The embodiment of music/sound within an intermedia performance space

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***Abstract* — Coming from a background of new music (audio) theatre composition / performance and acousmatics, we examine an ongoing collaboration from the perspective of these disciplines. Documenting the process of exchange at each stage has allowed for a constant analysis of methods used to facilitate our communication and procedure of developing musical collaboration within a larger context of a multimedia performance project - a choreographic installation encompassing dance, video, animation, visual design, and virtual worlds. We will focus on our use of terminologies / languages / systems as tools for research, as well as on the subjective experience of working with live electronics. Meta-technical ideas are explored with regard to the spatial and temporal considerations involved in this kind of process, that is to say the acoustic, the three–dimensional, and the audio-visual relationship: the absence / presence of a sound source, its physicality, its virtuality but also the evolving relationships with the visual elements of the performance. In this case the key sound sources used are the bandoneon and the voice. Combined with a wearable costume that incorporates wired and wireless systems of amplification into its design, plus choreographic movement, the live electronics become, in effect, several other extended instruments in space.**

***Index Terms* — Interactive Systems, Live Electronics, Multimedia performance, Sound Spatialisation.**

I. Introduction

"Digital technology has merely reinforced the importance of the human body and the physical in live performance." John Richards[1]

In this paper we aim to describe the working process involved in our artistic collaboration using interactive live electronics: methods, tools, terminologies, but also subjective experience and present some meta-technical issues that are raised with regard to a project that is essentially embedded in the medium of sound theatre and installation.

A. Context

This work was undertaken within a wider collaborative project – Ukiyo (floating world) a choreographic audio-visual performance installation. 'Ukiyo' is concerned with 'real-time gestural interaction that animates a feedback system and generative algorithms, through which the virtual space and the performer's movements are intertwined'.[2] Thus the audiovisual world comprises dance, gesture, digital objects, music and sound. The development of this ongoing project involves periodic group sessions and longer workshops (the first held in London in May 2009, the second in Tokyo in December). The workshops bring together the performance group with additional participants to explore a wide range of issues around interactive and networked performance settings. The group sessions were largely dedicated to integrating technological and artistic aspects of this process into the overall structure.

Our work had a direct influence on the spatial use of live and pre-recorded sound in the performance space. Other amplified or non-amplified sounds were integrated into the costume-design of the dancers, for example portable loudspeakers, inverted 'false' loudspeakers, and sound-producing materials worn on the body. The amplified sounds of the bandoneon were brought into dialogue with live percussive sounds or vocal gestures produced by the dancers. Equally the vocal and physical gestures of Caroline's character 'woman-instrument', and her electronic counterpart elicit, in turn, a response from the other performers.

Our collaboration was also shaped by the pre-existing design of the project, namely the emphasis on interaction in real time. It had to take into consideration the scenography of the performance area, five 'runways' that crossed each other at certain points, with an audience moving freely in and around the space. Speakers and wires had to be placed firstly according to their effectiveness within a large, ambient space, and with a view to their practicalities when worn by the performers.

The first performance took place at Brunel University in June which served as an opportunity to put our technological and artistic ideas to the test. The performance was followed by a question and answer session which brought valuable (and positive) feedback from the audience, and also highlighted up interesting questions for our continuing exploration.

B. Theoretical Background

Since we aim to explain how we use terminologies / languages / systems as tools for research as part of our ongoing collaboration a brief discussion of some of the theoretical grounding is in order.

We are concerned here with the notion of Sound Theatre as opposed to Music Theatre, which because of its historical adhesion to a musical score, can limit collaborative, interactive work that necessarily goes beyond fixed parameters. As a term, the latter has its roots in the German tradition, 'Musiktheater' referring to all genres including contemporary opera by composers such as Harrison Birtwistle's 'The Mask of Orpheus' or Wolfgang Rihm's 'Die Eroberung von Mexico,' instrumental music theatre as exemplified in most of the work of Mauricio Kagel, or new experimental work leading on from the conceptual ideas of John Cage's 'Europeras'. For this reason it can be problematic when used in other cultural traditions, for example the British or American, where contemporary Musical Theatre enjoys a popular following, and lead to further confusion amongst its practitioners[3]. Theorists such as Björn Heile, Michelle Duncan, David Roesner or Erika Fischer-Lichte have also been concerned with developments of recent Music Theatre, re-evaluating the balance between score and performance in the light of a paradigm shift that has occurred in the last twenty years: "For a serious engagement with opera as a dramatic spectacle, performance must be seen as primary and the score principally as the incarnation of potential performances"[4].

