing their “liquid rooms” event), nothing to do with the academic ritual: piece “a” / applause / piece “b” / applause / piece “c” (cf. www.sincronie.org). Unfortunately, soon after the preparation of the first event Fausto died...

Q: Within the list of pieces that study, there are authors like Georg Friedrich Haas, Bernhard Lang, Giovanni Verrando, Pan Sonic, Ryoji Ikeda and Raime... Do you know personally or artistically their works?

Apart Raime, I know all the authors you mentioned.

Q: In my study I also propose listening questionnaires. About your music, in general, it is important that listeners are aware of the details of your pieces (instrumentation, title, presentation...)? You think that the perception can be influenced?

The perception works by recognizing the patterns that recur and characterize a particular music. Anything that might in some way help the listener to identify these

patterns influence the listening. My pieces often have titles with a close relationship to the musical structure. But maybe it is better to leave the listener free to trace his own patterns.

C.3 Giovanni Verrando

In my study, I examine different genres of today's experimental music, trying to analyze especially the sound characteristics. Within this series of pieces (by composers such as G. F. Haas, Bernhard Lang, Riccardo Nova and performers as Pan Sonic, R. Ikeda and Raime) I chose two of your compositions, Dulle Griet and Triptych #2. Both pieces have peculiar sonic characteristics that I was interested in analyzing. I also read your book La Nuova Liuteria: Orchestrazione, Grammatica, Estetica and many of the questions that emerged after listening of your compositions found somehow an answer after the reading the book.

Q: In general, I feel in these two tracks (Dulle Griet and Triptych # 2) a common understanding of the internal space of the sound, that is the spectrum. In both pieces there is an integration of "spectral-blocks" (sometimes defined by very dense textures of acoustic instruments, sometimes by electronic interventions...). The sonic flow could be seen as a figurative process and the listening may approximate to visual action: the sound masses are so defined as to be tangible, real almost solid. There is something that perhaps recalls Xenakis' vision of masses of sound, but the solutions are even more extreme and personal. On the other hand, something recalls Scelsi's idea of "sound-Klang", as three-dimensional and complex material and the exploration of the inner space of sound. Not to mention the use of objects and non-traditional sound materials that expands the spectrum and integrates perfectly with the idea of sound materiality. Beyond the technical aspects, I would like to ask you what idea of sound accompanies these pieces and your music in general.

GV: Two elements characterize the composition process of these two pieces: the exploration of the inharmonic (or the equilibrium between harmonic and inharmonic) and the new instruments. Working on the spectral dimension, I progressively attempted to create a grammar of inharmonic. For instance, in *Dulle Griet*, traditional acoustic

instruments, modified or prepared, and concrete ones constitute –together with electronics– different sections based on their degree of inharmonicity and brightness. It was important to me to transform these properties of sound in thematic material: *Dulle Griet* consists of clear sections in which the main character is the spectral material. My idea of sound was simple: to render what resonates in my mind. To set myself in relation with the themes of the pieces (e.g. myself in front of Bruegel’s painting, myself in front of the spectral complexity...). In order to do it, I needed to go beyond the world of harmonic sound and extend the ordinary instrumental domain.

Q: The recording and collection of sounds seem to have also a fundamental role, the proximity of certain sounds is such that one may have the impression that, while listening, these sounds “come out” physically from the speakers. Even if it is no longer a novelty, there is a growing interest in the perceptual dimension of a composition. Nowadays, among composers not only the structural, technical and instrumental aspects are taken into consideration, but also a sort of perceptual intention assumes a great importance and affects many compositional steps. You deal with these themes in a very rich perspective, taking into account concepts of psycho-acoustics and physics of sound; if it is possible to simplify the discussion, which is the perceptual intention of these pieces? What is the idea of sound you want to be perceived?

