

Towards a fluent electronic counterpart of the voice

Identity, opportunities and challenges

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Abstract

This thesis presents different approaches of the combination of voice and electronics. It gives an insight into the issue of identity raised by the electronics transformations of the voice and the new forms of vocality they generate. It examines aspects such as the different facets of the voice's identity, the new possibilities and context created for the voice by the electronic transformations. It presents some historical approaches of the combination of voice and electronics such as the ones of Eimert and Meyer-Eppler, Berio and Nono. This thesis also discusses the necessary redefinition of a performer's musical identity required by the electronic extension of his acoustic instrument in the context of free improvisation. It explains in particular the creation and development of the electronic extended voice realized during this master research. Finally, this thesis discusses the live electronics and fixed media pieces realized and performed in the context of this research.

Introduction

According to J. Derrida (1967, p.89), “the voice is consciousness”. It gives to the conscious a means to hear itself and to make itself heard by others. The human voice represents the intimate emanation of the individual, in the sense that it is often associated with the soul.

There is certainly a sort of interior voice that accompanies each individual. Even though this interior voice is muted, it has a form of vocality. It has the same timbral qualities, the same rhythm, and the same flow than its physical counterpart i.e. the organic voice. To a certain extent, this interior voice can be seen as the replicate of the organic voice.

Nowadays the phenomenon of vocality is not reduced to what comes out of the organic voice. “It became an independent sonorous phenomenon. The relation of causality with the physical vocal organ became tenuous”. (Bossis, 2005, p.7)

During the Twentieth Century, especially under the influence of contemporary and electronic music, new forms of vocality emerged. The electronic voice, coming either from some electronic transformations of the voice or from artificial voice, represents one of these new forms of vocality. It can be seen as another counterpart of the organic voice.

The electronic counterpart of the voice raises several questions: Where is the voice going? What constitutes the identity of the voice? What are the place and the functions of the electronic voice in a musical context? How can we apprehend the combination of voice and electronics? How to extend the voice with electronics to make it as fluent and flexible as its organic counterpart?

The present dissertation proposes to investigate some of these issues concerning the electronic counterpart of the voice, with the particular context of the electronic transformations of the organic voice. After exploring the different facets of the voice’s identity, certain historical approaches of the combination of voice and electronics in a musical context will be discussed, notably the approaches of Eimert and Meyer-Eppler, Berio and Nono. Then the issue of the redefinition of a performer’s musical identity required by the electronic extensions of his acoustic instrument will be addressed, regarding the context of free improvisation. In parallel, the creation and development of the electronic extended voice realized during this master research will be explained. Finally, the live electronics and fixed media pieces realized and performed in the context of this research will be discussed.

To finish this introduction, the reader should not be surprised by the change of pronouns in the course of this thesis. As required by a practice-based research, the artistic practice and the theoretical discourse answer and generate each other. Thereby, the impersonal pronouns used to refer the development of the more theoretical reflection will be replaced by personal pronouns when my artistic practice will be referred.

Quotations from French-language references are translated to English by the author.

1 Exploration of the different facets of voice and identity

1.1 Context of the research

The voice is probably the oldest instrument in existence. As Joan La Barbara (2002) has said, it is the “original instrument”. Meredith Monk tells us that the human voice, as being the original instrument, bring us back to the origin of others, and “in a way it is like the memory of being a human being”, referring here to our sense of being part of the same human community. Everybody has a voice, which gives it a special connection with the audience, and in fact there is no human culture, no matter how remote or isolated, that does not sing. In other words, singing is ancient and universal.

The voice has in fact some characteristics that make it a very special and unique instrument. It is organic and integrated to our body; it is alive and completely dependant of all the hazards of our physical and psychological states; it can mirror emotions; it represents the same vector for speech and for music; it is also hidden and carries a complex and delicate mechanism, so it functions a bit like a ‘black box’.

Immediately the voice is communication. As soon as we use the voice, “it carries always an excess of references and connotations whatever it does. Would it be with raw noises or delicate singing, the voice always refers to some kind of meaning, of signification, and in other words, the voice always refers beyond itself. It creates constantly a range of associations” (Berio, 1965). The voice is intimately related to the personal identity (i.e. who is producing the voice), and it can give also information referring to the general identity (i.e. gender, age, socio-cultural background, nationality, etc.). Furthermore, the voice is often part of a shared space and time because it is generally directed towards an audience, even if this audience is restrained to our self and the voice is only resonating in the space of our mind (i.e. the interior voice).

From a psychoacoustic point of view, a voice signal contains some unique elements called ‘formants’. Gunnar Fant (1960) defines formants as “the spectral peaks of the sound spectrum of the voice”. Formants could also be defined as the distinguishing or meaningful frequency components of human speech, singing, and utterance. In speech science and phonetics, formant is also used to mean ‘an acoustic resonance of the human vocal tract’. Containing formants is a very unique characteristic of vocal sounds that other sounds do not have. In reverse, if we want to give to a non-vocal sound some kind of ‘vocal quality’, we can capture the formants of a vocal sound and add them to the non-vocal sound to give it this ‘vocal feature’. For example Trevor Wishart’s contribution to the program CDP (Composers Desktop Project) allows to realize this operation.

From the origins of singing in primitive cultures to the present use of voice in Western improvised, contemporary and electronic music, the voice in a musical context has encountered many changes, which have deeply affected its identity.

The origins of singing (as being the vocal production of musical tones) seem to be long lost in antiquity and predate the development of spoken language. In primitive cultures singing was an important function associated not so much with entertainment or frivolity as with matters vital to the individual, social group, or religion. Primitive man sings to invoke his gods with prayers and incantations, celebrate his rites of passage with chants and songs, and recount his history and heroics with ballads and epics. (...) It is likely the earliest singing was individualistic and improvisatory, a simple imitation of the sounds heard in nature. At what point the singing of meaningful, communicative sounds began cannot be established, but it was doubtless an important step in the creation of language. The major early cultures that

were sources for Western music each had distinguishing musical characteristics that related, in some degree, to their respective languages. Experts recognize that a culture's spoken language and its musical expression influence each other, but the relationship is very complex and not well understood. (Koopman, 1999)

In *The Singing Neanderthals*, Steven Mithen bring us back to the origins of music and language, and explains that music is not only a derivation of language with no evolutionary value in itself. He claims that although Neanderthals had the kind of vocal tract and respiratory control that could have enabled speech, the neural circuitry for language was not present. However, they developed a “music-like communication system that was more complex and more sophisticated than that found in any of the previous species of Homo-sapiens, one that included iconic gestures, dance, onomatopoeia, vocal imitation and sound synaesthesia” (Mithen, 2005). He calls this proto-music/language “the ‘Hmmm’ communication system”.

This system was holistic (not composed of segmented elements), manipulative (influencing emotional states and hence behavior of oneself and others), multimodal (using both sound and movement), musical (temporally controlled, rhythmic and melodic) and mimetic (utilizing sound symbolism and gesture). These holistic utterances, each with its own meaning but lacking any meaningful sub-units (that is to say, words) were used to manipulate other individuals, as commands, threats, greetings and requests. They would have been as much music-like as language-like. (Mithen, 2005)

According to this theory, modern language only evolved when holistic utterances were ‘segmented’ to produce words, which could then be composed together to create statements with new meanings.

Mithen explains also:

Music-making had considerable survival value as a means of communicating emotions, intentions and information and therefore facilitated cooperation, that is: the sharing of information and resources, working as a team during a hunt, caring for each other's well-being, advertising and consolidating pair-bonding. In all known societies music-making is frequently, if not always, a group activity. (Mithen, 2005)

Although there is no doubt that today's music can communicate ideas or emotions, the proto music/language hypothesis developed by Mithen seems to be quite far from the present use of the voice in Western culture, especially since the activities of making music and communicating with language are clearly separated.

Through several centuries of sacred music, the development of polyphony, the rise of theatrical music, until the development of different forms of opera, vocal art has encountered several transformations. Nonetheless, it seems that one of the biggest changes that affected the voice's identity happened actually before, during the period of prehistory, when we passed from the proto music/language (called the “Hmmm system of communication” by Steven Mithen) to the separation between the activities of making music and communicating with language.

Since then, it seems that the identity of the voice, despite a certain evolution, did not change substantially, and my hypothesis is that it is only with the development of electronic and contemporary music during the Twentieth Century, that the identity of the voice has encountered again an important change.

Therefore, it is possible to say that the change of the voice's identity that started to happen around a hundred years ago remains an important one. It affects deeply the identity of the voice in music. This transformation is perhaps one of the most fundamental changes to the voice since the period of prehistory.

During the Twentieth Century, the voice became disembodied, dislocated, dissociated, and more abstract. Until then, vocal art can be seen as having often represented humanity in a 'figurative' sense. With the evolution of music during the Twentieth Century, and especially under the influence of contemporary and electronic music, the voice was emancipated and became, at least in part, an abstract material. We passed from a 'voice-subject' to a 'voice-object'.

We passed from a voice which the timbre expresses the totality of the subject, to anonymous voices, eccentric, coming from un-determined places. We passed from a music with a strong lyrical emphasis, to a music where, for example, the un-determination of the places where the voices come from, or their spatial trajectories, are a new aspect of the musical composition. (Cohen-Levinas, 2006)

With its emancipation from traditional singing, the identity of the voice in music has been in fact not only transformed, but also derived in two opposite directions, represented by the dialectic subject/object. On one hand, the voice went further in the 'traditional path' and has being elevated at the level of icon, especially when there is no separation between the voice and the subject i.e. when the singer or the character is clearly recognizable and the voice represents the subject. In contrast, the voice has been derived in a new direction, more abstract, and it can be perceived as an 'object', a material, malleable like clay by a sculptor. The range of intermediary hybrid states between these two poles 'subject/object' has also been expanded, and sometimes we do not know anymore if the voice is expressing a subject, or if it is a technical artifact, an object, or something else.

It is precisely this ambiguity that modern and electronic music explore in permanence. The voice seems in fact to be of a special interest for composers, as attested by the large production of pieces written for the voice or with voice as a support, especially during the second half of the Twentieth Century. In parallel to its emancipation at the musical level, the voice has also been carrying a special interest in the field of scientific research and technological progress, as illustrated by the large number of studies and researches that have attempted to clarify and demystify the phenomena of voice.

Despite these attempts of clarification, the voice often remains an enigma.

Even though it seems to be clearly identifiable, the confrontation with the voice is a confrontation with an object that extends in all directions the classifications and categorizations. It opens a field difficult to represent with words and it could be reductive to give a definition, the question of 'vocality' being so inherent to human being. (Cohen-Levinas, 2006)

The change of the voice's identity in music has raised the hypothesis that several facets can now constitute the voice's identity. These different facets can be interpreted as being distinct modalities of the voice's identity, ranging from the representation of a subject, the reference to a meaning, the resonance of a body in its mother tongue (i.e. the 'grain of the voice' described by Roland Barthes), to the materiality of an abstract substance malleable like clay.

To my belief, electronic music has deeply influenced this transformation of the voice's identity in a musical context. Among other things, electronic music made it possible for instance to separate these different facets of the voice's identity, emphasizing certain aspects and erasing others.

Before going deeper into the topic of the transformation of the voice's identity in relation to electronic music, it is necessary to define the field of this research. In particular it is necessary to define what is exactly meant by the term 'identity' and by the expression 'relationship between identity and music'.

Identity is an ambiguous term. "The fundamental paradox of identity is inherent in the term itself, since it implies both similarity and difference" (Buckingham, 2008). It is important to distinguish the philosophical concept of identity from the notion of identity used in psychology and in social sciences.

The philosophical concept concerns the specific relation where two entities are one and the same thing or are 'identical to' each other.

The sociological notion of identity has to do with a person's self-conception, social presentation, and more generally, the aspects of a person that make him or her unique, or qualitatively different from others (i.e. cultural identity, gender identity, national identity, and processes of identity formation).

Going further in the notion of identity as it is interpreted in social sciences, identity can be interpreted as **the set of characteristics that makes an entity being identifiable, definable and recognizable.**

A certain number of psychoanalysts (cf. Freud, Lacan) hesitate to use the concept of identity and prefer the concept of 'personality'. To summarize, they see in the concept of identity a kind of vague, carry-all notion, coming from social sciences, in which it is necessary to precise the content at each instant it is used. Influenced by this position, one could think that it is better to simply avoid using this concept because it refers to so many explicative theories. However, in the context of this research, the term identity will be used rather than the term personality because even if it is necessary to define it each time it is used, the notion of identity is in fact different from the notion of personality. Furthermore, the notion of identity is an essential and relevant lens through which it is possible to examine in a coherent way the different aspects specific to the combination of voice and electronics.

In order to clarify or better define the scope of this research, the question of the relationships between music and identity need to be discussed. Liz Garnett (2009) questions for instance the relationships between voice and identity in a musical context by putting in parallel different theories from philosophers, researchers and musicologists, and by giving her own perspective on the relationships between voice and identity. Her approach is in fact inspired by the writings of MacDonald, Hargreaves and Miell, in which a distinction is made between 'music in identities' and 'identities in music'. According to them, 'Identities in music' refer to "the aspects of identities that are defined, or at least shaped, by musical activities", while 'music in identities' refers to "the ways that music acts as one of the resources people use to create their definitions of self". (MacDonald, Hargreaves and Miell, 2002)

This distinction being made, it is clear that the present research is putting in parallel the concepts of voice, music and identity in a different manner. The present study does not concern for example 'identities in music' and 'music in identities' in the same way that MacDonald, Hargreaves and Miell interpret these notions. In other words, this study does not concern for example "the self identity of young musicians", "the musical identities and the school environment", "the family perspective of the development of musical identities", the relation between "gender identity, national identity and music", or 'how music can be seen as a catalyst for changing personal identity'.

In this thesis, the term 'identity' in relation to music and especially to the voice, is used to refer three main assumptions:

- 1) The identity of the voice as being **the special characteristics that make a voice being a recognizable and identifiable entity as being vocal material**
- 2) The identity of the voice as referring to **the personal identity often attached with the voice** (the voice is identifiable as representing a person)
- 3) The **musical identity** of an improvising musician i.e. **his musical language and ways of playing**.

To summarize, the relation between identity and music in the framework of this thesis is principally concerned with the 'identity of the voice' and with the 'musical identity of a performer improvising with an electronically extended instrument'. The 'identity of the voice' refers to two distinct aspects of the voice: the first aspect concerns the characteristics of being vocal material; the second aspect refers to the personal identity often associated with the voice. We will discuss further the evolution of the voice's identity generated by the electronic transformations of the voice. This study also concerns the specific development of the musical identity of an improviser working with an electronic extended instrument, and how this musical identity is shaped, transformed and requires 'redefinition' when an acoustic instrument is 'augmented' with electronics.

1.2 The voice in live and fixed media music

The voice grabs attention. This is partly why it is such a powerful instrument in music, whether in a live musical context or with fixed media pieces. Arguably, when a voice is used in a musical performance or in a fixed media piece, it grabs the attention from the listener in a quite different way than from any other instrument.

One of the reasons for this 'strange authority of the voice' is that the voice is often instantly recognizable as being a human voice. In other words, we identify it instantly as being vocal material. Furthermore, in general when we hear a voice, immediately we imagine the person who produces it. Moreover, as Meredith Monk says, it brings us back to the 'memory of being a human being'. This human connection is very strong and makes us very much connected to vocal material. It can awake our sense of being part of the same community. In addition, we often think, in a more or less conscious degree, that the voice might be communicating something to us, and even maybe something important. In fact the voice carries both verbal communication and non-verbal communication.

Another possible reason why a voice is so powerful in a musical context is because it is a rich, flexible and complex source material. In fact the voice represents a very interesting source material for composers, not only because it has a complex structure and contains formants, but also because its behavior is very diverse and changes significantly. The voice is also very flexible and certainly can imitate almost any sound within its frequency range.

Moreover, since the voice seems to function as a model or a reference for the listener, being instantly recognizable as a human voice, often associated with a personal identity, it can allow the listener to hear and understand better certain electronic transformations. This wide range of references allows the voice to be used by composers to 'guide' listeners in their experience and perception of the music. In other words, the voice can help listeners perceive certain electronic transformations in reference to a material they are very familiar with.

1.3 Dimensions and facets of the voice's identity in music

With the evolution of contemporary and electronic music during the Twentieth Century, it seems that the emphasized element of the voice's identity has shifted from being a 'voice-subject' to becoming a 'voice-object'. After explaining in more details what are these different facets that constitute the identity of the voice in a musical context, we will point out some issues related to the interconnection of these elements.

From the investigations carried out during the last two years, my hypothesis is that in a musical context, a voice carries several dimensions, facets, and modalities, which constitute an identity with many possible functions. This hypothesis represents a proposition, a perspective that it is possible to apprehend the voice's identity from different angles when it is combined with electronics, despite the fact that it is likely that another person might apprehend and conceptualize the voice's identity in their own unique way.

It is my belief that these dimensions are best defined in the following categorization (to be defined in length in this discussion).

- The **'voice-subject'**: the personal and the general identity of the person who produces the voice (gender, age, nationality, socio-cultural, background) or of the character incarnated by the vocalist.
- The **'voice-meaning'**: the semantic content of speech or utterances, which includes verbal language and non-verbal language.
- The **'voice-grain'** (cf. Roland Barthes): a body that resonates (which could be seen as the acoustic properties of the voice subject) and the mother tongue as it sings, speaks or vocalizes (which could be seen as the acoustic properties of the voice-meaning i.e. influence of the native language and culture). NB: Roland Barthes considers that the sounds of lungs and of the breath are not part of the grain of the voice.
- The **'voice-object'**: the 'pure sound aspects' of the human voice (i.e. the phonetic and sound aspects of speech or utterances in addition with the voice-grain, the lungs, and the breath).

It is important to mention that this way of apprehending the voice's identity is quite subjective. It represents my interpretation of the results of the investigations at this very moment of the research. Albeit subjective, this interpretation is an interesting angle to approach the question of identity in relation to the voice and its use in a musical context.

The voice-subject

The voice is an emanation of the individual. For each person who speaks, the voice is an essential element part of the sense of self. Losing the voice, or not recognizing it, can be experienced as losing the sense of self. The voice is a sign of identity.

The 'voice-subject' refers to the person or the character associated with the voice (who produces the voice). It can be somebody we know (personal identity), or somebody we imagine. When we hear a voice, we also perceived some information that is associated with the 'general identity' of the vocalist (i.e. gender, age, nationality, socio-cultural, background) or with a character incarnated personified by the singer/vocalist.

The 'voice subject' is related to our faculty to identify a subject, real or virtual, with the voice that we hear. This faculty can be difficult to control since it is relatively instinctive. It is possible to refer to it as the 'call for the subject' or personification. The term 'personification' means here the attribution of human traits (qualities, feelings, action, or characteristics) to non-living objects (things, colors, qualities, ideas, sounds).

At first glance, the 'call for the subject' seems to be principally present when the voice is used in a 'traditional way' i.e. when singing or speaking. In reality, the 'call for the subject' (or at least its potential) is also present when the voice is used in unusual ways for instance when it is integrated with extended vocal techniques.

When listening to next to each other several recordings of similar extended vocal techniques performed by different vocalists, it is possible to realize how the 'call for the subject' is present. Even though extended vocal techniques represent an abstract way of using the voice and have an inherent function of 'depersonalizing the voice', the identity of the person behind the voice is generally easily and instinctively detectable. For a listener who is familiar with this kind of repertoire or ways of using the voice, it would be easy to recognize for instance Joan La Barbara from Sainkho Namtchylak. Even though the musical context in which the extended vocal techniques are heard is generally not necessarily encouraging such a personification of the voice, it is clear that the 'call for the subject' is still present, at least as a 'latent facet'. In short, the subject is ready to be identified.

The voice meaning

The 'voice-meaning' refers to the semantic content carried by the voice. It includes verbal language (communicative system with words) and non-verbal language (which includes among others, paralinguistic, such as voice quality, rate, pitch, volume, speaking style, as well as prosodic features such as rhythm, intonation and stress). It includes also all the range of emotions audible through the vector of the voice.

Emotions represent another layer of meaning and in fact it is interesting to realize how this layer is much stronger than we often imagine in comparison to verbal language. For example, when there is a discordance between the verbal language understood intellectually and the emotions perceived intuitively (both expressed through the voice), it is always the meaning carried by the emotions (and additionally by the non-verbal language) that are communicated first, before the meaning carried by the verbal language. Even without noticing it, we are very good at perceiving this meaning.

One particularity of the voice is that it represents the same vector for speech and for music. If, a priori, speech generally exists to communicate something through the medium of the voice, it is also possible, for example in a musical context, that speech exists for its sonorities rather than for its meaning. There are certain cases where speech does not necessarily exist to communicate something but more for the sake of having its acoustic properties heard. This is something which Luciano Berio and Umberto Eco were interested in when they experimented with the text of Joyce towards the creation of *Thema-Omaggio a Joyce* at the end of the 1950's. In this context, it is not the semantic content that is in the foreground, but the speech's acoustic properties. Nonetheless, Berio did not invent completely this sonic approach of the text as it can be found already during the Renaissance, where attempts were made to champion sonic qualities of texts, instead of striving to emphasize their intelligibility.

One of the major differences between Renaissance and Baroque repertoires is related to the treatment of text. During the Renaissance, there was a tendency to privilege the multi-layering of voices and the use of simultaneous texts in detriment of intelligibility. In opposition to this practice, composers from the Camerata Fiorentina and after prioritized the

clarity of the text, which formed the basic principles of the Baroque era (Segnini & Ruviaro 2005).

In a musical context, is it possible to detach the voice from the meaning it carries?

As soon as, in a musical context, a text is delivered through the medium of the voice, the first tendency of a listener can be to try interpreting the meaning of the text and the meaning carried by the non-verbal language and emotions. If the language in which the text is delivered is not understandable, the main focus can rapidly shift to the interpretation of the non-verbal language i.e. the traces of the semantic content. In this case, the focus is still principally on the 'voice-meaning' i.e. what the voice might want to communicate to us. In the same way that we have an inherent faculty to identify a subject behind a voice, the faculty to imagine a meaning carried by a voice is also very common and instinctive.

However, the necessity to understand what the voice might want to communicate can also rapidly shift to the background as soon as it becomes clear that the focus of the music is somewhere else, as it is the case for example with the piece *Thema-Omaggio a Joyce* by Luciano Berio or with the piece *I am sitting in a room* by Alvin Lucier. In both pieces, the main focus is not on the 'voice-meaning': it is on the speech's sonorities for *Thema-Omaggio a Joyce* and on the voice's resonances in a particular space for *I am sitting in a room*.

Nonetheless, the attempt to understand a possible meaning behind the voice might still come first, instinctively, just for a very short moment. Even when there is no text, as soon as there we hear voice, our general tendency is often to look for some kind of meaning behind it. In fact the voice carries our latent capacity to discover some meaning in any kind of human utterance. This 'potential for meaning' is completely latent, inherent to the voice, ready to be discovered. When hearing a voice, more or less consciously, we think that it might be communicating something to us. In some cases, this becomes an instinctive reflex or a survival instinct. This instinct can be named the 'call for the meaning'.

With the theory of Mithen in mind, it seems in fact coherent that we have such an instinct deeply inscribed in our mechanism since there is a strong probability that during the period of prehistory, there was no distinction between the activities of making music and communicating with language.

By the past, the voice and the text have often been blamed for 'bringing down' the music to some kind of 'concrete content'. Probably partly in reaction to the music of the Nineteen Century, the Twentieth Century saw the emergence of the idea of autonomy between music and meaning, and of an anti-symbolism movement. This raises the question of the possibilities for the music to be autonomous from the meaning.

Regarding this issue, it is interesting to look at the ideas of 'narrative impulse' and 'narratives in music', as developed by Jean Jacques Nattiez.

Human beings are symbolic animals; confronted with the trace they will seek to interpret it, to give it meaning. We ascribe meaning by grasping the traces we find, artworks ensue from a creative act. This is exactly what happens with music. Music is not a narrative, but an incitement to make a narrative, to comment, to analyze. (Nattiez, 1990)

From Nattiez's perspective, humans could be seen as 'narrative animals' i.e. somehow we need to create 'narratives' to understand music.

Here the interpretation of the term 'narratives' does not necessarily refer to the act of telling stories, but rather to 'our capacity of creating scenarios emerging from the relations between several entities'. In this context, 'scenario' means the prediction of a sequence of 'events' or 'happenings'.

It seems that according to the way our minds work, if there is not an explicit narrative, we construct it. It is a bit our way to apprehend the world. Concerning music, if the narrative is not there in the music, then we just construct it in our mind. It works in a similar way than language works: we hear the sounds and we learned to interpret them, to give them some meaning.

What emerge from Nattiez's writings is that music does not have meaning in itself, but 'potential for meaning'. This potential can be realized within the context in which the music is received (opera, song, film, performance, concert of fixed media pieces, installation, etc.). Following this idea, meaning does not lie in musical sound or in the media in which it is presented, but in the encounter between these two. When we perceive several entities in a musical context, we create, more or less consciously, some kind of 'narratives'.

If music carries 'potential for meaning', depending on the context in which it is received, does this imply that all music is potentially meaningful or narrative?

The answer to this question depends on the way the term 'narratives' is defined. Undoubtedly there are different degrees of interpretation and different assumptions of the concept of narratives in general, and how they apply in music. However, it is important to distinguish the way composer intend to create narratives, as this determines how listeners may or may not perceive narratives when they hear a given piece of music.

Looking at certain possible interpretations of the concept of narratives in music, we must consider first narratives to be the creation of scenarios emerging from the relations between several entities. If we take this assumption in a large sense, potentially it is always possible to find some kind of relation between different entities and consequently it is always possible to find narratives in music. In fact with this interpretation of the term 'narratives', it would also be always possible to find narratives in almost everything, since our mind is most often trained to look for these patterns. The problem with this definition is that when it is applied to a larger sense, everything is potentially perceivable as 'narrative'. For instance an object placed in a certain context, can be perceived as potentially narrative - in the sense that we can always imagine scenarios from the situation of having this object placed in a particular context. From this angle, any object placed in a musical context can be perceived as potentially narrative.

If we consider the notion of 'narratives' in a more restraint sense, the term can also refer to a development, a progression, a gesture, a movement, and a transition, implying a certain kind of causality. As a consequence, not all the music would be narrative and only certain musical pieces would be potentially narrative. This interpretation of the term 'narrative' could be named 'abstract narratives'.

If we consider the term 'narratives' as referring to 'the tale of a story', then of course far less music will fall under the category of being narrative. Nonetheless, for centuries, there has been a strong musical emphasis on songs told in concrete fashion. These stories were expressed in songs by the medium of voice, which endowed these narratives with a privileged vector, helping to establish them as being more firmly rooted in human cultures.

My interpretation of the concept of 'narratives' is a combination of the idea of scenarios emerging from the relations between several entities, and the idea of progression, development, gesture and a certain sense of causality. Personally, I do not perceive all music as being narrative or meaningful.

Perhaps it is potentially narrative and meaningful, depending on the interpretation given to these terms, however I do not always perceive this as so.

Going back to the voice and the 'narrative impulse' that it suggests, it is possible to say that if music carries 'potential for meaning', depending on the context in which it is received, then a fortiori the voice, which is historically and culturally a 'potential vector of communication', can be perceived as emphasizing a potential meaning when it is presented in a musical context. Nonetheless, the idea of the narrative impulse carried by the voice can also refer to some 'abstract narratives'. Following this idea, the voice can be approached for its sonorous qualities and for its characteristics as being a material. It can also suggest a gesture, a movement, a form, a sensation, rather than an explicit story.

In the acoustic sound domain it is difficult to detach the voice from its concrete dimensions such as the 'voice-subject' or the 'voice-meaning'. However in contrast, within the electronic sound domain, this distinction becomes easier. It is with this in mind that the voice is approached in the context of this thesis. We will see how the electronics transformations help the voice to become detached from certain concrete dimensions, placing it at a level of sound, therefore allowing it to become more abstract.

The voice-grain

The expression "voice-grain" comes from the essay *Le grain de la voix* by Roland Barthes. This essay represents one of the foundational texts in the study of voice and identity. Barthes theorizes the indescribable but uniquely identifiable "grain" of the voice as a result of "the intersection between the individual singing body and the culture-bound language it sings" (Barthes, 1972). He develops his argument by comparing two singers, Fisher-Dieskau and Panzéra.

The voice is not personal, it expresses nothing of the cantor, it is not original (for example all the Russian bass have more or less the same voice) but at the same time it is individual: it has us hear a body which has no civil identity not personality but which is nevertheless a separate body [...] The grain is that: the materiality of the body speaking its mother tongue; perhaps the letter, almost certainly the signifiante (Barthes, 1972).

The word 'signifiante' has here a different meaning than the word 'signification' because it refers to the relation of the signification with the preoccupations, points of view and interests of the receptor.

The grain of the voice is not or is not merely, its timbre; the 'signifiante' it opens cannot be better define, indeed, then by the friction between music and something else, which something else is the particular language (and nowise the message). (...) The grain is the body in the voice as it sings, the hand as it writes, the limb as it performs (Barthes, 1972).

Barthes also tells us that some voices have a grain and some others do not. In other words, with some voices, we only hear the 'voice-subject', the 'voice-meaning' and the lungs (which according to him do not constitute the grain of the voice). He gives the example of Fisher-Dieskau, a German singer, to illustrate what he calls a voice without grain. In fact he blames Fisher-Dieskau's voice for being too 'standard' or at least not special enough in the sense that this voice does not let hear its grain. On the other hand, according to Barthes, the voice of the French singer Panzéra has a grain.

After listening to several recordings of both singers, and even it is possible to understand what Barthes means by saying that certain voices have a grain while others do not, this remains quite a subjective point of view. To my belief, it seems impossible that a voice would not have a grain. It is possible to imagine that for certain reasons (such as the culture, the education, the personal background, the psychological state) a person would not allow the grain of his or her voice to be heard. However I

believe that every voice has a grain, or at least a potential grain, since every voice is the emanation of a body that resonates in a mother tongue (even if certain persons hide it unconsciously).

It seems that much of the literature that followed the ideas of Barthes regarding the issue of voice and identity, evinced a fascination for individual distinctive voices, like Barthes did by displaying a preference for the voice of Panzéra, rather than the one of Fisher-Dieskau. According to Barthes, in order to have an identity, a voice needs to let hear its 'grain' i.e. the body resonating in its mother tongue.

The voice-object

The 'voice-object' represents one of the most interesting dimensions of the voice's identity. It is constituted by the sonorities and the phonetic aspects of the 'voice-meaning' (i.e. the sonorities of the words and of the non-verbal language), in addition with 'the voice-grain' (i.e. the sound of a body that resonates in the mother tongue of a person) and with the sonorities of the lungs, the breath, and all the other sounds produced by the vocal apparatus (lips, tongue, etc.). In other words, the 'voice-object' has to do with the 'pure sound aspects' of the human voice.

Although both the 'voice-subject' and the 'voice-meaning' are intrinsically related to the acoustic voice, representing some of its facets, they can also be detached from it, allowing the voice to be perceived from different angles. The 'voice-object' does not include for example the 'voice-subject' or the 'voice-meaning'. It only includes their sonorities. The 'voice-object' represents the material voice free from the references to a subject and to a semantic content.

Currently my hypothesis is that to really work in depth with the 'voice-object', certain electronic transformations of the voice are required, otherwise in the acoustic domain the voice always refers too much beyond itself and it is more difficult to perceive and extract the different facets from its identity.

To a certain extent, the idea of approaching the 'voice-object' in combination with electronics can remind the work of the painter Pierre Soulages in his series of paintings called 'Outrenoir'.

'Outrenoir' refers to the last painting period of Pierre Soulages. These paintings can be seen as being saturated with black paint. Black can also be seen as referring to an absence of light or color. However, the work of Soulages represents paradoxically exactly the opposite. If it is true that Pierre Soulages works with the unique pigment black, what interests him is not the pigment in itself, but how light reflects on black surfaces.

Soulages covers the canvas with black paint and then works with the light that is reflected on the different black surfaces. The ribs he creates have different angles. For each rib, there is a ridge and a furrow, and the angle of each peak is different, so there is always a tiny face, which reflects the light differently. As a consequence, the light reflection varies a lot. This is why these paintings are almost impossible to photograph because the photography often simplifies them too much. However, some pictures of Soulages's paintings can be seen on the next pages (pictures 1, 2, 3) to give a general idea of Soulages's work. However, the viewer should keep in mind that these paintings are in reality very big and presented in a non-linear way. They are seen from a distance, in fluctuating orders, and with changing reflections of light, all of which creates a completely different experience.

What interests Soulages is the particular quality of light when reflected by the black paint, which is not the same quality of light that could be reflected by the blue, the yellow or another color. Black reflects the light like no other color does. Soulages said that the black does represent only the extreme, the dark (there is no darker than black) because besides that, it is also a bright color.