Given this perspective, the notion of Sound Theatre or Theatre of Sound invites a re-dressing of the balance between the visual and aural components of performance, and is described by one of its leading exponents, composer Craig Vear, as the following: "an experimental interdisciplinary performance concept combining field recordings, live computer music, the mental 'seeing' evoked from sound, and a theatre performance environment." It draws attention to "the phenomenological qualities of sound, music and theatre"[5].

In this light a direct parallel can be made with Simon Emmerson's concept of 'Space Frames'[6] in relation to live electronic or electro-acoustic performance. The local frame includes the stage and event, whereas the field is concerned with the arena, surrounded in turn by its much larger landscape. Depending on the diffusion of the sound source within the four spatial possibilities of event, stage, arena and landscape a musical discourse takes place between them. Their transformation, in terms of juxtaposing a sound source from one space to another, is a contributing factor towards the 'play of realities', whether surreal, paradoxical, magnified, contradictory or conflictual, that comprises sound theatre. For example, small sounds belonging to the mechanism of an instrument can be magnified through amplification to occupy the much larger space of the landscape.

Lastly, we started from the premise that in all work involving interacting with live electronics it is essential to consider the development of a Control Intimacy[7], a term used by Emmerson that refers to the relationship between performer and electronics with regard to the accurate mapping of action to sound, taking into account nuances of cause and effect and subtle changes of technique that alter, in turn, the sound. A Local Control (ibid) on the part of the performer necessitates hearing back the sound source from its place of origin, ie. from within the locality, so that in many cases a loudspeaker in the close vicinity of the source, in the 'local frame', becomes vital. She or he must be able to monitor timbral nuances emanating both from the source and from its electronic counterpart.

II. Initial Steps

We first met in one of the early group session working on the new project that would become Ukiyo – Caroline performing the bandoneon and Oded with his laptop. As the work process within the group is based on improvisation and exploration of ideas and relationships we each brought our own repertoire of musical material and ideas as a starting point. As the only musicians in the group we decided that a first step in developing our musical and sonic relationship within the larger multimedia context would be to record some of Caroline's playing as a reference as well as a sonic source material.

During our first recording session we discussed the possibilities of incorporating samples of pre-recorded sound (bandoneon) as the basis for the live electronics, developing and modifying the original instrumental timbres and amplifying some of the live instrumental percussive / air sounds so as to make them sufficiently audible during a performance. The live electronics would respond to certain pitches and timbres produced by the instrument, triggering off a palette of extended sounds and filling a longer silence with air sound. They open up the possibility of another dimension of space within live musical performance, that of a virtual presence together with the physical presence of an instrument. The choice of musical material was determined by an essentially experimental work process, whereby Oded suggested certain timbres and

registers such as low, sustained bass notes, chord clusters in the middle range, very high pitches, tremolo produced by rapid bellows movement, and percussive sounds produced on the body of the instrument, to be recorded. We examined many technical and musical possibilities of playing:

- Drawing fingers/thumb across all sides of the bellows – soft, rachet-like sound.
- 'Sweeping' the bellows with flat fingers – frictional sound of the material being brushed.
- Operating the keys on either side of the resonant case, (left and right) - multiple clicks.
- Knocking / tapping the wooden case on either side – percussive sound.
- Operating the air release lever as an action in itself or to release the bellows – click / air sound.

Another important element in these early stages was to record some of Caroline's free improvisation incorporating some of these elements into a flow of sequences that made musical sense.