GV: Yes, you are right when you say that this attention to the sound (monitoring, amplification, and so on) should not be new, but in most of the concert of written acoustic music this is not entirely true. And I have suffered, because I come from academia. There is a legacy, noble but outdated, that might coincide with the sound typical of the 20th century chamber ensemble (that of Schoenberg’s *Pierrot Lunaire*, for instance). Stockhausen, for example, contributed to this change of sound paradigm, almost one-dimensional; and then Fausto Romitelli: we are still noticing how much his ensemble for *Bad Trip* is helping to modify the general horizon of the typical idea of the sound of a “contemporary ensemble”.

Yes, it is true, I still try to explore the properties of sound, even when I work with acoustic instruments. What sound I want to be perceived? Only that one I have in

my head. But to put it on, into the score, to realize it through the instruments, I have to forge the details of sound, to know its properties. For this reason I studied psychoacoustic and I support one of the simplest but fundamental truth of psychoacoustic: there is no absolute assessment of sonic properties (roughness, brightness,...), rather there exist evaluations that depend on single individuals and on the different perception of the inner characteristics of sound that inevitably everyone has. This shift in perception is due to psychophysical conditions, cultural contexts, musical background and so on, elements that represent our irreducible identity. In short, as I said, I have an idea of sound and I want to represent my identity: in order to do this, I need to compose the details.

Q: In addition to a very rich sound exploration, it seems to perceive, in Triptych #2 for example, a linear temporality. There are forms that follow one another, but listening is not lost in a timeless stasis as sometimes happens in Scelsi, spectralists or minimalists. In fact, there is clear intention to create a succession of contrasting events. Of course I listened to your String Quartet n° 3, where at times the sound seems to be developed in a cyclical way, timeless, but in case of Triptych # 2 and Dulle Griet I feel there is not this idea. What is your idea of musical temporality (if it is possible to generalise)?

GV: Until now, I have almost always tried to make the musical materials coincident with a temporal subdivision that characterize the use of these materials. In *Tryptich#2* and *Dulle Griet*, specific sonic material correspond to fixed sections. Time is translated into form (with reappearances and new beginnings). Thus, in these pieces, I did not consider temporality as a continuous flux, but as a container with its own clear limits useful in characterizing the composed sections.

Q: There are several aspects of your book that I would like to discuss, but I try to limit my curiosity to two aspects. First, the importance composer's CHOICE and his PERSONAL RESPONSIBILITY. It seems to me a key aspect, which I also would extend to the listener, the record label, the programmer of events... Today it is more necessary than ever the ability to distinguish and choose. How, in your opinion, this responsibility could develop and grow in a multi-media, instant, disposable reality...?

GV: Unfortunately I do not have an answer that goes beyond of the strictly musical domain. I would need the sociological skills that I do not feel to own. I will say though that the focus on irreproducible singularity foreshadows a musical community different from the one we are experiencing now (exceptions excluded), both in the world of written music and pop music. In the pop world, exceptions aside, what it is important is the market (nothing more mortifying and repressive of intellectual potentials). In the world of written music, it is hard to accept what emerges with always more clarity: the stronger the individual's ability to express their own vision of the world, the more interesting the music becomes. I refer to the innate difference typical of each one of us that, when combined with a great technical knowledge, a well-grounded awareness of past and present contexts, and a potential talent, accounts for an irreproducible aesthetic and open up towards a new perspective on the world. This focus on nonconformity is a newness that has been also introduced by recent researches in psychoacoustic: there is no longer a unique interpretation of musical data rather there are common conditions where the individual perceives the sound and its characteristics in a unique way that is in fact irreproducible.

Academia, however, finds difficult to accept the disappearance of the only truth. And at the same time, this statement (i.e. there is no one truth) cannot and will not justify any aesthetic choice, style, or perspective.

Here, then, is the responsibility involved: I can put myself on stage only if developing constant proneness towards research, the study of the context that surrounds me, and an in-depth analysis. Otherwise, I risk following the choices of others: I reproduce instead of to create.