For him, light is a material. He explains that painted colors do not exist as such because there are only relations. Speaking of black, blue or red does not talk about painting but about one of the characteristics of the paint, and according to him, perception is a much more complex than the word can express. In the work of Soulages, the relation between the color and the light varies with the space. The distance we have from the painting plays a role. When we see a painting that is made of traditional relations between the grays, whites, yellows, reds and greens, it is still on a surface. When we are in front of a painting that involves the reflection of light on the surfaces of black, the space of the canvas is no longer on the painting, but also before the painting, so as we look, we are part of this space. Soulages hangs his paintings in space with a system that enables the viewer to approach the paintings from different angles and in different orders. He wants in fact to avoid linearity and leave the viewer free to choose his direction, allowing everyone to build his meaning in his own way.

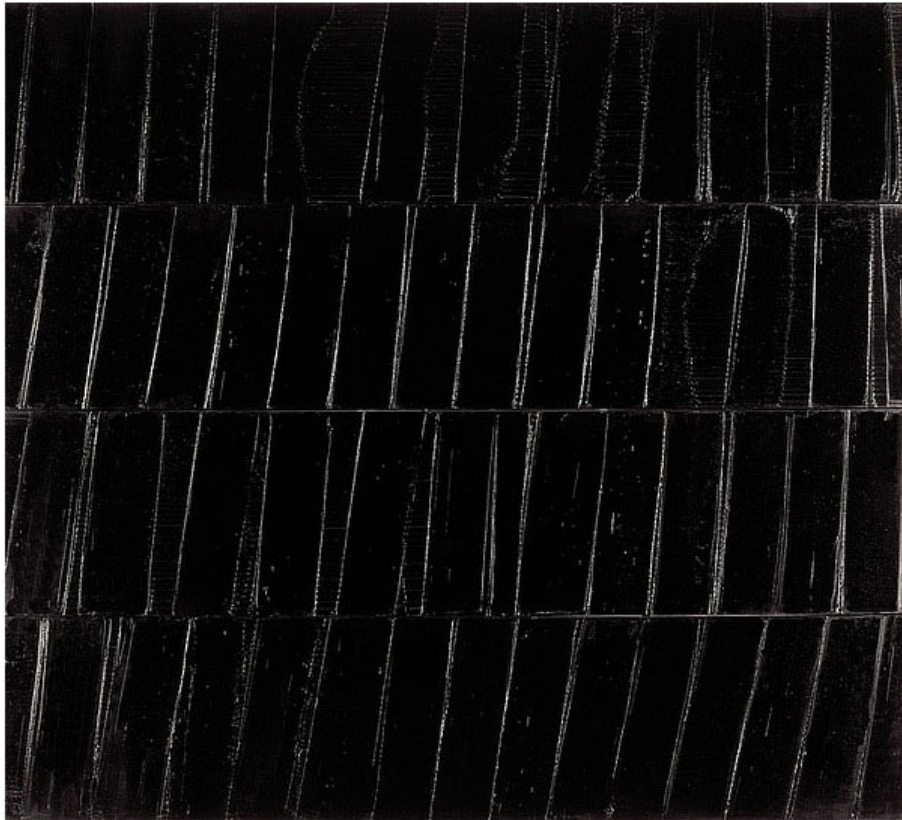
There are several ways in which the work of Soulages can be linked to the issue of the voice's identity regarding the combination of voice and electronics.

To a certain extent, it is possible to compare the 'voice-object' to the 'black paint' in the work of Soulages. The voice (which is very much connoted as black paint is connoted) can be elevated, with electronic transformations, to the level of material, of sound object, and become malleable like clay. The electronics transformations could refer in this case to the light and the space in the work of Soulages. They can be compared to the way Soulages works with the reflections of light on black painted surfaces in a certain space.

In the work of Soulages, certain reflections of the light, which were not there before, appear, so it brings new elements. In comparison, with electronic manipulations of the voice, new elements also appear such as different facets of the voice's identity, new sonorities and new possibilities for the voice.

With the reflections of the light on black painted surfaces, it becomes possible to apprehend the painting from different angles and points in space, so it adds new dimensions to it. With electronic manipulations of the voice, it is possible to apprehend the voice from different perspectives, to separate and combine different facets of the voice's identity so it also adds new dimensions to it.

Furthermore, the light in the work of Soulages enables the viewer to observe certain details of the black paint that were not noticeable before because there were too small or too packed in the black paint itself. Consequently, the light enhances certain aspects and elements of the material that could not be perceived before. With electronic manipulations, for example with granular time stretching, we can also perceive certain details of the voice that were not perceivable before.



Picture 1: Soulages, Painting Polyptych C 1985, Oil on canvas, 324 x 362 cm



Picture 2: Soulages, Painting 15th September 2009, Acrylic on canvas, 170 x 181 cm



Picture 3: Soulages, Painting 17th November 2008, Acrylic on canvas, 324 x 181 cm

To summarize, the voice carries several dimensions and facets that are part of its identity. In the acoustic domain, these dimensions are deeply interconnected and as a consequence it is difficult to extract them or even to perceive them separately. This interconnection is part of the acoustic voice's identity.

The electronic transformations of the voice allow the different facets of the voice's identity to be perceived separately, extracted, and combined. With electronic manipulations, the interconnection of the dimensions of the voice's identity can be taken apart, or even taken entirely. The voice becomes a material that modulates its identity between the 'voice-subject', the 'voice-meaning', the 'voice-grain', and the 'voice-object', and many variations and combinations of these dimensions are made possible. With electronics, the vocal material could be apprehended from different angles. Certain details of the voice which were not perceivable in the acoustic sound domain, can be now perceived

To a certain extent, this possibility to perceive, separate and combine different facets of the voice, to enhance or erase certain of its details, is an important transformation of the voice's identity. Electronics can transform the voice's identity in a way that no other medium can, affecting deeply the function of the voice in music and its relationships with other instruments and sounds.

So far, the biggest transformation of the voice's identity seems to have happened during the period of prehistory, as Steven Mithen mentioned (2005), with the separation of the activities of making music and communicating with language. My hypothesis is that the second more important transformation that happened to the voice's identity since the period of prehistory is the one that the voice encountered with the development of contemporary and electronic music during the Twentieth Century. The voice became disembodied, dissociated, dislocated and more abstract. This represents one of the most important changes affecting the voice's overall identity.

1.4 The roles of the combination of voice and electronics

The combination of voice and electronics refers to different configurations. There is a distinction to be made between the voice combined with electronics but not necessarily transformed, the voice synthesis, and the voice transformed by electronic manipulations. The latter will be the main focus of this section, although few examples might be also taken from the other categories.

As mentioned previously, the change of the voice's identity is an important consequence that emerges from the combination of voice and electronics. It happens clearly when the voice is manipulated by electronics and to a smaller degree when the voice is combined with electronics without being transformed.

The electronic manipulations of the voice in a musical context have made it possible to perceive different facets constituting of the voice's identity, enhancing certain aspects of it and removing others. Moreover, it helped to abolish the 'vocal predominance' from the past and facilitated the emergence of new possibilities for the voice.

1.4.1 Perception, separation, and combinations of different facets of the voice's identity

The electronics manipulations of the voice enable the ability to perceive, separate and combine different facets of the voice's identity. For example with an electronic transformation such as pitch shifting, it is possible to make a voice less recognizable or even not recognizable at all. In other words, it is possible to remove the 'voice-subject' (called the 'diagnostic sphere' by Meyer-Eppler as we will see in the second chapter). With other electronic manipulations such as extreme spectral time stretching, it is even possible to remove the 'voice-grain' i.e. to make the sound result not recognizable as coming from vocal material. Even if it seems very logical, it is important to point out that when

the 'voice-grain' is removed, the 'voice-subject' is also taken away. Furthermore, when the 'voice-grain' is removed, the voice becomes in a way dehumanized. This idea of dehumanization of the voice was in fact initiated by the Dada and Sound poetry movements in the beginning of the Twentieth Century, and was followed by the development in contemporary and electronic music. The electronic sound domain made it in fact possible to go further in the dehumanization of the voice.

The emancipation of the voice

Almost until the Twentieth Century, the sound of the voice in Western music has not changed dramatically. Vocal ranges have increased and vocal styles have changed, but the basic principle of song has dominated. During the Twentieth Century, the voice has been taken away from traditional singing and from the principle of song. The voice became disembodied and more abstract.

The progressive transformation of the supports has encouraged the use of new languages, new ways of writing and listening. (...) This emancipation of the voice seems to have engaged composers and listeners to write and to listen in a different way, with is both demanding and fascinating. (Cohen-Levinas, 2006)

One of the first example of this emancipation of the voice which utilized electronics manipulations is the piece *Vocalises* by Pierre Henry (1952). This piece in many ways symbolizes the 'decrystallization' of traditional singing, and by extension of the role of the singer. Here the voice can be perceived as a sound object (i.e. a malleable sound material free from its original references).

In *Vocalises*, Pierre Henry manipulates a single sound, the recorded vocalization of a classical singer on the vowel A, with the chromatic Phonogène. The variations in pitch of the original sound are obtained by mechanical transposition within the framework of a composed scheme. The voice becomes disembodied, dislocated, dissociated from the singer and even 'depersonalized' by way of sounding nothing like a voice.

The Phonogène was a tape machine created in 1951, which can transpose the sound by changing the tape speed. It existed in two versions: the chromatic Phonogène and the sliding Phonogène.

The chromatic Phonogène was controlled through a one-octave keyboard. Multiple capstans of differing diameters vary the tape speed over a single stationary magnetic tape head. A tape loop was put into the machine, and when a key was played, it would act on an individual pinch roller/capstan arrangement and the tape played at the specified speed. The machine worked with short sounds only. (...)

The sliding Phonogène (also called continuous variation Phonogène) provided continuous variation of tape speed using a control rod. The range allowed the motor to arrive at almost a stop position, always through a continuous variation. It was basically a normal tape recorder but with the ability to control its speed, so it could modify any length of tape. (Poullin, 1999)

In the beginning of the 1950's, in different electronic studios in Europe and in the United States, several devices were developed to manipulate sounds. Many experiments were realized with voice as a support. My hypothesis concerning the reasons of the use of the voice for such experiments is that the voice is a very good material for references. It is very sensitive for any changes it might undergo by the electronic manipulations.

In Germany, the Tempophon or Springer machine was developed by Alex Springer. The Tempophon was similar to a device designed by Denis Gabor. "This time/pitch changing device was installed in a number of analogue electronic music studios around Germany. For instance, in 1963, Herbert Eimert used the Tempophon for his electronic music composition called *Epitaph für Aikichi*

Kuboyama, for speaker and electronically transformed speech sounds” (Roads, 2001). The following years, a number of similar machines were built after the Tempophon (to be explained in length in this discussion).

The relief from the association with the singer

In the acoustic domain, the voice is hardly ever completely released from its association with the singer. To a certain extent, it is possible to release it on a physical level in the sense that the singer is not seen but the resonances of his or her voice are heard through a particular space. However, this is not a complete liberation since the person producing the voice might still be recognizable.

In contrast, with electronic transformations, the voice can be easily released from its association with the singer i.e. it is possible to remove the ‘voice subject’. However, the electronic manipulations of the voice often need to be radical. For example, recording a voice and playing it back through loudspeakers (i.e. dislocating the voice, which can be considered as a first level of transformation) would not be enough to take away the ‘voice-subject’. The fact that the singer is not present on stage physically (i.e. the voice is dislocated), is not enough to remove the ‘voice-subject’ because he or she can still be present or identifiable through his or her voice.

In order to liberate the voice from its association with the singer, some more extreme electronic transformations are thus often required. Starting with the removal of the ‘voice-subject’, it is possible to achieve this liberation for example with pitch shifting. To give a concrete example, it can be experienced when there is a vocalist singing on stage and the voice coming from the loudspeakers seems to not be his or her voice because it has been pitch shifted.

However in some cases, the simple combination of an acoustic voice with an electronic voice can also achieve this release (even though the acoustic voice is not transformed). A concrete example of this situation is when any other singer than Carla Henius performs *La Fabbrica Illuminata* by Luigi Nono while the voice of Carla Henius is heard through loudspeakers.

This example raises the issue of having a gap in timbre between the voice heard acoustically and the voice heard through loudspeakers. The acoustic voice is such a strong reference that a timbral gap between the acoustic voice and the voice heard through loudspeakers can become an important issue for the vocalist whose voice has been pitch shifted, and for the listener. However, from another perspective, composers can enrich the instrumentation or the theatrical dimension of a piece by using such a gap in timbre.

Breaking with the traditional rules of vocal behavior

The disembodied and dislocated voice (i.e. in this case, the voice heard through loudspeakers) can help to break the rules of vocal behavior and to alleviate the voice from its lyrical tradition. It gives more freedom to the vocalist for experimenting with his or her voice. It also allows the composer to be freer, and the listener to hear the voice in a different way because it has far less references. However, this dislocation does not take completely away the ‘voice-subject’ as we just saw.

The rupture with vocal predominance

To a certain extent, it is possible to consider that a large part of the traditional vocal music of the last centuries was emphasizing a ‘voice-subject’ (for example a character), a ‘voice-meaning’ (for example a story, a poem) and a traditional musical content (for example a tonal melody). Consequently, the voice was very much situated in the foreground and had a kind of predominance in relation to other instruments and sounds.

During the Twentieth Century, modern music tended constantly to explore other musical potentials of the voice, and in particular the 'voice-object'. It is interesting to notice that during the last centuries, there was also a predominance of the pitch parameter in music. This raises the question of a possible relation between the pitch predominance and the voice predominance in a musical context. Arguably, one can imagine that it was necessary to attenuate the predominance of voice, as it was necessary to find ways to attenuate the predominance of pitch.

This rupture with the vocal predominance from the past can be illustrated by the change of the voice's identity, the relief of the voice from its association with the singer, and the break with the traditional rules of vocal behavior.

The removal of the 'grain of the voice'

Electronics transformations can remove entirely the grain of the voice in the sense that it is not possible to recognize the sound as coming from vocal material whether human vocal utterances or any other voice. This situation can happen for example when a voice is transformed with distortion processes. With certain distortion processes, the sound is not recognizable as coming from vocal material because it lacks a certain 'vocal quality'.

To a smaller degree, electronics can remove the grain of the voice in order to not make it recognizable as coming from human utterance (i.e. the sound has some vocal quality but not a human vocal quality). This is achievable with electronics transformations such as spectral vocoding or cross synthesis.

In the acoustic domain, the removal of the voice's identity as being human vocal material seems to be more difficult to achieve. Certain vocal extended techniques can go towards this direction, but often it is still possible to hear a certain vocal quality at a moment or another of the sound (if not during the sustain part of the sound, at least during its onset). When hearing an acoustic vocal sound, there is often a very short moment (sometime just a fraction of a second) when some kind of vocal quality can be detected, even if the vocal sound is integrated with extended techniques. However, it is important to mention that certain vocalists (for example Phil Minton or Joan La Barbara) are very good at blurring this recognition of the voice as coming from human utterance.

1.4.2 Emergence of new relationships and possibilities

From the combination of voice and electronics, new relationships emerge between these two. The development of electronic music helped to abolish the dichotomy between the voice and its accompaniment. It opened the field of the possible relationships between the voice and the electronics. With the development of electronic music, the predominance of the voice in relation to other sounds or instruments has encountered new situations where this predominance disappeared, and other kinds of relationships appeared.

The possible relationships between the voice and the electronics can be perceived differently by composers and by listeners.

These relationships or 'scenarios' are best defined in the following categorization, articulated around **the dialectic between the fusion (being one) and the coexistence (being two)**.

Here the **fusion** refers to a perfect mixture between the acoustic and the electronic dimension, or even the dissolution from a sound world into the other, while in contrast, the **coexistence** refers to the concomitance or the simultaneity of different entities, these entities being two distinct entities.

In between these two poles, other 'scenarios' between the voice and the electronics exist, among which we can find for example the **imitation** (the electronics become a double of the acoustic voice or the other way around), the **densification** (the electronics can make the voice been more dense and thick by adding some layers to it or by other means of stratification), the **extension** (the electronics are amplifying, extending, expanding the possibilities of the acoustic voice, and even overtaking what the acoustic voice can do), the creation of a **new hybrid entity** (morphing between the different dimensions and creating a new material with a new identity).

Most of the electronic pieces combining voice and electronic explore several kinds of relationships between the voice and the electronics. Occasionally it is possible to notice the predominance of one specific relationship.

The Twentieth Century saw the expansion of the interesting 'grey area' in which the distinction between the voice and the electronics is being blurred. In this area, the acoustic voice imitates the electronics or the electronics imitate the acoustic voice. Personally, I am very interested in the first category where the acoustic voice imitates the electronics, and this is in fact something that several vocalists have been already exploring. Recently, the Norwegian vocalist Sidsel Endresen released an album called *One* (Sofa, 2006), where her solo acoustic voice imitates electronics or certain electronic transformations of the voice.

Concerning the other category of this grey area, the first experiments with speech and voice synthesis started in fact long before the Twentieth Century, with the experiments of Kratzenstein and Kempelen. In 1779 in St. Petersburg, Russian Professor Christian Kratzenstein explained the physiological differences between five long vowels (A, E, I, O, U) and made a mechanical apparatus to produce them artificially. In 1791 in Vienna, Wolfgang von Kempelen introduced his 'Acoustic-Mechanical Speech Machine', which was able to produce single sounds and some sound combinations. Experiments with mechanical and semi-electrical analog vocal systems were carried out until 1960's, but with no remarkable success. Renowned scientists, such as Herman von Helmholtz and Charles Wheatstone, made significant experiments in this field. (Lemmetty, 1999)

Regarding the voice synthesis, J.Q. Stewart introduced the first full electrical synthesis device in 1922. Since then, many experiments and developments were realized in the field of voice synthesis. An interesting example of the use of voice synthesis in a musical context can be illustrated by the piece *Phoné* by John Chowning (1980-81). In *Phoné*, Chowning applied the frequency modulation method to sung voice synthesis for the first time. The voice synthesis will not be discussed in the framework of this thesis because this research focused primarily on the electronic transformations of the voice and the combination of voice and electronic sounds.

New possibilities

From the electronics transformations of the voice new possibilities can emerge. In fact, electronics manipulations of the voice can bring to the foreground new sonorities by magnifying certain characteristics of the voice.

Electronic amplification, which can be considered as a first basic level of transformation, can for example bring to the foreground certain elements of the voice that would not be heard in a similar way (or even not be heard at all) in a purely acoustic context. However, it is important to realize that the gap between the way of vocalizing in an acoustic context and the electronic transformations of a voice is much wider when the voice is more radically processed than when the voice is just amplified.

The electronic voice can also open the field of a new theatrical potential, for example by raising the dramatic character and expressive potential of the voice. Whether in the context of fixed media pieces

(for example with *Visage* by Berio), live electronic pieces (for example with *Duality* by Gunnarsson and Guilleray), or of contemporary opera, the electronic voice raises the potential for developing a dramaturgy.

Within the context of sound theatre, as in contemporary opera, the potential for developing a dramaturgy or series of fictitious events between imaginary characters personified by singers that are both on and off stage, live and virtual, represented by its own amplified or electronically processed voice, is enormous. (Wilkins, 2010)

New sonorities

The electronic manipulations of the voice enable new sonorities to be discovered. An electronic voice can accentuate the percussive elements of the acoustic voice and make it sound more percussive than it does acoustically. It is something we can often observe for instance in the music of Trevor Wishart. From another approach, the piece *L'imaginaire du parleur* by Gunnarsson and Guilleray (to be discussed in length in this discussion), explores also certain abstract properties of the electronic voice and particularly the different ways to accentuate the percussive qualities of the voice and to create interesting percussive textures.

Electronics transformations can even make the voice sounding like a bell, which is something almost impossible to achieve in the acoustic domain. Trevor Wishart, in the piece *Vox 5*, gives examples of bell-like voice sounds by morphing from the vocal syllable 'ko' and 'u' to a bell sound (by spectrally stretching by increasing amount). Another example can be found in the piece *In Between* by Gunnarsson and Guilleray (to be discussed in length in this discussion) using voice, bells, and electronics, where the distinction between the voice and the bell is also being blurred.

New possibilities in the field of vocal music with language

Electronic music established new possibilities in the field of vocal music with language by resolving the antagonism between text and music and allowing different approaches of the text to develop (for example a more phonetic approach). Berio tells us that when speech is manipulated with electronics, "the sound of a word can become more important than its meaning or new meanings can appear" (Berio cited by Dalmonte, 1986). Interesting examples of these new possibilities can be found in the tape piece *Thema-Omaggio a Joyce* by Berio (1958), or in a completely different manner in the tape piece *Encounters in the Republic of Heaven* by Trevor Wishart (2011).

Smooth connections between vocal and non-vocal materials

Certain electronic manipulations of the voice can facilitate smooth connections between vocal and non-vocal materials. Even though it is possible to create a kind of 'acoustic morphing' or 'acoustic cross-fading', the result in the acoustic domain is quite different from the result in the electronic domain. In fact it would be interesting to compare these different realizations, acoustic and electronic, and observe in which domain the result is more convincing. Concerning the electronic domain, it is possible to find many of these smooth connections between vocal and non-vocal materials in Trevor Wishart's music, since it is an aspect that he particularly explored (cf. the pieces *Red Bird* and *Vox 5*).

Eternal sustain of the voice

Electronics gives to the voice the possibility to be sustained eternally. There is no need to breath anymore. From a traditional singing point of view, this is a revolution. Although it is occasionally possible in the acoustic domain, as attested with the piece *Circular Song* by Joan La Barbara or with

the Tuva singing techniques of Sainkho Namtchylak, it is quite different from the possibilities offered by electronic manipulations. It is also rather challenging to achieve a continuous vocal sound acoustically. In fact, singing by inhaling for a long time could even be considered, in some cases, as potentially dangerous for the vocal apparatus, so it needs to be done with care and awareness. With electronics, in contrast, the eternal sustain of the voice is easy to achieve, for example with granular or spectral freezing.

Multiplicity and spatial dislocation of the voice

Electronics offer to the voice the potential to be multiple in different ways. A first example of the voice's multiplicity can be found in the beginning of the piece *Du tunnel à l'esplanade* (to be discussed in length in this discussion), where clusters of voice surround the audience (voices are layered in order to form clusters and these clusters are spatialized in eight channels surrounding the audience). Multiplicity can also be achieved with distortion processes. Another way to achieve it is for example to add a kind of 'electronic shadow' to the acoustic voice, as it is possible to realize with the patch Max/MSP *Pot B* (to be discussed in length in this discussion). With this patch, a strange hybrid material can emerge from the voice (neither voice or electronics but in between these two).

The multiplicity of the voice is also achievable in the acoustic domain but in a complete different manner. For example multiphonic singing techniques or certain reflections and resonances of a voice in a particular space could also suggest a certain kind of multiplicity.

Spatialization techniques represent a special way to achieve the voice's multiplicity. Interesting examples of spatialization of voices are audible in the piece *Prometeo* by Luigi Nono (1981-1984).

The voice can be disposed or arranged within acoustic space according to the structural properties of that space and the use of audio technology. Given the framework of sound theatre, a placement of voices in different locations, whether heard through loudspeakers or live, offer the possibility of dialogue between them and a resultant generation of dramatic meaning. The sense of hearing is sharpened as an audience determines sonic sources from parameters surrounding their own body in space, perceiving factors such as distance, volume and timbre in the mood and verbal signification of the voice. (Wilkins, 2010)

In the piece *Du tunnel à l'esplanade*, the different voices surrounding the audience are forming static clusters or masses of sounds slowly moving. The piece *L'imaginaire du parleur* also introduces voices surrounding the audience and moving, sometimes rapidly. However, with these pieces, the main interest was not to bring a new theatrical aspect of the multiplicity of the voice, as Wilkins mentions it, but more to experiment with spatialization as a new parameter of the musical composition. There are many other examples of electronic music pieces where spatialization strategies emphasize the multiplicity and the movements of voices.

Fragmentation

The fragmentation of vocal material allows exploring new sonorities. When the fragmentation is coupled with repetition, it can accentuate them. The visual and sound poet Bartolomé Ferrando (2007) explains that he "started to do sound poetry some time ago, when he discovered the richness of what is fragmentary; when he realized that a part of an image, a trace of writing or just something isolated and separated from the rest could be as much intense than the totality".

In the acoustic domain, a lot of sound poets and composers, such as Kurt Schwitters with the piece *Ursonata* (1932), Luciano Berio with the piece *Sequenza III* (1965), or Georges Aperghis with the

piece *Récitations* (1978), have explored certain aspects of speech fragmentation and repetition in their musical compositions.

The fragmentation of vocal material can be quite challenging to realize in the acoustic domain and often requires a lot of virtuosity. Although the electronic fragmentation processes need some kind of expertise to produce interesting results, it seems that it remains more accessible, especially since it can be realized in a non real time process. In this context, it is possible to take the time to decide in a very precise and detailed manner, after experimentation, which kind of sonority could be accentuated or isolated by fragmentation. Furthermore, the possibilities offered by the electronic fragmentation of the voice are broader than in the acoustic context, and lead to the discovery of new sonorities within the words and the vocal materials.

The electronic fragmentation of the voice has been explored as well by many composers, for example Berio with the pieces *Thema-Omaggio a Joyce* and *Visage*, or Wishart with the piece *Encounters in the Republic of Heaven*. Granulations processes can also be considered as an example of fragmentation.

Trevor Wishart often uses interesting sequences of fragmented voices. These sequences are for example achieved by reordering text fragments, shredding them and cutting randomly the result in such a way that the repetitions of certain particular elements are heard within the resulting stream.

In the piece *L'imaginaire du parleur*, certain particular aspects of the words and vocal material's sonorities have been emphasized. By fragmenting and repeating certain segments, unusual sonorities of the voice were placed in the foreground.

2 Voice and electronics: science, poetry and protest

During the research about the combination of voice and electronics, the work of many composers came across. It would be almost impossible, and probably not so interesting, to make an inventory of all the electronic and electroacoustic works created for or with the support of the voice, because they are so numerous. Nonetheless, it might be useful to mention a few particular different and historical approaches.

The first approach mentioned in this chapter is the one of Herbert Eimert and Werner Meyer-Eppler, which can be considered to be a scientific approach. It brings us back to an important moment in the history of music and speech, the one of the first electronic manipulations of vocal and speech sounds in Germany. Eimert and Meyer-Eppler discovered that by electronics means, it is possible to separate the 'diagnostic sphere' and the 'semantic level of speech'. In the first section of this chapter, this discovery will be explained in more details and we will discuss how it can be related to the issue of the voice's identity in relation to electronic music.

In the second section, Luciano Berio's approach of the combination of voice and electronics will be discussed, exploring his interest in bridging music and poetry and his attempt to create a continuum between electronic music and instrumental and vocal music.

Finally in the third section, we will discuss Luigi Nono's use of the voice in combination with electronics during the 1960's, with the example of the piece *La Fabbrica Illuminata* that he composed in 1964.

2.1 Eimert & Meyer-Eppler - a scientific approach to the combination of voice and electronics

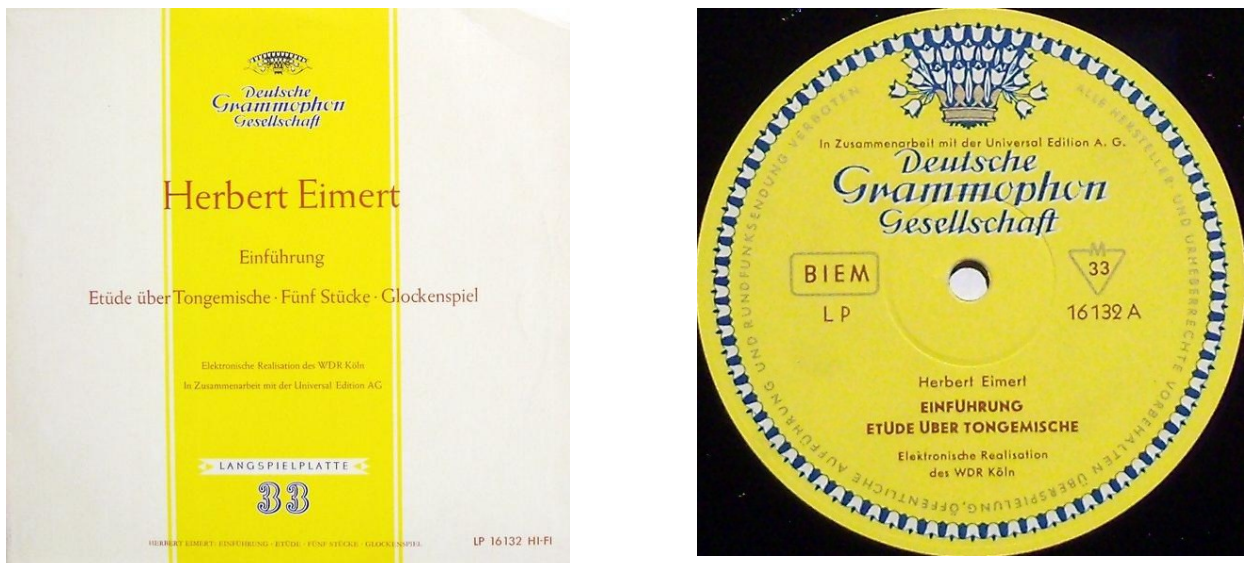
I discovered the approach of Eimert and Meyer-Eppler after coming across an analogue tape entitled *Musik und Sprache*. It was a recording of a lecture in German given by Herbert Eimert and Werner Meyer-Eppler in 1954 on a radio night music program, dealing with the issue of speech and electronic music. After translating the content of the tape, I realized the importance of this document concerning the historical approach of voice and electronics in relation to the question of the voice's identity. In fact, Eimert and Meyer-Eppler's approach appeared to be quite different from the ones encountered before.

Herbert Eimert believed in a scientific approach to sound production. With the help of phonetician Werner Meyer-Eppler and sound engineer Robert Beyer, he participated to the creation of the Electronic Music Studio of Cologne that he founded in 1951 and headed until 1963.

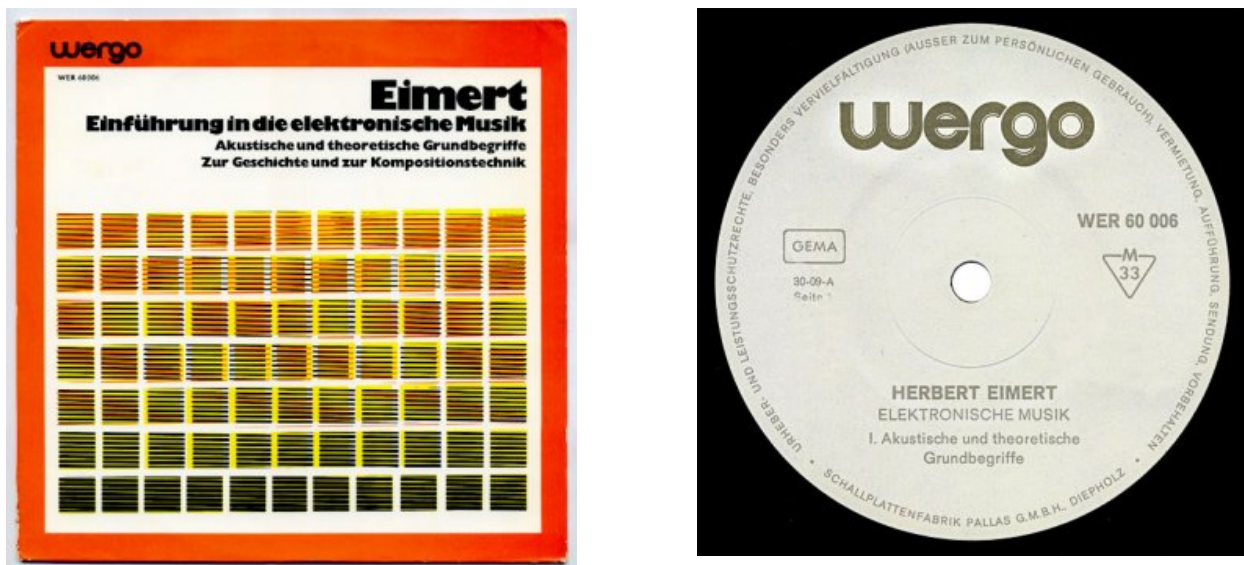
After working as music critic for the *Kölnischen Zeitung* journal and as music editor for Köln radio NWDR (Nordwestdeutscher Rundfunk), Eimert became the director of the NWDR's late-night music programs in 1948 and launched his own broadcast series in 1951, *Die Klangwelt der elektronische Musik* (The sound world of Electronic Music). Soon after the beginning of this broadcast series, Herbert Eimert, with the support of Werner Meyer-Eppler, convinced Hans Hartmann, the director of the Cologne broadcast, to found the studio for electronic music.

Eimert summarized his discoveries about electronic music and the relation between music and speech in an LP record called *Einführung in die Elektronische Musik* (Introduction to Electronic Music). The first edition, called *Einführung-Etude über tongemische* (Mono on 10 inch), was published in June 1957 by Deutsche Grammophon Gesellschaft (cf picture 4). The second edition called *Einführung in die Elektronische Musik* was published by Wergo in 1963. It contained additionally the examples from

the piece *Epitaph for Aikichi Kuboyama* (cf picture 5). This record was not so much an account of the experiments in this field, but more a report about the existing possibilities.



