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Instrumental Sound Structures

An instrumental approach to sound oriented composition

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Abstract

The current situation of instrumental sound composition relies on the use of unconventional instrumental techniques, the utilization of traditional instruments in combination with technology or the development of new instruments.

This paper seeks to analyse the links between new and traditional instrumental means of musical control and expression, by comparing them and ultimately relating them to my own compositional processes and results.

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Introduction

Sound is the essence of all music. Western musical culture, however, has fragmented this universe in descriptive elements, allowing the rationalization and development of musical material and technique. In this reduction, the formation of discrete elements in relation to their fundamental frequency proves to be of primordial importance over the rest of sound parameters, elaborating theories and systems that would eventually dominate the entire musical praxis along centuries. This, at the same time, favoured musical conceptions constructing a high degree of formalization and analysis, giving rise to a solid consolidated musical tradition and an elaborated system of musical notation.

Nonetheless, the complexity of events and advancements of the 20th and late 19th centuries catalyzed a series of conditions that affected the creation of and conception of music, like possibly never before in history. Questioning fundamental musical values, breaking and enhancing many traditional principles. One of these breakthroughs was the inclusion of *sound* as musically valid material. In that respect, the long-term musical conditioning based on the emphasis in specific musical parameters that had defined music itself, was being confronted (or expanded in other cases) by a wider musical conception.

Personally, I have always been intrigued by the possibilities and characteristics of sound as raw musical material. Conceiving sound as an infinite world of possibilities and constructions that was once limited by tradition, either by notation or instrumental technique. In this respect, the application of technology to my own compositional work opened up new possibilities and largely expanded previous musical conceptions.

The collision of these two worlds opens up new musical directions, but it also raised new problems and dilemmas upon the remaining use of traditional paradigms in combination to new technologies, and consequently aesthetical results. In the sense that traditional means and tools for music production have been created to function in rather different musical environments and to fulfil different aesthetical needs. It is true that they have been continuously developed and adapted over the entire history of music, however, to what extent are they possible to adapt or to survive the radical change of technological and aesthetical conditions? Is it even useful to preserve traditional musical paradigms? Especially in a rapidly changing creative environment where the decreasing possibilities of performances by groups of traditional instruments is in contrast with an obvious increasing interest of new generations of composers and musicians to implement technology, many times blurring the line between

performance, composition, research, installation, instrumental development, pop, academy, and ultimately: noise and music[1].

This paper tries to explain my personal solutions and answers to these questions through a set of examples from my own work, introduced by some of the major ideological landmarks, and personal influences of sound oriented composition in the 20th century. This in an attempt to elaborate a brief, but hopefully substantial analysis of their compositional thoughts and conditions in order to relate them to my own work and musical contribution.

[1] In the entire text the term "sound" would be referring to the whole variety of acoustic phenomena, including "noise". For that reason this last term is avoided since I rather define it as "sound without acquired musical meaning", just as "music is castrated noise" (Feiler, 2008).

Chapter I
The Western reinvention of sound in the 20th century

It is out of the scope of this research to make a scrupulous analysis of the conditions and stages in which sound, as a musical element in its own right, gain importance along the history. Nonetheless, for me it is important to formulate a brief analysis of some of the breakthroughs and key figures during the 20th century, both to obtain some insight into the development of sound oriented composition as to exemplify the influences of certain developments and approaches to sound as matter for music composition in relation to my own musical practice.

Listening outside

Some consider that the technological achievements and the possibilities of sound recording and sound synthesis were determinant to change our view of what constitutes music. Nonetheless, I believe that this has to do more with a complex web of events taken place between the 19th and the 20th centuries that brought about the conditions that gave rise to major ideological musical breakthroughs.

The emancipation of the tonal system at the beginning of the previous century in favour of other organizational systems (12 tone technique, modal music, Serialism) may have been important for the evolution of the formalized compositional practice, and certainly influenced and potentialize new sound resources within the note-based creative frame. However, these were purely expanding the possibilities of the established system without an immediate and more radical impact in the nature of musical material and its composition.

In that respect, the Futuristic movement took a more radical approach. Despite the fragile musical content of their manifestations, their ideology was more relevant to sound composition as it was based on something that previous developments of Western music did not directly acknowledge, ***listening*** outside predefined musical contexts. In other words, their approach was not based on the intellectual fundamentals of compositional technique, but on the act of *contemplation* and acknowledgment of their surroundings, rejecting then the literate musical tradition by the appreciation of the complex sound environments that emerge from the variety of machines and engines that have occupied the industrial soundscapes since the development of the Industrial Revolution.

> "To excite our sensibility, music has developed into a search for a more complex polyphony and a greater variety of instrumental tones and coloring. It has tried to obtain the most complex succession of dissonant chords, thus preparing the ground

> for Musical Noise. (…)on the other hand our ears rejoice in it, for they are attuned to modern life, rich in all sorts of noises. But our ears far from being satisfied, keep asking for bigger acoustic sensations. However, musical sound is too restricted in the variety and the quality of its tones… We must break at all cost from this restrictive circle of pure sounds and conquer the infinite variety of noise-sounds. Each sound carries with it a nucleus of foreknown and foregone sensations predisposing the auditor to boredom, in spite of all the efforts of innovating composers. All of us have liked and enjoyed the harmonies of the great masters. For years, Beethoven and Wagner have deliciously shaken our hearts. Now we are fed up with them. This is why we get infinitely more pleasure imagining combinations of the sounds of trolleys, autos and other vehicles, and loud crowds, than listening once more, for instance, to the heroic or pastoral symphonies."
>
> (Russolo, 1913, p.5)

However the potential musical impact of their thesis diminished as the result of the inclusion of traditional music fundamentals in their advanced formulations based on the necessity for musical notation and possibly artistic validity and acceptance. Acceptance that nevertheless was not achieved in the musical life of the beginning of the century, but that had a silent impact in the progression of Western music.

> "We want to score and regulate harmonically and rhythmically these most varied noises. Not that we want to destroy the movements and irregular vibrations (of tempo and intensity) of these noises! We wish simply to fix the degree or pitch of the predominant vibration, as noise differs from other sound in its irregular and confuse vibrations (in terms of tempo and intensity). Each noise possesses a pitch, at times even a chord dominating over the whole of these irregular vibrations."
>
> (Russolo, 1913, p.9)

The concept of extracting sounds, or objects, from their environmental customary nature to artistic contexts was also envisioned at that time by other art disciplines and artists like: Pablo Picasso, Marcel Duchamp, or Man Ray among others. The aesthetic reasons were probably more varied than the simple wish of translating sound into music composition, however the use of *found objects* was more common in plastic arts than in music. In that respect, composers like Satie (Parade, 1917), Respighi (Pines of Rome, 1924) or Antheil (Ballet Mécanique, 1926) did some attempts to integrate sound into music composition, although these were more sound illustrations in service of a more conventional use of musical discourse.