Q: Second, I would like to ask you more about compositional approach that -as you write- "consists in the scientific and conscious study of the internal characteristics of sound and in our way to keep, classify and rework them" and it is based on elements the physics of sound and psychoacoustics. The technology enable us to carry out microscopic investigations about time and sound (I think of granular synthesis, for instance), but I would like to ask you about a personal misgiving. The spectrogram and the computer synthesis are powerful tools, but if these processes are taken as the only

means of inspiration lead to controversial consequences. I catch a glimpse of the risk of a “cooling” of the music, which come close to a surgical producing of a material. It seems a natural risk when the sound is only worked through a visual representation (the spectrogram or multi-track vision for example). I think to some offshoots within electroacoustic / acousmatic where the meticulous granular synthesis allows complex manipulations but hampers –in my opinion– the instinct and expressiveness. Beyond the process, your music, instead, appears to me visceral, human and handcrafted. Do you share these concerns? and how do you balance between these aspects?

I do not know if I am able to maintain the right balance. I’m not me that I can say. I understand the concern. But I think that any sound material brings with it own difficulties. And I believe that the “instruments/tools” are a means, or rather, are “vehicles” for a purpose. They of course exert a strong influence on the ultimate objective (the starting sound of an electronic piece hardly coincides with that one a piece for traditional acoustic instruments). But the relationship between the means and purposes is part of the writing process: I start from an idea, I’m going to confirm it with the instruments, and come back to the starting idea that now is inevitably changed, I return again to the instruments and so on. If needed (and this happens frequently) I search for new instruments not typical of the traditional set, and I modify them. In other words, I put my sonic image into a working area, try the best means to translate it expressively, to finally reach my purposes.

Q: Regarding the relationship between means and result. In your book, you brilliantly discuss the appearance of linearity in contemporary music, explaining how the development “in a straight line” shifts the focus from the surface to the depth (“not over, but inside”). One detail that I think is related to these reflections is the idea of “limitation”. Nowadays technology allows the creation of infinite sounds, the choice of the composer takes place -in my opinion- also in limiting the degrees of freedom to get deeper exploration (vertical) of the sound. This is another aspect which I think is lacking in some areas electroacoustic and on the contrary I find common, transversely, in different genres of exploratory music. There is this aspect of limitation in your idea of “choice”?

GV: Yes, definitely. My starting limit, for instance, depends on the idea of sound that constitutes the piece. I analyse it, I describe it (using descriptors such as brightness, roughness, inharmonic degree...) in order to delimit the territory of my work.

Q: Your interest in the inharmonic, noise and distortion is clear and evident. The references to different genres and aesthetics are audible, what is your relationship with the non-academic experimental music (electronic, glitch, techno ...)? how much is the communication between distant musical contexts fruitful? And when does this connection not lead to banal contaminations typical of mainstream?

GV: I spent a period (between 2005 and 2013) in which I wanted to bring “non-academic” musical elements into my language. I did it in *Triptych*, *Triptych#2*, in the first part of *Multiplicity*, etc... I did it because my background was (and is) made of many different musical stimuli, many different experiences, academic and not. Lately I do not feel the need to explicitly recall any specific element, because I think I succeeded to integrate and elaborate better what makes up my identity.

Obviously, I imagine that anywhere, in my work, you can find traces of different musical experiences that represent my identity (for example, in my opinion, what emerges clearly in formal choices). But in my last pieces (*Fourth Born Unicorn*, *Keekee Bouba...*) I feel that I serenely identified and characterized myself. For this reason, I don't have a general answer to the question of communication between distant musical contexts. I have perhaps my response: it coincides with my project. In other words, everyone pursues with great depth and seriousness their own project. The answer to that question is also in this act of responsibility.

Q: You, Riccardo Nova and Fausto Romitelli are often mentioned together as pioneers, leaders of innovative musical openings and innovator of a post-spectralist aesthetic. What is really interesting to me, is your intent to integrate acoustic and electronic sounds through very serious but also very explicit paths and the interest to open the view towards different musical contexts. (no question here, but any comments that may emerge from these lines is useful and welcome!)