Picture 4: First edition of the LP published by Deutsche Grammophon Gesellschaft in June 1957



Picture 5: *Einführung in die Elektronische Musik* published by Wergo in 1963

Einführung in die Elektronische Musik is a radioplay with sound examples of electronic sounds and various ways to combine them, starting with basic elements like sine-wave, pitch, tone mix, noise, chord, pulsation, envelope, and then moving to serial music, composing with electronic sounds, etc. The B-side is devoted to the theme of 'music and speech' and includes music examples from Webern, Meyer-Eppeler, Eimert, and an electronic version of Stravinsky's music. *Einführung in die Elektronische Musik* belongs to a fascinating category of musical-didactic hybrid that emerged in the wake of the first electronic music studios around 1950. In presenting what could be called a taxonomy of electronic sound, these albums were intended to sensitize listeners to the new musical material of recorded and synthetic sounds, as opposed to the familiar gestural language, whether tonal or post-tonal, of vocal and instrumental music. (Patteson, 2010)

Eimert's lecture devoted to speech and music retraces his ideas by articulating theoretical reflections with sound examples. The next section attempts to summarize the content of this historical document that gives us a particular insight into the combination of voice and electronics.

In his lecture, Eimert starts by giving a general introduction where he explains:

In the very complex spectrum of the word and in general of speech, the sound is characterized in general by the first two formants. Voice consonants are approaching the vowels. Among these are the vibrants "L, M, N", the sibilances "S, CH, F" where by far there are more wide-spread formant areas, and the plosives like "K, P, T" where the spectrum is spread among the anterior area of listening. (Eimert, 1963)

Eimert explains also that if one would make such a plosive stationary and if one would considerably amplify it, then he would get the so-called 'white noise'. There are different methods to make a short sound sounding permanent. He points out in particular the method of alteration of letters, and says that in this case, the tape is static but there is a reading head rotating ⁽¹⁾. He adds that in this way, every consonants and vowel can be made constant.

Eimert mentions as well that it has been a long way from the first experiments with the spoken words to the first usable results and that during this journey he found a very valuable support and inspiration with Werner Meyer-Eppler, the director of the Phonetic Institute in Bonn, who died in 1960.

Afterwards, the lecture introduces Werner Meyer-Eppler, who gives theoretical information about acoustics of vocal sounds.

Speech and music are containing next to each other different levels of information, different levels of functions or spheres, which each for themselves can provoke elements of information for the listener. For example it is possible to separate the linguistic semantic level of speech to the diagnostic sphere. (Meyer-Eppler, 1963)

This is a particularly interesting point regarding the separation of the different facets of the voice's identity in the context of the combination of voice and electronics, since it shows how the electronic manipulations of speech can help to separate the 'voice-subject' (here called the 'diagnostic sphere') from the 'voice-meaning' (here called the 'semantic level of speech').

As an example, Meyer-Eppler has recorded a spoken sentence on tape and he let it play back in reverse. He wants to show that when the sentence is played back in reverse, we can recognize his voice as the diagnostic sphere of the signal but we cannot understand any word, so that the semantic content is lost. In turn, he demonstrates that it is possible to understand everything without recognizing his voice when the tape is played back a bit faster or slower.

From nowadays perspective, these sound examples could give the impression to be a bit outdated, maybe because they seem obvious, but if we replace them in the context of the 1950's, it was an important discovery in the research about electronic manipulations of speech. These experiments refer in fact to an significant moment in the history of music and speech, and it is interesting to realize that at that same period, in different parts of the world, similar experiences were carried out independently, such as in 1953 in the United States where Fairbanks, Everitt and Jaeger carried out experiments on a method for time and frequency compression-expansion of speech.

⁽¹⁾ This 'reading head rotating' suggests that Eimert was using a Tempophon.

Certain of these experiments about speech manipulations were realized towards different aims. For instance the experiments carried out in France with the Phonognène, were realized for the purpose of creating electroacoustic music.

At the Institute of Radio Engineers in Illinois, Fairbanks, Everitt and Jaeger imagined that their experiments about time compression-expansion of speech could be useful for radio broadcast because they could save around ten minutes of a broadcast program without the intelligibility of the speech being altered and without the audience's knowledge. They also imagined that "straightforward compression by larger amounts could be useful wherever high-speed communication is crucial, as in certain military situations" (Fairbanks, Everett & Jaeger, 1954). They imagined as well the time expansion of speech as facilitating experiments in phonetics and linguistics, and they saw their method as giving promise as an approach to the problem of bandwidth reduction.

In Germany, even though Eimert and Meyer-Eppler were experimenting with similar speech manipulations in the beginning of the 1950's, their approach had totally different objectives, more related to music. The Tempophon or Springer machine used by Eimert and Meyer-Eppler for their experiments was originally created to save some time for the broadcast programs by allowing the speech to be compressed in time without altering its pitch and its intelligibility. Soon after its creation, the Tempophon was used for musical purposes by composers of the Electronic Studio of Cologne such as Stockhausen, Eimert or Koenig.

Going back to *Einführung in die Elektronische Musik*, Eimert explains afterwards in more details the electronic manipulations of speech sounds. He demonstrates for example speech manipulations such as the transposition without changing the speed of speech, which was something recently made possible. For his demonstration, he has recorded a sentence first spoken normally, then a minor third higher, and then a minor third lower. To prove that the speed was the same, after playing the three sentences separately, he played them simultaneously, showing here again his rigorous scientific approach.

Following with the issue of intelligibility, Eimert gives other examples of manipulations of spoken voice such as extracting partials by filtering out and ordering them from up to low. In this case, it is clear that it was not possible to understand the meaning of the spoken words. Later he gives an example where the partials are added up, and there it is possible to understand the meaning of the words towards the end. However he mentions that a synchronization of the individual partials is required for the intelligibility of the end result. As a final point, he gives an example where the filtered spectrum of speech is changed in single tones or pitches. According to him, in this example the words are "shimmering through in a very subtle way". (Eimert, 1963)

Eimert provides as well the example of an electronic tribute to Igor Stravinsky made by the composers of the Cologne's studio in 1957 as a birthday gift in honor of Igor Stravinsky. This short piece applied the principles discovered by Eimert and Meyer-Eppler by manipulating the recording of the sentence "to the honor of Igor Stravinsky" (in German). Similar electronic transformations have also been applied to an excerpt of the *Variations* on Webern's *Opus 30*.

Eimert concludes by mentioning that these techniques have been leading him to the preparation of the piece *Epitaph for Aikichi Kuboyama*, where speech is manipulated by electronics. This piece was composed in the WDR Studio in Cologne between 1957-1962. The text used by Eimert as a basis for the piece was an epigraph composed by the anti-nuclear philosopher Gunther Anders in memory of Aikichi Kuboyama. The death of Aikichi Kuboyama, a crewmember of the Japanese fishing boat Lucky Dragon in 1954, marked what Gunther Anders called "das erste Fernopfer des Atomzeitalters," i.e. the first distant victim of that atomic age. Kuboyama's death was the result of radiation poisoning from the U.S. army's testing of the nascent hydrogen bomb at Bikini Atoll.

Eimert's *Epitaph for Aikichi Kuboyama* constitutes in fact one of the first conscious attempts to explore the ambiguities of the speech-music continuum using some of the earliest electronic means.

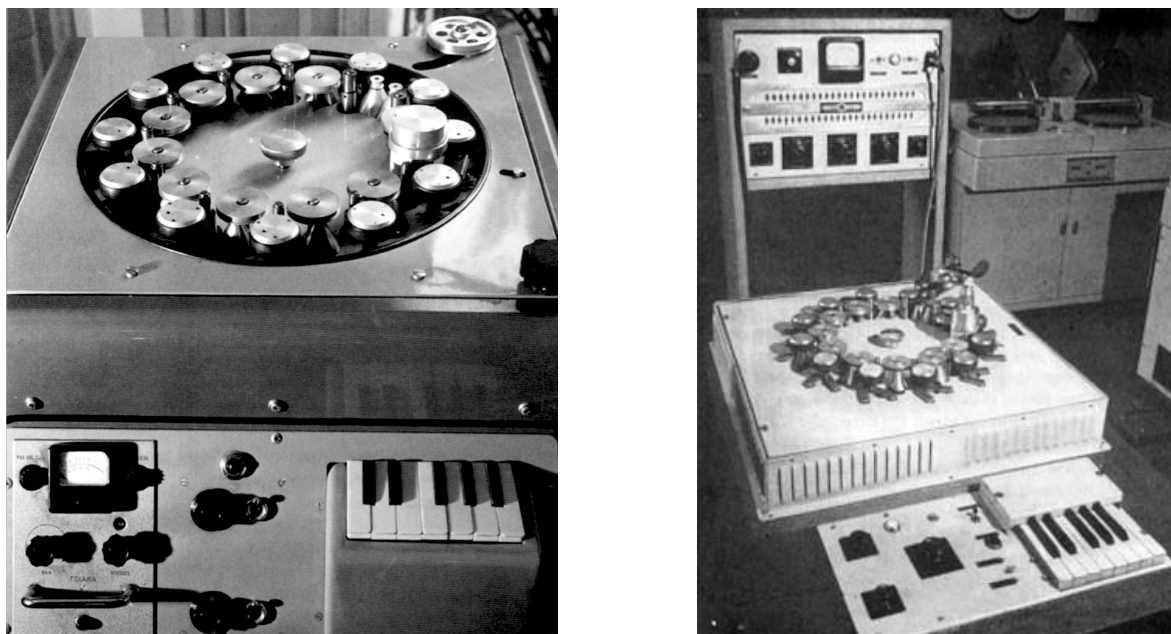
For the electronic manipulations of speech, Eimert used extensively the Tempophon, also known as the Springer Machine, with which he iterated spoken word fragments.

As mentioned in the previous chapter, the Tempophon was inspired by a device designed by Denis Gabor. During the middle of the 1940's, Gabor constructed a "sound granulator based on a sprocketed optical recording system adapted from a 16mm film projector. He used this Kinematical Frequency Convertor to make pitch and time changing experiments, changing the pitch of a sound without changing its duration and vice versa". (Roads, 2001)

According to Curtis Roads (2001), in the beginning of the 1950's, Jacques Poullin working with Pierre Schaeffer, constructed a spinning head device for the segmentation called the Phonogène⁽²⁾. At that same period, Fairbanks, Everitt and Jaeger were experimenting with a similar invention in the United States (Illinois), and the German company Springer made a "machine based on similar principles using the medium of magnetic tape and several spinning playback heads"⁽³⁾. This device called Zeitregler or Tempophon was then used by Herbert Eimert's 1963 for processing of speech for the piece *Epitaph für Aikishi Kuboyama*". (Roads, 2001)

⁽²⁾ Here Curtis Roads misinterprets the basic principles of the Phonogène. The Phonogène is not a "spinning head device" but it is a static head device as mentioned in the first chapter of this thesis. Jacques Poullin, who constructed the chromatic Phonogène (cf. picture 6), explains clearly its mechanism: the "multiple capstans of differing diameters vary the tape speed over a single stationary magnetic tape head" (Poulin, 1999). The Phonogène can transpose the sounds by changing the tape speed.

⁽³⁾ The Tempophon's basic principles are in fact radically different from the ones of the Phonogène. The Tempophon has one rotating element (also called the capstan-head) containing four playback heads (cf. figure 1). It allows the pitch of a recording to be changed without altering its duration, or conversely to change the duration of a recording without altering its pitch.



Picture 6: The chromatic Phonogène

The Tempophon was strapped to the side of a tape machine, with the tape passing its spinning capstan-head (cf. pictures 7,8,9). The tape speed in relation to the spinning capstan-head was set by the Tempophon itself, independently from the original speed, making it possible for instance to vary the pitch without altering the tempo.

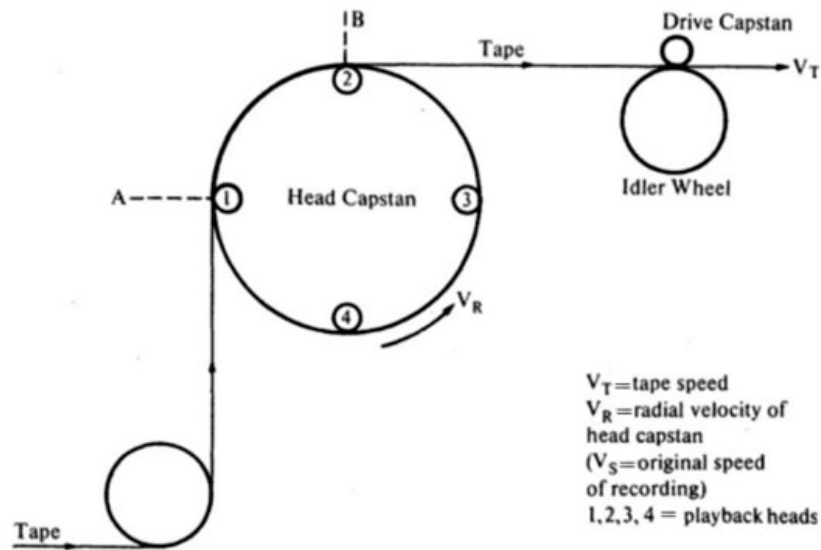
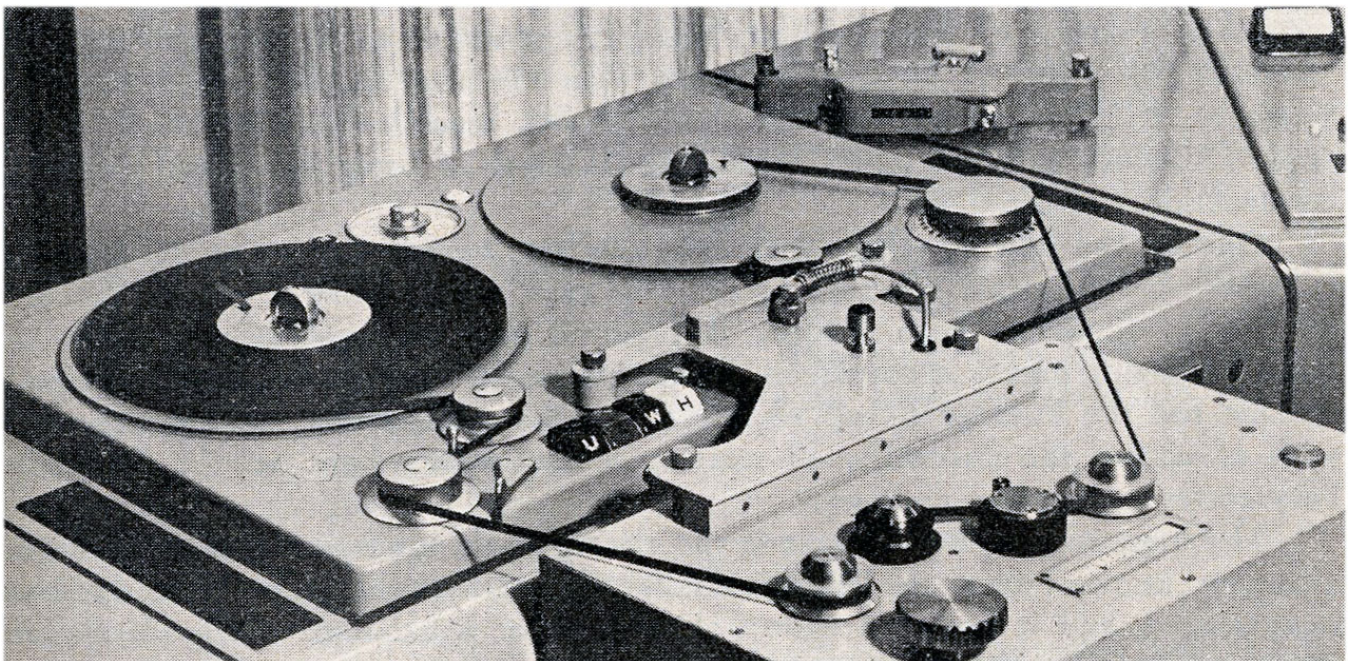


Figure 1: A diagrammatic view of the Tempophon



Picture 7: The Tempophon working with a tape machine

In relation to the musical domain, Eimert and Meyer-Eppler's approach to the combination of voice and electronics, coming from a scientific tradition, was innovative. It also produced different musical results than the ones produced by other composers of the Electronic Music Studio of Cologne around that same period. If we compare for example the relation between the voice and the electronics, and the relation between speech in music, there are noticeable differences between how these aspects are treated in the piece *Epitaph for Aikichi Kuboyama* by Eimert (1963), in the piece *Spiritus intelligentiae sanctus* by Ernst Krenek (1955), and in the piece *Gesang der Jünglinge* by Stockhausen (1956).



21 Tontechniker Heinz Schütz am Magnetophon T9 von Telefunken. Dieses Magnetophon konnte man auch mit einem Zusatzgerät, dem sog. Tempophon (Tempo- und Tonlagereger) benutzen (vorne). Das Tempophon war mit einem rotierenden 4-Fach-Wiedergabekopf ausgestattet (sichtbar zwischen den Umlenkrollen). Mit einer solchen Einrichtung wurden für Eimert's EPITAPH u.a. einzelne Vokale, Konsonanten und Silben zu Dauertönen verwandelt.

Picture 8: Heinz Schütz using the Tempophon



Picture 9: The Tempophon

Eimert and Meyer-Eppler's scientific approach to the combination of voice and electronics contributed to the formalization of the possibilities of separation between the different spheres of the voice's identity. To a certain extent, the 'diagnostic sphere' and the 'semantic level of speech' mentioned by Eimert and Meyer-Eppler, can be compared certain of the facets of the voice's identity as discussed in the first chapter of this thesis. For example the 'diagnostic sphere' can refer to a certain extent to the 'voice-subject', and the 'semantic level of speech' can refer to the 'voice-meaning'.

The pieces *Spiritus intelligentiae sanctus* by Krenek (1955) and *Gesang der Jünglinge* by Stochausen (1956) were both dealing with a religious text. It is interesting to point out that in contrast, the pieces *Epitaph for Aikichi Kuboyama* by Eimert (1963) and *La Fabbrica Illuminata* by Nono (1964) were both dealing with a political text. It would be interesting to investigate further and compare the treatment of the political aspect of the text within the music in Eimert's piece and in Nono's piece, because besides the fact they refer to different political engagements, both pieces were realized around the same period.

To conclude about Eimert and Meyer-Eppler, apart from the historical value of the document *Einführung in die Elektronische Musik*, their research has been inspiring many composers afterwards in the domain of electronic music composition, in particular regarding the combination of voice and electronics and the relation between speech and music. Concerning this thesis, the work of Eimert and Meyer-Eppler was inspiring not only in terms of methodology (i.e. concerning the scientific and empiric approach) but also in terms of research trajectory, since it formalizes the separation of the different information levels of speech such as the diagnostic sphere and the semantic level of speech.

2.2 Berio - Bridging music and poetry

At the end of the 1950's, Luciano Berio was involved in the research about poetry and music in which he spoke of attempting to create a continuum between speech and music. Berio's challenge was to create a bridge between music and poetry. He thought that poetry always looked at music in a nostalgic way, as an "unattainable possibility". For him, "the associative mechanism of poetry tends to suppress the musical character of its sound" (Dalmonte, 1986). Using poetry, as well as techniques derived from sonic art, Berio envisaged that new relationships between words, bearing a meaning or consisting of sounds and syntaxes, could be created. Voice, vector of both speech and music, appeared to be a privileged area for Berio's experimentations. At that moment he was working in close collaboration with Cathy Berberian, a singer/performer, pioneer of vocal extended techniques and of contemporary singing in the 1950's. The electronic tape pieces *Thema-Omaggio a Joyce* (1958) and *Visage* (1961), both realized with the voice of Cathy Berberian, represent good examples and concrete results of Berio's research about speech and music. Berio's vocal works around that period were certainly not composed for or with any voice. They were all created for or with the voice of Cathy Berberian and it is undeniable that their collaboration has been influential in the way that Berio worked with voice and treated vocal material. However, the pieces *Thema-Omaggio a Joyce*, *Visage*, and *Sequenza III* (1965) belong to the compositional approach of Berio, which remains in fact very different from the compositional work of Cathy Berberian. This can be observed with the piece *Stripsody* by Cathy Berberian composed in 1966 for solo voice.

It is particularly interesting to realize that Berio's experimentations with voice and speech in the electronic sound domain, have deeply influenced his later acoustic works for voice, not only in terms of sound materials, but also in terms of compositional approaches with voice and languages. To a certain extent, *Sequenza III* (1965) can be seen as a kind of summary or a continuation of what Berio did previously, not only with his acoustic pieces including voice such as *Chamber Music* (1953) and *Circles* (1960), but also with his electroacoustic pieces such as *Thema-Omaggio a Joyce* (1958) and *Visage* (1961). Although this idea seems to be a big jump, it represents, to my belief, an interesting hypothesis that requires further explanations. After describing the musical content and the compositional processes of *Thema-Omaggio a Joyce*, *Visage*, and *Sequenza III*, the next section will attempt to explore the compositional continuity between these pieces.

Thema-Omaggio a Joyce (1958)

Thema-Omaggio a Joyce is an electronic tape piece realized by Berio at the Studio di Fonologie in Milan in 1958. It is based on a text written by James Joyce (the beginning of the Sirens Chapter from Joyce's *Ulysses*), and a recording of Cathy Berberian's voice reading this text. It can be seen, as Berio said himself, as an "electro-acoustic elaboration of Cathy Berberian's voice on tape" (Berio, 1958). This piece represents the first experiments of Berio with the human voice. It drew his attention to the new possibilities inherent to the voice. According to Berio, in electronic music, there is no distinction between human and instrumental sound: "We use sound as an acoustic phenomenon regardless of its origins. Superficially, it might appear as though this would deprive it of an important characteristic, its meaning. In reality, however, exactly the opposite is the case: when analyzed, new strata of stream come to surface." (Dalmonte, 1986). Here Berio is not interested in sound by itself and even less in sound effect, whether vocal or instrumental origin. "He works with words because he finds in them new meanings. By analyzing the words acoustically and musically, he rediscovers them". (Dalmonte, 1986)

If the experience of electronic music is important, and I believe it is, its meaning lies not in the discovery of new sounds but in the possibility it gives the composer of integrating a larger area of sound phenomena into musical thought, thus overcoming a dualistic conception of musical material. Just as language is not words on one side and concepts on the other, but is rather a

system of arbitrary symbols through which we give a certain form to our way of being in the world, so music is not made of notes and conventional relations among them, but rather identifies with our way of choosing, shaping and structuring certain aspects of the sound continuum. Verses, prosody and rhymes are no more an assurance of poetry than written notes are an assurance of music. We often find more poetry in prose than in poetry itself and more music in speech and noise than in conventional musical sounds. It is within this general perspective that *Thema-Omaggio a Joyce* should be approached. I tried to interpret musically a reading of Joyce's text, developing the polyphonic intent that characterizes the eleventh chapter of *Ulysses* (entitled "Sirens" and dedicated to music), whose narrative technique was suggested to the author by a common procedure of polyphonic music: the fuga per canonem. In this work I made no use of electronically produced sounds; the only sound source is a recording of Cathy Berberian's voice reading the beginning of the eleventh chapter of *Ulysses*. The text is not only read in its original English version, but also in the Italian (Montale) and French (Joyce, Larbaud) translations. In *Thema* I was interested in obtaining a new kind of unity between speech and music, developing the possibilities of a continuous metamorphosis of one into the other. Through a selection and reorganization of the phonetic and semantic elements of Joyce's text, Mr Bloom's day in Dublin (it is 4 pm at the Ormond Bar) briefly takes another direction, where it is no longer possible to distinguish between word and sound, between sound and noise, between poetry and music; once more, we become aware of the relative nature of these distinctions and of the expressive character of their changing functions. (Berio, 1958)

At times it is relevant to distinguish the intentions of a composer, from what could be actually perceived from a listener perspective. Occasionally these two perspectives reveal more differences than common points. Concerning *Thema-Omaggio a Joyce*, although there are elements mentioned by Berio that are undoubtedly perceivable when listening to the piece, such as the musical qualities of the text, there are also certain points that might need further explanations.

The point of departure of *Thema-Omaggio a Joyce* was the fascination that Luciano Berio and his colleague Umberto Eco had for onomatopoeia in poetry. An onomatopoeia is a word that imitates or suggests the source of the sound that it describes. Berio and Eco explored this domain significantly, from Italian literature to James Joyce. The chapter XI of Joyce's *Ulysses* was representing for them a "triumph of onomatopoeia" (Dalmonte, 1986). When Berio was reading poetry, he said he was hearing music. For example in the chapter XI of Joyce's *Ulysses*, he could hear a cadence of white noise with the saturation of S sounds. After exploring the musical qualities of the text, Berio and Eco compared the sound of the English text with French and Italian translations.

The piece *Thema-Omaggio a Joyce* starts with a simple lecture by Cathy Berberian of the opening of the chapter XI of Joyce's *Ulysses*. In this section, the voice is slightly amplified and deformed until the final "hissss" that marks the beginning of radical electronic manipulations, which make the text sometimes unintelligible. The electronic transformations, rather subtle at the beginning of the piece, become more and more radical in the course of its development, to finish by completely 'metamorphosing' the vocal material, or at least not making it recognizable as such. As mentioned above, the original vocal material is based on the sonority of the text, not on its meaning. The semantic content of the original text remains difficult to grasp, especially since the text is based on the musicality and the acoustic properties of the words rather than on a concrete meaning. Berio used the syntax of the text to create the structure of his piece and in fact, this was something new in his approach.

Berio derived sonic materials from Joyce's phonemes, and sonic structures from linguistic combinations. In fact, he composed these structures according to precise criteria for example by

“grouping the phonemes on the basis of their acoustic affinity in a gradual sonic evolution” (Berio, 1983).

Berio also made continuous sonic evolutions coexist with aperiodic rapid sequential changes, using the style of onomatopoeia and applying it to phonetic materials to compose some structural transitions.

After selecting the materials, I linked the words according to their acoustical properties rather than imply their order of occurrence. In other words, I established an acoustical and semantically frame and then transformed the words alternately according to the requirements of one or the other with various technical means, most of them perhaps rudimentary: complicated editing, filters, acceleration, slowing down, ect. (...) *Thema* was of basic significance for my work because through it I experienced the text not as a closed, unchangeable object, but as one whose meaning and sound both allow the proliferation of new functions. (...) There is a strong connection between the phonetic quality of the text and the musical texture. (Berio as cited in Dalmonte, 1986)

Composing with phonemes is something that Berio already started in 1953 with *Chamber Music* when he experimented with voice and instruments and with texts from Joyce. (cf. *Chamber Music*, instrumental work for female voice, cello, clarinet and harp; Edizioni Suvini Zerboni 5053). With *Thema-Omaggio a Joyce*, the use of electronics allowed a greater control over the compositional process of working with phonemes, which deepened Berio's approach.

Berio's treatment of Joyce's text in *Thema-Omaggio a Joyce* has influenced the treatment of the texts in his later pieces such as *Larorintus II* (text of Dante), *Sequenza III* (text of Kutter), *Sinfonia* (text of Levis Strauss). (Ramazzotti, 2010).

Berio used certain techniques to compose *Thema-Omaggio a Joyce*. For example, the vowels were organized in a harmonic progression from A to U and some continuous gradual transitions allowed to pass from a formant range to another. The category of plosive consonants, on the other hand, was structured in rapid and aperiodic sequences of unvoiced and voiced stop consonants: B-P, T-D, T-B, CH-G. Meanwhile, the group of sibilants was organized so that the spectrum of white noise of the S sounds would be submitted to different degrees of filtration to allow the continuous evolution of S into F, F into V, SZ, ZH, etc. (Ramazzotti, 2010)

According to Stoianova (1985), “the result is a multiple continuum vowels-consonants, sounds-noises, acoustic-electronic, continuous-discontinuous”.

These three phonetic structures (harmonic, plosive, white noise) were juxtaposed so that the one evolves into the other according to three main types of articulation, suggested by Joyce's linguistic associations, which are discontinuous-periodic-continuous, continuous-periodic-discontinuous, and periodic-continuous-discontinuous. The dimension of the continuous articulation can result both from singing a harmonic progression of vowels as well as the spectral saturation of the S sounds, while the dimensions of discontinuous and periodic articulation are produced both by the emission of groups of plosive consonants and by the accented articulation of vowels and syllables. (Ramazzotti, 2010)

While studying the text of Joyce, Berio discovered that “the onomatopoeic dimension of some words resembled musical ornaments: trill, appoggiatura, acciaccatura, portamento, glissando, vibrato” (Berio, 1983, p.27). He focused on the relations between some onomatopoeias and some musical processes that Joyce wanted to bring forth in his text. For example the expression “Imperthnthn, thnthntn” would make him think of a trille; “Chips, picking chips” would recall a staccato gesture, while “Warbling! Ah lure!” would make him think of an appoggiature. “Deaf bold pat brought pad

knife took up” would recall a martellato expression technique while the passage “A sail! A veil awave upon the waves” would suggest him a glissando.

According to Ramazzotti (2010), Berio used “the stylistic features of onomatopoeia for their acoustic function and applied them to phonetic materials to compose the degree of change necessary for the evolution of his sonic structures, as, for example, in his *Sequenza III*”.

Berio said that he took into account the semantic specificities of the text otherwise “the names of the people in the telephone book would have been enough” (Berio, 1983). Here it is possible to ask to which extent did he actually take into account the semantic content of the text, since this text is so poetic? When going deeper into analyzing the piece and Berio’s writings, it seems that regarding this aspect, Berio was mainly interested in the structural organization of the text, its syntax, rather than its semantic content. My hypothesis is that if Berio took into account, as he said, the semantic specificities of the text, it is not obviously perceivable when listening to the piece therefore this aspect needs further investigations.

A priori there is an ambiguity with the interpretation of the term ‘syntax’ and the expression ‘semantic content’. To my interpretation, the ‘syntax’ refers to the combination of the units of a language, the way the sentences are structured in a particular text or language (without reference to their meaning), while the ‘semantic content’ is referring precisely to the meaning carried the text.

Bruno Bossis brings an element of answer to this issue:

Thema-Omaggio a Joyce is not just exploiting the latent musical potential of poetry. The semantic content is not purely destroyed; it is displaced and the meaning is placed in the organization of the language, in the form. It leads to a new conception of poetry. It emphasizes the idea of a new definition of the world, of reality, a new conception of art, a metaphoric. Art become a new activity that differs from systems of codes, forms and signs, coming from the scholastic rigor. (Bossis, 2007)

From this perspective, the semantic content is not destroyed but the meaning is placed in the organization of the language. This seems indeed a valid interpretation of Berio’s writings. In other words, we could say that Berio displaced the concept of the semantic content of a text towards its structure. The meaning, the semantic content, resides here in the structure of the text. This is certainly also what Berio referred when he mentioned the proliferation of new functions for the text.

“Berio quoted Joyce to describe the formal structure of the Sirens chapter as a canonic fugue, even though for him, the polyphony of Joyce can be referred only in terms of facts and characters: a voice which is reading is always a solo voice and not a fugue” (Bossis, 2007). According to Bossis, “*Thema-Omaggio a Joyce* is not really like a fugue. The polyphony suggested by Joyce is not a writing process, and the superimposition of layers of Cathy Berberian’s voice traces do not give to the piece a significant structure”.

The Studio di Fonologia in Milan and its electronic devices played an important role in the creation of the *Thema-Omaggio a Joyce*. In 1954, Berio and Maderna deepened their understanding of the phonological aspects of language at the Studio di Fonologia through electroacoustic analysis, and by contacting researchers in phoniatriy. Berio said that he used electronic instruments “to multiply and increase the transformations of vocal colors coming from one voice, to break down words and to reorder the resulting vocal material using different criteria”. (Berio, 1983)

The electronic manipulations of the voice in *Thema-Omaggio a Joyce* were mainly tape manipulations (such as speeding, slowing down, cutting the tape, which occasionally produces the effect of stuttering), in addition with filtering, distortion processes, echoes and multi-trackings.

Although relatively basic from nowadays perspective, these electronic manipulations had already a wide range of effects on the identity of the voice, from very subtle to quite radical. They could in fact make it possible to play with the different facets of the voice's identity. These electronic transformations of the voice were indeed very effective, and with *Thema-Omaggio a Joyce*, Berio became one of pioneers of the electronic manipulations of voice and speech in a musical context.

Denis Charles wrote about the electronic transformations in *Thema-Omaggio a Joyce*:

The transformations possible with electronics are far from reducing the voice to a mechanical texture empty of human being. On the contrary: electronics transformations of the voice extend its possibilities of expressivity. (Charles, 1980)

To conclude on *Thema-Omaggio a Joyce*, it is possible to say that in this piece, Berio progressively took away the 'voice-subject', the 'voice-meaning' and even occasionally the 'voice grain' to make appear the 'voice-object'. Furthermore, he approached the text from a new angle, which allows the proliferation of new functions. He deepened his way of composing with phonemes, and extracted the structure of the piece from the 'semantic content' of the text. The concept of semantic content has been displaced towards the structure of the text. Finally, *Thema-Omaggio a Joyce* had an important impact on Berio's work and deeply influenced some of his later pieces with the human voice.