Mechanized sound

The relation between machines and art was an important subject in the emersion of different aesthetic attitudes in the beginning of the 20th century.

Although in the 18th and 19th centuries some composers made explicit references to their environments, like in the case of Beethoven's 6th Symphony, (Braun, 2000) the development of industrialization opened up a new fascination to incorporate environmental sounds into musical contexts as the reflection of the culture's metamorphosis. In this regard, the emergence of railways and locomotives in the half of the 19th century, had an impact in the artistic production of the time, ranging from pessimistic reactions about transforming the pastoral landscapes into industrialized ones to the excitement of new increasing ways of mobility that would expand commerce, economic growth and social opportunities; the influence of these industrial changes and their development would have an increased impact in the revaluation of the relationship between life, environment and arts.

Locomotives aroused the fascination of composers as early as Berlioz, "Le Chant des Chemins de Fer" (1846). But many other composers and musicians would be motivated by the loudness, speed, energy and dynamics of this new giant machine translating visual impression into insisting ostinatos and continuous rhythms. A phenomenon that influenced not only classical music like in the case of Arthur Honegger, "Pacific 231" (1923) or Villalobos, "O Tremzinko da Campirina" (1923) but other genres like jazz or blues, like Duke Ellington's "Daybreak Express" (1933). All examples of social and technological changes that had an explicit intended connection of "real life" surroundings and artistic creation more predominant than in other musical periods.

In any case, artists have different perspectives of what this new surroundings and "life itself" should represent in art. In the case of the Futurists, the invention of new instruments was revolutionary, and although Russolo stressed that their hypothesis about noise networks would eventually achieve a condition of abstract elements of art, their efforts were diminished by the accusations of "servile imitations of daily life" (Varèse, 1917) by composers like Varèse, Antheil and painters like Mondriaan.

Although Antheil and Mondriaan would have shared interests of every day life sounds with the Futurists, they had different visions of their essential qualities of machine and the different ideas of nature in music. For Mondriaan, the Futurists make a significant step in expanding the sounds of traditional instruments with noise (Bijsterveld, 2000); however, their music was too close to nature and lack of abstractness. They were unable to fulfil his necessities of a neo-plastic music based on fixed vibrations and sudden brake offs. For the Futurists, nature, just as technology, was part of the modern life, for Mondriaan, art should be essentially abstract. Antheil, also a member of De Stijl, works with machines in his piece, Ballet Mécanique, from 1927; for Antheil, silences and repetition were the most important musical elements as opposed to the tones of Mondriaan or the organized "noisy" microtones form the Futurists.

In any case, machines fulfil different necessities depending on different aesthetical perspectives, their recognized preciseness and rejection of exacerbated sentimentalism from the Romantic period received different approaches in regard to musical abstraction. For the Futurists, the variety of a sound complexity came from the expanded reality, for the neo-plastic ideals of Mondriaan, their capacity of creating sudden contrasts between tones and non-tones within the context of universality and for Antheil, the capacity of regular repetition and silence for others like Ernest Krenek, their use of machines was just a trend that would be diminished since mechanical music in a long term will prove dull and lack of active participation. Whatever the use of machines would have been in the late 19th century and beginning of the 20th century their musical manifestations speak back not as perspectives of a new musical machinery but as a reflection of a culture undergoing a deep transformation of artistic values and surroundings.

It is certainly difficult to determine in what extent new technological innovations led to new artistic conceptions and aesthetic forms, as opposed to composers and music philosophers applying their preformed ideas and concepts to the available technology to realize them. But this probably depends on the given situation, period, and composer, evolving in parallel and always undergoing a feedback communication between idea and means.

In this regard, one composer that was always in search for the means to realize his ideas, and one of the most influential composers of the century, being a key figure in the development of music as a "sound art" was Edgard Varèse. Despite his influence with the Futurists, Varèse did not directly acknowledge his city noise surroundings as an influence on his own work, as the futurist did with their enthusiasm found on the industrial environments or many other sound composers imitating the sounds of the city, specifically in New York. He did not derive

his sound visions directly from the emerging technology of the time, nor choose to follow the atonal methods of Schoenberg or the linear polyphony and rhythmic harmonic distribution of Stravinsky. He was to develop and pursue his own musical fantasies of masses of sound, sound beams and spatial sounds, even though they were difficult to realize with the available means. His approach, although emerging from the academic traditions, banishes the most fundamental musical principles; his necessities for new musical instruments in which his sound ideas could be realized obliged him to concentrate in percussion instruments due to a lack of pitch and brass instruments, including new instruments like the Ondes-Martenot or sirens in his wish to encompass a frequency continuum.

However, he follows more conventional approaches in terms of notation and instrumental invention. His music is represented in terms of notes within the traditional notational system, although expanded as a result of unusual musical instruments. But notation is a pure pragmatic solution for performance communication, since music is not solely based on note distribution, and sound is not the result of concatenation of pitches, but a complex amalgamation of sound planes taking advantage of instrumentation as a core element of the musical discourse rather than anecdotal or incidental colour.

Electricity and Studios

No other technological innovation has had a bigger impact in music than the application of electricity. Electricity favours the appearance of devices that would allow a new manipulation of music material having an impact in the conceptualization of music itself, along with the new instruments that generate sound with electronic means as well as the invention of one of the mediums of music/sound massive diffusion, with no other percipient in history, that would become the place for the new music composition studios, the radio.

"Any normally equipped radio station could produce electronic music without the need of especially expensive equipment"

(Eimert, 1955, p.3)

Perhaps the first audio art piece reproduced by this innovative way was "Weekend" from the German experimental film maker, Walter Ruttman, which premiered as a radio piece in 1930. Although the sound material is used as an anecdotal recollection of sounds over a weekend in Berlin, done in a narrative-related fashion, and with no further sound compositional

ambitions, it was one of the first examples of a pure sound composition. But this was far from being the only piece at the time. "Hörfolgen", a series of listening was established in Germany in 1928 as an attempt to increase interest in a new sort of radio art form. It was a combination of poems, songs, pre-recorded noises and texts. It was probably the first attempt to consider sound as part of a dramatic narrative and not simply functional background; however, the genre was not considering an "art form" since their ultimate goal was to entertain listeners.