GV: Riccardo, Fausto and I at the same time lived very different lives but we shared a main principle: to go beyond the sound of “Pierrot Lunaire”. Outside the

academia we met a different approach to sound (spectralist, rock, electronic, amplified, that one of Stockhausen's *Trans* or *Gesänge*...) that has led us to create a new sonic idea beyond that restricted idea (though rich in important history), described above. Then, actually, except strange coincidences due to common experiences, we have written and we write a lot of different music. But the direct contact with the body of sound gave us a common perspective.

Q: Within the list of pieces that study, there are authors like Georg Friedrich Haas, Bernhard Lang, Riccardo Nova, Pan Sonic, Ryoji Ikeda and Raime... He knows personally or artistically their jobs?

GV: Yes, with some of them I have worked directly. Riccardo has been partner of musical studies. With Pan Sonic I collaborated in a tour organized by AlterEgo, and I was even before a very passionate listener, as for Ikeda, Lang and Haas.

Q: In my study I also propose the listening questionnaires. About your music, in general, it is important that listeners are aware of the details of your pieces (instrumentation, title, presentation...)? Do you think perception can be influenced?

GV: Both responses seem plausible to me. Yes, it may be useful to know instruments of a "new liutherie" I've worked on in recent years and reflections I have developed around them. The perception it is certainly a little affected. No, *Dulle Griet* or *Keekee Buba*, for example, can be heard and watched as they are, because they represent my identity, including misery and opulences.

C.4 Bernhard Lang

In my study I considered your pieces from Differenz/Wiederholung series, in particular DW2, 3, 7, 8, 9, 14, 15 and 17.

Q: In my study, I compare pieces based on their sonic texture. I am convinced that part of your music could be seen within this perspective. Though, your music appears to me more elaborated and I have difficulty to consider it just in terms of sonic matter. In a micro-scale, every small unit consists of a complex sound made of harmonics, noise, dense textures... But on a larger scale the structure recalls styles,

cultures and many extra-sonic elements. Could you look at your music in this double sense?

BL: A posteriori, perhaps yes.

Q: Within the DW series, there are many musical sections that are based on contrasting and poli-rhythmic clusters in which you make use of repetition creating interlaced mechanisms that mimic automated processes. However, I could also find long sections where the music is more static and the repetition here works as a mantra (I think, for example, to the final part of DW17). In these cases, the narrative seems to stop, the music appears suspended, and the sound gives the impression to expand “vertically”. Is there something in your music that relates with minimalism and spectralism?

BL: I’m interested in the dialectics between minimal initial conditions and resulting complexity; since the eighties I have been working with FM-Spectra, deduced from synths.

Q: The idea to explore sound nuances, typical of spectralism, comes together with a particular conception of time in music. Similarly, minimalism and its use of repetition, is strictly related with perception over the time. However, in your pieces the time is differently used: not only within cyclic structures where the musical flow appears atemporal and periodic, but also inside rapid successions of poli-rhythmic figures where the time appears fragmented... So, I see a double use of repetition: the first exploits duration to expand time and perception, the second use of repetition generates atomized clusters and break up the temporal flow. Am I wrong? What is your idea of time in music?

BL: Again, herein I’m more interested in the dialectics than in a certain position

Q: You also talked about the significance of creative process, that impresses into the piece the composer’s identity and it could work as a sort self-referential activity. Is this one reason why you are interested in mixing different aesthetics (e.g. instrumental contemporary pieces, glitch, turntublism...) to mask your singularity?

BL: I’d rather say no, I take what I can get and what I find surrounding me: das

Zuhandene/das Vorhandene [what it is available and present].

Q: It seems that in your compositions the creative process often includes a complex elaboration of philosophical, aesthetic or cultural arguments. However, even if someone ignores the creative construction, he could perceive and discover many things in your music... Besides the representational meaning, how important are the perceptual aspects in your creative process?

BL: for listening not. Not even the score tells about it.

Q: During my next perceptual studies, is it important that the audience of these auditory sessions would be previously informed about your intentions or any other additional aspects?

BL: no, see above.

Q: Within listening sessions, I played an excerpt of DW15—second song within a selection of other pieces and it was evaluated as “repetitive and periodic” and “hypnotic and enveloping” and it was considered homogeneous within a selection of genres such as post-spectralism, electroacoustic, glitch, basic-channel style... and pieces of Giovanni Verrando, Georg Friedrich Haas, PanSonic, Rioji Ikeda and others. Do you see any particular connection with these genres and composers?