The next stage began with Oded developing sketches for interaction between bandoneon and electronic sounds. Working with pure data[8] and using the various recordings we did, Oded developed a prototype patch that analysed the incoming signal from the bandoneon, identified some musical elements, and generated electronic responses based on the input. For example when the input was sustained notes (or chords) the patch began to pile harmonics on one of the detected notes. We then began to work interactively with the Pd patch and live bandoneon, testing the reactions of the former to various instrumental pitches and timbres, and 'tweaking' the patches so that they responded more markedly in order to allow a 'Control Intimacy' on Caroline's part[7]. The incorporation of visual feedback in the patch enabled Caroline to learn the degree of reaction to a particular sound, which in turn affected her choice of speed and dynamics in a process of sensitisation that demanded flexibility on both sides (as Oded was adjusting the patch parameters) to allow for this dialogue, this 'play', to take place.

III. Musical Collaboration Within Multimedia Project

While this process was taking place between us the larger *Ukiyo* piece was taking shape. The performance would have two parts linked by an entre'acte consisting of a silent film accompanied by a pianist (playing music to be composed by Oded). In the first half Caroline would be playing the bandoneon, which she would then leave on stage as a silent, visual reference. When she returns to the performance space in the second part she is dressed in a radiant gold dress – echoing the bandoneon's design – and performs a vocal part as a character which we named 'instrument-woman'. The dress, designed by Michele Danjoux, co-director of the DAP Lab and lecturer at De Montfort university, included two small speakers attached to the back to relay the voice and electronics. The back pieces containing the wired speakers are detachable from the rest, so that the performer can place them on the floor, where they would continue to sound, when exiting the space.

Fig 1: Caroline with wearable speakers in rehearsal

The visual relationship between the bandoneon and the 'instrument-womans' character was echoed by a decision to have the live electronic responses in the second part be a blend of the vocal performance with recorded bandoneon sounds. For example, a low rumble of modified chord clusters responds to the spoken voice, following in turn the melodic contours of the humming voice, bird-like calls respond to the whistling voice, and fricative sounds (s,sh) were convoluted[9] with bandoneon clusters, resulting in a merged timbre. The Pd patches we developed mirrored the structure with one patch working with the bandoneon sounds in the first part and a different patch responding to the vocalisations in the second part.

With the evolution of the patches the process of working closely with responses to one's own generated sound became a fascinating and highly complex affair,

demanding a strong sense of timing, of acting and reacting to an electronic virtual partner in a constant flow of dialogue. There is also an inherent sense of 'play' with the live electronics, of imitation and variation, an interaction between playing an instrument or vocalising and 'rebounding' from the response. The patch was designed with an ultimate goal of giving the performer a sense of control of the result, although there can, and should be, some unexpected results. In the words of Brandon LaBelle 'Interaction is built on the belief that to remove the hand of the artist is to invite unexpected results'[10]. But asserting this control demands multiple listening and responding tasks. Aiming to understand better the relationship between the voice and electronics Caroline began a process of notating some of these improvisations, creating a visual score (see fig. 2 on last page) which served as a counterpart to the 'virtual score' which the Pd patch provided.

Caroline's statement regarding the subjective experience of working with live electronics may be in order at this point: "Because of the nature of the modified sound source a certain 'distancing' takes place when I hear it in relation to my own sound. This spatial-sonic instrument is strange but somehow related. I am communicating with a familiar source that has become an 'other'; displaced, altered, its changed character has taken on a fragmentary, other-dimensional aspect as the 'electronic woman-instrument'." Interesting would be to further delimit that borderline during performance and modify the already modified live electronics, this by slight shifts of instrumental and vocal colour, so that the resulting sound sequences are constantly changing, subtle, complex, like multiple mirrors. However, it seems vital to maintain an "observable connection" as Todd Winkler mentions, otherwise "the dramatic relationship will be lost to the audience."[11]

As we approached the first performance and the dramatic shape of Ukiyo was developing Caroline's vocal performance became more extravagant in line with the evolving nature of her character. It now encompassed a larger vocal register which included Sprechstimme, more use of dynamics, and extended vocal techniques. The vocal techniques used included:

- Range of air colours using various vowel / consonant shapes of the mouth
- Whistles
- Laughs
- Singing
- Sprechstimme
- Humming
- Onomatopoeic sounds based on 'zaum' text[1]

1 sound poetry invented by the Russian Futurists of the early 1900's, including Alexey Kruchenykh. The word literally means: 'beyond mind'.