A more ambitious approach was realized some years after in the "Studio d' Essay" around 1943, and although it has no direct link to the German studios from ten years earlier, their approach was based on the experimentation of sound, noises, spoken literature and music regarded as equal importance to Pierre Schaeffer, a member of that group and founder of what would be later considered as "Musiquè Concrete". One of the most important achievements of Schaeffer is the formulation of theories considering sound as objects and with it the development of critical theory about the musical sound experience, focusing on sound as we hear it in relation with environment. This gave him a position that together with the influence of tape recorder techniques, allowed him to concentrate on sound from a topological perspective.

A couple of years later, another historical event took place, this time in the German radio of Westdeutscher Rundfunk of Cologne, at the time called Nord-westdeutscher Rundfunk (NWDR). Another studio of electronic music was born. In this case, the studio and its production emerged as a result of expansion from the current compositional techniques. For Herbert Eimert, the new electronic music was not more than an extension of serialist's procedures (Chadabe, 1997); the new implementation of technology in music would expand the organizational systems of the already established compositional practices, expanding organization of pitch to other sound parameters. The new electrically generated sound principles would allow the possibility to extend, calculate and provide a more precise measuring of musical parameters,

> "The composer determines each note by its pitch, duration and intensity. Only he no longer has only 70-80 pitch levels at his disposal (this is the average number utilized in instrumental music; Bach's "Wohltemperiertes Klavier" utilizes 50-55 different pitches), only 6 or 7 intensities from pp to ff and only minims, crotchets quavers, dotted and syncopated values. He now has at his disposal the entire range of frequencies from 50-15,000 cps, 40 or more precisely calculated dynamic levels and an infinite number of durational values". (Eimert, 55 pg. 3)

However, as in the case of Paris, composers coming to work on both studios gave a more individual perspective to the available technical resources and theoretical backgrounds of both schools. Xenakis came to the school of Schaeffer, not to work on the juxtaposition of sound objects but to elaborate complex sound-masses. Ligeti worked on "Artikulation", and although its basic form is serially organized, Ligeti's main idea had to do with the relation between his own sound speech associations and artificial language (Wehinger, 1970), which in that case "sound associations" were more related to Musiquè Concrete according to the Cologne school (Stuckenschmidt, 1955). Even Stockhausen took his compositional ideas much further than the basic principle of discrete sound organization and permutation, formulating concepts like "moment form" as in the case of pieces like "Kontakte", or "statistical form", as used in "Gesang der Jünglinge". His continuous concern to integrate mechanical instruments and electronic processes mark a step away from the ideas of rejecting the integration of traditional instruments in the "new" electronic music "A disparity of means must always be eliminated. Thus the traditional instruments must be eliminated, and in our electronic music we do so" (Gredinger, 1955, p.41).

In general terms, it can be said that while the French school was occupied with the categorization of forms (external sound structures) and the listening relationships, the German school was focused in the internal sound behaviour, generation, timbre and global structure. And although both approaches were influenced by their founders and, as already mentioned, the different composers working in this studios, a parallel can still be drawn in the current situation of sound composition, even though technology is nowadays much more advanced than back in those days. This still depends on these two same basic approaches, sample and synthesis.

The rivalry and obvious disassociations between the two studios, for both political and aesthetical reasons, were apparent at the time, however they both agree in the rejection of tradition and an exaltation of new compositional techniques and sound resources taking advantage of the new technological available means and reacting to the old fashion technical and aesthetical grounds as a necessity to find new ways of organizing the new produced sound materials. The way that they both counterparted the traditional principals were by their emphasis on rationalization, construction and integration, securing the transitional development of European tradition, in Cologne, by their interests in structure and permutation through a "real control of nature" (Eimert, 1958), and in Paris, by their interests in cataloguing and defining sound material.

> "The third, the electronic stage,…is conceived by the intellect alone; the range of experience derived from traditional music procedure is transferred to a radically new material". (Stuckenschmidt, 55 p. 11)

> "Seen from an historical viewpoint, the development of music has been one in which man has gradually found, by the creation of his own methods of regulation, the means to put artificial manipulation in the place of natural sound control.(…) As he (the musician) improved his instruments technically, he was enabled to extend his range and produce other than natural notes. Thus he freed himself from the limitations imposed by nature" (Krenek 55, p.15)

Sound view from a new continent

"We no longer needed electronic studios; we already had them in our brains."
Pauline Oliveros

About the same time, an approach to new sound resources, an opening to all sounds and the use of technology was taking place in America. This approach, unlike the European one, had an emphasis on experimentation, performance, improvisation, indeterminacy and "make music with whatever you can" (Chadabe, 1997).

Coming from a generation of inventors and pioneers in the exploration of unconventional tuning systems like Harry Partch and Henry Cowell, the new generation of composers strived to step out of the previous western music history, and certainly from the derivative European traditional models. It was a generation whose postulates eventually had an impact on the same European assumptions and musical traditions. One of the key figures of this generation and one of the most influential music philosophers and composers from the 20th century was John Cage.

Cage started to work with sound in 1939, with his "*Construction in Metal"* for percussion. His necessity of finding structural principles while dealing with percussion lead him to revaluate the nature of sounds in relation with duration and silence. In this way Cage detached the concept of structure from the one of content, this formulation allowed him to establish priorities by filling in moulds of time with sounds or silences, a common system used in other

pieces like "Imaginary Landscape" 1,2,3,4 and 5 from 1939 to 1952. Although Cage's interest in sound is manifested as early as 1937:

> "I believe that the use of noise to make music will continue and increase until we reach a music produced through the aid of electrical instruments which will be available for music purposes any and all sounds that can be heard…whereas, in the past, the point of disagreement has been between dissonance and consonance, it will be, in the immediate future, between noise and so-called musical sounds."
>
> (Cage, 1937, p.3)

His ideas and predilections about the inclusion of environmental sounds might reflect some parallels with the ideas of the Futurists or even Schaeffer; nonetheless, these were first subjected to a high concern for organization and control using arbitrary numbers and predetermined compositional schemes. These ideas found a connection with the serialist's techniques, but with the great novelty of not just avoiding pitch organizational methods, but promoting a disconnection between "sound" material and method/structure. These principles; however, changed as indeterminacy and chance increased in his compositional methods, permeating throughout other compositional parameters: instrumentation, structure, rhythm, pitch etc. He questioned not only the extreme intellectual approaches coming from Europe at the time, but jeopardized the whole Western musical traditional establishment.

Although Cage seems to be the most representative of American composers form that period, he directly influenced a whole next generation of younger composers whose interest in unwritten musical forms and the revelation of natural acoustical phenomena through music composition and the use of technology, took sometimes even a more radical position against traditionally based upon materials and musical systems. Oliveros, Lucier, Ashley, Behrman, Tudor, Mumma, they all approach sound composition from different perspectives, providing different solutions to compositional problems in relation with technology and live performance by listening, experimenting and using alternative use of "found technology".