Visage (1961)

Visage is a tape piece made with electronic sounds and recordings of Cathy Berberian's voice. It was realized at the Studio di Fonologia in Milan. When composing *Visage*, Berio was trying to find ways to increase the possibilities of bringing closer musical and acoustic processes as a means to find musical equivalents of linguistic articulations. He composed *Visage* in 1961, before he left the Studio di Fonologia Musicale of the Italian Radio in Milan. The piece was also intended as a tribute to the radio.

The experience of electronic music enables the composer to assimilate into the musical process a vast area of sound phenomena that do not fit pre-established musical codes. *Visage* is almost a sound track for a play that has never been written. So it can be played not only in the concert hall but in any place where recorded sounds can be reproduced. It is based on the symbolic and representative charge that is carried by vocal gestures and inflections, with the "shadows of meanings" and the mental associations accompanying them. *Visage* can also be regarded as a transformation of real examples of vocal behavior that go from unarticulated sound to syllable, from laughing to weeping and singing, from aphasia to types of inflections derived from specific languages: English and Italian as spoken on the radio, Hebrew, Neapolitan dialect, etc. Thus, *Visage* does not offer a meaningful text or a meaningful language: it only develops the resemblance of them. A single word is pronounced twice: "parole" ("words" in Italian). The vocal dimension of the work is constantly amplified and commented upon by a very close relationship, almost an organic exchange, with the electronic sounds. The voice is Cathy Berberian's. (Berio, 1961)

In his notes on *Visage*, Berio explains well how the "shadows of meaning" are also part of the semantic content since they imply many mental associations. This refers also to the idea of the 'voice-meaning'.

In terms of compositional processes, certain strategies have been expanded with *Visage*. For example concerning the musical syntax, as in *Thema*, some sonic materials were derived from the acoustic spectrum of phonemes, but here the structure of the piece emerged from a kind of sonic uniformity towards the incorporation of an opposing timbre. Furthermore, it is possible to observe the return of certain sonic events, which establishes a connection with the beginning of the piece. The return of sonic events can be perceived in the form of a cadence, for example when white or colored noise is preceded by impulsive sounds. This creates a connection with the spectral band of white noise of the beginning of the piece. This kind of cadence also articulates some of the sections of *Sequenza III*.

The electronic procedure of progressively filtering white noise, used in *Visage*, produces a spectrum corresponding to the one produced by the progressive evolution of the S sound into the sequence of phonemes F - V - SZ, and the effect of colored electronic sound or filtered noise, can be associated with the phonetic effect produced by an aspirated vowel filtered by the oral cavity, used cadentially as in *Sequenza III*. (Ramazzotti, 2010)

Visage can also be considered as an attempt to overcome the dualism between electronic sounds and the recorded natural voice. The differences of the two kinds of sound sources are diminished by the imitation relationship between the two dimensions (for example, the white noise, when filtered, becomes colored and simulates the filtration of vowels by the throat, mouth and nose; in parallel, the impulsive electronic sounds can remind of the impulsive qualities of some accented vowels). Berio's electronic sounds were then transformed in order to attain the acoustic qualities of vocal opposition timbre. In addition, the sound sources were organized in a certain way so that they could coexist on tape and interact with each other (for example when one type of sound source is evolving into the timbral dimension of the other).

The desire to create a continuum between electroacoustic music and instrumental music was in fact central and recurrent in Berio's thinking. He imagined no clear separation between genres nor between means of production, but rather creative acts that are fundamentally defined by the imaginations of composers and by their capacities to integrate various materials and memories they bring to music. (Cremaschi & Giomi, 2004)

The electronic equipment available at the Studio di Fonologia in Milan was of a great support for Berio's aspiration to create a continuum between the electronic and acoustic sound dimensions. Here Berio used electronic transformations either to give to the vocal material some electronic characteristics, or to give to the synthetic sounds some vocal appearances. He was in fact trying to blur the distinction between the acoustic voice, the electronics transformations, and the electronically generated sounds.

For example, speed modulation, by varying the duration of the sound envelopes, could turn a sequence of vowels into groups of impulsive sounds. The results of these transformations are vocal sounds distorted in register and envelope, which combine perceptually when juxtaposed and overlapped on tape with synthesized sounds. (...) While laughter is a gesture belonging to the expressive world of man, when the sound of laughter is electronically manipulated by a deceleration of tape speed, it can lose its gestural dimension and reveal the series of impulses of which it is made of and which make it similar to certain synthetic sounds. Thus through electronic deceleration, laughter become a bridge between the world of acoustic sounds and that of expressive sounds. (Ramazzotti, 2010)

A similar example can be found when a vocal fry is chopped into small pieces down to a single particle of vocal fry. These small particles of vocal fry can remind electronically generated impulses. In the piece *L'imaginaire du parleur*, small particles of vocal fry are used to create an ambiguity and a bridge between the electronic and acoustic sound domains.

Another interesting electronic device available at Studio di Fonologia and that Berio used was the amplitude modulator. In order to obtain a vibrato effect, the amplitude modulator could be set to play a frequency of only a few periods per second. (...) Concerning the synthetic sounds, Berio used a Toc generator for the production of impulses, and a white noise generator (the material passed through various filters could produce different degrees of colored sound). After consulting the documentation of the Studio di Fonologia and of these two machines used by Berio, it becomes evident that his model for sound synthesis was partly based on the acoustic characteristics of phonemes. (Ramazzotti, 2010)

To conclude on *Visage*, it is possible to say that with this piece, Berio went further in deriving sonic materials from the acoustic spectrum of phonemes. The expressivity of the voice, i.e. the emotions and the non-verbal language, is very much explored in *Visage*, which is something new compared to *Thema-Omaggio a Joyce*. The structure of the piece emerged mainly from some sonic uniformity towards the incorporation of an opposing timbre. In a way, Berio incorporated some kind of transversal gesture through the whole piece. There are also other new elements in the elaboration of the structure such as the return of sonic events in the manner of a cadence and the alternation of different sections. Furthermore, Berio furthered his aspiration to create continua between music and poetry, between music and speech, and between the electronic and acoustic sound domains. This was realized by making the different sound sources (electronic or acoustic) imitating each other. For that purpose, the electronic devices available at the Studio di Fonologia in Milan were an important and necessary support.

Sequenza III (1965)

The piece *Sequenza III*, for solo voice, was written in 1965 for Cathy Berberian. With this piece Berio said that he “tried to assimilate many aspects of everyday vocal life, even trivial ones, without losing intermediate levels or normal singing. In order to control such a wide range of vocal behavior, he broke up the text in order to be able to recuperate fragments from it on different expressive levels, and to reshape them into units that were not discursive but musical. The text had to be homogeneous, in order to lend itself to a project that consisted essentially of extracting the excessive connotations and composing them into musical units”. (Berio, 1965)

Sequenza III is carrying vocal virtuosic figures with words and pronunciation of vowels and consonants during the whole piece. There are some new, unusual, and challenging vocal techniques that are involved, such as the rapid repetition in random order of a small number of syllables or words, and the vocalization of tense laughter on a number of distinct pitches with rapid accents. There are also some rapid alternations between different voice productions and ways of delivering the text. The singer/vocalist has to follow many directions evoking different psychological/emotional states and this is constantly punctuated by laughter. The alternation of sections is an important aspect of the piece. The text, a poem by Markus Kutter, is not really treated in the order in which the words are written. Elements like tonality, rhythm and melody, in the traditional sense, are all absent. There is no function of melody and no functional harmony. The rhythm is in fact not treated metrically, but speed and density become the new interpretation of the time axis. Furthermore, Berio uses a creative notation system. For example some symbols have been created for coughing or beating the mouth with the hand. Different emotions are listed above the score. The lines staves are arranged for relative and exact pitch. In addition, the vocalist is expected to do her own dramaturgy, which gives her a lot of freedom in the visual and performance aspects.

The text written by Markus Kutter for *Sequenza III* is:

Give me a few words for a woman to sing a truth allowing us to build a house without
worrying before night comes

The general gesture of the piece could be interpreted as the following: initially, the text is heard as phonemes (for example: to, co, for, us, be); then gradually, some words and pitches emerge; after that comes the peak of the agitation of phonemes and of the tension of the singing; eventually some complete sung phrases emerge, followed by a slow death of the singing.

In *Sequenza III* the emphasis is given to the sound symbolism of vocal and sometimes visual gestures, with their accompanying 'shadows of meaning', and the associations and conflicts suggested by them. For this reason, *Sequenza III* can also be considered as a dramatic essay whose story, so to speak, is the relationship between the soloist and her own voice. (Berio, 1965)

Here Berio points out the dramatic and theatrical character of the piece, which of course plays an important role in the performance.

The relations between *Sequenza III* and Berio's previous electroacoustic works

It is particularly interesting to realize that the experiments that Berio did in his electroacoustic pieces using the human voice in the late 1950's and the beginning of the 1960's (for example with *Thema-Omaggio* and *Joyce* and *Visage*) have been influencing the way he wrote for solo acoustic voice afterwards (for example with *Sequenza III*). To a certain extent, with *Sequenza III*, Berio was able to realize with the sound of the natural voice the same sonic processes that he had obtained in *Thema-Omaggio a Joyce* by electronic modulations of the voice, in *Visage* by sounds of synthesis.

Of course Berio was not the only one at that period who was writing instrumental or vocal music influenced by the way he worked with electronics or by the experimentations he did in the electronic sound domain. Stockhausen, Nono and Boulez, were indeed also influenced by the way they worked with electronics. In fact the possibilities offered by electronic music created some possible structural and expressive models in vocal and instrumental music, which had not existed before.

A typical process of electronic music that has influenced instrumental and vocal music is for example the one of speeding up and slowing down a tape. It seems that in the music of the 19th Century, an increase in the musical intensity was generally accompanied by a slowing down of the music (for example with a fermata at the climax of the piece). After composers started to work with electronic music and especially with tape speed manipulations, it seems that the moments of highest intensity were then the moments of the greatest density of activity. It is possible to find this feature in Berio's, Stockhausen's, and Boulez's music of the 1950's and 1960's.

Going back to the relations between *Sequenza III* and Berio's previous electroacoustic works with voice, it seems that there are several elements that could lead us to think that there is a possible continuity between *Thema-Omaggio a Joyce*, *Visage*, and *Sequenza III*. After looking at the potential connections between *Sequenza III* and *Thema-Omaggio a Joyce*, we will look at the possible relations between *Sequenza III* and *Visage*, and finally summarize the links bridging these three pieces.

Regarding the similarities between *Sequenza III* and *Thema-Omaggio a Joyce*, we can mention first the creation of a data bank of source materials and the connection between material and form. In *Sequenza III*, after a collection of source materials was made, potential musical combinations were thought, and at the same time, a global structure would begin to take form. This structure could be seen as being generated, at least in parts, by the character of the source materials, so that there would be a relation between form and material. This can be seen as an influence from *Thema-Omaggio a Joyce*, where a similar procedure was applied. Moreover, we can certainly observe a similar kind of relationship between how the text is becoming an abstract phonetic material in both pieces. We find also in both pieces the use of the musicality of the words, syllables, phonemes, onomatopoeias, the

fragmentation of the text, and an alternation between continuous and discontinuous sounds. To a certain extent, it is possible to say that in *Sequenza III* the text is treated after the manner of *Thema-Omaggio a Joyce*. Furthermore, the idea of cutting up the text of Kutter in *Sequenza III* recalls very much the idea of cutting up a tape. Certain acrobatic vocal techniques from *Sequenza III* (such as the repetition in random order of a small number of syllables or words) recall as well the tape manipulations of *Thema-Omaggio a Joyce*. In addition, the International Phonetic Alphabet notation system (IPA) was used in both pieces. In *Thema-Omaggio a Joyce* the International Phonetic Alphabet was used to plan a 'score' of the piece, which is something we find again in *Sequenza III*, where the IPA's alphabet was used when consonants and vowels were grouped in oppositional pairs, and when there were circular motions between the relation front-back or open-close.

Concerning the relations between *Sequenza III* and *Visage*, it seems that the two pieces also have several common points. First of all the theatrical potential and the expressivity of the voice (the emotions and the non-verbal language) are very much explored in both pieces. Moreover, in both pieces we can notice the return of certain sonic events in the form of a cadence and a constant punctuation by laughter. In *Visage*, Berio worked intensively with laughter and especially different types of laughter, something we find also in *Sequenza III*. For example the vocalization of a tense laughter on a number of distinct pitches in rapid accent in *Sequenza III* could be seen as coming partly from *Visage*. Furthermore, we can observe in both pieces an imitation of the electronics by the acoustic voice. Additionally, in *Visage* it is possible to perceive that the electronics imitate the human voice. Finally, the alternations of sections in *Sequenza III* could be found also in *Visage*.

To summarize, regarding the relations between *Sequenza III* and both pieces *Thema-Omaggio a Joyce* and *Visage*, there are several elements that make it possible to think that there is a certain kind of continuity between these three pieces.

The common elements that the piece *Sequenza III* shares with the pieces *Thema* and *Visage* are the strong structural connection, the fact that some parameters are developed through the entire piece, the way that the structure has been elaborated, the alternations of sections (coming mainly from *Visage*), the alternation between continuous and discontinuous sounds (coming mainly from *Thema*), the way of working with the voice material, the way of working with text, for example its fragmentation (coming mainly from *Thema*), the expressivity of the voice i.e. the different emotions and non-verbal language (coming mainly from *Visage*), the musicality of the words, syllables, phonemes, onomatopoeias (coming mainly from *Thema*), the way of treating the rhythm with speed and density (the impression that occasionally in *Sequenza III* a tape has been speeded up or slowed down), and the imitation of electronics by the voice (coming mainly from *Visage*).

To conclude on *Sequenza III*, it seems that although the piece involves only an acoustic voice, it belongs to the same research that Berio started with *Thema* and *Visage*. Probably he would not have been able to write *Sequenza III* without his experimentations with electronics. Regarding the relations between *Sequenza III* and the facets of the voice's identity, we can say that in *Sequenza III*, the 'voice-meaning' is mainly lost, except towards the end when clear words and phrases emerge. The 'voice-subject' is present most of the time, but occasionally the vocal extended techniques blur its recognition. The piece makes clearly emerge the 'voice-grain'. Furthermore we can point out that even though there are no electronics in this piece, the extended techniques sometimes make the voice sound as if it was electronically processed (with the fragmentation of words, the distortion of the singing, and the imitation of filtering processes, pulses or white noise). To a certain extent, the 'voice-object' starts to become apparent. By expanding the way to use a voice purely acoustically, this piece opened new horizons for the acoustic voice and for the next generations of vocalists.

Two years after the composition of *Sequenza III*, in 1967, Berio reaffirmed his wish to free the voice:

I came to the point of understanding how much the voice is intimately related to the totality of the human experience. My ambition is to liberate the voice from all the constraints imposed to the voice by artists. I want to make rediscover its subtle strength, its purity, in infallibility. (Berio, 1967)

2.3 Nono - Voices of protest

During the 1960's, Nono seemed to be always more fascinated with the human voice, the one which expresses everything. In 1964, he wrote the piece *La Fabbrica Illuminata* (The Illuminated Factory), where the voice expresses its revolt and its everyday pain, in the oppression and terrible rumors of machines. The voice captivates the sounds, very high or agonizing. The body is linked to the metal, the fire, stridency and shots hammered that resonates in the belly. (Cadieu, 1995. p 35)

La Fabbrica Illuminata is a piece for voice and four-track magnetic tape, based on texts by Giuliano Scabia and Cesare Pavese. The piece was dedicated to the workers at the Italsider factory in Genoa. Composed in 1964 for the inaugural concert of the prize Italia at Genoa, the piece was however not performed on that occasion because of the highly politicized character of the texts considered offensive against the Government. The first public performance took place in Venice at La Fenice on the 15th of September 1964 as part of the XXVII International Festival of Contemporary Music, The Biennale.

La Fabbrica Illuminata points out Nono's position against the social injustice and unfairness related to the social forms of capitalism. With the raise of Italy's industrialization, the conditions in the workplaces got rapidly degraded: low wages, dangerous environment, physical and mental alienation of the workers. In fact the piece opens with a commentary sang by the vocalist, about the trial of a work process in the Italsider factory in Genoa. Luigi Nono went to this factory with the poet Giuliano Scabia to record and take notes on the sounds and words they heard. This factory was atrocious. It was called "the factory of the dead".

Few days before the premiere, Luigi Nono explained the context of the piece in an interview realized by Martine Cadieu. At that moment, "he was deeply engaged into communist action" (Cadieu, 1995). He explained that the text of the piece was completely true, that he was recording the worker's words together with the poet Giuliano Scabia. They collected fragments of syndical texts and worker's speeches. He explained that when a worker was working eight hours, he was only payed two hours. The rest was going to the factory. It was the law of profits, always more profits for the factory: the workers were working more, but they were payed less, and the companies were making more profits. (Cadieu, 1995)

Nono wanted to fight against these injustices, and help the workers to have better working conditions. According to Nono, demonstrating and creating music, were just two faces of the same coin. The words "obsession" and "pain" were always coming back in the interview that he gave to Cadieu in 1964. Nono insisted in the action and on the reflection of the artist. With *La Fabbrica Illuminata*, he wanted to share a precise idea about "mankind of that period and the servitude-liberation that is attached to him". (Cadieu, 1995)

This is not music, not documentary-theater, not poetry-survey, neither recording and technological acquisition, surrender to power, routine of middle class, or popular naturalism. It is a 'journal-illumination'. It is an 'idea-music' semantically precise about mankind of today in the place of his 'servitude-liberation'. (Nono cited by Cadieu, 1995)

Apparently Nono was often talking about the Hebrew tradition of spending time to offer to others what one knows, and to try in turn to understand. With his friend Luigi Pestalozza, they presented *La Fabbrica Illuminata* in cultural centers for workers, where they were discussing the piece together with the workers after its performance. Nono thought that the workers wanted and were able to understand why and how music could express the theme of their lives and of their fights. They wanted to understand how it was composed technically. They were often deprived from academic preparation and submitted to radio and songs bombing. However, because of their work and life, they were obliged paradoxically to be technically at the avant-garde in terms of new ways of production and working methods.

The technical analysis, much more than the esthetic analysis, makes them understand everything. The relation between noise and sound was not a problem for them, contrary to the bourgeois audience of concert halls. (Nono cited by Cadieu, 1995)

The workers were neglected, under-estimated, and Nono thought that it was even maybe because of cultural initiatives. For him, meeting the workers in Geneo, Reggio Emilia or Trieste was very important, and especially it was an element of an answer to which he thought were the essential questions that a writer should ask himself: why writing and for who?

The premiere of the piece took place at La Fenice on the 15th of September 1964 in Venice. According to Martine Cadieu, who was present for the premiere, on stage there was metal, garbage, imaginary rolling mills and everything was like "shadows in shades of gray: a place at the same time wide but closed". The voice of Carla Henius was symbolizing the worker. "Her voice was wide, painful, fighting with the other voices that were surrounding and closing down the audience from everywhere". Carla Henius's voice was representing a voice of protest, solitary, provoking the choir or answering it. She was symbolizing from time to time the messenger, the witness, the victim. The workers around her, represented by the choir on tape, brought also their pain and expressed violently what was their life by the question: how many minutes for a man to die? In the prologue, the worker's obsession, was heard through the texts and documents recorded by Giuliano Scabia.

"It is not a provoking literary but a reality". (Nono cited by Cadieu, 1995)

The material for the tape part came from several sources: recordings of the factory Italsider in Genoa-Cornigliano, noises of the factory itself, of the steel production, voices of the workers, the voice of the German mezzo-soprano Carla Henius, a choir, and electronic sounds produced at the Studio di Fonologia in Milan. These recorded elements were interacting with each other as well as with the voice of the live singer. Even though the tape part was fixed, Nono said that its relationship with the live performer was what united the past with the present, and he wanted the piece to change according to the situation of each performance. He himself altered the volume levels, speaker placements, and other elements in response to the space in which the work was performed. He also took in consideration the individual performer, what she was doing at each moment, and what he felt he wanted to emphasize on a given occasion. After the premiere in Venice, Nono performed *La Fabbrica Illuminata* in countless factories.

The structure of the piece can be seen as consisting of four parts (cf figure 2): Corale, Giro del Letto, Tutta la Cita and Finale. The first part (Corale) represents the exposition of the drama. It addresses the situation: a factory, a story, a fighting situation, a moment of passion and life in the worker

movement. The second part (Giro del Letto) is the illumination of the factory where Nono wanted to show the worker's obsessions. The words and the text are cut, overlapped. It never stops. This tour around the bed (Giro del Letto), symbolizes also the obsession of a woman who works and who only thinks of the moment after the work when she will be able to rest in her bed. It symbolizes as well the night turns of the factory that never stops. Nono wanted to stress out the night oppression and the real oppression by superimposing the disembodied voices coming from the loudspeakers with the acoustic voice of Carla Henius singing on stage (which was the same voice as the one coming from the loudspeakers) creating an effect of multiplicity. The third part (Tutta La Cita) symbolizes the culmination of the protest, the tiredness of the workers, the necessity of a change. Aggressive electronics machinery sounds contrast with the voice of Carla Henius, sometimes exhausted and hardly audible, sometimes shouting to make hear her pain and protest. The last part (Finale) is based on poems of Cesare Pavese. The four lines are extracted from *Deux poésies à T.* In this part the voice of the singer is released. "The painful night finished in the morning light, with the hope a newborn day. It is a final opening". (Cadieu, 1995)

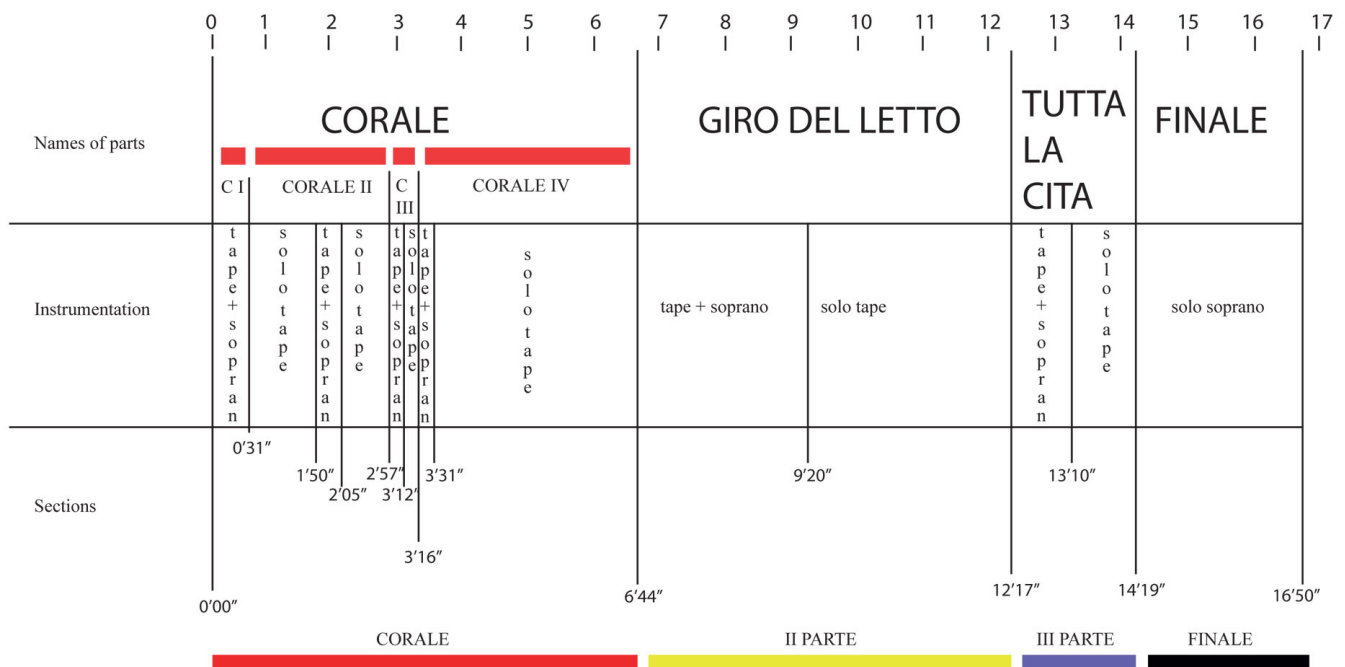


Figure 2: The structure of *La Fabbrica Illuminata* (Guilleray, 2011)

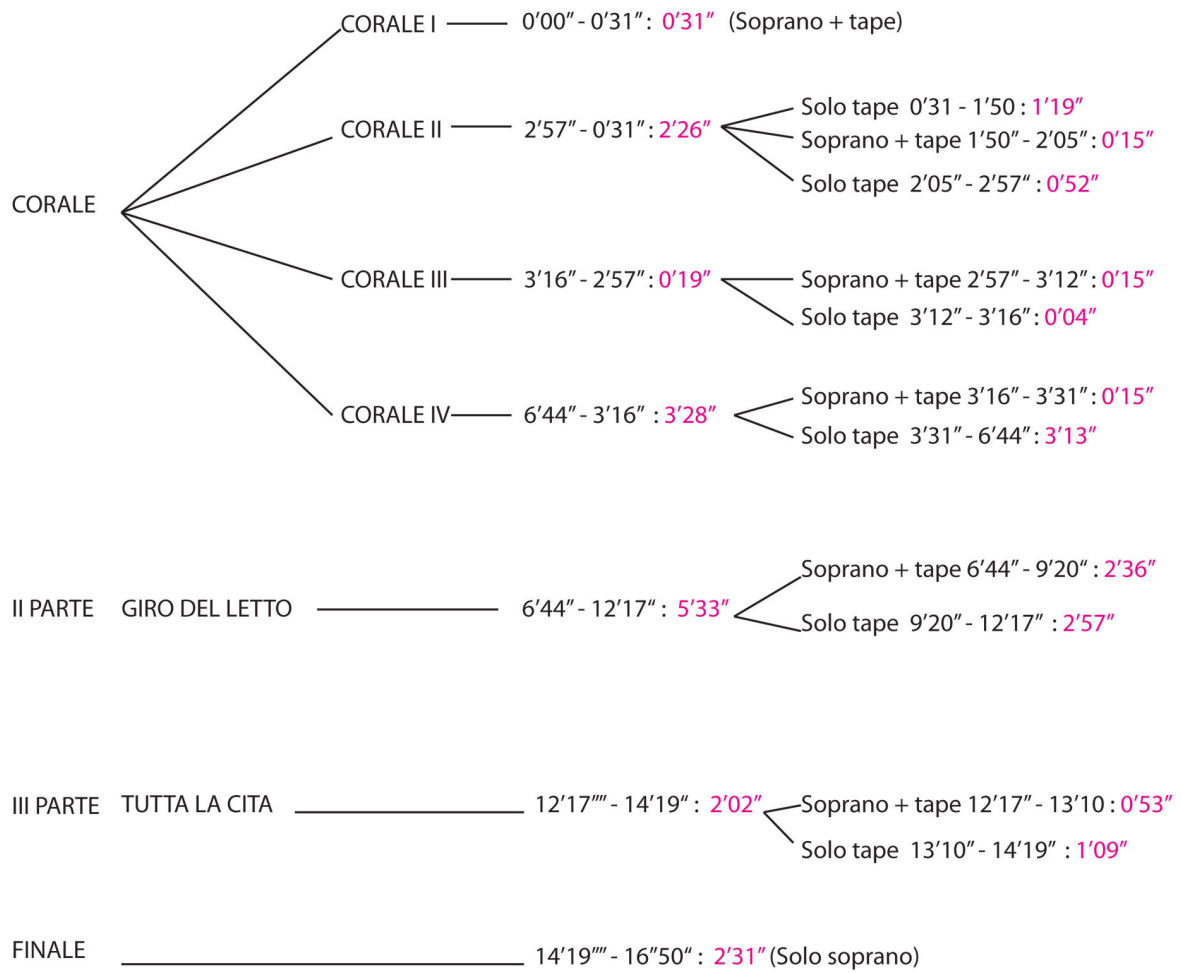


Figure 3: The durations of *La Fabbrica Illuminata* (Guilleray, 2011)

The relationships between the voice and the electronics in *La Fabbrica Illuminata* could be seen as articulated around three main scenarios: the accompaniment (when the electronics are for example accompanying the voice), the extension (when the electronics are extending the voice), and the coexistence (when the electronics are creating contrast with the voice). In terms of structure, there is a constant alternation in the different sections of the piece between a voice and tape part, and a solo tape part (cf figure 3). At the end however we hear a solo of acoustic voice.

Cadieu (1995) claims that the voice's expression in this piece is very physical: thickness, fatigue, slowness, startle, move, cry, fall, despair, exhaustion, whispers, extinction, sleep, dream, heavy reality, and the tour starts again. Cadieu explains that the electronic part that surrounds the voice as a natural element was probably the hardest to understand. According to her, "this electronic element needs to be entered as the wind, or as obscurity. It is a space, sometimes oppressing, sometimes liberating."

According to Nono, "with electronics there is a real danger of naturalism: we risk to describe, to reconstitute, to not create anymore". But Nono explains that he knows very well these limits so that's why the vocal part is even more elaborated and worked out. "In the second part, the voice appears by layers; the same words can be said with different expressions. That is what I recorded with the singer in the studio. We tried a lot, and among a large amount of materials, then I chose. The superimposition and the use of different expressions intensify the drama. The choir has been recorded too and transformed electronically, raising and lowering intensity levels of the singing, filtering it". (Nono cited by Cadieu, 1995)

When I performed *La Fabbrica Illuminata*, it seems that there was a certain distance between my voice and the electronics especially because the electronics did not contain my voice. The gap in timbre between the live voice and the voice on tape was bigger than when I would perform pieces with my voice incorporated to the electronics. It is the case for example in the pieces *In Other Words* by Robert Blatt (2009), *Duality* by Gunnarsson and Guilleray (2011), or *Glossolalia* by Robert Blatt (2011). However this gap does not make the piece less interesting because the main point in *La Fabbrica Illuminata* resides, in my opinion, in the expression of the social injustice and unfairness related to the social forms of capitalism, and this expression is not diminished by the fact that it is not the same voice coming from the stage than coming from the tape. Since the dislocation of the voice was, according to Nono, a way of intensifying the drama, one might argue that the format of having another voice on stage than the one on tape might be less dramatic, but on the other hand, this can also be compensated by the expressivity of the live voice during the performance.

Nono says that since *Il Canto Sospeso* the singing never stopped to enlarge. “I think that we limit too much the singing: man and woman have a superior facility than what we let them do in classical and contemporary music. I am interested in all the possible enlargements of the voice: Indian techniques, Flamenco, Hebrew singing. To my belief, singers should learn everything”. (Nono cited by Cadieu, 1995)

In *La Fabbrica Illuminata*, Nono uses the voice as a way of expressing the fact that the revolution is a human movement. During his ‘revolutionary pieces period’ from the 1960’s, it was almost always voices that he was using. Occasionally he used recognizable voices. Choirs and solo voices were often heard, and these pieces had mostly spoken voices on tape. However, when we go back to the music that Nono was writing in the 1950’s, for example *Il Canto Sospeso*, he was then using a very interesting technique where the words are split into syllables and each syllables is sang by a different voice. Nono invented that technique. He was strongly criticized by Stockhausen in an article about music and speech (Stockhausen, 1958). In this article, Stockhausen compared his piece *Gesang der Junglinge*, with Boulez’s *Le Marteau sans Maître*, and Nono’s *Il Canto Sospeso*. To summarize, Stockhausen wanted to show that he took further the idea of the combination of speech or text and music, than for example Nono did with *Il Canto Sospeso*. Stockhausen criticized Nono for using texts so full of meaning (*Il Canto Sospeso* was based on farewell letters from prisoners sentenced to death for fighting against the Nazis) while the semantic content was not accessible because it was dissolved by the technique described before. Stockhausen argued that if we do not understand the meaning of the words, why choosing these texts? Why did the composer take away, intentionally the meaning of the text? Maybe he should have chosen less meaningful texts?

According to Nono, Stockhausen’s phonetic analysis of the vocal part of *Il Canto Sospeso* was absurd because Nono’s idea was to create a human expression. The heritage of these letters was the expression of Nono’s piece.

All my compositions for choir afterwards are to be understood in relation between the words as phonetic and semantic entity, and the music as compositional expression of the speech. The principle of the decomposition of a text, its fragmentation and repartition in vowels and consonants, for example in *Cori di Didone*, did not take away the signification of the text but on the contrary expressed the text musically as phonetico-semantic structure. The composition based on the use of the phonetic elements of a text contributes nowadays as before to the transposition of the semantic signification into the composer’s musical language. (Nono, 1993)

It is interesting to notice that in the case of *Il Canto Sospeso*, the concept of semantic signification is transposed into the composer’s musical language. As we just saw, in *Thema-Omaggio a Joyce* by Berio, the notion of semantic content is also transposed, but in this case it is displaced to the structure of the

text. In fact it is worth to note that in both pieces, the concept of semantic signification has been displaced.