The Pd patch, which was developed around a more intimate and restrained vocal style, no longer responded coherently to the the input and had to be adjusted. With very little time before the first test run these adjustments were only partially successful and we are revisiting this aspect in our ongoing collaboration. Thus our search for an interface that offers Caroline intimate control of a rich sonic base still imposes boundaries on her performance. We are currently working on adjusting and expanding these boundaries. Nevertheless it is a important for us to understand the tension between our collaborative, musical exploration and the larger dramatic shaping of the performance we are part of.

IV. Meta Technical Issues

A. The relation of the spatial to the temporal - the acoustic, the 3 dimensional:

The live presence of the instrument is enhanced by its' amplification, for example of air, or percussive noise on the keys / bellows, producing a macrocosm of these otherwise relatively inaudible sounds[2]. They claim another virtual, audible space, unlimited by the localisation of their source. In the same way pre-recorded samples of bandoneon music can be relayed and modified or processed at will in order to change their identity. This frees the player from any direct link between the sound and movement he or she is producing, as in some instances it is not technically possible to play in the same way whilst moving. It also sets off the live from the recorded, played back or manipulated sound, in a strategy of immediacy, emphasizing their confrontation within the audio space. Even more exciting is the use of live electronics in dialogue with the instrument, operating in real-time but obviously coming from another dimension of the same space. In developing these elements we draw on both the ideas of a 'theatre of sound' and on Emmerson's term 'Space Frames' as "objects of musical discourse… Space itself can tell a story" [12].

The voice becomes an extension of instrumental sound, employing a wide range of techniques including speech, pitched and non-pitched sounds, Sprechstimme, etc. The effect of spatial difference, of far and near, macro- / microscopic, is created by a 'dialogue' between the different loudspeaker sources. This is made all the more subtle by the possibility of a complete

2 We refer to one of the possibilities within Emmersons' definition of Frame Play, whereby small sounds are magnified through amplification into a larger field of the audible space (a concept that was favoured by Cage). See [4] Pg. 99.

rotational axis of 360 degrees on the part of the small speakers.

The listening space offers so many possibilities when integrated with live performance – ambient sound (coming from many different sources in the room), 'immersive' sound (filling the acoustic space to the point of 'saturation'), and spatialisation, the effect of distance and proximity between sounds.

B. Performer to public – body language, contact between the two

This aspect ties in with Caroline's main research question (undertaken as part of her PhD studies at Brunel) which is concerned with possibilities of extending the presentation context to suit the demands of a particular performance work. It is to do with the flexibility of a space, the performers and the public. In the case of 'Ukiyo', the public moves around the performance area in order to see much of the floor movement and screen projection. At the same time they hear acoustic sound emitted from the voice or instrument as well as its amplification by way of loudspeakers placed at a distance to the source, or stand close enough to witness those emitted by micro-speakers attached to the performers' back. Within an 'ambient' space, whether it is to do with sound or visual elements, it is absolutely vital to create this possibility, as the audience perception will shift constantly. The public is then engaged in creating their own personal version of the work according to where and how they move through it.

This also relates to the multiplicity of performance spaces in networked multimedia performance such as Ukiyo. This is not just the fact that we try to link a physical performance space with a virtual one. It is also about the different artistic spaces that each media component inhabits and the reconfiguration of the artistic space that a multimedia setting attempts. In Ukiyo we are trying to open the possibilities for audiences to perceive a shared artistic space. The dancer's don't perform *to* music which permeates the performance space, rather they share this space with the music. The relationship between Caroline's sonic performance (whether instrumental or vocal) and the electronic responses is a multilayered, multivalent affair. The patch aims to match and expand some aspects of her sonic properties but also takes parameters from a higher musical/textural level. When paired with Caroline's performance style the result is a shifting presence, of both the live performer and the electronics, in the performance space. Our goal as we continue this project is to extend these to the dancer's relationship with the digital environment (audio and visual) through the use of sensors and video tracking of their motion on stage. In the meantime we also began experimenting with making the performer's bodies into sound sources (both acoustic and electro-acoustic by way of speakers) as another mean of integrating the audio and visual spaces.