BL: I do really know but Haas who was my teacher of sorts, and to whom I owe a lot.

C.5 Mika Vainio

Q: Your pieces are focused on raw sonic characteristics, which are merged into a unique idea of sound. Your music appears to me not functional, neither representative nor narrative: it explores the internal space of sound, as it would be a single matter, complex and tactile. Pan Sonic’s sound appears to be made of sonic thick material. This exploration seems to be close to the perspective of some spectralist and minimalist composers and in particular to Giacinto Scelsi’s vision of “Spherical Sound” in which a simple sound could be the origin of a deep exploration. What is your idea of sound?

MV: Sound is an idea of expression. An expression of situation and / or feeling.

This does not need to be physical. It can also be mental only.

Q: I attended some of your concerts (in solo and with Pan Sonic) and I have listened at your records. Your live performances include not only aural aspects but also bodily experiences, while the home listening of your music involves a more attentive appreciation. Thus, again, the theme of materiality of sound seems to emerge. What are your perceptual intentions? How should your sound be perceived in case live or home listening?

MV: In both cases by listening, instead of hearing.

Q: The material and corporal aspect of sound is one of the primal characteristics of your approach. You mainly explore it through analogue manipulations: I got the idea that you mostly work with a few number of sound sources and you expand and enhance their spectral characteristics, rather than starting to overlap many different sounds. How does your approach change in case of a recording session or a live performance?

MV: Depends always of particular piece.

Q: Pan Sonic performances included a very effective video projection of sound wave plotted as a vertical line. This video increases the sensation that the music is based on primordial elements of sound and also adds a minimalist character of your performance. Is there a specific idea for the inclusion of this video?

MV: idea was to present visual form of our sound in realtime. Those thieves who now have that oscilloscope somewhere in France, possibly have a different idea.

Q: I can find in your music some elements of minimalism and spectralism as well as electroacoustic and industrial aesthetics, such as the repetition of elements, the hypnotic effect, the enveloping sound, the use of sustained tones and microtonal variations, the presence of noises and real world sounds... Which past genres or aesthetic do you think are related with PanSonic's music?

MV: I don't give a fuck about Pan sonic anymore. It has been over now about seven years and that is a big relief. Let's say traditional music of Africa, Marcel Duchamp, Heavy Metal, raw fish, Sylvia Plath, Heidegger and Link Wray.

Q: The idea to explore sound nuances, typical of spectralism and minimalism, comes together with a particular conception of time in music. In these cases, the exploration of sound during time occurs vertically rather than linearly, creating a sort of “hypnotic eternal present”. In Kesto, for instance, some pieces show tight rhythmic profiles while other are based on cyclic and atemporal static situations. What is your idea of time in music?

MV: Music needs time to exist, even though sometimes just an idea of time.

Q: Within my study, I compare distant pieces based on their sonic texture. My common perspective is the sound treated as a complex and almost tactile substance and I am convinced that your music fit within this perspective. This selection (with pieces of Georg Friedrich Haas, Bernhard Lang, Riccardo Nova, Rioji Ikeda among others) spans a large series of genres such as post-spectralism, minimalism, glitch and electronic music, basic-channel style... do you see some connections with these authors?

MV: I might like some of their music, otherwise very little.

Q: You collaborated with some composers such as Fausto Romitelli and Riccardo Nova, and you also played with contemporary ensembles such as the Italian guys of AlterEgo. Which aspects of contemporary music interest you more?

MV: I am interested about music. After my previous experiences i am not interested in collaborations any longer.

Q: I would like to include extracts of your pieces in listening sessions, in order to study their perception in comparison with other compositions. Is it important that the audience of these sessions would be previously informed about your intentions or any other additional information about the pieces?

MV: Everyone experiences music their own way. I don't expect any specific reaction, and certainly not understanding my intentions.