With *Il Canto Sospeso*, even if the fragmentation of the text makes it more difficult to be understood, particularly with the kind of serial canonic structure that Nono was working with, he wanted to create a human expression. He mentioned this himself when explaining that the fragmentation of the text was a transposition of the semantic content into his musical language.

It is interesting to notice that later on, around the 1960's, Nono seemed to have change his way of treating the text, and when he gates further with something like *La Fabbrica Illuminata* in 1964, there it is very clear what the voice is saying. One could make the hypothesis that during Nono's revolutionary pieces period, communicating text intelligibly became a priority.

To make a parallel with the different elements constitutive of the voice's identity, it is possible to see Nono's use of the voice during his 'revolutionary pieces period' as emphasizing the 'voice-subject' (with for example the singer symbolizing the worker in *La Fabbrica Illuminata*) and the 'voice-meaning' (with the urge to communicate text intelligibly).

This can be related to the question of a potential elitist tendency associated with the emancipation of the voice, from 'voice-subject' to 'voice-object', as it has been mentioned by John Potter (Potter, 1998).

According to Potter, the emancipation of the voice, from 'voice-subject' to 'voice-object', seems to be partly related to cultural politics. In this essay, Potter undertakes an ideological analysis of voice production over the history of Western music. He develops an approach of the history of vocal music driven by the dialectic between a populist urge to communicate text intelligibly and an elitist tendency to privilege the voice as a sound-object (Potter, 1998).

Although this can be perceived as a big jump, Potter's ideas can be related to Nono's priority to communicate texts intelligibly during the 1960's, and to Nono's thought that by its cultural initiatives, the society might have been neglecting and putting aside the social category of the workers.

However, it is significant to mention that Liz Garnett has criticized Potter's ideas by explaining that the tendency to say that the voice's natural state is distorted by cultural politics might be forgetting the fact that "popular vocal styles are just as culturally constructed as classical ones, after all, even if generally they are less expensive to acquire" (Garnett, 2009).

Regarding this issue, my hypothesis meets the ideas of Garnett. There is certainly a general opinion that tends to say that the 'natural state of the voice' is closer to popular vocal styles than to classical, contemporary and experimental vocal styles. However, I believe this opinion forgets how much popular vocal styles are constructed. In fact the general public opinion is constantly solicited with popular vocal styles since they are so much integrated in commercial TV channels and radio programs. With such bombings, people tend to think that these vocal styles represent the natural way of using the voice while they are just as constructed as classical and experimental ones. Furthermore, if we think of the use of the voice in the period of prehistory as described by Mithen (2005), which could include for example the imitation of the sounds heard in nature, one could argue that this 'prehistoric way of using the voice' is a very 'natural one' since it is ancient, universal and realized without artifact. With this in mind, it is possible to imagine that this ancient way of using the voice might be in fact closer to experimental vocal styles than to popular singing.

3 The redefinition of a performer's musical identity required by the electronic extension of his instrument in the context of free improvisation

3.1 Context

The redefinition of a performer's musical identity when he uses an electronically extended instrument is a necessary consequence of the fact that the instrument changes greatly when it has been extended with electronics. For the performer, many readjustments are often necessary in terms of physical and musical gestures.

The reasons that motivated the project

My involvement in improvised and contemporary music introduced me to the combination of voice and electronics. I was looking for extending the possibilities of the acoustic voice. Electronics seemed to offer new possibilities, not only in terms of extension of the voice in performance but also in terms of new approaches to composition with voice.

I started by performing pieces written for voice and live electronics as well as improvisations with real time processing of my voice. While I was already in the process of developing a vocabulary as a vocalist improviser acoustically, integrating live electronics appeared to be a significant change.

In order to improvise in an interesting way with real time processing of my voice, it was necessary to investigate further the possibilities offered by the electronic sound domain. It would have been very superficial to improvise with the electronics just as an 'effect' on the top of the voice. To my belief, in order to contribute to the creation of an interesting improvised music, real time processing of the voice required deeper investigations.

At the beginning, improvising with voice and electronics can be experienced as playing two different instruments simultaneously. It reminded me of playing the piano and singing at the same time. It needs a similar concentration and the automation of several skills in order to be done well. To become one fluent and flexible instrument, the combination of voice and electronics requires a strong practice, the automation of a certain numbers of skills, a great control. In other words it requires a kind of mastery of the instrument.

The aim of the project

Therefore, the idea that initiated the project was to find solutions for extending my voice with electronics. I was interested in combining these two so that they would become one instrument. The objective was to be able to improvise with this new electronically extended voice with the same fluency and flexibility as with my acoustic voice. In parallel, fixed media and live electronics pieces combining voice and electronics would be created.

To summarize, this research was articulated around three main axes:

- The creation and development of the electronically extended voice as an instrument for performing free improvisation (and occasionally for live electronic pieces)
- The creation of fixed media pieces combining voice and electronics
- The creation and performance of live pieces including voice and live electronics

In practice, these three main paths can overlap. Improvisation can be used to create materials for fixed pieces (whether fixed media or live electronics), and in reverse the materials created for fixed pieces help to expand the performer's vocabulary in free improvisation.

The redefinition of the musical identity in the electronic sound domain

Playing free improvisation with an electronically extended instrument can imply that the performer has to redefine his musical identity. In fact a large gap can appear between the vocabulary developed acoustically and the one developed electronically.

When an instrumentalist or vocalist extends his instrument with electronics, he can feel at first as being on the opposite side compared to an acoustic point of view. Even though performers try constantly to push further the limits and boundaries of their instruments, an acoustic instrument still remains strongly limited, for example by physical and acoustic constraints. In the context of free improvisation and contemporary music, trying to extend the limits of the instrument is in fact very common and many developments have already been realized in this domain especially with traditional Western instruments and voices.

In contrast, when thinking of extending instruments and voices with electronics, it seems to be an unlimited area. The whole panel of colors is available for exploration. To some extents, this is almost the opposite perspective than the one of an acoustic instrument. In reality, electronics have also many limitations. Developing a vocabulary and a new musical identity with an electronic extended instrument requires as much work and practice as with any acoustic instrument, and this process encounters many constraints. Going back to the idea of having a whole panel of colors to explore, consequently one has to choose which colors, language, vocabulary, and syntax will be used. In other words, one has to redefine his 'musical identity'.

I initially started to define a certain musical identity as a vocalist/improviser in the acoustic domain. In other words, I developed a certain vocabulary and ways of interacting with other free improvisers. With the integration of electronics, I had to choose which electronic transformations and ways of playing would belong, or be the counterpart, to my acoustic musical identity. Certainly the choice of using certain sounds and electronic processes constitutes an important aspect of one's musical identity. Nonetheless, the timing in which these sounds are placed in a musical context, their articulation, their interaction with other sounds, are undoubtedly very important elements of one's musical identity.

The weight of the readjustments required by the redefinition of my musical identity was significant. This offered me the opportunity to choose to create an electronic musical identity that belongs to my 'acoustic musical identity', or to create a very distinct electronic musical identity that would go in a completely different direction.

The limitations as creative process

From another perspective, an instrumentalist or vocalist working with electronics inevitably encounters certain limitations. Consequently, he often uses existing constellations such as Kyma or already existing Max/MSP patches. To a certain extent, this can be seen as some kind of constraints.

Nonetheless, limitations can offer much potential for creativity. Therefore, these constraints are not necessarily a negative element. They can paradoxically open the doors to freedom and creativity. Without limitation, one could for example experience the 'writer's white page syndrome'. This characterizes the incapacity of a writer to start or continue his work, because he does not know anymore in which direction going since there are too many possibilities. Many writers encounter such blockings and a possible technique for solving this issue is the introduction of rules and constraints.

3.2 The development of the electronic extended voice

It is important to mention that the electronic extended voice is a collaborative project, and that it would not have been possible without the precious help and the technical advices of Johan van Kreij and Lex van den Broek. It is also a project in constant evolution. It has been evolving a lot during the last two years, it is still in development, and it will probably change again in the near future. The next section presents the process of creating this instrument and its evolution until the redaction of this thesis (from September 2010 until April 2012).

The simultaneous exploration of the sound processes and control interfaces

The first step in the development of the electronic extended voice was to explore the possibilities with already existing constellations. At the beginning, I imagined that I would first carry out some experiments with electronic transformations of the voice by the realization of non real time pieces, and afterwards, I would experiment with different control interfaces. In practice, things did not happen this way since all the explorations, whether in terms of sound processes or control interfaces, happen simultaneously. In fact the electronic transformations and the possible control interfaces were explored in parallel. As soon as possible, the results of these experiments were put into practice in non real time domain and in live performances, in order to follow a kind of empiric approach. Practically, studies and short pieces combining the voice and electronic transformations were created, and live pieces and improvisations were performed.

The different steps

a) The realization of studies and short pieces (September 2010 - December 2010)

In the context of this research, my experimentations in a non real time context started with the creation of studies and short pieces combining different vocal techniques with different electronic transformations of the voice.

The first one of these studies was called *Exercices de styles*. It was inspired by the book from Raymond Queneau from the same name, where he retells an apparently unremarkable tale ninety-nine times, employing a variety of styles, ranging from sonnet to mathematical formula. This piece explores different combinations of voice and electronics. It uses the same excerpt of the text by Queneau. This short excerpt is vocalized with twelve different vocal techniques and manipulated with twelve different electronic transformations (pitch shifting, different types of filtering, ring modulation, spectral transformations, granulation processes, phase vocoding, time stretching). The obtained sequences were adjusted in a different order, after having experimented with random orders. I wanted to avoid the 'tension-release relationship' and give to the piece the form of a montage. The final adjustments were made by ear.

The second study was called *Esquisse*. It was inspired by certain compositional approaches of Karel Goeyvaerts (*Sonate for 2 pianos*, *Concerto for 13 instruments*, tape piece *Compositie n°4*). In *Esquisse*, I experimented with a simple system, using twelve different samples of my voice and combining them with twelve different vocal techniques, twelve transformations, twelve durations, four dynamics, according to a matrix that divided statistically these parameters. Seventy-two combinations were obtained. A random generator was used to determinate their placement in a time line within a framework of eight minutes. As a final adjustment, the piece was cut in two, and these two layers were superimposed to obtain more density.

The third study was called *Metallique Esquisse*. The objective of this study was to obtain more contrast in timbre and more randomness. Nine samples (three of voice, three of bells, one of guitar, one of kalimba and one of carillon) were combined with nine electronic transformations. These combinations were determined by a matrix realized using a random generator. This matrix specified the number of parts in which each sample should be divided (there were sixty-seven parts in total), the combinations of the different samples and the different electronics transformations, the length of each of the sixty-seven sections, and their placement in the timeline (within a framework of four minutes). The final adjustments were also made by cutting the piece in two and superposing these two layers. Additionally, a strange melody was integrated in the last section to contrast with the rest of the piece. To a certain extent, it is possible to consider this melody as the introduction of a certain hierarchy in the music. By having certain rhythms, pitches, or types of sound occurring more often than others, it creates a sort of hierarchy, which can be related to the concept of tonality. By introducing a hierarchy, a certain tension-release relationship can be perceived. This helped to create more contrast with the rest of the piece in which all the parameters were statistically divided therefore the tension-release pattern was in principle avoided.

b) The patch *Pot B* (October 2010)

To process my voice in real time I started to use the Max/MSP patch *Pot B* created by Johan van Kreijl. The patch was originally realized for his live piece called *Voices of the Boat* composed in 1997. Since the patch was created for a particular piece and not especially for being part of an augmented instrument to be used in the context of free improvisation, it became necessary at a point to make some readjustments.

The main transformations of the patch *Pot B* are granulation and delay processes. One of the characteristics of granulation processes is that they need a higher degree of control. Although the patch already contained a certain degree of higher control (by having fifteen parameters being separately controllable), this aspect needed to be adjusted in order to reach the flexibility required for a live free improvisation.

c) From the midi controller to the trackpad and the interpolation module (December 2010 - February 2011)

After using a midi controller as control surface (cf. picture 10) from October 2010 until December 2010, a trackpad was used from January 2011 (cf. picture 11).



Picture 10: Nano Kontrol from Korg

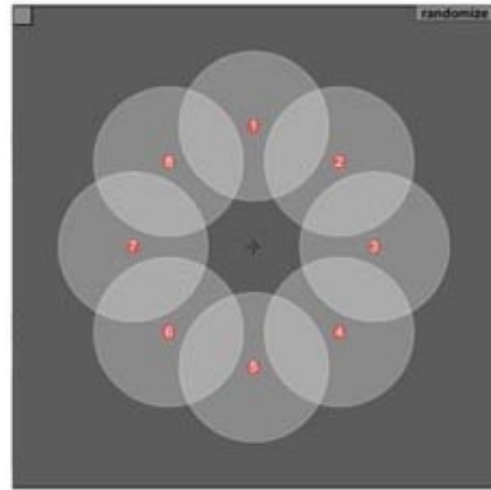


Picture 11: Apple trackpad

At the same time, an important step was realized, when the interpolation module was implemented to the patch *Pot B* (cf. picture 13). With this module, it was possible to interpolate between eight beforehand stored presets of different combinations of the fifteen parameters originally controlling the patch. The interpolation module was linked to the Apple trackpad, which allowed more flexibility than with the previous configuration (cf. pictures 12 and 13).



Picture 12: Apple trackpad



Picture 13: Interpolation module patch *Pot B*

With the use of granulation and delay transformations, the processing of my voice could be perceived as sounding quite textural, or at least more textural than in the acoustic domain. It was less easy for example to 'phrase' in the same way that it was possible acoustically. There were also some fast and delicate gestures that the acoustic voice could do, which were now blurred with the granulation and delay processes. Therefore, new ways of improvising and playing needed to be developed.

For a while I wondered if these processes were the most suitable as being the ones used in the context of free improvisation. They seem to be very far from my acoustic musical identity as a vocalist improviser. In order to find other electronic transformations that would be more suitable, in parallel I continued to experiment with various transformations in the context of fixed media pieces.

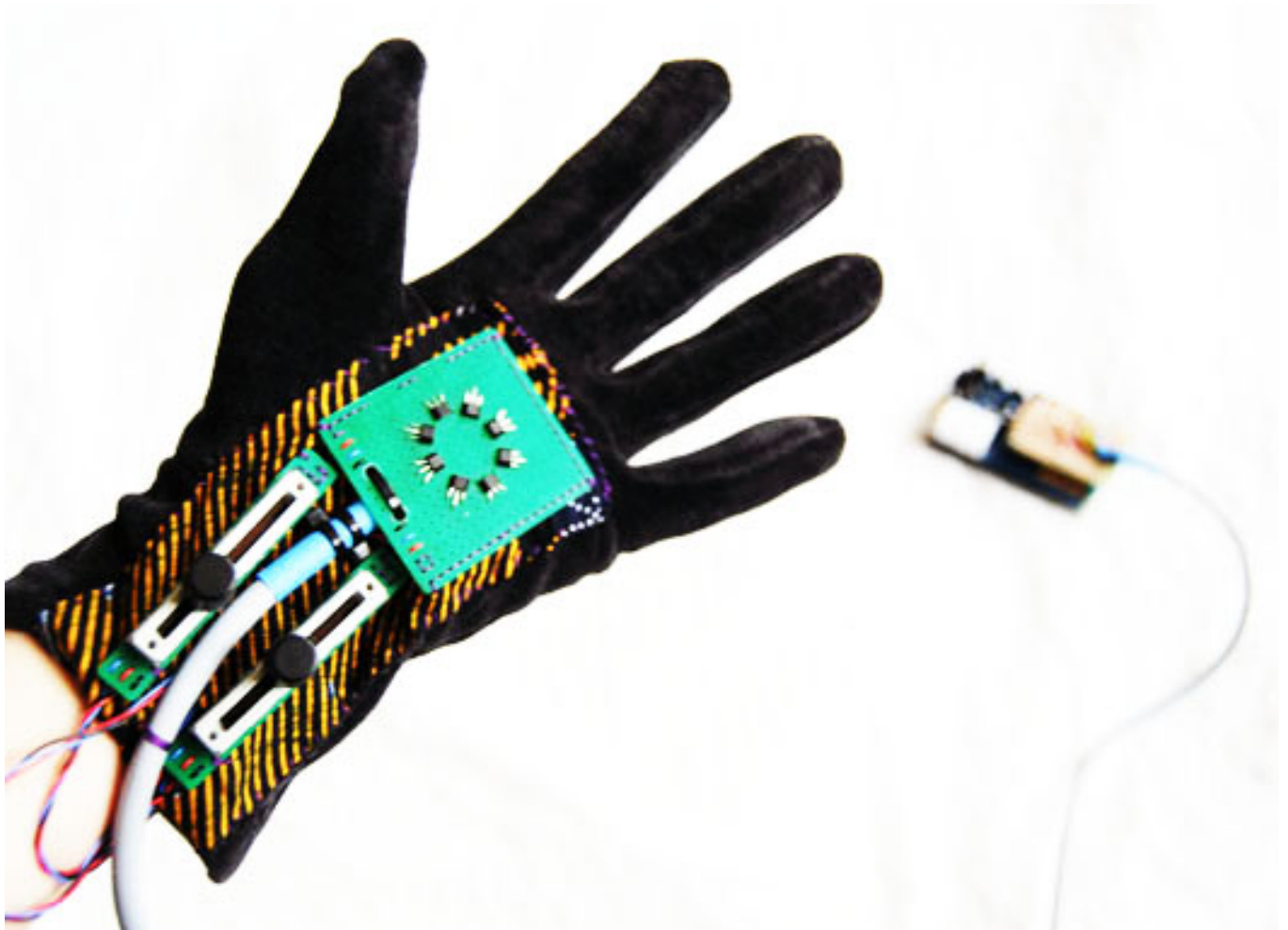
d) The live piece *Duality* (January 2011 - March 2011)

In January 2011 in collaboration with Bjarni Gunnarsson, we started to compose the piece *Duality* for voice and live electronics, which was presented in March 2011 at the Institute of Sonology. This piece included a tape part and a live part performed with the electronic extended voice. At this moment, the electronic extended voice consisted of the patch *Pot B* (for the granulation and delay processes) and the trackpad (as control interface). An interesting aspect of this piece is that the relationships between the voice, its electronics transformations, and the electronically generated materials, were constantly changing during the different sections of the piece.

e) The glove interface version 1 (April 2011)

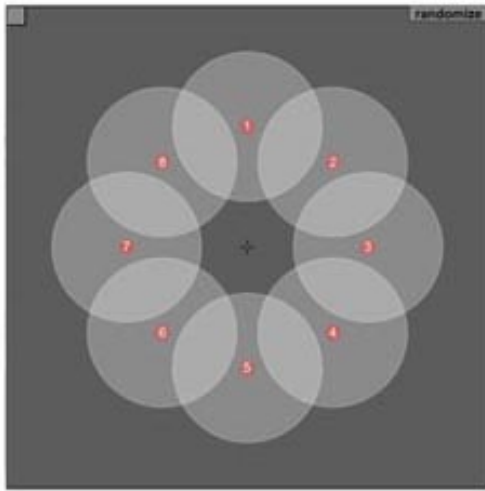
After the performance of *Duality*, an important step was made in the development of the electronic extended voice when the control interface was changed to the glove interface. This glove interface, inspired by the work of Laetitia Sonami, was built with the help of Johan van Kreij and Lex van den Broek. It included eight magnetic field sensors (that translates the data received to the Max/MSP patch via an IpsonCompact) and 2 faders (cf. picture 14). This new control surface allowed me to play and improvise in a more 'organic way' since it was closer to my acoustic voice.

Previously, it was problematic to have to look at the computer screen when improvising. Since the glove interface was more integrated to the body and allowed to play with closed eyes, it became possible to improvise with more flexibility and intuitiveness.

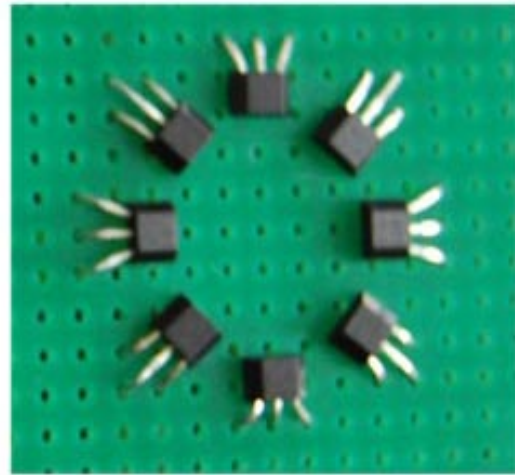


Picture 14: The glove interface version 1 (April 2011)

The eight magnetic field sensors were connected to the eight presets of the interpolation module in the Max/MSP patch, between which it was possible to interpolate (see pictures 15 and 16).



Picture 15: Interpolation module



Picture 16: Magnetic field sensors module

One fader controlled the general volume, and the other fader controlled the mix between the amplified voice and the electronically transformed voice. This last fader, was allowing me to pass quickly from a voice just amplified to a voice electronically transformed, which was an interesting feature since it had the function of a 'bridge' between the acoustic language (that I did not want to completely abandon) and the electronic language (that I was recently developing). This fader was bringing more flexibility in the playing by allowing fast changes between the two sound domains. The mapping strategies of the glove interface in relation to the patch *Pot B* will be explained in more details further in this chapter.

f) The performances of free improvisations with the glove interface (May 2011-March 2012)

Between April 2011 and April 2012, I performed free improvisation with the glove interface on a regular basis and in various configurations. For example I performed in duo with Bjarni Gunnarson (electronics), with Younes Riad (electronics), in trio with Wen Chin Fy (cello) and Mei Yi Lee (percussions), in trio with Milana Zaric (harp) and Yannis Tsirikoglou (electronics), in quartet with Wen Chin Fu (cello), Rodrigo Parejo (flutes) and Nicolau Lafeta (trumpet), and with larger ensembles such as the Sonology Electroacoustic Ensemble (SEE) and the Royal Improvisers Orchestra (RIO).

More recently, in February 2012, with Johan van Kreij (electronics) and Younes Riad (electronics), we played an interesting improvisation. It is possible to listen to it in a stereo version in the CD joined with this thesis (track n°7). In this improvisation, the blend of the different electronic sound worlds and of the different musical identities is particularly successful. Sometimes it is difficult to distinguish who is playing. The interaction between the sounds is also very interesting. A gesture can be started by a performer and instantly (or accidentally) it can be captured and finished by another one. In its larger form, this improvisation is also of interest for its time structure.

The fact that the electronically extended voice did not change for almost one year was an important element. It made it possible to acquire a certain flexibility and fluency in the playing that would not have been achievable if the instrument would have kept changing frequently.

g) The exploration of new possibilities: the creation of a test instrument with the Ipad as a control surface, and the implementation of some other types of electronic transformations without using delay (January -February 2012)

In January 2012, in parallel to the practice with the glove interface and the patch *Pot B*, I started to experiment with an Ipad Touch as control surface for testing other electronic transformations such as ring modulation and different types of distortion. Even if the control of the Ipad Touch is much less refined than the glove interface, it is an interesting way to test new processes. The Ipad Touch is connected to the program Ableton Live via TouchOSC so it is very easy to connect a new electronic process to the control surface. In this way, new processes can be tested in a simulated live situation. If the results are interesting enough, these transformations can be implemented later in a next version of the patch *Pot B* as a new module. The idea was to experiment with other kinds of electronic transformations of the voice (for example without using delay such as distortions and ring modulation) and implement the more successful ones later as a new module of patch *Pot B*.

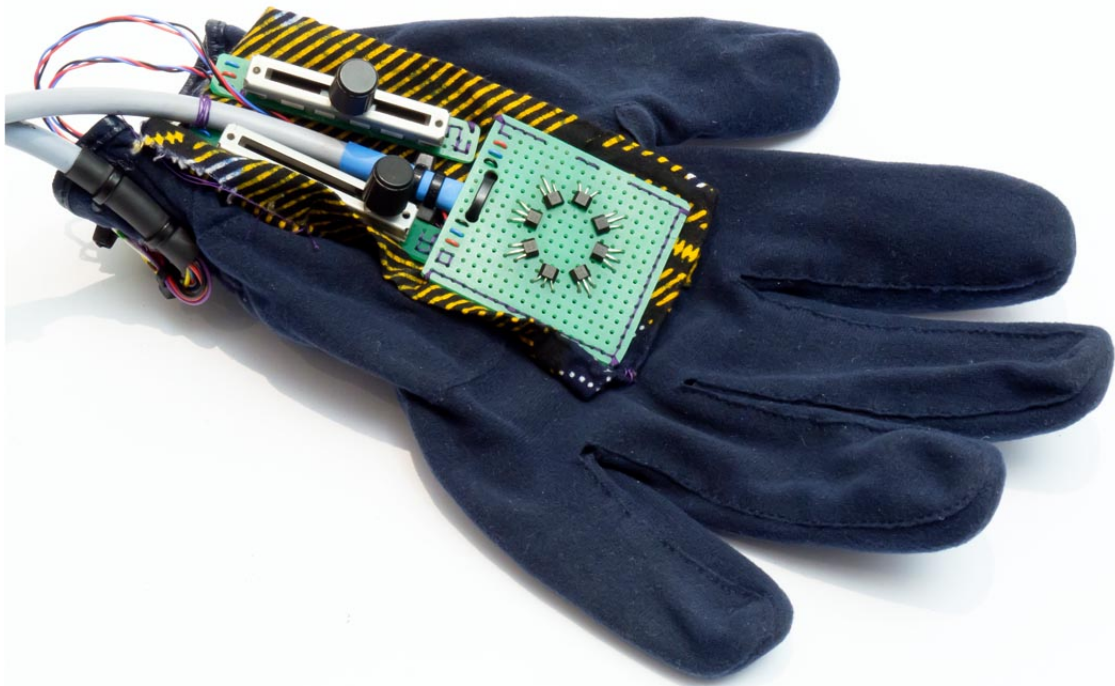
h) The new steps in the development of the control interface: implementations of four flex bending sensors in the glove (April 2012)

In April 2012, four flex bending sensors on the back of the fingers were implemented to the glove interface (cf. picture 17). In order to generate more complex gestures these new sensors will be connected to the patch using multi-parametric mapping strategies.

Multi-parametric mapping strategies allow people to think gesturally, or to mentally rehearse sounds as shapes. (...) A one-to-one mapping strategy often lead to focus on the requirement to mentally break down the sound into separate parameters. (...) Mapping strategies which are not one-to-one, and which utilize a measure of the user's energy under the control of more than one limb (or body part), can be more engaging to users than one-to-one mappings. (Hunt, Marcelo & Wanderley, 2002)

For the same reasons mentioned by Hunt, Marcelo & Wanderley, the implementation of four flex bending sensors in the glove interface will bring more flexibility to my playing by allowing for example to rehearse some 'sound gestures' as 'shapes'. I also think it will be more engaging on a physical level.

This new step is currently in development and the first results will be presented at the Institute of Sonology in June 2012.



Picture 17: The glove interface version 2 (April 2012)

Processes working better in non real time than in real time performance context

In my opinion, certain electronic transformations of the voice, such as pitch shifting, appeared to work better in a non real time context than in live performance. Whether as a singer or as a listener, in a live situation, I often found problematic to hear simultaneously an acoustic voice and its pitch shifted counterpart. Taking away the voice's identity in general is not necessarily a problem, even though it can really denature the voice, but in a live context, pitch shifting is somehow not working in my opinion. However, this needs to be nuanced by the fact that it also depends on how the pitch shifting transformation is applied to the voice: if the live voice is just very slightly pitch shifted, or if the pitch shifting is integrated to an other transformation, such as granulation processes, and used only for a short amount of time, then it can be already less problematic.

In contrast, when a voice is pitch shifted in a fixed media piece, even though it is a radical transformation that denatures the characteristics of the voice, I perceive it as less problematic.

Pitch shifting is a transformation that changes deeply the identity of the voice, in that sense that it removes the 'voice-subject'. The voice is an essential element of the sense of self. Loosing our voice, or not recognizing it as such, is a bit like loosing our self. Furthermore, the voice is such a strong reference, both for the vocalist and for the listener, that taking away the 'voice-subject' can appear to be too much disturbing, especially for the vocalist in the context of a live performance.

Granulation processes

Granulation processes can be defined as the fact of building sounds using small particles, for example between 10 and 100 milliseconds. Some important aspects of granulation that need to be specified include the direction of sample navigation, the speed of navigation, the size of the grains and their density.

The patch *Pot B* allows to control several parameters over various combinations of granulation and delay processes. There are certain advantages and disadvantages of using granulation processes. In terms of advantages, the granulation processes make it possible for example to sustain a sound eternally. The sound result can also blend very nicely with other electronics sounds and with acoustic instruments, so it can easily function as a bridge between acoustic and electronic sound domains. Additionally, granulation processes lend themselves for experimentation with compositional methods, due to the relative lack of acoustic limitations. Some people even say that "granulation processes always sound good whatever you do".

In terms of disadvantages, one could mention that occasionally granulation processes can blur the fine articulation of the voice. It also becomes more difficult to phrase. Furthermore, we know what granular processes sounds like: to a certain extent, granular processes always sounds similar, so it raises the question of the musical identity of the performer.

Despite the recognition of the personal timbre of the voice, which might be preserved to a certain extent, I believe that what constitutes the musical identity of a performer using voice with granulation processes has to do with the vocabulary and the musical gestures developed by the vocalist (i.e. the timing, articulation, ways of interacting, etc.).

With granulation processes, the voice remains generally recognizable as coming from vocal material (i.e. the 'voice grain' remains present). However, as soon as pitch shifting and pitch deviation are added to the process, it becomes more difficult to recognize the sound result as coming from vocal material. It takes away not only the 'voice-subject', but also the 'voice-grain'.

Concerning the intelligibility of speech, it gets rapidly lost. In fact, as soon that the position of the deviation changes or the density of the grain gets more sparse, it becomes difficult to understand the words. On the other hand, this emphasizes the phonetic character of the words by magnifying the acoustic properties of their syllables or letters. This aspect of the granulation processes can be related to the piece *Thema-Omaggio a Joyce* by Berio (cf. chapter 2).

The issue of articulation

Considering articulation as a mean of distinguishing things, we can say that the voice is a flexible instrument that allows, already in the acoustic level, a high degree of articulation. Julio Estrada (2004) tell us that “the voice can become an organic instrument capable of modulating all manner of articulations to the limit and of following the capricious dictates of fantasy.”

In fact, electronic transformations can articulate the voice in a complete different manner. One can argue that the fine structure of the articulation of the voice could be somehow diminished for example by putting the voice in a granulation process. Maybe there are some situations where this is not true, however in this case one could start from the premise that this is a fair assumption. Nonetheless, even though the fine structure of the articulation of the voice could be somehow diminished, there are certain advantages to use such granulation processes. However, if one wants to capture this ‘fine articulation of the voice’ or to preserve it with the processing, one might have to look at some other kind of processes.

Occasionally making the processes occur at a different timing is indeed a kind of articulation. Sometimes it is even an advantage because in a real time situation, the original sound could mask the processing or the processing could mask the original sound, depending on what their amplitude relationships were. So having this time distinction can be an appropriate way to deal with this issue.

One could say that this issue of articulation is a very fundamental one for a performer dealing with electronics, because with certain kinds of processing, things become more general, and this could reduce certain features of the articulation of the original sound. With granulation processes, there is still something of the articulation structure that remains. For example, if one introduces some silences, those silences could be interpreted as a way or articulating, and the silences will be preserve by the granulation processes. In Kyma, there is a transformation that allows separating the unvoiced sounds from the voiced sounds. It is very interesting to use this process with speech because the result is focused on the consonants and their phonetic qualities. This could be considered as focusing on a certain aspect of the articulation of speech. This is a way to emphasize the articulation, but on the other hand, this has serious consequences for the sound.

If we think of general categories of processing, any kind of processing is going to have an influence on the articulation. For example granulation, which affects the time resolution, obviously also affects the articulation. Ring modulation, which affects the frequency aspect a lot, can also affect an important part of the articulation. Filtering processes or convolution, which also affects the frequency content, have also an impact on the articulation. All kind of electronic processes are going in a certain way to either emphasize certain aspects of the input, and may blur some aspects of the articulation or maybe just pick up on parts of them. There are also some filters where it is only necessary to give an impulse as an input, and the sound result is very noisy, chaotic and loud, so in that case the articulation is hardly more than a trigger.

With granulation processes, the direct sensitivity of playing a violin, a piano, or using a voice, is a bit lost. There are still some articulation possibilities, but there is a distance to the instrument. For someone who is used to hear an immediate result of his actions in his instrument, and who is using a more intuitive control, this change might be quite destabilizing.

If we consider phrasing to be a form of articulation, one could achieve phrasing in very different ways. Phrasing could be interpreted in the sense that every now and then there will need to be pauses. For example an instrumentalist taking a breath could reflect a certain amount of phrasing. Separating certain sections of an electronic composition by having a rest is also a possibility of introducing phrasing. Silence is in fact an efficient way to articulate things.

The mapping strategies of the glove (April 2011 - March 2012)

Until March 2012, the glove consisted of eight magnetic field sensors connected to the 'interpolation module' (which interpolates between eight different presets of the patch *Pot B*) and two faders that control the mix between acoustic and processed voice, and the general output volume. The data received from the glove were translated and sent to the Max/MSP patch via an IpsonCompact, created by Lex van den Broek (cf. figure 4).