While in Europe, studios prompted the collaboration of composers and technicians creating meticulously crafted pieces, in America, lacking any institutional support, electronic music was created by composers and musicians experimenting and fooling around with circuitry, taking the tape out of the studios into performance spaces and transforming extreme amplification and feedback into musical instruments.

However, when it comes down to the organization of musical material, the lack of structural principles and traditional systems, stressed the necessity to construct and invent solid fundamentals to manipulate and structure the new available sound resources. After five hundred years of tonality, the urge to formalize new methods that would provide both, musical validity and control, to the new materials was of eminent importance. Some look to Serialism, the "new" technique in vogue, like in the case of Cologne. Schaeffer, on the other hand, based his efforts in definition, perception and description of this new sound material, and Cage opted for indetermination and chance routines. *Despite the diverse and sometimes antagonist approaches on sound material, the similarities of arbitrary processes, either in the form of permutations or highly systematized chance operations, resulted in an obliteration of musical dialectic constructions based on sound itself, eliminating the possibility of more meaningful relationships between sound and music composition.* In the American as in the German schools, the consequence was based on the interest of stepping out of the compositional process eliminating personal subjectivity.

> "He scrupulously avoids not only "self-expression" but also what might be called compositional intervention in the natural process on which his pieces are based".
>
> Alvin Lucier (Tenney, 1995, p.16)

"I try to find what's there – Not to make it do what I want, but to realize what's there. The object should tell you what it wants to hear."

David Tudor (Schonfeld, 1972, p.20)

In the American generation of composers, the position probably emerged as a reaction from the extreme control from the Cologne practices, and European tradition in general. In its place, setting up the rules and conditions and allowing the rest to take care of the music. Cologne, on its part eliminates subjectivity by the emphasis on objective construction and technique of production, but perhaps both positions were just a reaction of the exacerbated individuality of the Romantic period.

> "In the meantime, the individual has stepped back; a realization o the transcendental has been relived to him, and he has given up his active position in the face of the Absolute. At this time artistic creation has, in a remarkable way, been freed for the need of personal expression, in that it is conditioned by an almost completely objective system of proportion and balance".
>
> (Goeyvaerts, 1955, p.36)

In any case, these different attitudes towards sound composition and organization opened up innovative paths in the development of music aesthetics demonstrating the different relationships between technology, sound, system, composition and performance, endorsing an expansion of musical experience.

All these first steps and perspectives are possibly more significant and widely considered to be the main initiators of technology in service of music and sound. This was not only a claim of "all possible sounds" as potential musical material (as in the case of Russolo and Cage), but an inclusion of sound as structural dynamic material that can be transformed and composed, advocating inventiveness, imagination, authenticity and consequently progress.

It is clear that technology develops much faster than ideological advances; aesthetical changes require long terms of analysis and reflection while technological developments change rapidly each year. But after almost a hundred years from the "Art of Noises" by Russolo, we are still based in a *pitch-dominated musical culture*. As the majority of new music is still conceived, structured and interpreted with an emphasis on pitch beyond more intricate sound considerations. And the efforts to develop new interfaces for musical expression seem to be futile since contemporary music is still created to be played on the same instruments that Varèse, eighty years ago, remarked as useless to express his ideas.

New Instrumental Sound Resources

Adaptation of tradition into a new sound aesthetic

At the turn of the 20th century, musical material was experimenting a deep transformation and expansion as a result of social, technological and political changes that eventually had an impact in art and science.

This expansion of musical awareness that brought a wider consideration for musical materials would soon have an impact in its means of generation. The necessity to expand, transform and create new instruments that would respond to the expansion of sound musical resources and that would function outside tonal confines soon became indispensable.

By the 1920's various new mechanical and electrical instrumental inventions were being incorporated into the musical production. Some with bigger commercial ambitions than others, but most of them, with the exception of Russolo's instruments, were based on traditional keyboard models and/or in the control (sometimes pretty advanced like in the case of Theremin) of conventional musical parameters.

In the first half of the 20th century, composers concerned with the creation of "new sounds", beyond dissonance and consonance, and previously considered "noise", had either to build their own instruments (Russolo), search for financial support to be able to collaborate with technicians and develop their own instruments based in his own musical necessities (Varèse), use non-instrumental objects or physically modify or invent new techniques for the existing instruments according to their own sound needs (Cage).

In the orchestral field the introduction of instruments like the Trautonium and the Ondes-Martenot was a success in a way that they were the first electrical instruments incorporated in the orchestral repertoire, but from my point of view, that did not represent a major step into the invention of new instrumental sound resources, since their control interfaces, although advanced and very different that conventional instruments, were devoted to the same musical parameters: pitch, rhythm, volume and timbre (in this last by activating simple switches, similar to an organ). And for the same reason, they did not have a significant impact in the nature of composition and performance.

A major step into the incorporation and development of new instrumental sound resources into the traditional instrumental groups was the expansion of the percussion family. The creation of the first works composed solely for percussion instruments posted new compositional problems and considerations as a result of an increased relevance in other musical parameters besides pitch.

Composers like Cage, Cowell and Varèse used percussion as the most immediate way of dealing with new un-pitched sound structures.

In particular, Varese's needs for new instruments pushed him to look for financial and technological support being turned down several times. As a result he had to deal creatively with the available traditional means. His concern with a continuous flow of pitch led him to introduce sirens as a musical instrument, and his primacy for timbre and its manipulation to create new sounds led him to elaborate unusual instrumental combinations, in which sound is

constantly changing as a result of different instrumental distributions, what Milton Babbitt called "non-electronic synthesis" (Babbitt, 1971).

For Cage, the model of a composer included being an inventor of new sounds and new instruments (Pritchett, 1993).

After working with homemade percussion instruments and trying unsuccessfully, like Varèse, to engage a collaboration with technicians in order to create new instruments through the establishment of a Centre for Experimental Music, he introduced his sound ideas into the traditional instrumental world by adapting and transforming the sound of a conventional instrument through preparations. Cage's prepared piano pieces originated coincidentally, as many other great art inventions, by a creative solution for a lack of resources; the pieces were supposed to be composed for the percussion accompaniment of a dance performance, a common task for Cage at that time, but the costs and problems of logistics made very impractical for Cage to perform in small dance recitals, and specifically in this case, the only available instrument for the performance was a piano. Thus, Cage, surely influenced by Cowell's "String Piano", decided to use the inside of the piano changing the tone and sound quality by adding preparations that would result in an emphasis of the percussive identity of the instrument.