D. Glossary

A useful source of the most updated definitions and concepts is available online at the glossary page of EARS' website (<http://www.ears.dmu.ac.uk/>, (Landy et al. 2017)).

ADSR is an acronym that stands for Attack, Decay, Sustain, Release and is a means to define those respective elements of a sonic event. It is especially used in sound designing with electronic music instruments.

Anecdotal music, name given to the genre inside electroacoustic music that employs recognizable sounds more for their *anecdotic* or narrative aspect than for their abstract potential. The first piece to be explicitly named in this way is *Hétérozygote* by Luc Ferrari, but this practices has been implicitly used by other composers (Caesar 1992, 61).

Artworld, a term coined by Danto by which he meant “an atmosphere of art theory.” Dickie has specified that an artworld system is a framework for the presentation of a work of art by an artist to an artworld public (Dickie 1984).

Basic-channel, is a term used to describe a subgenre of IDM music that had emerged around the electronic duo *Basic Channel* (Moritz von Oswald and Mark Ernestus) in Berlin in 1993. This denomination is not broadly recognized and often is used to indicate subgenres like minimal techno, dub techno and dupstep.

Binaural beats, is a beat originated by an interference between two sounds of slightly different frequencies (lower than 1500 Hz, with less than a 40 Hz difference between them). This pulsation is perceived as a periodic variation in volume whose rate is the difference of the two frequencies.

Combination tones, sometimes known also as meta-, resultant, or subjective sounds; are psychoacoustic phenomena that consist of additional tones that are perceived

when two real tones are sounded at the same time (*e.g.* Tartini's third sound). This circumstance is deeply explored by minimalists (*e.g.* Clarence Barlow's "...until...") when this *subjective* sounds, such as transient overtones, emerge from repetition or layering of sonic forms.

Drone, is a term to indicate any sustained or unchanging pitch or group of pitches. It is a musical practice largely explored by materialist minimalist composers (La Monte Young, Niblock, Charlemagne Palestine) who created drone works lasting long periods of time, often several hours. It is also constitutive element of several styles of Indian music and is especially common in recent electronic music and experimental rock (*e.g.* Velvet Underground).

Dubstep is a genre of electronic dance music (EDM) that appeared in the late 1990s in London. It emerged as a development as offshoot of genres such as garage, dub, techno, drum and bass, jungle, and reggae. In fact, part of the origins of dubstep can be traced back to the growth of the Jamaican sound system party scene in the early 1980s. The music generally features sparse, syncopated drum and percussion patterns with bass lines that contain prominent sub bass frequencies (O'Connell 2006).

Electroacoustic Music (independent and institutional). General term for electronic music that might also involve acoustic instruments. Nowadays, the term became a flexible designation that covers an immense range of musical styles and includes in the range of 81 genres and categories (cf. www.ears.dmu.ac.uk); however, in this dissertation, I mostly used it as a label that spans acousmatic, sonic art, multi-channel diffusions, and mixed-sound compositions, and includes figures such as Horacio Vaggione, Denis Smalley, Jonathan Harvey, and independent sound artists such as Robin Rimbaud and Steven Roden.

Ecstasy, (related to music listening) is a state of being characterized by immobility, concentration, solitude, calm or loss of memory (Rouget [1980] 1990).

Genre (see also subgenre, style), is a collection of works sharing a common set of conventions. Works establish genre when they repeat formal attributes to the point of establishing listening expectations that those attributes will continue to

exist (Demers 2010). Differently from style, a genre is a more broad classification, that could encompass a lot of music and artists (see also (Emmerson and Landy 2012)).

Glitch, is a term that –when related to music– refers to a sound of a digital “mistake” that occurs through the mistranslation or deterioration of digital data. It commonly refers to the electronica genre denoting music which is based on the structuring and manipulation of small audio artefacts traditionally considered as defects, such as clicks, compact-disc-player skips and low loudspeaker buzz. Well-known glitch musicians include Alva Noto, Kim Cascone and Oval.