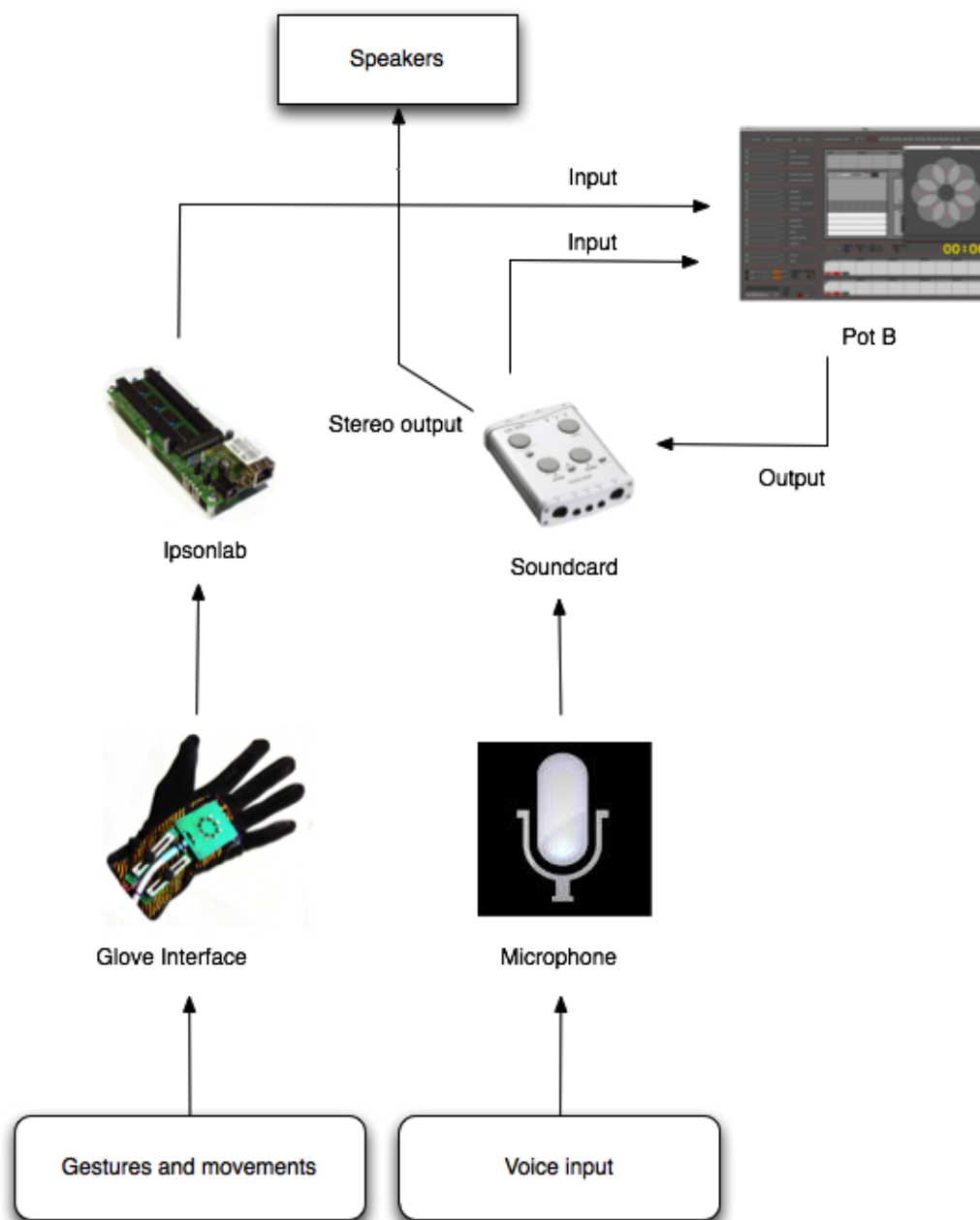


Figure 4: The setup of the electronic extended voice (Guilleray, 2011)

The mapping strategy of the glove interface is a combination of a ‘one-to-one’ relation for the faders and a ‘few-to-many’ relation for the interpolation module in connection with the parameters in the patch *Pot B*. One fader is controlling the general output volume. The other fader controls the mix between the acoustic voice and the processed voice. The two faders work with a one-to-one relation in the sense that when we move one fader it changes one thing, for example the amplitude of the output. The interpolation module works either with a one-to-many or a few-to-many relation in connection with the parameters in the patch *Pot B*. A magnet is taped on a finger of the right hand. When I approach this magnet from one of the magnetic field sensors of the left hand, the fifteen parameters of the patch go to the position stored with the preset corresponding to this magnetic field sensor (one-to-many relation). If the magnet is placed in between two magnetic field sensors, then these two magnetic field sensors are receiving some information. The parameters of the patch will be interpolated somewhere between the two presets corresponding to the magnetic field sensors (few-to-many relation). In the first case, the relation between the control interface and the parameters of the max patch is a one-to-many relation. On the second case, it is a few-to-many relation. In each case, the presets control the position of fifteen parameters within the patch, which is of course a significant advantage when we want to improvise with granulation processes. Granulations processes call for a higher degree of control. The system of the interpolation module and its eight presets allow the performer to play with more flexibility since he does not have to think of all the parameters that are changing simultaneously. Thereby it is possible to have a more playful and intuitive approach, closer to an acoustic instrument.

One interesting discovery in the development of this instrument is that at the beginning I was often disturbed by the fact that I had to do the ‘envelope follower’ manually. This was realized either by moving the general output volume fader proportionally with the volume of my acoustic voice, or by letting this volume fader set at the maximum position, and moving the other fader controlling the mix between acoustic and processed voice. In this last case, to stop the processing, the position of this fader needed to be set completely on the acoustic part (so there would be no processing but the voice would still be amplified). This ‘manual envelope follower function’ reminded me somehow of the accidental theremin, which required constant movement from the user to produce sound: “because of the need to keep moving, it felt as if your own energy was directly responsible for the sound”. This emphasis “the psychological effect on the human player of engagement with an instrument”. (Hunt, Marcelo & Wanderley, 2002)

In April 2012 the glove was implemented with four flex bending sensors on the back of the fingers. These sensors will be now connected to the patch using multi-parametric mapping strategies. This multi-parametric mapping strategy can allow gestures to become sounds. With this implementation, it should be possible to achieve more complex sound gestures, and rehearse sounds as shapes. Furthermore, it should be possible to be more engaged on a physical level.

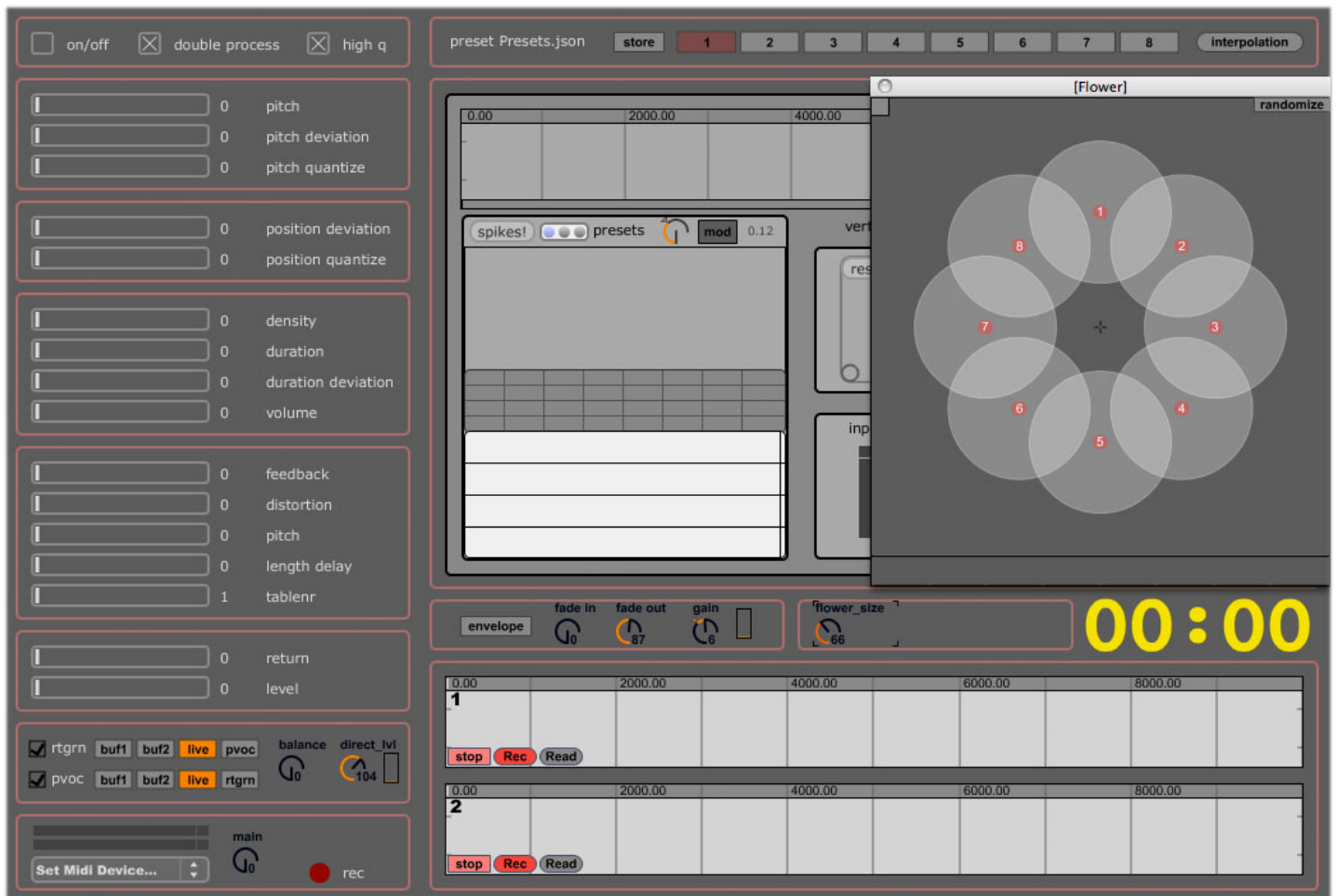
Explanation of the patch *Pot B*

As mentioned previously, the patch *Pot B* was created by Johan van Kreij and it is available on his website as a standalone application: <http://www.jvkr.nl/home/Download.html>

The following description is based on a conversation in which Johan van Kreij explained the basic functioning of Pot B.

The patch *Pot B* (cf. picture 18) comprises different processes. The original version of the patch is articulated around two main processes dedicated to granulation and delay. During this research, the patch has been expanded to include other different processes and some new abstractions. In March 2012, the patch comprised additionally a phase vocoding module, two buffers, an interpolation module and a clock. Generally, in a live performance situation, I use mainly the processes dedicated to granulation and delay, together with the interpolation module.

Picture 18: The Max/MSP patch *Pot B*



The granulation and delay processes of the patch

1) Pitch

Three faders control the pitch parameters: pitch value, pitch deviation, and pitch quantization. When the pitch value is set to the value 60, it means that the grain is read at its original note value. The values are divided in half tone pitch steps, so 72 would be an octave higher. The pitch deviation adds a random offset to the pitch, thereby deviating randomly each grain within a certain range around the central pitch. The closer the pitch deviation value is to zero, the more the sound result becomes a cloud of detuned sounds. The pitch quantization is rounding those pitch values by steps towards a harmonic overtone series. This harmonic overtone series is obtained only when the parameter is set to the maximum, which is at the value 127, otherwise it is an inharmonic series. The quantization can be seen as a kind of grid over the pitch deviation that allows the possibilities of chosen pitches. At a certain point, the combination of pitch deviation and pitch quantization are translated to speed values, 60 being original speed (translated as speed 1), the value 48 being half the original speed (translated as speed 0.5). So the pitch quantization takes place on the speed values.

2) Position

The pitch grains are read from a delay line, in which the material feeds. If the position deviation is set to zero, it means that all grains are read or taken from the beginning point of the delay, this beginning point of the delay being 'right now'. All the grains overlap in the sense that they read the material as it is being put into the delay line right now. As soon as the position deviation moves, we start to hear some blurriness, which could sound like a phasing effect, so it means that the grains do not only read the now moment but a bit more for example the last 100 milliseconds. With live input is quite easy to hear. At some point it becomes discrete so it is not anymore like a phasing effect but we hear twice the same event. So the bigger the value is, the more difficult it is to hear what is the 'now moment' because the more it blurs things in time. The position quantization is making a grid of steps. When the position quantization is set to zero, there is no grid. As soon as we start to move the position quantization a little, a grid of very small steps appears. The steps become larger and larger when the value rises, until there are only few discrete steps and we hear the sound from three discrete places of the delay line.

3) Density and duration

Concerning the density, when the value is high it means that there will be a low density, so there will be a lot of time before the next grain appear; and when the value gets lower, this amount of time before starting the next grain becomes smaller, so density becomes higher. The duration parameter determines the duration of the grain. The duration deviation is a kind of randomization of the duration of the grains: some are long and some are short. The volume parameter randomizes the volume of each grain, from equal maximum volume to various kind of volume.

4) Feedback and distortion (cf. figure 5)

This is a separate process. It is also based on a delay line, and that delay line can feedback into itself. So there are actually two processes going on simultaneously, and the second one is based on the five faders: feedback, distortion, pitch, length delay, table number. If we consider the granulator process to be process A, then it is controlled by the first nine parameters on the left side of the patch, from pitch until volume and goes out on the loudspeaker directly. However the result of this process feeds also into a second process, process B, which is a feedback delay or tap delay. This delay has actually a build in ring modulator, called distortion, and it is possible to set the pitch of that distortion, the length of the delay. The table number changes the signal with which the ring modulation is realized. There are five versions of this signal, all of them being a mixture of overtone sine waves. The output of process B does not go directly into the loudspeaker but feeds into a variation of process A (A'). This process is controlled with exactly the same settings as the first granulator process, apart from the pitch value, pitch deviation and pitch quantization. Pitch transformation is omitted in order to avoid the build up of certain pitch relationships. The process A (granulator) is done separately for each channel (channel 1 and channel 2) so there are two A processes, but they share one process B. The return parameter has to do with the input signal which is actually a cross fader that allows to crossfade between, for instance, the input and the returned signal. If the position of this fader is set to the value 60, then we will hear the input sound but the output sound will keep feeding back for quite a long time, and if the feedback distortion of set to a high level, this can actually build up to a level which is too loud.

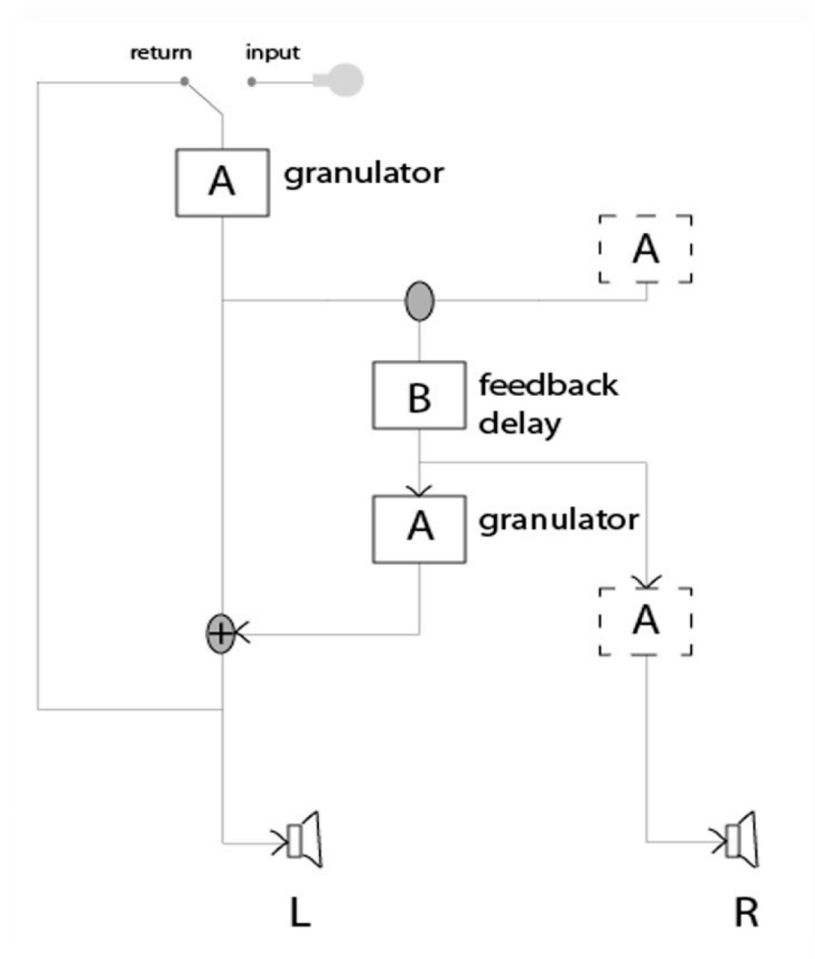


Figure 5: The different processes of the patch *Pot B* (Kreij, 2012)

4 Pieces and improvisations

4.1 Free improvisation

Free improvisation represents one of the most interesting and stimulating ways of creating music nowadays. It relies on the creativity of several improvisers or 'instant composers'. It often challenges our limits, technically, musically, and even spiritually. When playing free improvisation, the improvisers share the responsibility of creating the music together at that very moment. This is something challenging and at the same time very inspiring. It is never for granted, and it represents a very intense experience, which I am passionate about.

It is a different experience to play free improvisation in a solo context, in small groups (for example between two and five performers) and with larger ensembles. During the last two years, the part of my research devoted to the domain of free improvisation was focused, among other things, on exploring the possibilities of uncommon instrumentations, on combining acoustic and electronic sound domains and on finding ways to extend my vocal language with the incorporation of electronics.

During the last years, I had the opportunity to work with fantastic improvisers by forming groups of varying size, instrumentation and line-up. This flexible format ranges from duets, quartets, to bigger ensembles, and from purely acoustic (not even amplified) to electroacoustic ensembles. When playing free improvisation, points of focus can vary a lot depending on the musical context. For example, playing an acoustic solo can generate a different focus than playing with a large electroacoustic ensemble of fifteen improvisers.

As explained in the third chapter, the redefinition of my musical identity as a vocalist improviser using electronics was necessary. Until recently, the acoustic and electronic sound domains generated distinct ways of playing. For instance the use of phrases and certain types of articulations of the voice was more common in the acoustic context. In contrast, the use of textural materials, as results of the granulation processes, was more recurrent in the electronic sound domain. However, this is something that might change in the coming months since new elements will be introduced in my electronic vocabulary, such as fragmented and phrased articulations.

Currently the areas of exploration also differ in the general domain of free improvisation and in the specific situation of free improvisation with the electronic extended voice.

Concerning free improvisation in general, whether it is with small groups or with large ensembles, a current point of focus is the emphasis on strong and clear musical propositions. It does not mean necessarily playing loud or phrasing, it can be playing soft or being silent. It does not mean neither being theatrical or exuberant, but it should be focused, engaged and 'inhabited'. In other words, what is expressed musically must be important.

Concerning the material, another aim is to contribute to the music with some material that the partners in the improvisation can interact with. This includes to not play textural sounds all the time, and to propose occasionally certain sounds with clear contours and shapes. For instance, it is essential that a textural material can potentially develop into something more articulated and eventually in a solo. This can be challenging to achieve with granular processes since they can have the tendency to sound textural and it might be more difficult to phrase with them. In fact, finding solutions to develop a certain kind of phrasing and articulation using granular processes is one of the objectives of the project.

Other points of interest are the creation of contrast, counterpoint, and the exploration of the possible relationships between the different instruments involved in the improvisation.

The search for instability, chaos, confronting situations and unpredictability, remains also an important part of my exploration. Creating the conditions for the realization of abrupt cuts could be a way to bring more unpredictability and give opportunities for the music to change rapidly, which is often more difficult to achieve with improvisation than with written music. With abrupt cuts, improvisers could stop playing, start something new, or simply develop further what they were playing. The occasions of short or percussive sounds, of an end or a beginning of a sound material, can be grasped to stop, start, or develop musical materials in a different way. This represents an example of solution to achieve these abrupt cuts, which are very refreshing for the music and can open the improvisation towards unexplored areas.

Staying out of the comfort zone and finding solutions in challenging situations are other important aspects of my research, especially since the expansion of the boundaries of the instruments and of the ways of playing are at the center of the approach.

Exploring different ways to build up and cut off tension, to maintain a musical intensity, represent other objectives to be incorporated when improvising.

To conclude about free improvisation in general, a certain point needs to be clarified. In free improvisation, it seems that as soon as a kind of rule is elaborated, as being something that would make the music works, there is always a new element that arises to contradict this rule. Thereby, the present section is not attempting to elaborate guidelines about how to make an improvisation work. It needs to be approached as a proposition of different interesting aspects concerning improvised music, with all the subjectivity that this implies. In other words, this section should be approached as much as an account of a personal experience than as an area open for discussion.

Concerning the specific situation of free improvisation with voice and electronics, one of the principal objectives is to create the conditions for the electronic voice to be as fluent and flexible as the acoustic voice. The possibilities of creating bridges between the acoustic and the electronic sound domains and the expansion of the boundaries of the voice are primarily investigated. Playing with the ambiguity of the recognition of voice by making it less obvious is another point of interest. Furthermore, certain sonorities of the voice and certain phonetic aspects of the words and texts are explored.

Another point of interest is to find a balance in the physical level of using the voice, between the physical tension and its release. In fact, particular ways of using the voice and certain extended vocal techniques can be very demanding physically. Working with electronics can help to solve some of these issues. For example with electronics it can become easier physically to sing loud or very high for a long time. A particular short event, which can be difficult to repeat for a long time acoustically, can also become easier to produce with electronic manipulations.

For the last two years, improvising as much as possible with the electronic extended voice was of a major importance for the practical part of this research. However, during the first elaboration phase of the instrument, from September 2010 until April 2011, it was more challenging to improvise with the electronic extended voice because it was constantly changing. In fact it was not really possible to react fast because there was no sufficient control over the instrument. Free improvisation requires occasionally fast reactions. Before the implementation of the glove interface, the level of precision, flexibility and rapidity in my playing was not sufficient. From the implementation of the glove interface in April 2011 until March 2012, the electronic extended voice did not change. This allowed me to build a certain practice and knowledge of the instrument with which it was possible to improvise.

Since April 2011, I often improvised with the electronic extended voice, especially in the context of the Sonology Electroacoustic Ensemble directed by Richard Barrett, and also in some other contexts such as duos, trios and small groups. Currently the glove interface is still evolving and a duo improvisation with Younes Riad (electronics) will be presented at the Institute of Sonology in June 2012.

4.2 Live electronics pieces

During the last two years, in parallel of researching, composing, and improvising, I have been also performing pieces for voice and electronics. This gave me the opportunity to encounter very different performance situations and configurations of pieces combining voice and electronics. This section discusses certain performative aspects of the live pieces that I encountered recently, pointing out in particular, how certain practical configurations can influence the interaction between the live voice and the electronics.

The musicians performing modern music with electronics are occasionally perceived as being a bit 'lost' in front of the electronic medium, and as not knowing yet how to 'musicalize' these electronic sounds or how to interact with them. I actually believe that a lot of musicians nowadays are not so disoriented in front of the electronic medium and they are finding creative solutions to respond and interact with it, whether the electronics are fixed on tape or realized in real time. Furthermore, the idea that it would be more difficult for an interpreter to relate with fixed electronic sounds on tape than with real time electronic transformations, needs to be nuanced. In fact, certain performers can interact beautifully with electronic sounds fixed on tape, and in contrast, some others might not know "if the electronic part is working or not", even though the electronics are realized in real time, because for example these performers might be too busy playing their instrumental part.

For the purpose of interacting with electronics when performing pieces combining voice and electronics, my strategy has been so far to perform this kind of pieces as much as possible and to adapt to each situation and configuration, which is often different in terms of set up, notation, vocal part and electronic part. Each case is approached with as much flexibility as possible. The idea is to interact with the electronic part, as being a partner, a double, an extension, etc. In the dialectic axis from the fusion to the coexistence, many different relationships between the voice and the electronics are possible, but the main idea is to 'relate'.

Regarding the preparative work towards the rehearsals and performances, even though a strict methodology has not been developed, there are certain elements which reoccurred in my preparation. The electronics are often notated or represented in different ways according to each piece. Very often a representation of the electronic part is added on the score or a new score is created. It is useful also to listen to different versions of the piece, and to analyze them by ear. Integrating the electronic dimension of the piece is essential. If the piece requires a Max/MSP patch or a SuperCollider application, these elements are included in the practice as soon as possible, in order to rehearse the piece with its complete dimension. A research is carried out about the realization of the electronic sounds, their functions and their relationships with the other sounds of the piece. The context in which the piece has been created is also investigated (i.e. the reasons that motivated the creation of the piece, the circumstances including the socio-political context, the potential audience, and the particular aspects that the composer wanted to achieve or explore).

Regarding the different configurations of live pieces combining voice and electronics, certain pieces performed recently will be described and discussed through the particular angle of the influence of their practical configurations on the interaction between the live voice and the electronics. This interaction between the live voice and the electronics can in fact be facilitated or disturbed depending on certain practical elements. Finally, the live piece *Duality* will be analyzed in more details.

4.2.1 In other words

In other words (2009) 9'

for voice and live electronics

composed by Robert Blatt, performed by Marie Guilleray

In other words (for voice and live electronics) was composed by Robert Blatt in 2009 and performed in September 2009 at the Royal Conservatory of The Hague for the First Year Festival 2009. The text is taken from *Les Mots et les choses* by Michel Foucault. There are three different excerpts used throughout the whole of the piece. These lines are from a passage where Foucault is analyzing a painting by Diego Velázquez. "By doing so, he finds himself confronted with the incompleteness of language's ability to describe what is represented purely within a visual domain. A painting resides in what we see. It never resides in what we say" (Robert Blatt, 2009). In this piece, Robert Blatt attempts "to transfer the contrasting relationship between language and vision to language and hearing". He wants to "create an atmosphere along the border of comprehensibility and incomprehensibility, where words are understood as either carriers of language or sound, or where words have meaning or meaning becomes lost". (Robert Blatt, 2009)

In this piece, the live voice was processed with a Supercollider application realized by Robert Blatt. The main electronic transformations of the voice consisted in phase-vocoding, time-stretching techniques, and distortions processes. The results of these manipulations were layered at different points in the piece to create counterpoint. The score included the notation of a traditional vocal part and the numbering of some electronic 'events'. These 'events' had the function to either record new vocal material, stop recording and process the vocal material, or play back the processed material. The vocalist triggered each electronic 'events' manually by clicking at the right moment on the SuperCollider interface while singing. The composer was by the mixer to adjust the levels and equalize the output.

A lot of freedom was given in terms of dramaturgy and expression, which added another dimension to the piece. Furthermore, it was very interesting to hear the voice getting more and more altered during the course of the piece, ending with some quite radical transformations and consequently taking away the 'voice-subject', the 'voice-meaning' and even the 'voice-grain'.

Even though the electronic transformations of the voice were realized in real time, the interaction between the live voice and the electronics was perhaps not the most successful in this performance. Being simultaneously singing and triggering the electronics transformations with an unfamiliar computer interface was challenging. For instance if by mistake, I had triggered a next 'event' too fast or at the wrong moment, it was not possible to correct it, so this would have had some important consequences for the music and for the performance. It is possible to imagine that if the control interface had been the glove interface that I am currently using, probably it would have been easier to interact with the electronics. However, at the moment of the performance of the piece, in September 2009, the glove interface was not created yet.

In May 2011, I performed another piece by Robert Blatt that he composed in close collaboration with me. This piece was also for voice and live electronics and it was called *Glossolalia*. For the performance of *Glossolalia*, certain practical aspects were adjusted, making it possible to concentrate entirely on the singing and not having to control the electronic transformations of the voice. Regarding the issue of the interaction between the live voice and the electronics, *Glossolalia* was more successful, and my hypothesis is that it has to do with the fact that in *Glossolalia*, I could concentrate better on this relationship, while in the case of *In other words* it was more difficult because I had other priorities such as controlling the electronic transformations while singing.

Trevor Wishart confirms this issue in *Audible Design*:

For the performer he/she is performing on a new instrument which is composed of the complete system acoustic-instrument-plus electronic-network. Any new instrument takes time to master. Hence there is a danger that a piece for electronically processed instrument will fall short of our musical expectations because no matter how good the performer, his or her mastery of the new system is unlikely to match his or her mastery of the acoustic instrument *alone* with the centuries of performance practice which it arises. There is a danger that electronic extension may lead to music trivialization. Because success in this sphere depends on marriage of good instrument design and evolving performance practice, it takes time! From this perspective it might be best to establish a number of sophisticated electronic-extension-archetypes which performers could, in time, learn to master as a repertoire for these new instruments develops. (Wishart, 1994, p.8)

An interesting experiment would be to perform again these two pieces (*In other words* and *Glossolalia*) with the glove interface of the electronic extended voice.

4.2.2 Calais Jungle

Calais Jungle (May 2010) 8'

for voice and live electronics

composed by Marie Guilleray, performed by Marie Guilleray (voice) and Johan van Kreij (live electronics)

Calais Jungle is a piece for voice, tape, and live electronics, composed between October 2009 and May 2010. Originally a tape piece, it became a live piece, presented in May 2010 at the Royal Conservatory of The Hague. The live version of the piece was realized with the help of Johan van Kreij. The piece refers to an event that happened in France in September 2009, where the Calais refugee camp known as 'the Jungle' was razed to the ground after hundreds of French riot police moved in and cleared out residents hoping to smuggle themselves into Britain. The piece deals with the contrasting relationship between our 'everyday life' and the atmosphere of 'Calais jungle', a tense atmosphere, a state of emergency. The text is an excerpt from *L'Impossible retour* by Henry Michaux.

In *Calais Jungle*, a voice part, a tape part and a live electronic part, coexist. The tape part was created in an intuitive manner, by manipulating voice materials, kitchen sounds and field recordings. The general structure of the piece consists in an evolving alternation between two sound worlds: one symbolizing 'Calais Jungle' and the other symbolizing the 'everyday life'. During the course of the piece, the 'everyday life' sections become more intrusive, longer and predominant, until they finish by taking over the 'Calais Jungle' sections. The sections representing the 'everyday life' are more noisy and fragmented. They include fast and short vocal sounds, kitchen samples, games and television sounds. The sections representing 'Calais jungle' contain field recordings, long continuous vocal and electronic sounds with slow movements, and sparsely, shorter vocal sounds and whispered excerpts of the text by Henry Michaux, which become more fragmented, altered and incomprehensible during the course of the piece.

During the performance of the piece, the interaction between the live voice and the live electronics added an important dimension to the piece. For instance, in the beginning, a continuous vocal tone was recorded, phased vocoded, frozen, and played back, which allowed the live voice to interact with it by singing tones moving slowly around the processed voice. This continuous vocal texture recreated in real time the tension of the atmosphere of 'Calais Jungle'. In the course of the piece, the different tape parts and other live electronics processes were triggered and operated by Johan van Kreij using Max/MSP.

Although the piece remains rather abstract, the main idea was not to explore a particular set of relationships between the voice and the electronics, but to find a way of expressing the urgency and the drama of the situation of 'Calais Jungle'. The refugees, coming for most of them all the way from Afghanistan with dreams of a better life in England, were taken away from France in very bad conditions. This unsustainable, and yet more and more current situation, fell almost into complete indifference. This piece is a tribute to the refugees and denounces the indifference that this event received from the public opinion.

Regarding the main idea of the piece, the live performance was successful. The flexibility of the relation between the live voice and the live electronics, generated by the interaction between the two performers (one on stage and one by the mixer), created an intensity allowing the tension and the contrast between 'Calais Jungle' and the 'everyday life' to take their complete dimension. In other words, the success of the live performance aspects intensified significantly the 'message' of the piece.

4.2.3 In Between

In Between (October 2010) 15'

for voice, gongs, and live electronics

composed and performed by Marie Guilleray and Bjarni Gunnarsson

In Between is a live piece for computer, voice and gongs, composed with Bjarni Gunnarsson. It was performed in October 2010 at the Villa Ockenburgh in The Hague. The piece is inspired by the way the resonances can connect together, disturb each other, and create some new sonic and imaginary environments. The main idea consists of a pure tone that gives birth to some other and more complex acoustic experiences, inviting both the performer and the listener to participate in these different perceptions. *In Between* is the path taken from and towards stable points, and examines what happens in the more chaotic states between these two. This could be understood as a parallel world where the listener can witness how a simple sound can evoke images of places, explosions, sounds from nature, or represent a mirror of the performer's sound world.

In this piece there were three main relationships between the acoustic and electronic elements: the fusion (an intimate mix between the two dimensions, a complete integration or even a dissolution of a sound world into the other), the double (the duplicate, the replica, or even the substitution from a dimension to another), and the coexistence (the concomitance or simultaneity of very different elements).