However ironically, after the time consuming process of composing the different sounds and tuning the piano (the most traditional tempered instrument of Western tradition) into a "miniature percussion orchestra", the emphasis of these pieces were made in melody rather than sound, an approach opposed to the blocks organized by rhythmic structures creating masses of *sound*, that he developed in his previous percussion works. The decision to concentrate in melodic lines in the first approach to the prepared piano was perhaps due to the nature of the instrument and the combination with dance. Nonetheless, Cage's instrumental invention was one of the first in which new sounds are composed by a transformation of a traditional instrument into a new instrument, adapting a conventional instrument onto its own musical necessities through self-experimentation.

Another approach to instrumental sound oriented composition with traditional instruments was by expanding technique and instrumental vocabulary. Determining the time in which new performance techniques started to be a solution to incorporate new sound resources in music composition is difficult. Probably one of the first composers to formalize his new performance techniques applied to the piano was Henry Cowell, although all these

instrumental techniques were mostly developed in the second half of the 20th century, creating a whole new challenge for instrumentalists and a new instrumental culture of virtuosity.

Methods and catalogues of these new sounds became progressively more popular. Bags of instrumental sound tricks were now at the service of any composer, without any further sound/compositional involvement or authentic musical necessity. The experiential discovery of sound was substituted and resumed to a set of discrete elements, just as adding more notes to the available ones. These eventually brought a trivialization of sound resources and enhanced the utilitarian view of "sound effects" within the traditional system; however, there have been a number of composers incorporating extended techniques into a more personal sound language.

Helmut Lachenmann defined his music as "Instrumental Music Concrete", as a reference to the term employed by Schaeffer adapted to his own instrumental composition. Lachenmann advocates the use of sound material as energy profiles derived from instrumental actions, actions that do not belong exclusively to instrumental activity but that we experience constantly in our daily life. In this way, Lachenmann tries to build a compositional technique out of composing different relationships from sound and its energy characteristics: intensity, pressure, loudness, distortion, etc. translating them into a context where the traditional musical parameters are no longer of primacy importance, but the complex combinations achieved by the juxtapositions of previously neglected instrumental sounds acquired a musical meaning.

As Lachenmann, other composers successfully integrated new unconventional instrumental technique into their compositional language, based on an authentic aesthetical necessity that through self-experimentation or close collaboration with an instrumentalist evolved into a meaningful integration of tradition and personal sound/music relationship.

Technology and tradition

The appearance of the recording technology and with it "Tape Music" not just originated a set of new compositional problems about the nature of musical material and its organization, but it also represented a break with previous modes of music presentation. Although tape music was created in studios that originally were born out of radio stations, the music was not

conceived to be broadcasted by radio but to be concert music, music to be played over a loudspeaker system in a concert hall.

Spatial distribution of sound has been the long concern for many tape composers, experimenting with trajectories and movement (pre-recorded or in real time with a later appearance of more advanced technology) as an element of sound composition. Another interest was to take advantage of the speaker quality and frequency response by creating speaker orchestras in which each of them would emphasize different sound characteristics, and placing them strategically according to their quality, power and direction. An idea first carried out by François Bayle in 1974 but which continues to be an appealing solution for many tape composers.

These approaches of tape music presentation can be pre-recorded, played back through a digital medium or projected in real time through a mixer or computer, however the real-time diffusion of a fixed medium is not widely considered as common performance practice. Tape music entered the performance field when composers started to combine the medium with traditional instruments.

One of the first examples is "Musica su Due Dimensioni" by Bruno Maderna composed in 1952 for flute, percussion and tape. It was also one of the first pieces associated with the Cologne studio, although nonetheless not typical of the studio's philosophy (Chadabe, 1997). From that point on, many other composers attempted to explore the possibilities of the new medium in relation with conventional mechanical instruments.

This approach posted a series of musical possibilities as well as problems. In general terms, the qualities of both parties were emphasized; composers wishing for an extreme level of complexity and preciseness could finally achieve it. On the other hand, the qualities and fluctuations of human interpretation soon became apparent in the impossibilities of the fixed medium. Basically, there were two approaches, to create in the tape part a sort of accompaniment for the instrumentalist or to use the tape part as an extension of the instrument, but in both situations soon emerged the problem of synchronization. One solution was to use the fixed tape part as a sort of aural score for the performer or to specify durations in the notated score, others allowing some flexibility in the performance, and others triggering the tape parts during the performance. But all these problems and their different solutions expanded and developed the relation between performance of traditional instruments and technology, confronting them and attempting to fuse them into a single musical product.

However, for some composers, the most radical impact of the first attempts to combine technology with tradition was the possibility to introduce electronic sound as "music".

> "With a live instrumentalist on stage, I could introduce electronic sounds in a presentable and civilized way to a larger audience and have the audience accept the sound as aesthetically valid."
>
> Mario Davidovsky (Chadabe, 1997, p.69)

But in any case, these different approaches that tape composition embodied were not acknowledging the medium as an "active" instrumental resource, it was in service of an instrumental performance or it was the performance itself representing the final product, but it did not play an active role in the performance, it was a fixed medium and remained fixed.

In that respect, some composers incorporated the possibilities of tape as a flexible instrument for performance.

Cage used tape as an active part in the performance process in "Rozart Mix" from1965. He used eighty-eight tape loops that should be mounted, unmounted and repaired in real time. Oliveros implemented tape, delay and feedback in her works "I" and "IV" from 1966 and Lucier used tape in his piece "I am sitting in a room" from 1969 as a way to recycle real time recorded sounds back to a space, in that sense for him tape was a conveyor to articulate the space of a room that becomes the resonator. The compositional possibilities of tape recording in order to recycle material playing it back into the performance with different delay times was used before by Stockhausen in "Solo for Melody Instrument with Feedback" from 1966. From then on, many other composers have used tape as a way to play back material during a live performance or discover new musical resources by looping sounds, showing the possibilities of adapting what was considered a fixed medium into an instrument.

That was commonly the case in America, where the experimental approach to sound composition and technology was emphasized in performance, hence enhancing new instrumental resources, adapting, reinventing and twisting technology in favour of every compositional situation, founding a new genre in the relation between technology and music composition.

Origins of Live electronic music

One of the first examples of live electronic "sound composition"[1] was Cage's "Imaginary Landscape No.1" from 1939, for piano, Chinese cymbal, and two turntables. This piece marked for Cage the beginning of a set of pieces in which the instability of electronics of the time, and the unpredictable output of his re-purposed appliances made technology a critical partner for his experiments in indeterminacy (Collins, 2007)

Although "Imaginary Landscape No.1" is a landmark for live electronic music, especially for the appearance of live manipulation of turntables as predecessors to the modern Disc Jockeys, the use of turntables was due to the circumstance that Cage could not afford a Theremin. Applying a frequency continuum was earlier implemented by Varèse, although in his case with sirens.