IDM, Intelligent Dance Music, is “a subgenre of electronica that originated in Britain during early 1990s. [...] IDM includes chill-out music, [...] ambient, beatless music, [...] techno and jungle [...]” (Demers 2010)

Industrial, is a genre of music, emerged in England and Germany in the 1970s, characterised by the fusion of rock and electronic music including avant-garde electronics experiments (tape music, musique concrète, white noise, synthesizers, sequencers, etc.) and punk provocation. Typical sound of Industrial music is aggressive and harsh. Typical industrial bands are Throbbing Gristle, Einstürzende Neubauten (Vale and Juno 1983).

Krautrock, is a style of rock that emerged in Germany in the late 1960s, which drew from sources of experimental music practices such as psychedelic rock, the avant-garde, electronic music, funk, minimalism, free improvisations. Representative bands are Can, Kraftwerk, Neu!, Amon Düül II, Popol Vuh, and Faust.

Multiphonic, is an extended technique on a monophonic musical instrument frequently used by a 20th century composers (*e.g.* Berio, Sciarrino) in which several notes are produced at once. These are generally floating and unstable high harmonics of a fundamental note.

Noise, (as noise music), is a genre of electronic music featuring distortion and loud volumes. Noise music has precedents in first avant-garde movements such

Italian futurist music (*i.e.* Russolo's *intonarumori*) and American experimentalists (*i.e.* Cowell, Cage) Originally emerged in the early 1980 with industrial bands (*e.g.* Cabaret Voltaire, Throbbing Gristle), noise music has a large diffusion and development within several Japanese music contexts and musicians (*e.g.* Merzbow).

Offshoot (related to music) see *subgenre*.

Pointillism gets its name from a technique used by some French painters in the nineteenth century that represented scenes by means of dots of colour rather than lines. A pointillistic texture in music is one that features rests and wide leaps, a technique that isolates the sounds into “points” (Kostka 2016, 238).

Post-spectral, (or post spectral) compositional technique that goes beyond sound spectrum analysis, and reunites timbral and harmonic elements with other elements of music (Dunbar 2011, 295)

Scene, related to music, is any kind of music community that is mainly defined by cultural and social parameters. A music scene can encompass several genres.

Soundscape (composition) is a form of electroacoustic music or sound art initiated by members of the World Soundscape Project (WSP) at Simon Fraser University. It contains audio footage foregrounding the properties of a specific location: “environmental sound recordings form both the source material and also inform the work at all its structural levels in the sense that the original context and associations of the material play a significant role in its creation and reception” (Landy et al. 2017). The term was coined during the early 1970s by the group of R. Murray Schafer. Notable soundscape composers include Hildegard Westerkamp and Barry Truax.

Spectromorphology, is a “descriptive tool based on aural perception” (Smalley 1997, 107). The term is used for describing sound spectra and how they change over time. It is a method that focus on perception itself but it also acknowledges external associations triggered by sound (Demers 2010).

Style, in music, is a term to designate a series of recognized practices and conventions

that work as distinguishing marks for an artist or a group of artists who might not belong to the same music genre.

Subgenre, is a word that denotes a group of pieces belonging to one genre but displaying characteristics that are not necessarily shared by all other members of the same genre. Nowadays, subgenres are often present within IDM music practices, for example, techno constitutes a genre that includes subgenres such as ambient techno and dub techno.

Techno, one of the most relevant electronic dance music (EDM) genres that emerged 1980s in Detroit (*i.e.* Detroit Techno). Techno's name refers to its technological aspect, its nearly exclusive reliance on synthesizers and drum machines. Unlike house, techno tends not to use samples of well-known songs, sticking instead with newly composed materials or unrecognizable samples (Demers 2010). Well-known techno musicians include Juan Atkins, Derrick May, and Kevin Saunderson. Techno grew to prominence in Detroit dance clubs even as it gained popularity in other cities (Reynolds 2013).

Technological listening occurs when a listener perceives the technology or technique behind the music rather than the music itself, perhaps to such an extent that true musical meaning is blocked (Smalley 1997, 109).