The vocal part and the gongs were performed acoustically. Bjarni Gunnarsson performed the tape and the live electronics parts. The interaction between the acoustic and the electronic elements was rather successful, even though the voice and the gongs were not amplified. It is important to mention that the space where the piece was performed was quite reverberant, which made the acoustic instruments resonate longer and blend with the electronics, diffused by two small speakers. Although the live electronic part was not recording in real time the acoustic voice and the gongs in order to transform them, the tape part contained these elements. Consequently, there was not a big gap in timbre between the acoustic voice and gongs and their counterparts on tape. Other electronic sounds included transformations of field recordings (recorded together in Iceland in August 2010) and electronically generated sounds realized by Bjarni Gunnarsson.

It was surprising to realize that the interaction between the acoustic and the electronic elements was so successful. This proved that the success of the interaction between the acoustic and the electronic dimensions does not depend only on elements such as amplification or real time transformations. The diffusion and performance of the electronics, in addition with the involvement of the acoustic and

electronic performers, are essential components determining the success of the interaction between the two dimensions. It is true that generally amplification of an acoustic sound can help to make it blend with the electronic dimension. However, in the context of this performance with a small reverberant space and a simple electronic set up, the acoustic and electronic dimensions were relating well without amplification.

A recording of *In Between* (performed in October 2010 at the Villa Ockenburgh in The Hague) can be heard as documentation on the CD joined to this thesis (track n°6).

4.2.4 La Fabbrica Illuminata

La Fabbrica Illuminata (1964) 17'

for voice and tape

composed by Luigi Nono, performed by Marie Guilleray (voice) and Kees Tazelaar (electronics)

La Fabbrica Illuminata was composed by Luigi Nono in 1964. Although the piece does not include a live electronic part in the sense of real time electronic transformations of the voice, it remains a live piece combining voice and electronics on tape, and it represents a particular configuration of voice and electronics which is interesting to discuss in this section.

The piece was performed together with Kees Tazelaar (electronics) in December 2011 at the Institute of Sonology in The Hague. The live diffusion of the electronics on tape intensified considerably the message of the piece, its performance, and its listening experience.

Regarding the preparatory work towards the rehearsals and performances, the study of the score published by Ricordi Milan Editions raised some questions. Despite the difficulty of following the hand writing of Luigi Nono, the durations and times mentioned in the original score appeared to be quite different from the ones of the electronic tape part provided by the Institute of Sonology and from the ones of the recorded performance of the piece with the live voice of Carla Henius. As a consequence, certain decisions concerning the durations had to be taken in order to combine these three different sources, which were not necessarily giving concordant information. These adjustments were crystallized into a new version of the score.

The electronics on tape took their complete dimension during the rehearsal and the performance of the piece in Arnold Schoenbergzaal at the Royal Conservatory when Kees Tazelaar diffused and performed the electronic part. The main reason was not the hall, even though of course the Arnold Schoenbergzaal of the Royal Conservatory is a bigger and more reverberant space than the studio where the piece was rehearsed before. What was more significant was that until then, when rehearsing, the tape part was played in a 'flat' way, and consequently it was more difficult somehow to relate with the electronics. The live diffusion of the electronics on tape intensified considerably the experience and the message of the piece. The interaction with the electronics took a broader dimension. This confirmed me that in a live performance context with an interpreter, fixed sounds on a tape are not necessarily more difficult to interact with. As experienced in this case, the interaction with electronic sounds fixed on tape can be very alive.

Occasionally certain performers complain about the restriction of having to perform together with fixed sounds on tape. To a certain extent, it is understandable that a fixed tape can give the impression of a lack of flexibility. However, one can argue that it is perhaps a prejudice, and it would be worth to explore new ways of interacting with fixed sounds on tape. Good diffusion and performance of the tape part are in fact essential in order to allow the relation between the tape and the live acoustic instrument to evolve.

4.2.5 Duality

Duality (March 2011) 11'

for voice, live electronics and tape

composed and performed by Marie Guilleray and Bjarni Gunnarsson

Duality is a piece for voice, live electronics and tape, composed together with Bjarni Gunnarsson and presented at the Institute of Sonology in March 2011. The piece is based on the process of hypnosis and the theory of the hidden observer as discovered by Ernest Hilgard. The question of a divided consciousness inspired the unfolding of this piece where multiple controls in human thought and action operate at the same time. The piece fluctuates between states of order and disorder, where a tension is created between the conscious and the subconscious. The text is taken from *Les Champs Magnétiques* (André Breton, Philippe Soupault, 1920), where the principle of automatic writing is put into practice. This surrealistic technique was developed as a means of expressing the subconscious.

Besides evoking a duality, emphasized by the tension between the conscious and the subconscious, this piece aims also at exploring different kind of relationships between the voice and the electronics.

Duality comprises a tape part and a live part. The tape component contains electronically generated sounds and a processed voice. The live component includes an amplified voice and a processed voice. During the performance, the different sections of the tape and the reverb over the live voice were controlled manually. This gave to the tape a flexible character. The live voice was performed using amplification and the electronic extended voice interface developed during this research. At the moment of the performance of *Duality*, the electronic extended voice consisted in the Max/MSP patch *Pot B* for the processing and the Apple trackpad as a control interface (cf. chapter 3). Eight presets of the patch *Pot B* were stored beforehand and progressively triggered during the course of the piece, allowing a flexible control over the live part.

In order to facilitate the performance and to get more familiar with the tape part, a score of *Duality* was created (cf. excerpts of the score with pictures 19, 20, 21, 22). The representation of the electronics (tape and live) was realized in an intuitive manner. It appeared to be an efficient way to notate the music for the purpose of the performance.

Duality is comprised of six sections delineated primarily by changes in relationships between the voice and the electronics, in sound materials, tempo and density. The duration of each section is relatively short, between 0'25" for the first part, and 3'35" for the section of the hypnosis, which is the longest section of the piece. The first section (00'00"-00'25") is a short introduction with only electronics on tape. It sets a mysterious atmosphere. The second section (00'25"-02'40") introduces a soft voice singing a melody with excerpts of the text by André Breton, accompanied by slow motions of the electronics on tape. The atmosphere is calm and a melancholic aspect can be perceived. Here the electronics are more accompanying the voice. The third part (02'40"-03'50") starts with a rhythm initiated by the electronics on tape, which could be perceived as representing a heartbeat that accelerates, stops and hesitates, while the whispering voice becomes dislocated and announces that something is about to happen. This section could be seen as if both the voice and the electronics are testing each other to see which one could take the control of the situation. It is a relation of coexistence where both entities are clearly distinct. This part creates a tension in the atmosphere, which gets intensified during the next section. The fourth part (03'50"-04'55") symbolizes the chaos with an increase in density and tempo, and a change of sound materials. The electronics on tape become more active and aggressive. This influences the behavior of the live electronic voice, which starts to be more altered until we only hear its traces. The fifth section (04'55"-08'30") represents the hypnosis where time seems to be frozen. The live electronic voice seems to be hypnotized, imitating the electronics on tape and responding to them quite systematically. Their relationship could be seen

as if the electronics would be a model or an archetype for the voice. This part also symbolizes a kind of relief after the tension built by the previous part. The last section (08'30"-11'00") concludes the piece with an 'evasive dance' between the voice and the electronics, where it is difficult to distinguish the live voice from the voice on tape. There is dissolution from a dimension into the other. This last section can also be seen as representing an escape from the state of hypnosis towards a more opened place.

The text is an excerpt of André Breton's *Les Chants Magnétiques*:

"La fenêtre creusée dans notre chair s'ouvre sur notre cœur
On y voit un immense lac
Où viennent se poser à midi des libellules morodorées et odorantes comme des pivouines
Tout le monde veut y passer, dans ce couloir sanglant
Où sont accrochés nos pêchés, tableaux délicieux.

Quel est ce grand arbre où les animaux vont se regarder ?
Il y a des siècles que nous lui versons à boire.
Son goûter est plus sec que la paille et la cendre y a des dépôts immenses.
On rit aussi mais il ne faut pas regarder longtemps sans longue vue."

In the second section of the piece, which is the moment when the voice first enters, the text is sung in a traditional way. For someone who speaks French, it is perfectly understandable what the voice is saying. However, it is important to mention that the text is surrealist, and it features the element of surprise and unexpected juxtapositions. The meaning of the text is quite difficult to grasp, as it is also the case with the text of Joyce used by Berio in *Thema-Omaggio a Joyce*. In *Duality*, the text evokes some unusual and poetical associations of ideas and images that emphasize the absence of control exercised by the reason or by aesthetical and moral preoccupations. It is possible to understand the meaning of each word, but the general meaning of these lines evokes an imaginary and surreal world. In contrast, as soon as the third section starts with the whispering dislocated voice, it becomes rapidly impossible to understand the meaning of the text. The semantic content gets lost and this leaves the listener with some traces of the voice. The different words are superimposed and dislocated to create a dense whispering voice texture incomprehensible and disturbing. Later during the piece, few words emerge in an unexpected way. However, they do not suggest a clear semantic content.

For the performance of the piece, Bjarni Gunnarsson was standing by the mixer to perform the tape part, and I performed the live voice on stage. During the composition process, we worked in close collaboration and we were both involved in the creation of all the parts of the piece (live and tape). However, probably due to the repartition of the tasks for the performance, the roles seemed very distinct, and in fact I became more involved in the voice/live electronics part and Bjarni became more involved in the tape part. When looking at our next collaborative composition, *L'imaginaire du parleur* (October 2011), there it is more difficult to distinguish who is responsible for what.

Concerning the compositional process, *Duality* emphasized the importance of the role of improvisation in the creative process. Improvisation was used to generate materials and to discover new combinations of voice and electronics. After exploring some possibilities with improvisation, a selection of the more interesting materials and combinations of voice and electronics was made, in order to construct the basic material of the piece. After that, these sound materials and combinations were worked again in a more detailed manner. Finally, the structure of the piece and the transitions between the different sections were composed collaboratively.

Concerning the issue of composing together, *Duality* was a very interesting and confronting experience. At this moment, we both had a different way to approach the composition process of this particular piece. My approach was to determinate in advance the general form of the piece, its structure, the bigger gestures, and later to go deeper into the details of the sound materials and their smaller gestures. In other words this approach was going from the more general to the more detailed. Bjarni's approach was exactly the opposite, starting from the sounds themselves, and leading naturally towards a coherent bigger form. Certainly there is not one good method that solves all the problems. Both approaches are valid and have their qualities. The interesting aspect was that we had to find a way to create music together despite these different views. From distance, it seems that the piece was not so successful regarding the blend of compositional approaches. However, this process of finding new ways to create music together was initiated. In this sense, *Duality* was a very fruitful step: we did not want to compose in this way anymore. This is probably why it has been possible to create *L'imaginaire du parleur*, which appeared to be much more successful, from the perspective of the blend of compositional approaches. To summarize, *Duality* was a necessary step in the development of the collaboration, without which it would not have been possible to compose *L'imaginaire du parleur*.

Duality raised also the issue of being simultaneously composer and performer, which was an interesting and challenging position. To a certain extent, it is possible to imagine that this situation shares certain similarities with the circumstances of free improvisation, where composers and performers are also the same persons. However, both contexts generate very different states of mind. Free improvisation refers here to the situation where the music is not planed in advance, i.e. where there is no plan of a structure, no guidance or conduction elements during the course of the piece. In this particular context, the form of the piece, its instrumentation and the specific sequences of sound materials are open. It is common that a certain kind of sound material or vocabulary is more likely to be played, since for example it is part of the musical identity of an improviser. However, the modalities and the order of occurrence of the sound materials are in principle not planed. In this particular context, the musical events, their connections and the form of the piece emerge from the process of creating the music at that very moment. In the case of *Duality*, the sound materials, their transformations, their relationships, the structure of the piece, were all planed in advance. The only element that was left a bit open was occasionally the exact timing of certain sections. This was in fact be a positive element for the performance because it added a certain organic paste through the whole piece (for example by adapting the timing of certain sections to the breathing pattern of the organic voice).

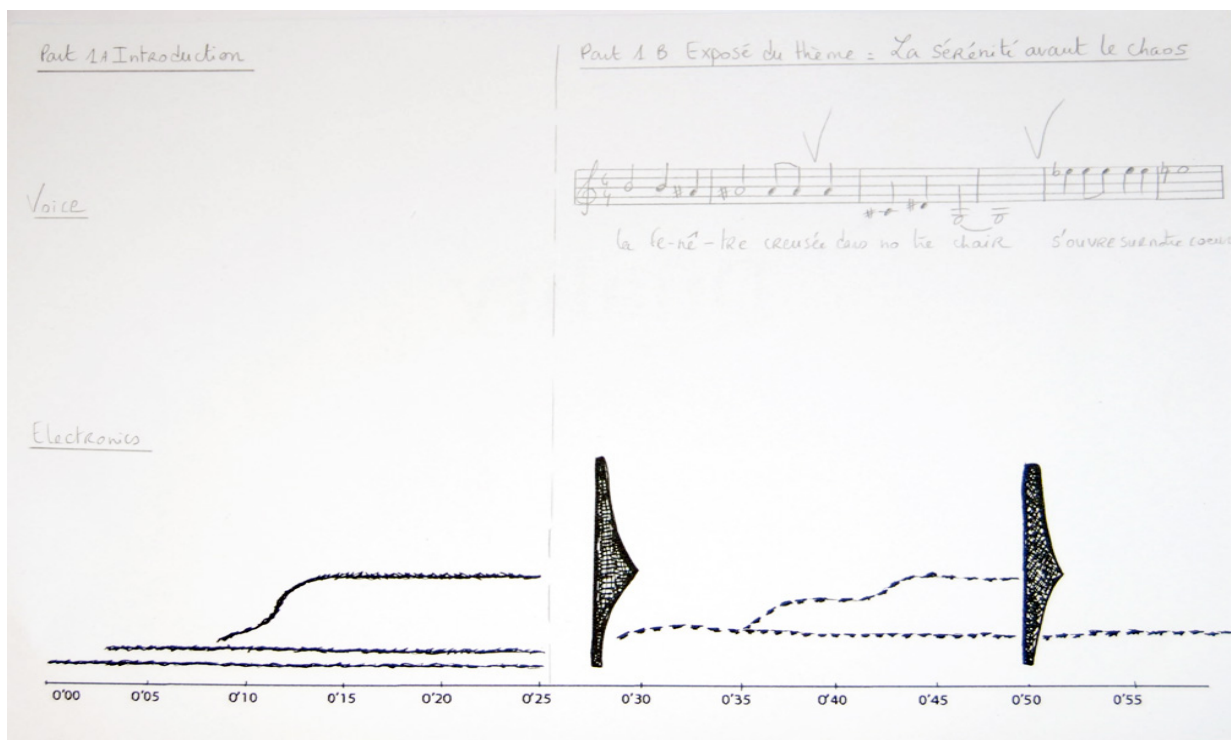
Being composer and performer simultaneously can be challenging. It can be an issue to be very implicated in the execution and realization of the piece, and at the same time being able to have the distance from an audience perspective, which a composer is more likely to have when he is not performing. A possible way to solve this issue can be for example to film and record the piece several times. With the evaluation of the feedback given by the recordings and the films, the necessary readjustments can be made.

Concerning the relationships between the voice and the electronics, a coherent balance between the different sound dimensions needed to be achieved. Occasionally the relationship between the organic voice, the processed voice, and the electronics on tape was fluent and smooth, blending the different sound dimensions very nicely and making them difficult to distinguish. In this case, the sound dimensions merged to become one. In another section of the piece, the emphasis was on the contrasting elements. At times the different entities would accompany and support each other, imitate or fight against each other, behave as soloists, etc. Regarding the objective of exploring different relationships between the organic voice, its electronic counterpart, and the electronics on tape, the piece was quite successful.

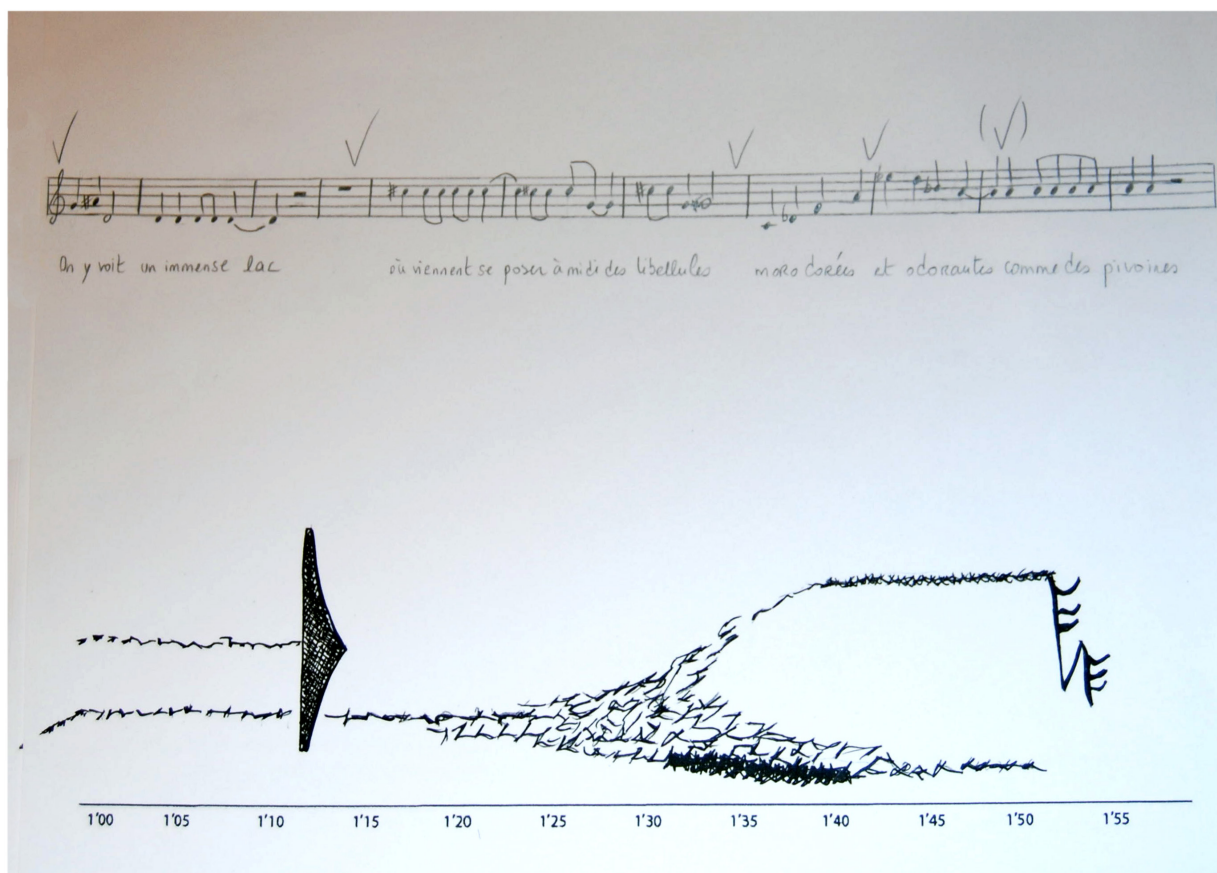
Concerning the realization of the live part of the piece, the main concerns were to make the live electronic voice as fluent and flexible as its organic counterpart, and to find solutions to the issue of being singing and processing the voice simultaneously. The electronic manipulations of the live voice were realized with the electronic extended voice, which at this moment was including the patch *Pot B* and the Apple trackpad. This setup raised some technical issues because the Apple trackpad, connected to the computer with Bluetooth, was going automatically to sleep if it had not been touched for ten minutes. Consequently, the patch *Pot B* needed to be restarted. At the beginning of the performance, while singing, I had to restart the patch again and it really took me away from the music. This unreliability of the Apple trackpad made it clear that this control surface was not suitable for live performance.

In conclusion, *Duality* was an important step in the development of this research. The piece allowed to deepen the exploration of the possibilities of the voice's transformations with the patch *Pot B*, and by doing so, it contributed to the extension of my electronic vocabulary. Concerning the electronic extended voice interface, the performance of *Duality* made it clear that the Apple trackpad is not suitable for live performance because of its unreliability. In addition, solutions were explored concerning the issues of being both composer and performer simultaneously, and being singing and processing the voice with electronics while performing. This piece represented a significant step towards the objective of making the live electronic voice as fluent and flexible as its organic counterpart. Finally, *Duality* was very useful in the collaboration with Bjarni Gunnarsson because it made us aware of the necessity of finding new ways to compose together.

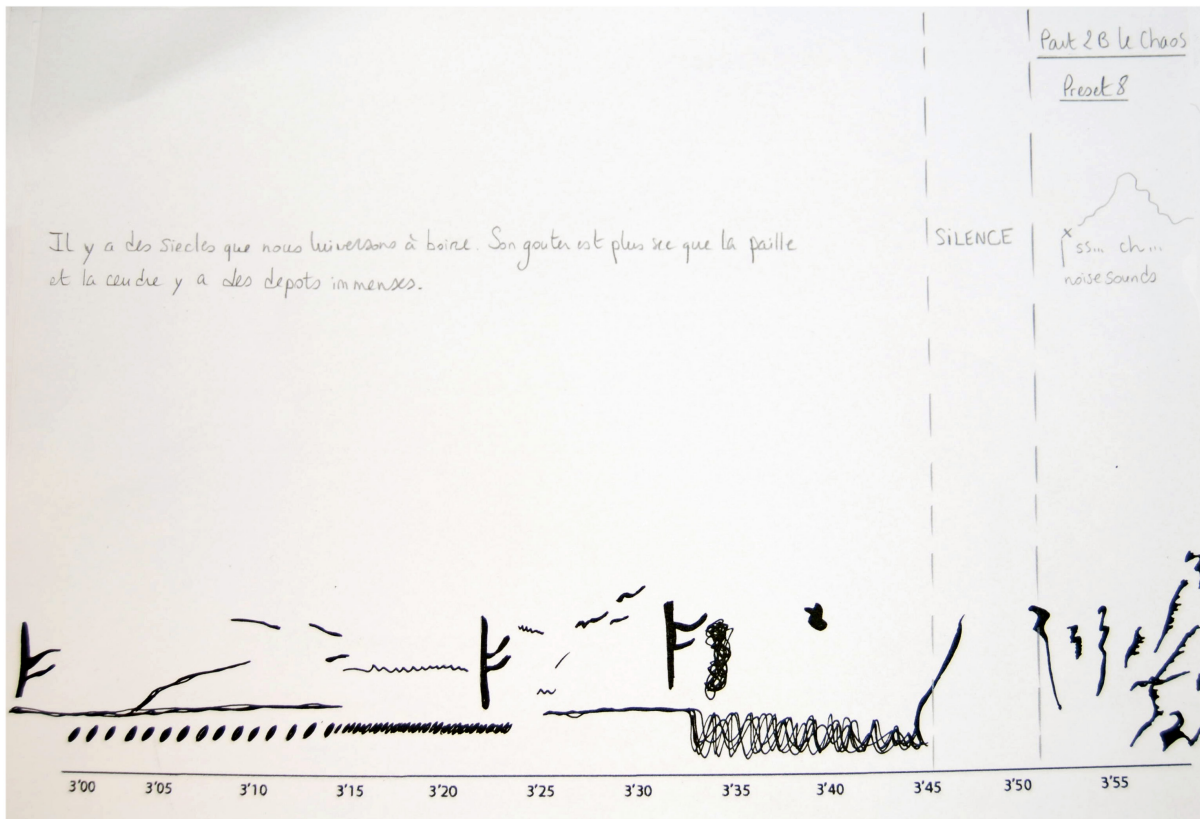
Duality can be heard in a stereo version as documentation on the CD joined to this thesis (track n°5).



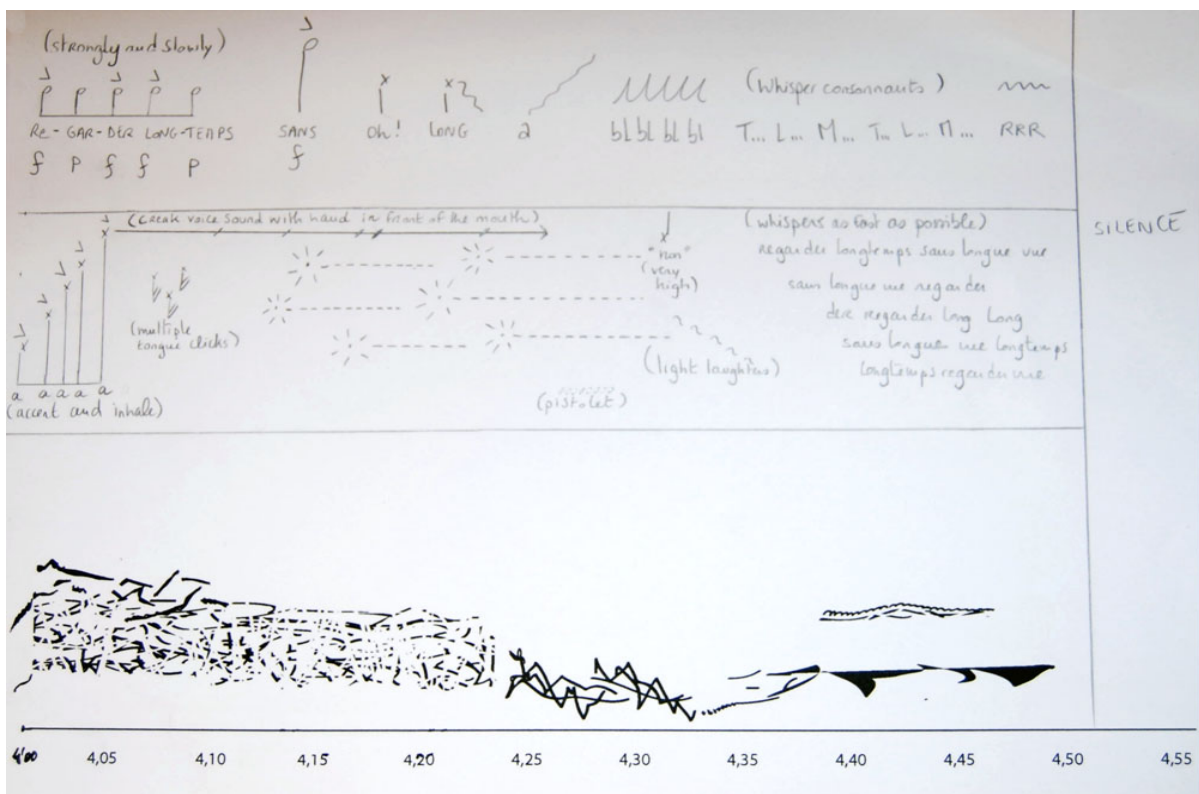
Picture 19: Score *Duality* page 1 (Guilleray, 2011)



Picture 20: Score *Duality* page 2 (Guilleray, 2011)



Picture 21: Score *Duality* page 3 (Guilleray, 2011)



Picture 22: Score *Duality* page 4 (Guilleray, 2011)

4.3 Fixed media pieces

4.3.1 *Du tunnel à l'esplanade*

Du tunnel à l'esplanade (June 2011) 11'

tape piece, 8 channels

Marie Guilleray

Du tunnel à l'esplanade was presented at the Institute of Sonology in June 2011. It is a tape piece based on the simple idea of slow motions of blocks and masses of sounds coming from underneath. Blocks of sounds become masses of sounds slowly changing. It is an attempt to create long gestures. At the beginning of the piece, the idea was to slightly blur the recognition of the timbre of the clusters and chords, or at least make it less obvious, by having percussive attacks at the beginning of each clusters. These clusters and chords are constituted by recorded sounds from voice, accordion, bells, gongs, and their electronics transformations. Later during the piece, these clusters become blocks and masses of sounds evolving through different electronic manipulations.

Tunnel's initial idea was originated partially in reaction to a series of short pieces realized previously, and that had to do with a more systematic approach (*Exercices de styles, Esquisse, Metallique Esquisse*). As a reaction to this way of creating music, I felt the need to create a piece in a more intuitive manner, starting from slow motion of blocks and masses of sounds, exploring the possibilities of blurring the recognition of the timbre of instruments, and creating long massive gestures. As the piece was taking form, it seemed that the original 'tunnel of sounds' opened to a larger space. In fact, this opportunity was taken to work with spatialization and continue the compositional process with eight channels. It represented my first attempt to work with spatialization in eight channels. It seemed that the title *Tunnel*, which was given at early stage of the creation of the piece, was not anymore suitable to the piece since it does not sound like a narrow space and it seems to be opened to a larger space. Consequently, the title of the piece was changed for *Du tunnel à l'esplanade*, which illustrates better the original idea of a tunnel of sounds and its evolution into the perception of an esplanade, which refers to a long and opened level area.

Another idea explored in the piece was the one of composing different sections from the same starting point and sound materials. In other words, the use of the same material and beginning to lead to different places was explored. Thereby, the materials and beginning of the first section (block A) were used to create the second section (cf. figure 6). It leaded the music to another direction. Afterwards, spectral transformations were applied to the whole second section in order to blur the recognition of the block A.

It seems that the idea of 'blurring the recognition' was an important layer in the creation process of the piece. The attempt to blur the recognition appeared in fact two times: first with the percussive attacks at the beginning of each clusters of sounds in order to blur the recognition of the different instruments and in particular of the voice (at least for a short moment); additionally in the second section of the piece by applying some spectral transformations to the whole section in order to blur the recognition of the reoccurrence of sequences of sounds coming from the first block of materials (cf. figure 6).

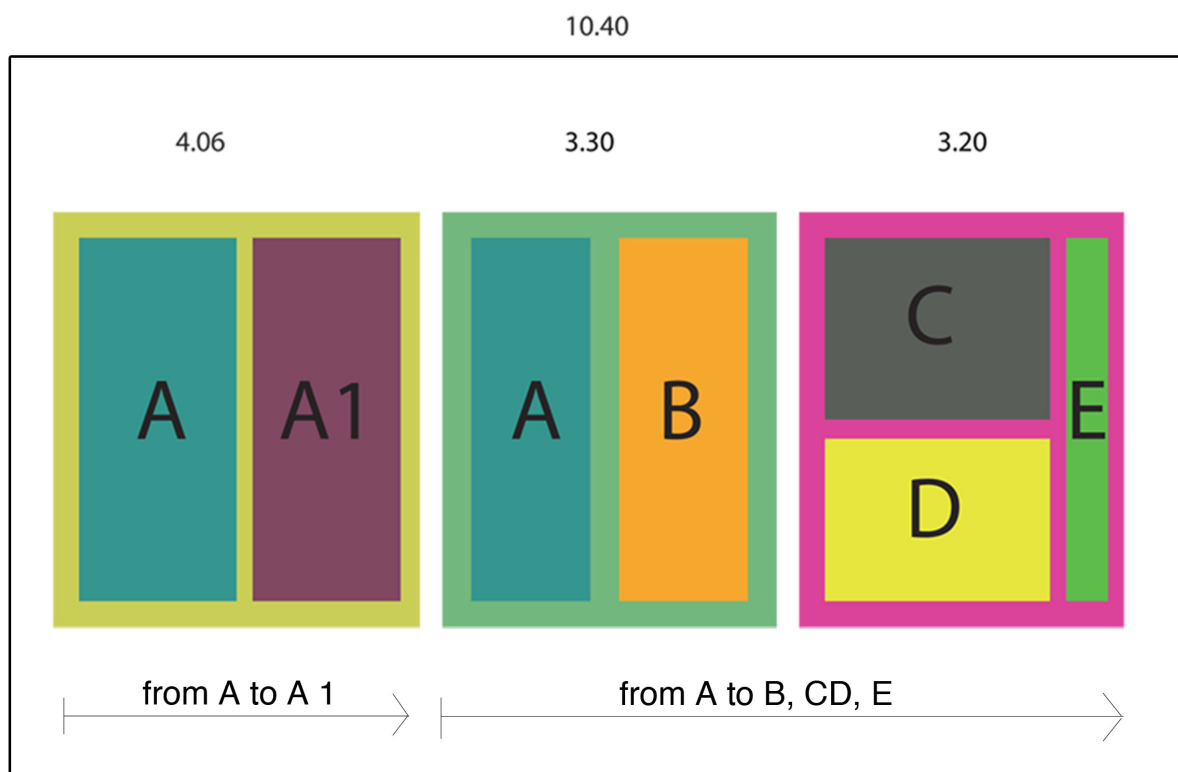


Figure 6: The structure of *Du tunnel à l'esplanade* (Guilleray, 2011)

Regarding the aim of blurring the recognition of the different instruments and in particular of the voice, at least for a short moment, the chosen strategy was not completely successful because despite the percussive attacks, the voice is clearly recognizable after one second of hearing the 'clusters'. Perhaps it worked better for the other instruments, however for the voice, it did not work so well. In fact, the recognition of the voice in this section was almost inevitable because the clusters were constituted by five or six different layers of vocal material, one or two layers of percussive material, and one or two layers of accordion. With such a majority of vocal sounds, few electronic transformations, and since the voice is a material that stands out so much, it is almost impossible for the voice to not be recognizable, even with percussive attacks. Nonetheless, these clusters were kept because they had interesting sonic qualities. Furthermore, their succession recalled a strange breathing pattern, which brought to the piece an interesting atmosphere and a kind of 'organic paste'.