C. Performer to instrument(s) – animate/inanimate, extension,' body' of instrument(s), body as instrument

It is necessary to include the 'extended' instruments in space - in this case the electronic bandoneon and the electronic voice - in relation to those of the performer: virtual instruments that interact with the two live components in real time, virtual extensions of the performer. Their relation is once-removed, distanced, alienated by a process of modification of the original sound source. This dissimilarity allows for more 'play' on the part of the live performer, freed from any constraints of direct imitation or variation and faced instead with a palette of possible responses, some of them unexpected. Important is the sense of 'Local Control' [12] on the part of the performer, being able to hear the balance between her own sound and that of her counterpart. Another factor is 'gestural nuance' [13], interpretive subtleties which bring an inherently human aspect to the relationship. There is a close dialogue between the two instrumental 'bodies' breathing, the one physical, (voice / bandoneon), the other virtual, (their electronic counterparts). In a sense the live body becomes 'animated' by the virtual in a chain of overlapping sound stimulii, so that their borders cross in a constant flow of multiple layers. Ultimately, what is constructed is one large 'instrument', a complexity of sound that invokes Helmut Lachenmanns' statement: "composing means: building an instrument" [14].

D. Sound/music to visuals – the absence/presence of both, their physical/virtual realities

Caroline's performance with the bandoneon deliberately begins with the creation of a 'scene', occupying and determining the space around the performer and the object-instrument. The visual movement/gesture is not necessarily linked to a certain sound; both determine their own paths. Indeed, sound is sometimes absent altogether during these movements. It can take on a virtual presence through the medium of loudspeakers relaying pre-recorded material, or live electronics, or a magnified version of the live instrument through amplification. This leads to a sense of dislocation between what is seen and heard on the part of the audience and frees the player to be able to explore another dimension of presence, another 'reality'. TIt is the "theatre of transformation" …"an expansion of the admissible" as described by Jonathan Harvey[15].

We are confronted with the question of the 'absent' body in performance. Its disappearance frees both

music and speech from the confines of live visual synchronization. Voice and instrument become 'undesiring' bodies, containing the character within their sound. There is a fundamental difference in perception between their absence or presence, one that highlights the dramatic possibilities of independent aural and visual components. Live electronics enter as another 'instrument in space', bringing interesting timbral differences to the original sound source, and with this, new characters into the 'theatre of sound', occupying the performance area in an essentially spatial distribution. They can react as a 'macrocosm' to the localised physical presence of the bandoneon or voice, introducing an unpredictable element of 'play' into this dialogue between absent and present. Likewise, any amplification of the live instrument magnifies its presence, so that we seem to be inside another dimension, another 'chamber' of sound.

E. Objects – their role, placement in space:

The object-instrument has to be wired with a contact microphone, adding a further, slightly bizarre dimension to its appearance. This also applies to the two loudspeakers attached to the back of the costume of the woman-instrument, wires trailing behind her as she moves and turns projecting electronic responses to her voice. In the latter case, these wires are used as an extension of her gesture, taking on the image of a coiled whip as she flings them to the ground. Later they become 'reins' preventing any further movement forward as she fully extends their length and is almost capitulated backwards in mid-gesture.

VII. Conclusion

Further developments in this interactive project are needed, so that a larger scale of responses becomes possible, for example sudden, unexpected silences on the part of the electronics, or extensions of timbres. Both bandoneon and voice should be able to work with the electronics at the same time if they are played live simultaneously. At present we have compositional sketches for the live instrumental and vocal parts, as well as for the different patches. We're considering the possibility of a duo work with longer duration, developed in parallel to the ongoing work with in the larger group, retaining the elements of music / sound theatre already developed, and incorporating the presence of Oded as a live performer. The flexible medium of live interactive electronics allows for a work to transform and grow organically over time, adapting itself to changing situations, contexts, cultures, and new interpretations. To return to our quoted source at the beginning of the paper, there is "an increasing focus in electronic music on shared experience, face-to-face, ritual, gesture, touch, social interaction and the exploration of devised instruments."[1]