Turntablism is a music practice consisting in the use of the turntable as a musical instrument. Turntablism has emerged during the past thirty years within the DJ culture of live performance. Since about 1977, when Grand Wizard Theodore invented the “scratch” technique, turntablism has been at the centre of several musical idioms, most notably hip-hop, techno, electronica, and other kinds of house or dance music. Each style has its own use of the turntable. What they have in common is an affinity for active sound mixing as a performance element and the application of electronic effects and synthesizer modules to broaden the sound spectrum of the turntable (Holmes 2008, 421).

Audio support

track number	Author ²¹²	Piece	time
[1]	G. F. Haas	<i>String Quartet No. 2</i>	20'44''
[2]		<i>in vain</i>	63'11''
	Pan Sonic	<i>Kesto (selection)</i>	
[3]		<i>Keskeisvoima / Centralforce</i>	08'49''
[4]		<i>Lautturi / Rafter</i>	05'51''
[5]		<i>Etäisyys / Distance</i>	05'43''
[6]		<i>Prospekt Vernadskogo</i>	02'23''
[7]		<i>Ilmenemismuoto / Appearanceform</i>	07'36''
[8]		<i>Selittämätön / Inexplicable</i>	09'07''
[9]		<i>Ilma / Air</i>	09'38''
[10]		<i>Linjat / Lines</i>	18'09''
[11]		<i>Säteily / Radiation</i>	61'16''
	B. Lang	<i>Differenz / Wiederholung 2</i>	
[12]		<i>DW2-Dead Repetitions</i>	08'31''
[13]		<i>DW2-Habit</i>	07'20''
[14]		<i>DW2-The Ovens</i>	07'05''
[15]		<i>DW2-Image/Idea (Harmonia Differentia Minima)</i>	06'50''
[16]		<i>DW2-Prisoners</i>	05'41''
[17]		<i>DW2-Need</i>	06'35''
[18]		<i>DW2-Repetition And Difference</i>	05'05''
[19]		<i>DW2-The Ovens Reconstruction</i>	07'00''
[20]		<i>DW 3</i>	22'48''
[21]		<i>DW 7</i>	24'23''
[22]		<i>DW 8</i>	28'05''
		<i>DW9 – Puppe Tulpe</i>	
[23]		<i>DW9-I</i>	14'21''

²¹² Audio material is provided with the permission of authors and editors.

[24]		<i>DW9-II</i>	06'32''
[25]		<i>DW9-III</i>	09'13''
		<i>DW14</i>	
[26]		<i>DW14-I</i>	15'36''
[27]		<i>DW14-II</i>	18'13''
[28]		<i>DW14-III</i>	04'26''
		<i>DW15 "Songs/Preludes"</i>	
[29]		<i>DW15-Song One</i>	06'03''
[30]		<i>DW15-Song Two</i>	10'52''
[31]		<i>DW15-Song Three</i>	04'23''
[32]		<i>DW15-Song Four</i>	03'55''
[33]		<i>DW17: Doubles/Schatten II</i>	46'37''
	R. Ikeda	<i>Headphonics</i>	
[34]		<i>Headphonics 00</i>	03'12''
[35]		<i>Headphonics 01</i>	03'12''
[36]		<i>Headphonics 10</i>	04'16''
		+/-	
[37]		+	02'50''
[38]		+. .	05'07''
[39]		+. . .	10'55''
[40]		-	06'36''
[41]		- .	11'51''
[42]		- . .	13'24''
[43]		+/-	01'05''
[44]	G. Verrando	<i>Dulle Griet</i>	06'33''
		<i>Triptych #2</i>	
[45]		<i>Musikplastik #2</i>	02'47''
[46]		<i>Harmonic Domains #3</i>	04'26''
[47]		<i>Filtering #5</i>	03'37''
[48]	Raime	<i>If Anywhere Was Here He Would Know Where We Are</i>	05'48''
[49]		<i>Told & Collapsed</i>	06'01''
[50]		<i>Passed Over Trail</i>	04'30''

[51]		<i>The Walker In Blast And Bottle</i>	05'11''
[52]	R. Nova	<i>Eleven</i>	20'16''