Nevertheless, a more representative example of live electronic performance was in "Cartridge Music" from 1960. In this case, the absence of records for the DJs introduced one of the most important instruments for the composers of live electronic music of the time, the microphone. The extreme amplification and resulting feedback would become the most important elements of live electronic music for Cage and generations to come.

Four years later, an example to live electronic music would come from Cologne, "Mikrophonie I" which was Stockhausen's approach to amplification and live processes. Other works from 1964 to 1970 like "Mixtur", "Mikrophonie II", "Prozession", "Stimmung", "Aus den Sieben Tagen" and "Mantra" would all use live processes to transform acoustic sounds, but unlike his American colleagues, Stockhausen was interested in issues of continuity, control, technique and expertise (Chadabe, 1997).

> "I am not only interested in the result; I am interested in the learning; I am interested in the initial culture. (…) There would not be any scientific or philosophical progress in our culture if one could not learn from one's forefathers"
>
> (Stockhausen, 1967, p.105)

This necessity to preserve and continue knowledge to be able to progress was akin to many of his contemporaries in Europe, but the "anti-intellectual strike" in American culture (Peyser,

[1] Even if much earlier instruments like the Telharmonium and the Theremin were some of the very first examples of live electronic music, these were functioning within tonal constraints or other non-sound oriented compositional languages.

1999) created the feeling of stepping out of the history, challenging many fundamental values of Western European culture, celebrating invention versus technique. These philosophical and aesthetical differences resulted in a wide variety of musical and compositional approaches that benefited music in general. But specifically in America, Cage's pragmatic approach to "found technology" was very influential for younger composers whom interests in design and discovery motivated them to build their own new instruments by experimenting with cheap technology and getting inside the actual circuitry.

Composers from the "Sonic Arts Union" (Cage, Behrman, Lucier, Mumma and Ashley) performed their live electronic works in many different venues around the world during the mid 60's. Many of the pieces were based in the use of amplification and feedback, applied to objects or traditional instruments, but some of their members were busy in designing their own instruments like Mumma, Behrman and the pianist David Tudor.

Building analogue circuits was part of instrument building and ultimately part of music composition itself. Mumma's work "Hornpipe", from 1967, used his custom built "Cybersonic Console" to analyze the input from his French horn and amplify the resonances of the hall, a pioneer example of real time interactive operation that would be developed further with the emergence of powerful computer stations.

In 1968 Tudor commenced a series of pieces titled "Rainforest", where the last piece of these series lies between "concert and installation". "Rainforest IV" was based on the principle of attaching transducers to multiple objects, which would resonate, filter and transform the original sound in various ways. These sounds are picked up by contact mikes and mixed through the space in which the audience is free to walk around. The piece was a major influence for young composers who eventually formed the group "Composers Inside Electronics", which for the next twenty-eight years would serve as a laboratory for artist-design circuitry and electronic performance (Collins, 2007).

Homemade circuit instruments developed in some places in Europe too. In 1972 "Voice Crack" a duo formed by Guhl and Norbert Möslang, which would crack everyday electronics was active for thirty years. Michel Waisvisz created the Crackle Box in 1975, which had tactile quality for performance and was extremely expressive.

The arrival of affordable microcomputers in the late 70's diminished and eventually substituted the design and efforts of homemade instrumental circuitry into programming. However, the operative power and musical potential of computers and their sound control

interfaces (which was the keyboard and later the introduction of the mouse in 1984) were far less musical expressive than the "Crackle Box", or the cartridge from Cage.

MIDI appeared in 1983 as an effort to incorporate musical performance into computer processes, in the beginning, by connecting synthesizers and organs, but later having more advanced instrumental uses. Nonetheless, the possibilities of commercially exciting interfaces remained insufficient to most professional performers interested in electronic sound control using their own instruments. Experimental music centers like STEIM have carried out the work of designing "alternative controllers" and systems in collaboration with performers and composers. The new possibilities that computers offer to the instrumental world have opened up new avenues and insights into the relationships between performance, sound and composition, but perhaps the concept of musical instrument is maybe a romantic one. Perhaps we just have to leave aside anything that comes from tradition and concentrate purely in new technology. It can be said that as long as music remains being magic and not science, successful music will continue to be composed and played by humans and not by machines; therefore I presume musical instruments will be around still for some time.

All these first approaches into the development of new instrumental sound resources, and the design of new instruments out of traditional ones have represented to me a direct, and sometimes indirect influence in my own compositional work. Either by being aware of them or by finding later an affinity between their methods, ideas, and strategies with my own music, their utopian inspiration of finding ways of expression within the available means has been, and will continue to be an important reference in my work.

Chapter II
Instrumental Objects
A personal approach to instrumental sound-based composition

Encounters

I presume that every composer is to a certain extent conditioned by his/her own early experiences with music. In my case, the way that I learned to understand music was by practicing it, evidently moved by a previous aural/emotional stimulus, but the relation between physical effort, movement, sound and emotion was always reinforced throughout my musical education and have been always important in my compositional output.

In my classical compositional formation, I soon discovered a fascination for raw sound as opposed to notes or pitch structures. The possibility to create complex sounds in an environment where ninety percent of the material is pitch based was for me as much a discovery as it was a challenge. My work was becoming increasingly sound based, to a point that my composition teacher would criticize it as "simple instrumentation of electronic music".

Afterwards, my experience with electronic means and technology supposed the discovery of a great number of tools and gained knowledge, allowing me to concentrate directly into the nature and manipulation of sound as basic material for music composition

Soon I noticed an impact from my practice in the electronic field to my instrumental compositional practice, as the similarities between composing sound structures by computer processes began to manifest in my instrumental treatment. Furthermore, the work with digital sound processes and the flexibility of generation of sound structures accentuated the necessity for more complex instrumental sound results.

To be able to generate sound structures in my previous instrumental works, I usually relied on what is commonly known as "extended techniques". However, these techniques did not seem to be an option anymore, partially because many composers have continually used them within pitch-based systems with no further sound considerations, but as exotic elements of color, or well known instrumental tricks that sometimes offer a cheap element of contrast used within traditional pitch oriented systems, transforming these techniques into increasingly recognizable "modern instrumental clichés". A product of this is the consideration of these techniques by many performers as simple "sound effects", a condition created as much by the repertoire as by musical education and training, where these techniques do not normally receive the proper time and musical consideration. In any case, we are still living in a musical culture dominated by pitch structures, and to ask for an understanding and proper musical "sound" education and training might be still a long time away.

In my opinion, the authenticity of sound based composition using traditional instruments lies in the conjunction between instrumental technique and compositional language, in other words, the translation from the sound of a given instrument, including its sound producing actions, to the plane of more personal compositional and musical utopias.