Despite the percussive attacks of the gongs, immediately the voice stands out. From this experiment, it is possible to affirm that without electronic transformations, it is difficult to blur the recognition of the voice because the material itself calls for this recognition. This is a very instinctive function of human minds, as explained in the first chapter of this thesis. To solve this issue, an alternative is to transform the vocal material with radical electronic transformations.

In the second section of the piece, despite the fact that the voice is still recognizable as being vocal material, the 'voice-grain' starts to evaporate, due to the spectral transformations applied in this part. The identity of the 'voice-subject' (or 'diagnostic sphere') slowly disappears. In fact the 'voice-subject' disappears always before the 'voice-grain'. Until now, I never heard electronic transformations that would preserve the 'voice-subject' and erase the 'voice-grain'. If it is not possible to recognize the sound as coming from vocal material, how can it be possible to recognize the person who produced the vocal sound? However, it would be interesting to research if the special timing of a speaking voice can somehow reveal the person behind this voice. Even though it is very unlikely, this would need

further investigations. In fact, it seems that what is particularly unique about each speaker has to do with the uniqueness of his or her timing, i.e. the unique timing of the enunciation of syllables, words, phrases and of their connections. This can be linked more generally to the relation between time and identity.

Concerning the objective of blurring the recognition of the reoccurrence of block A in the second section of the piece, the spectral transformations were very efficient.

Eventually, the last part of the piece (section 3) rearranges the materials and transformations from the previous parts in a different manner, and gives to the piece a new trajectory. In the last section, the original sound materials of the previous blocks were rearranged by being manipulated with different types of electronic transformations such as distortion processes. This was realized with the help of the software CDP (Composers Desktop Project) that Trevor Wishart has contributed to develop. Regarding the issue of the musical identity, it was interesting to realize that certain persons who were familiar with the music of Trevor Wishart, had to think for example of the piece *Red Bird* by Trevor Wishart when they heard *Du tunnel à l'esplanade*. It seems that by using Trevor Wishart's software for manipulating my voice, the music started to 'sound like Trevor Wishart's music'. This raises a similar question than when I used the granulation patch *Pot B*: to which extent, when a composer/performer uses a software created by another composer/developer in order to manipulate electronic sounds, the musical identity is maintained or disappears?

As an element of answer, it is possible to say that is very likely that the results of the sound materials transformed with a special software developed by a composer will somehow be 'colored' by the sound universe of the system and consequently by the approach of this composer/developer. In other words, the sound materials used in a piece by a composer, can be colored by the musical identity of the software developed by another composer/developer and used to transform or generate these sound materials. However, the sound materials are not enough in themselves to constitute the totality of one's musical identity. The way these sounds are articulated, their organization in time and space, their combinations and relationships, and the compositional strategies of a composer, are at least as much important than the type of sound materials he uses, in order to constitute his musical identity.

Going back to the piece *Du tunnel à l'esplanade*, even though Trevor Wishart has contributed to the development of the software that I used in the last section of the piece to manipulate vocal sounds, he probably would have organized these materials in a completely different manner. In this sense, it did not make completely disappear the musical identity of the piece to become Trevor Wishart's music. It is important to mention that Trevor Wishart is also, besides being a composer and developer of software, a vocalist/improviser who works frequently with voices, using them as sound examples for his software and as basis for sound materials in many of his pieces. It is always delicate to find the fine balance between the preservation of one's musical identity when he or she uses a system developed by another composer to transform certain sound materials. In this context, the musical identity needs to be also approached from a compositional perspective. However, this becomes more complicated when we think of systems that not only generate sounds or transform sounds, but also generate behaviors of materials that could be perceived themselves as being compositional strategies. In that sense, it is maybe more difficult to distinguish one's musical identity or a piece's musical identity. Nonetheless, if we look at the entire form of the piece, its larger gestures, probably it might be possible to distinguish the composer's musical identity or the piece's musical identity, from the system's musical identity.

A musical identity often emerges naturally from years of practice and experience. Maybe it is not so important to look for establishing a personal unique musical identity in the context of composed music since it might just emerge as a consequence from practice. It might be perhaps more

interesting to focus on exploring certain compositional strategies, on experimenting with electronic manipulations, even if it implies the use of other composers/programmer's software.

Nonetheless, in the context of free improvisation with electronics and in groups, this might be a different issue since it could be more necessary for an improviser to develop his own language. Here the expression 'developing the musical identity' refers to developing 'the sound vocabulary that we use when improvising and the ways of playing with it'. To make a comparison with language, the musical identity would not be constituted only by the words that we use, but also by their placement in the sentence, their timing, their articulation, the speech rhythm, the interaction of the speaker with other speakers, etc.

Du tunnel à l'esplanade will be presented in its original 8 channels version in June 2012 at the Institute of Sonology. In addition the piece can be heard in a stereo version as documentation on the CD joined to this thesis (track n°4).

4.3.2 Soufflerie de verre

Soufflerie de verre (September 2011) 8'30

tape piece, stereo

Marie Guilleray

Soufflerie de verre is a tape piece that was presented at the Institute of Sonology in October 2011. It is inspired by the city of Venice. Being interested in exploring the acoustic properties of Venice and its surroundings, the idea of this piece was to create a kind of unpredictable path through the city. In July 2011, I recorded some sounds in Venice, its surroundings, and the island of Murano. I find Venice rather fascinating and unpredictable. I enjoy very much being lost in its labyrinth structure, hearing the sound of the space changing radically in few seconds, coming from a narrow street and ending in a large square. The recorded sounds, emerging and receding from the city, were placed in an abstract context, allowing them to take different roles between responding to each other, interacting or accompanying each other. Other recordings of instruments were also added: the fiddle of Caoimhín Ó Raghallaigh, the percussions of Orlando Aguilar Velazquez, a guitar, and my own voice. After manipulations with electronics, these instruments recordings were integrated to the piece. They interacted between themselves and with the field recordings in a special way, often creating a mysterious texture where the line between background and foreground becomes blurred. Eventually the piece remains rather abstract and takes the listener into a curious walk through the city. The title recalls Murano's glass factory.

Soufflerie de verre could be seen as referring to 'Venice as a metaphor'. The metaphor means here that Venice is the point of departure and inspiration of the piece. Even though most of the sounds of the piece come from recordings made in Venice (and in fact, the piece also includes other sounds recorded in Italy and instrumental recordings), the main inspiration is the idea of an unpredictable path, which is inherent to this city. Venice is taken here as a symbolic inspiration, so it is possible that one might actually not recognize that the piece refers explicitly to Venice, and in a way it is not so important. My idea was more to take Venice and its unpredictability as an inspiration than to literally illustrate it.

In *Soufflerie de verre*, one could for instance experience some abrupt changes in space and in the atmosphere in few seconds. Likewise, one could also experience similar abrupt changes in Venice when coming from a narrow street and falling suddenly in the square San Marco. I was also inspired by the idea that the space suddenly opens. There are several elements that might recall Venice when listening to this piece, such as the sounds of water, Vaporetti (Venice's water bus system), the clouds of voices speaking in Italian, an Italian radio excerpt, the sound of the space that suddenly open.

However, I am not completely sure if it is possible to recognize the city just when hearing the piece (i.e. without the expectations created by reading the program notes), and perhaps it not so important, since the main interest was to suggest an unpredictable path rather than to illustrate literally the city.

To my belief, it is impossible to control how a piece will be perceived or experienced by an audience. However, it might be possible to influence the audience's experience by creating a context, certain circumstances, including the music itself, which could possibly 'guide' the audience in the listening experience. From this special context, the music could be heard with a certain focus and a special awareness. Mentioning in the program notes that the piece is inspired by Venice as a sort of metaphor creates already a sort of context from which the audience might be more inclined to perceive the piece with a particular focus. Nonetheless, this creates also some expectations, and since the piece remains rather abstract, these expectations might not be completely fulfilled if one imagines recognizing explicitly the sound of the city. From another perspective, this incomplete fulfillment of expectations can be seen as referring to a certain kind of unpredictability, which would refer again to Venice. There is also always a part of the audience that do not read the program notes, and in this case, they might be inclined to experience the piece in various different ways, one of them being possibly as a curious walk into an surreal landscape.

Soufflerie de verre also explored different combinations of sound materials (instruments, field, recordings, electronically generated sounds), experimenting with various kinds of relationships between them (accompanying, contrasting, imitating, extending). The idea of sounds emerging and receding from the city led to experiments concerning the placement of the sounds in a virtual place (foreground/ background), with shifts in position and movements.

The basic structure of the piece is a montage form where different short sections, not necessarily leading from one to another, are incorporated one after the other. Most of the transitions of the piece are abrupt although there are also some more smooth transitions. To my belief, the structure of the piece (cf. figure 7) symbolizes the unpredictability of a path through Venice.

The piece was originally composed in stereo and later made into an eight channels version. The main reasons of this new version were to support the idea of an opening of the space and emphasize the different spatial qualities of each section. The spatialization of this piece into an eight channels version was not so successful, and my hypothesis is that it is because it was originally created as a stereo version. As a matter of fact, the piece sounds better in stereo. Since this experience, the spatialization is now approached as a dimension of the music that needs to be taken into account and composed from the beginning of the creative process, or at least at its early stage, because otherwise it might lead to some problematic results.

There is almost no vocal material in this piece. In fact this piece is not really about voice and electronics. It represents more an attempt to combine different sound materials (mainly field recordings, but also recordings of instruments and voice and electronically generated sounds). After creating several pieces for or with voice and electronics, I felt the need to compose with other sounds. However, this piece is still relevant for this research because it deals with the combinations of different sound materials, making them relate in various ways. It also deals with the issue of incorporating the spatialization dimension in a later stage of the creative process. Finally this piece also experiments with different transitions, and the tension-release relationship they can generate.

Soufflerie de verre can be heard in a stereo version as documentation on the CD joined to this thesis (track n°3).

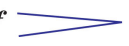


	0	1	2	3	4	5	6	7	8	9		
speakers	2 channels		8	4 channels		4 ch.	8 ch.	2 channels		4 ch.	8 channels	
materials	voice percussions drone	guitar percussions steps drone	g o a t s b e l l s	factory percussions		boat perc. drone	steps perc. drone clouds start	doors fiddle guitar clouds		radio murano clouds drone starts	radio clouds drone	metal birds radio clouds drone
time line	0'00"	1'12"	1'52"	2'11"		3'38"	4'11"	4'38"	5'44"	6'25"	6'47"	8'30"
durations	1'12"	0'40"	0'19"	1'27"		0'33"	0'27"	1'06"		0'41"	0'22"	1'46"
brightness (from 1 to 10)	5	7	7	4	5	7	8	8		5	6	7 9
background- foreground relationship (see diagram)	voice (local) percussions (local) drone (field)	guitar (local) percussions (arena) steps (local) drone (field)	g o a t s b e l l s	factory voices (field) machine and tools (local) percussions (local)		boat (local) perc. (from local to far) drone (field)	steps (local) perc. (field) drone (field) clouds start (field)	doors (local) fiddle (local + field) guitar (field) clouds (local)		radio(field) glass(local) clouds (local) drone starts (field)	radio (field) clouds (local) drone (field)	metal birds (field to local) radio (field) clouds (local) drone (field to local)
dynamics	<i>mp</i>	<i>mf</i>	<i>p</i>	<i>f</i>  <i>mf</i>		<i>mp</i>	<i>mp</i>	<i>mf</i>		<i>p</i>	<i>mp</i>	<i>mf</i>  <i>f</i>  <i>ff</i>
transitions	progressive abrupt		abrupt	progressive abrupt		abrupt	abrupt	abrupt		abrupt	progressive	abrupt

Figure 7: The structure Soufflerie de verre (Guilleray, 2011)

4.3.3 L'imaginaire du parleur

L'imaginaire du parleur (October 2011) 12'

Tape piece, 8 channels

composed by Marie Guilleray and Bjarni Gunnarsson

L'imaginaire du parleur was presented at the Institute of Sonology in November 2011.

It is a fixed media piece, composed together with Bjarni Gunnarsson during our residency at GRM in Paris in October 2011.

The piece is inspired by Roland Barthes's writings about the grain of the voice in his book *Le grain de la voix* (Barthes, 1981). The book *Le grain de la voix* (Barthes, 1981) needs to be distinguished from Barthes's essay from the same name (Barthes, 1972, reedited in 1982). In the essay *Le grain de la voix* (Barthes, 1972, reedited in 1982), Barthes treats more specifically about the concept of the grain of the voice. It is in the essay that Barthes compares the German and the French singers. In the book *Le grain de la voix* (Barthes, 1981), Barthes approaches different topics among which the one of the relationships between speech and writing.

The text that inspired the piece *L'imaginaire du parleur* is extraced from the chapter "De la parole à l'écriture" in the book *Le grain de la voix* (Barthes, 1981).

The grain of the voice is what is lost in transcription. It is an exterior body, which, in situation of dialogue with another body, both fragile, sends some messages intellectually empty, in order to catch the other and to maintain him in a state of partnership. Transcribed, the speech changed recipient and subject. The body, still there, stops to match with the person or more precisely with the personality. The imagination of the speaker changes space. It is not anymore a request, a call, or a game of contacts; it is about installing and representing an articulated discontinuation. (Barthes, 1981)

In this piece, we were interested, among others, in exploring different relationships between the 'grain of the voice' and the electronics. I was particularly inspired by Barthes's ideas such as "speech changes recipient and subject", "the body does not match anymore with the personality", "the imagination of the speaker changes space", and "the representation of an articulated discontinuation." (Barthes, 1981)

This can be related to the concept of the identity of the voice in the sense that the voice can be distinguished from the subject and from the semantic content. In addition, the concept of the 'grain of the voice', which can be perceived as the resonances of a body in its mother tongue, is close to the concept 'voice-object'. I was also interested in exploring how the 'voice-object' could develop and move through space.

Other points of focus included the exploration of the diversity of vocal utterances, the transformation of speech-like utterances into more abstract vocal utterances, the use of vowels elements of speech to explore the spectral areas of that sound, the movements of the 'voice-object' towards different states, the changes in speed of rhythmic articulation and in dynamics, and the electronics transformations to highlight certain aspects of the voice (making it possible to hear certain details).

In addition, we wanted to experiment with a different way of composing together, and letting the general form of the piece emerge from the creation of 'blocks of sounds'. The experience of composing the piece *Duality* led us to explore other compositional approaches. For *L'imaginaire du parleur*, we created separately different blocks of materials, exchanged them, created new blocks and exchanged them again. At the end of this process, we adjusted the general form of the piece.

Concerning the materials that served as basis for the piece, we chose to use voice and electronically generated sounds. The text used to generate the basic material for the voice part was written by Georges Perec for L'Oulipo (Ouvroir de Litterature Potentielle, which is a group of writers and mathematicians). This short text is in fact a serial poem where Georges Perec applied strict rules. The text has no clear understandable semantic content. It evokes some strange metaphoric figures. We chose this text for its acoustic properties and for its lack of semantic content. I recorded the text in different ways and with various techniques: speaking it at different rhythms, accelerating, slowing down, vocalizing the vowels, the consonants, singing the text with an atonal row (each pitch for a syllable), singing the text with improvised melodies, speaking backward, whispering, speaking with different emotions, with different vocal techniques such as vocal fry, vocalizing the vowels with multiphonics, screaming, singing while inhaling, etc.

From a selection of these recorded vocal materials, we started to manipulate the sounds with electronics separately in different studios, not knowing what each other was doing. After few days of creating 'blocks of sounds' separately, we exchanged our different blocks and started to work with the blocks of each other.

In the beginning I remember obtaining blocks of sounds with very different 'sound universes' than the ones of Bjarni. Therefore I decided to transform the materials using different transformations, in order to get closer to his sound universe and by doing so, to accentuate the ambiguity of not knowing anymore who was doing what. This was quite successful and we obtained several new blocks of sounds that we exchanged again. After working with these new blocks, we obtained finally nine blocks of sounds. At this moment, we did not know yet if we would use them all or not, in which order we would organize them, or what would be the transitions from one to another. Each block was in fact very interesting and had a certain degree of complexity, probably because they were the results of two different persons creating them. They were also surprisingly diverse even though they were all coming from the same source materials.

The spatialization was a dimension taken into account from the very beginning of the creative process. We both spatialized the blocks of sounds in eight channels before exchanging them.

The final order of the blocks was decided in collaboration. This order was from the most articulated and dense block, to the most continuous and static block, giving to the piece a kind of big decay form. The end of the piece could be seen as meditative response to the rapid activity of the earlier part of the piece. This form makes also sense in relation to Roland Barthes's text because it symbolizes the passage from a state of urgency, confusion, with high density, to a state of resignation with more serenity. It can refer to the transition from a speaker who tries desperately in a dense and confusing speech to explain his thoughts, to a speaker resigned and left with the continuous traces of his speech.

To summarize, *L'imaginaire du parleur* was a successful step in our collaboration for several reasons: we found a new way of working together and we were both satisfied with this non linear approach; we obtained from the same source materials, diverse blocks of sounds, and a coherent form emerged naturally from the creation of this blocks; the dimension of spatialization was taken into account from the beginning of the process; with this piece, it was difficult to distinguish who was responsible for what (on the opposite of *Duality* where it was much more clear).

L'imaginaire du parleur will be played in the original 8 channels version at the Institute of Sonology in June 2012. Additionally the piece can be heard in a stereo version as documentation on the CD joined to this thesis (track n°2).

Conclusion

After studying the combination of voice and electronics from multiple perspectives, this thesis demonstrates how electronic transformations and manipulations of the voice can open up a range of new aesthetics possibilities. Additionally, the erasure of the acoustic voice gives birth to an array of innovative forms of vocality, which are free from physical limitations and therefore lead to a different palette of expressive possibilities. Aside from this general trajectory of research, each chapter in this thesis attempts to approach the combination of voice and electronics from a different standpoint.

The first chapter explains how music in the Twentieth Century, largely through the development and evolution of contemporary and electronic music, permitted the voice to become disembodied, dissociated, dislocated and overall a more abstract musical medium. It is also essential to see this transition of mentality as layering the ground for many of the following abstractions that have been applied with electronic manipulations to the voice. Electronic transformations of the voice have in many ways continued to emancipate the voice from the weight of the classical tradition and from certain restraints inherent to the listener's cultural expectations. Furthermore, electronic transformations now offer vocalists a unique context to combine, configure and manipulate sounds for the sake of furthering the creative potential of the human voice.

Electronic manipulations of the voice have enabled for the perception, the extraction and the combination of different facets inherent of the voice's identity. Through the interconnection of these dimensions (inherent to the acoustic voice's identity) the voice can be deconstructed, and many of its aspects can be isolated, enhanced or removed. This allows the voice to be seen more as a material, from which electronic manipulations can modulate its identity between the 'voice-subject', the 'voice-meaning', the 'voice-grain', and the 'voice-object'. Additionally, many variations and combinations of these dimensions are also possible by way of using electronics. Through this process many vocal details, even aspects which were not perceivable in the acoustic domain, can now be perceived, magnified and brought to the listener's perception.

In the second chapter, important historical approaches of the combination of voice and electronics were discussed, such as Eimert and Meyer-Eppler's scientific approach, Berio's attempts to bridge poetry and music, Nono's politicized use of the voice as way of expressing revolution as a human movement. Each of these approaches brought a new insight, from which it is possible to say that the combination of voice and electronics has proven to carry new creative potentials. In future research, I would be interested to investigate how the treatment of text and its combination of voice and electronics results in a politicized meaning. Examples of this type of work can be seen in both Eimert's *Epitaph for Aikichi Kuboyama* and Nono's *La Fabbrica Illuminata*, two works realized around the same period yet having contrasting approaches to this theme.

The third chapter emphasizes the idea that a voice processed, treated or manipulated by electronics has the potential to become as fluent and flexible than its organic counterpart. The incorporation of electronic transformations to the domain of acoustic instruments has raised the issue of having to redefine the performer's musical identity. Therefore, in the case of the electronic sound domain, it has been necessary for improvisers to redefine their musical identity. During this master research, I responded to this condition by creating and developing an 'electronic extension of the voice', whereby my musical identity as a vocalist/improviser in the electronic sound domain has been redefined, and has in turn given me the opportunity to deepen, refine, and change certain aspects of my musical identity. Extending this trajectory, a next step of this research would be to ask other composers to write pieces to be performed with this 'electronically extended voice'.

In the fourth chapter, certain configurations of live electronic pieces, including voice and electronics, are discussed, especially through the scope of the practical aspects of these pieces and how they have influenced the relationships between the voice and electronics. The diversity of these performance modalities can be seen as an enrichment of the approach of performing live electronics pieces combining voice and electronics and a contribution to the expansion of this repertoire. The second focus in this chapter is concerned with fixed media pieces. Certain particular aspects are investigated such as distinct types of electronics transformations of the voice, possible relations between the voice and the electronics, different ways for the structure of a piece to emerge, and different manners to collaborate at the compositional level. Regarding the specific aim of blurring the recognition of the voice with electronic transformations, this involved carrying out experiments which proved that vocal electronic manipulations need to be conducted in such a way that significant affects are produced. By doing so, electronic transformations can mystify the voice's identity. If not taken to such an extreme then there is always a perception of being able to identify the person behind the voice. Further research domains to be explored could include investigating precisely in which circumstances the 'call for the subject' remains present regarding the relations between time and identity.

In conclusion the combination of voice and electronics presents itself as being out of frame, that is, as an expansion, an enlargement, as much as an adventure. This research can be seen as being positioned in its early phase, and it is clear that there is far more to be explored. In fact, this thesis was not attempting to answer to the question "how to combine voice and electronics?" but was rather a proposition to see how this vast question can be approached from numerous and contrasting angles.

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Appendix

A - List of Performances

- 15.06.2012: Free improvisation performance (voice and electronics) with Angelica Salvi (harp);
Premiere of the piece *Teilnahme* by Lula Romero for amplified harp, flute, voice and cello,
Theater The Regentes, The Hague
- 14.06.2012: Duo voice and electronics with Younes Riad, Ephémère series, Studio Loos, The Hague
- 17.05.2012: Free improvisation performance with Royal Improvisers Orchestra, Cerkno Festival,
Slovenia
- 11.05.2012: Free improvisation performance with Royal Improvisers Orchestra, Schorndorf, Germany
- 26.04.2012: Free improvisation with When Chin Fu (cello) and Mei Yi Lee (percussions), Wonderwerp
series, Studio Loos, The Hague
- 21.04.2012: Concert with Eric Boeren (trumpet), Peter Evans (trumpet), Tobias Delius (tenor
saxophone), Jason Adasiewicz (vibraphone), Oren Marshall (tuba), Guus Janssen (piano), Cor
Fuhler (piano), Michael Vatcher (percussions), Doek Festival, Bimhuis, Amsterdam,
- 24.03.2012: Free improvisation performance (voice and electronics) with Alfreydo Genovesi (guitar) and
Michael Vatcher (percussions), Why Not Festival, Amsterdam
- 22.03.2012: Free improvisation performance (voice and electronics) with Sonology Electroacoustic
Ensemble, Sonology discussion concert, Institute of Sonology, The Hague
- 11.02.2012: Free improvisation performance with Sonology Electroacoustic Ensemble, Open Day,
Royal Conservatory, The Hague
- 02.02.2012: Free improvisation performance (voice and electronics) with Sonology Electroacoustic
Ensemble, Sonology discussion concert, Institute of Sonology, The Hague
- 17.12.2011: Concerts with Royal Improvisers Orchestra, Centro Cultural de Sao Paulo, Sao Paulo,
Brazil
- 16.12.2011: Concerts with Royal Improvisers Orchestra, Centro Cultural da Juventud, Sao Paulo,
Brazil
- 14.12.2011: Concerts with Royal Improvisers Orchestra, Serralheria, Sao Paulo, Brazil
- 08.12.2011: Performance of the piece *Sit-Gim-Gut* by Ji Youn Kang (for percussions, voice and
electronics) with Mey Yi Lee (percussions) and Ji Youn Kang (electronics), Ephemere series,
Studio Loos, The Hague
- 01.12.2011: Performance of *La Fabbrica Illuminata* by Luigi Nono, with Kees Tazelaar (electronics);
Improvisation performance with Richard Barrett Electroacoustic Ensemble, Sonology
discussion concert, Institute of Sonology, The Hague
- 17.11.2011: Presentation of *L'imaginaire du parleur*, Concerts of electronic music with voice,
Institute of Sonology, The Hague
- 02.11.2011: Free improvisation performance with Wen Chin Fu (cello), Felicity Provan (trumpet) and
Rodrigo Parejo (flute), Zaal 100, Trytone Festival, Amsterdam
- 29.10.2011: Live performance (voice and electronics) with Bjarni Gunnarsson, Brussels
- 28.10.2011: Live performance (voice and electronics) with Bjarni Gunnarsson, Abylene Gallery Brussels
- 26.10.2011: Release concert for the album *Korabie* with Bjarni Gunnarsson, live performance (voice and
electronics), Souffle Continu, Paris
- 17.10.2011-26.10.2011: Artistic residency with Bjarni Gunnarsson at Groupe de Recherches
Musicales, Paris

21.09.2011: Concert with Royal Improvisers Orchestra, Zaal 100, Trytone Festival, Amsterdam

08.09.2011: Free improvisation performance (voice and electronics) with Sonology Electroacoustic Ensemble, First Year Festival, Royal Conservatory, The Hague

06.09.2011: Improvisation workshop, First Year Festival, Royal Conservatory, The Hague

03.09.2011: Performance with Music in Language Ensemble, Zeebelt Theater, The Hague

02.09.2011: Performance with Music in Language Ensemble, Zeebelt Theater, The Hague

29.08.2010-01.09.2011: Artistic residency with Music in Language Ensemble: Tanja Smit (visuals)
Anne Wellmer (voice/electronics), Cora Schmeiser (voice), Angel Faraldo (voice/electronics),
Anne La Berge (flute/electronics), Jelte Van Andel (double bass), Orlando Velasquez
(percussions), Zeebelt Theater, The Hague

27.08.2011: Concert with Eric Boeren (trumpet), Mary Oliver (violin), Wolter Wierbos (trombone),
Anne La Berge (flute), Zomer Jazz Fiets Tour, Groningen

26.08.2011: Concert with Eric Boeren (trumpet), Mary Oliver (violin), Wolter Wierbos (trombone),
Anne La Berge (flute), Bimhuis, Amsterdam

25.08.2011: Concert with Eric Boeren (trumpet), Mary Oliver (violin), Wolter Wierbos (trombone),
Anne La Berge (flute), STEIM, Amsterdam

24.08.2011: Concert with Eric Boeren (trumpet), Anne La Berge (flute), Mary Oliver (violin), Wolter
Wierbos (trombone), Zaal 100, Amsterdam

15.08.2011: Live performance (voice and electronics) with Yota Morimoto (electronics) and Akane
Takada (piano), STEIM, Amsterdam

23.06.2011: Live performance (voice and electronics) with Bjarni Gunnarsson for Sonology end exam
concerts, Institute of Sonology, The Hague

21.06.2011: Presentation of the piece *Du tunnel à l'esplanade* for Sonology exam end concerts, Institute of
Sonology, The Hague

16.06.2011: Premiere of Robert Blatt's piece *Glossolalia* for voice and live electronics, Wonderwerp
series, Studio Loos, The Hague

07.06.2011: First performance of Robert Blatt's piece's *Sacrament* (voice and electronics), Delta space,
The Hague

22.05.2011: Free improvisation performance with Wen Chin Fu (cello) and Nicolau Lafeta (trumpet) at
Villa Kabilla, The Hague

30.04.2011: Free improvisation performance (voice and electronics) with Bjarni Gunnarsson,
Trashvortex music series, Paris

28.04.2011: Free improvisation performance (voice and electronics) with Sonology Electroacoustic
Ensemble, Sonology discussion concert, Institute of Sonology, The Hague

23.04.2011: Performance of Anne Wellmer's new piece for Nachvanderhoop, Grot Kerk, The Hague

19.04.2011: Performance for Spring Festival 2011 - C.A.S.S. curated by Justin Benett, Royal
Conservatory, The Hague

15.03.2011: Performance of the piece *Duality* (voice and electronics) with Bjarni Gunnarsson, Sonology
discussion concert, Institute of Sonology, The Hague

07.03.2011: Free improvisation performance with Anne La Berge (flutes, electronics), Raoul van der
Weijde (double bass) Robert van Heumen (electronics), Monday Match, Bimhuis, Amsterdam

05.03.2011: Premiere of *Voyage dans l'espace* by Kees Tazelaar at BEAST Festival, Birmingham, England

24.02.2011: Concert with Royal Improvisers Orchestra, Overtom 301, Amsterdam

18.02.2011: Free improvisation performance with Bjarni Gunnarsson, 330 Live, The Hague

- 12.02.2011: Free improvisation performance with Sonology Electroacoustic Ensemble, Open Day, Royal Conservatory, The Hague
- 30.01.2011: Performance of Anne Wellmer's new piece, Studio Loos, The Hague
- 19.01.2011: Concert with Royal Improvisers Orchestra, Zaal 100, Trytone Festival, Amsterdam
- 13.12.2010: Free improvisation performance with Wolter Wierbos (trombone), Dana Janssen (bassoon) and Myriam Overlach (harp), Blauwe Maandagen, Roode Bioscoop, Amsterdam
- 04.12.2010: Free improvisation performance with Peter van Bergen's Interactive Orchestral Machine, Doek Festival, Muziekgebouw, Amsterdam
- 30.11.2010: Free improvisation performance with Richard Barrett (electronics), Gabriel Paiuk (piano), Kees Tazelaar (electronics), Yannis Tsirikoglou (electronics), Sonology discussion concert, Institute of Sonology, The Hague
- 19.11.2010: Concert with Royal Improvisers Orchestra, Butch Morris Festival, KC, The Hague
- 18.11.2010: Free improvisation performance with Angelica Vasquez (harp), Corné Roos (double bass) and Rodrigo Parejo (flute), Butch Morris Festival, Royal Conservatory, The Hague
- 29.10.2010: Live Broadcast on Dutch National Radio 4 with Richard Barrett (electronics), and Yannis Tsirikoglou (electronics), Royal Conservatory, The Hague
- 23.10.2010: Performance for Teodora Stepancic's new piece, Nutshuis, The Hague
- 14.10.2010: Free improvisation performance with Gabriel Paiuk (piano) and Yannis Tsirikoglou (electronics), Ephémère series, Studio Loos, The Hague
- 03.10.2010: Performance of the live piece *In between* composed together with Bjarni Gunnarsson; Free improvisation performance with Angelica Vasquez (harp), Corné Roos (double bass) and Nicolau Lafeta (trumpet), Z Zondag, Villa Ockenburgh, The Hague
- 16.09.2010: Free improvisation performance with Richard Barrett (electronics), Gabriel Paiuk (piano), Yamila Rios (cello) and Yannis Tsirikoglou (electronics), First Years Festival, Royal Conservatory, The Hague
- 11.09.2010: Performance of Wen Chin Fu's piece *Centrum sound* at Epi Centrum, The Hague
- 23.07.2010: Performance of pieces for voice and electronics with Emese Csornai (visuals), Artcage Gallery, Amsterdam
- 12.06.2010: Free improvisation performance with Bjarni Gunnarsson, Studio Loos, The Hague
- 05.06.2010: Free improvisation with Angelica Vasquez (harp) and Corné Roos (double bass), Studio Loos, The Hague
- 04.06.2010: Concert with Royal Improvisers Orchestra and Phil Minton, Bimhuis, Amsterdam
- 27.05.2010-30.05.2010: Performances of Yannis Kyriakides's piece *Ascent* with MAE Ensemble, Orgel Park, Amsterdam
- 26.05.2010: Free improvisation performance with Yolanda Uriz (flutes), Angelica Vasquez (harp) and Corné Roos (double bass), Tabula Rasa music series, Martin Luther Kerk, Amsterdam
- 18.05.2010: Performance of *Calais Jungle* with Johan van Kreij (piece for voice and electronics), Kees van Barenzaal, Royal Conservatory, The Hague
- 14.05.2010: Performance of *Calais Jungle* with Johan van Kreij (piece for voice and electronics), Studio Loos, The Hague
- 13.05.2010: Concert with Royal Improvisers Orchestra & ICP Orchestra, Paard Von Troje, The Hague
- 30.01.2010: Concert with Royal Improvisers Orchestra and London Improvisers Orchestra, Bimhuis, Amsterdam

B – Contents of the accompanying CD

01. Pdf version of the thesis
02. Stereo version of *L'imaginaire du parleur* (originally 8 channels) by Guilleray and Gunnarsson
03. Stereo version of *Soufférie de Verre* by Guilleray
04. Stereo version of *Du tunnel à l'esplanade* (originally 8 channels) by Guilleray
05. Stereo version of *Duality* by Guilleray and Gunnarsson
06. Stereo version of *In Between* by Guilleray and Gunnarsson (recorded in October 2010)
07. Stereo version of a live improvisation with Johan van Kreij (electronics) and Younes Riad (electronics) recorded February 2012