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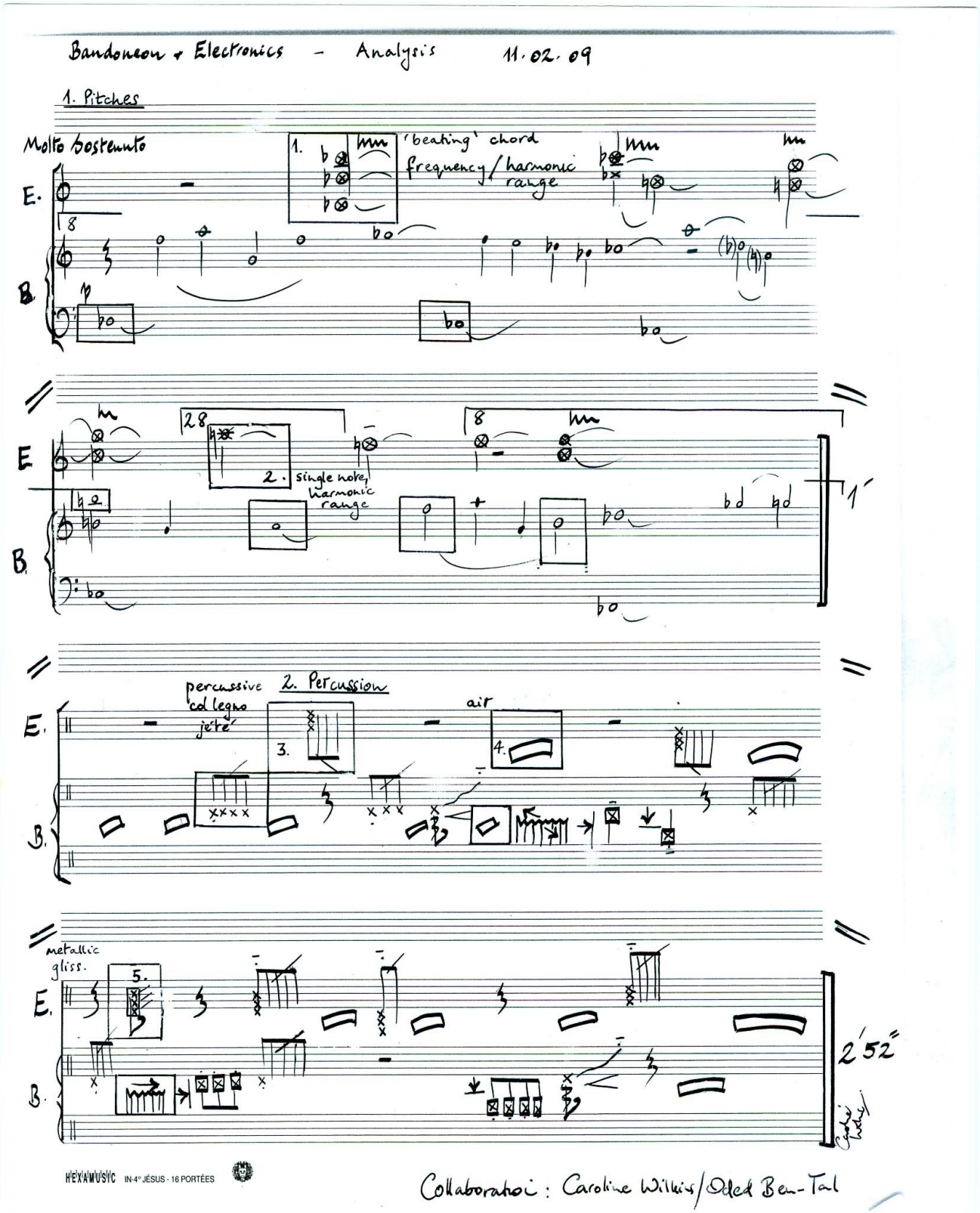

Fig. 2: Score of 2 short sections for Bandoneon and electronics