Solutions

My personal approach and solution to the problem was to create my own instruments out of the existing ones, instruments that would allow the possibility of designing my own sound structures, without having to rely in standard techniques, modern instrumental methods or personal tricks coming from an instrumentalist.

The first piece where I use this idea was Tú-vo (2005), where I tried to design a new instrument out of a standard classical flute. The idea in this case was to transform the flute by a reduction of its structural components, deciding to use only a part of the entire instrument. Since my interest is not precisely in pitch I decided to discard the part of the flute that deals with the articulation of this parameter. This structural limitation created many constraints as well as emphasized other aspects, aspects that in combination with a developed technique would derive into a new instrument.

Another approach to this idea was intended in the piece "_/" (2007) for triangle solo. In this case, as the simplicity of the instrument is already given, the idea was to be able to increase the number of excitatory objects and hence the techniques to be employed. This resulted in a virtuosic combination of feet pressure, use of different mallets made of different materials, and the use of various fingerings to achieve different tones.

These works are the first attempts to define my approach towards the relation between traditional instruments and sound structures. An approach that, from my perspective, enhances the possibilities of new sound resources and that conversely influences compositional procedures and form.

The idea of working with simple objects in these two pieces is related to the approach of using traditional instruments as rudimentary objects. In this way, I try to avoid tradition by extracting the instrument from its customary environment and setting it into my own compositional context. The sound of the instrument is not taken for granted but is the result of

a long period of experimentation in which sound material and structure emerges as the sound of each new instrument progressively takes shape.

The possibility of transforming any primitive object into a musical instrument has been a recurring idea in my last works; nonetheless, I believe that in order to transform an object into a musical instrument one has to be able to produce music with it, a complex dilemma since it involves the tedious philosophic exercise of defining music. But if we agree in taking the wide definition of Varèse as "organized sound", this organization would imply a necessity of technique, both for the composer as for the performer. In that way, I am interested in raising rudimentary objects to the category of musical instruments by applying technical skills. As the quote normally attributed to Duchamp states, "Poor tools require better skills"

However, my interest is not particularly in daily life objects, as much as it is in traditional instruments, for several reasons:

- Conventional instruments have an enormous background of tradition that has led to a consolidated instrumental identity. Everybody in our culture knows more or less what to expect from a violin or a piano. To create tensions and collisions by the distribution and administration of those expectations and identity transformations could be of great value for musical discourse.

- Parallel to these dilemmas is the continuous growing number of performers interested in exploring their instruments based on sound. Even if this is the result of a genuine necessity of breaking the imposed boundaries of their instruments or a simple fashion to use technology, we cannot ignore their requests. We might disregard all what they have learned and be trained for, but I have found that most of them react positively to a refreshing view of their instruments, cause at the end, good performers are musicians before being instrumentalists.

- Traditional instruments are easier to specify than objects. They are more generic and standard, even with all the possible differences between them, they are easier to describe in the case of notated music.

My interest as a composer is an employment of traditional instruments within sound oriented composition by departing from perspectives different from their conventional use, to "hack" traditional instruments, starting from scratch and approaching the instrument as an object (although sometimes very expensive ones which implies some limitations), based on

experimentation,[1] to re-discover the sound of each one without taking it for granted before starting each work.

In this respect, computers and technology are not indispensable in my work with sound, since sound is essentially the product of *instrumental technique applied to an object*. However, in practical terms, technology has played an important role in enhancing and mediating between different instrumental sound resources, even though, the decision of a certain use of technology is always bound to compositional necessities and the possibilities of the specific situation.

Use of technology

The two most predominant situations in the field of traditional instruments and live electronic music are the use of digital processes to elaborate further the instrumental sound material or to create a duo kind of situation in which the computer material is independent from that of the instrument. In any of these two cases, my perception is that in the end result, the limitations of each of these sources are emphasized, that partly due to the problem of the combination of two technologies coming from such different periods. In one hand, we have an extremely refined sound interface, capable of achieving the finest sound control but with a clear emphasis of certain musical parameters, and in the other we have an extremely flexible sound source, but a pretty rigid medium and certainly much less sophisticated in terms of control.

But for me the most remarkable discrepancy is the difference of *cultural identity*. While the sound of one medium is relatively new and has no cultural auditory reference for the listener, the other is strongly tied to our musical tradition, and is limited to produce just some sounds in comparison with the computer, and 90% of them being pitch material.

For me, it was clear that to deal with traditional instruments and live digital processes was an unbalanced situation, and possibly the most attractive and logical compositional strategy would be to take advantage of these differences by exploiting them, but it is also my feeling that these kinds of solutions are not always the most interesting and certainly do not favor development. Hence, my personal solution was to confront the ways of sound generation of each medium.

[1] Pretending to be this the stage before the musical product, but never the product itself.

Traditional instruments left progressively their condition of rudimentary objects along music history by a slow and meticulous refinement in connection with the necessities of a specific aesthetic that made them develop structurally as well as technically over certain sound parameters, particularly pitch and rhythm. For that matter, one of my interests is to define my own specific sound parameters in relation with the given instrument, the piece, the performer, the particular resources and possibly the venue.

In this way, the sound of the instrument is "newly" composed getting rid of its cultural attachment, transforming the situation from having an old man interacting with a kid (the computer), to two kids interacting with each other. Creating a more coherent dialogue between them constitutes a better sound cohesion and a congruent music interaction.

With the exception of a couple of pieces, my interest in technology, and particularly computers, is to use them as "administrators" of instrumental sound resources. In other words, I am interested in using computers as regulators rather than generators of sound material, analyzing, mapping, filtering, equalizing, controlling volumes and switching on and off sounds, so in that respect the computers do not create any sound by themselves but analyze incoming data[2] to activate or dynamically process physical instrumental sounds, enhancing some sounds characteristics and rendering the global structure of the piece.

In that sense, I am not interested in designing sound control interfaces, or "muted instruments", that would allow the control of digital sound processes, but instead to *design processes that would control incoming sound.*

Within the computer music world, the dissection between control device and sound generator might be seen as an advantage in favor of a better understanding and development, but it can be dangerous if there is no holistic idea behind the instrument design. In other words, if there is no clear knowledge between the control parameters and what these are supposed to control soundwise, a lot of effort is put into the development of controllers and physical interfaces, adding more parameters to control, sensors, faders, buttons, and then spending years to master

[2] Gathered by a set of sensors attached to the different parts of the instrumental bodies, microphones of different kinds, pressure sensors, photocells, distance sensors and switches most commonly.

them and create something substantially "expressional" and responsive enough as a traditional instrument[3].

[3] Older analogue forms of controlling sound have achieved more successful results. From "Cartridge Music" to the "Cracklebox", in which by direct contact to the source the performer is continually forced to rethink and re-evaluate his relationship with the instrument in light of the sonic results. (Collins 2007)

Examples

I will devote this space to illustrate some of the previous points and opinions with a number of my latest works and projects. This is to exemplify my way of approaching instruments as to deliver an insight into my methods of work, when working with traditional instruments. It is not intended to make a formal analysis of any of the mentioned compositions.

Enclosure

Cajón and live process

A commission from the Mexican percussionist José ”Pepe” García realized between the months of January and June of 2008.

The piece generates around two basic concepts:
On one hand, the exploration of the instrument as a very primitive but interesting wooden box. The internal resonances and vibrations of all its small internal components that reflect an enormously rich and complex world, normally unperceivable by the use of standard performance techniques and usual methods of amplification, which aim to integrate all these sounds, Section1.

Secondly, explore the use of the instrument in its “conventional” version. Taking advantage of the powerful and agile characteristics of the instrument by extending it with live computer processes completely controlled by instrumental technique, Section 2.

Section 1

Instrumental Architecture

The “Cajon” has its origins in Peru. It was invented as a necessity from African slaves during the Spanish colonization. The prohibition from the catholic church to use any drums that would allow them to communicate or perform pagan rituals obliged them to derive their own percussion instruments from the boxes that were used for transporting fruit, fish and other products. Any drums found by the church would be burned, in this way these instruments survived as not being identified as percussion instruments.

Ironically, Spanish flamenco musicians’ adopted the instrument at the end of the 70’s, and after a couple of modifications rename it as “Cajon flamenco”. The secretly created African

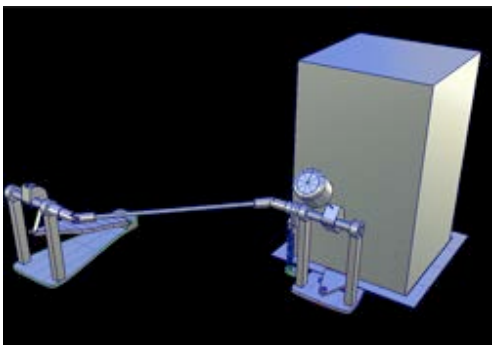
instrument, result from the Spanish oppression, is now most commonly known as being from Spanish origin.

In my piece I chose to use the flamenco version, not as an exaltation to our conquerors or any relation with the flamenco technique, but simply because its modifications allow more possibilities in the sound treatment.
The Spanish cajón has two or four *guitar strings* attached to the inner part of the front panel, incorporating a snare sound. In addition, it has a small set of *bells* hanging from the middle piece of wood that supports the structure; this adds a metallic vibration to the instrument. Several instrument makers already manufacture the instrument in this fashion; some have slight variations in the design, but in general this is the construction of the cajón.

Despite its early origins, this last version of the instrument is exceptionally new (not more than thirty years old), nevertheless it has very rapidly established in the Spanish folklore and has disseminated to others. The addition of these features reflect to me a significant labour of experimentation and addition of parts belonging to other instruments, in search of a particular sound that would fit into the development of a rather old musical tradition, such as flamenco music. An approach that I feel very related to my own composiitonal interests.

Within this experimentation, builders have continued adding elements and objects affecting the sound of the instrument.

"Rattle System" by Casey Connor



Pedal project for Cajón by Ovideo Venturoso

My contribution to these modifications was an attempt to bring all these sounds that are occurring in the inside of the instrument to the outside. But this was not just a matter of amplification, since the sounds of all these individual components are not separated in the standard cajón technique, but they form together the total sound of the instrument in each

strike from the percussionist. So it was a matter of finding the right techniques that would allow the separation and distinction of each of these elements.

Work in process

I started experimenting with one piezo disc attached to diverse parts of the instrument while checking its reaction by precutting it softly with my fingers on different parts. The result in every combination was extremely different, so the decision of how many microphones and where to place them was a very difficult one. However, what was apparent from the beginning was that any of the techniques to be employed should be particularly soft, in order to achieve the widest range of sounds.

Enclosed piezo discs attached to the frontal panel

Soon after discovering all of these different sounds I imagined the possibility of composing an environment in which this internal space would be projected to the concert hall, recreating with this a metaphor of the resonant chaotic environment happening inside the actual box. For this purpose I added an omni-directional microphone picking up mostly low frequencies of the instrument, a dynamic microphone on the rear open hole of the instrument picking up the more conventional sound of the cajón, and one more piezo disc attached to the central bells of the cajón. This information is then conversely diffused over a 4.1 system.

Piezo discs in contact with strings

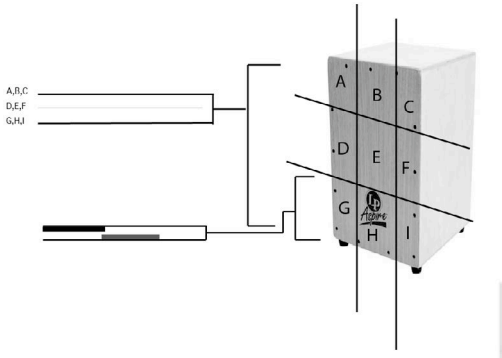
Technique

Already in the experimental process finding sounds inside the box it was obvious that a new technique to play the instrument would have to be developed. In collaboration with the percussionist, who already have developed a good finger technique as a solution for other pieces, we developed a technique to play the internal strings of the instrument from the outside and through a combination of feet pressure and finger technique. Feet pressure is already used in the conventional technique as a way to change the pitch of the instrument by varying the pressure on the frontal panel, our solution included the exploration of that technique by graduating the levels of pressure and the differentiation of the panel's sections to apply that pressure.

Fingers/feet technique

In this way the frontal panel is divided in 9 sections, each of them corresponding to a letter, to be used for both fingers and feet. The physical combinations allowed by these divisions produce a whole set of sound variations that at the same time create an "unintentional" quasi-cerographical performance aspect.

"Enclosure" on stage



The instrument is divided into 9 fractions to allow a more precise specification

Section 2

This section consists on the exploration of the rhythmical possibilities of the instrument and the subdivision of rhythmical patterns.

Pressure sensors and switches on the instrument

The space reduces to the focalization of the whole acoustic properties by amplifying the totality of the instrument, instead of individual elements, and the use of stereo system, and standard instrumental technique give a more traditional picture of the instrument than the former section of the piece. However, the introduction of computer processes breaks this common relationship between instrument and sound.

The computer processes consist of chunks of sound recorded on real time and controlled through a set of 5 pressure sensors, which at the same time determine the duration of the read portion of each buffer. These processes result in a number of interrupted rhythmical patterns that progressively disintegrate along the section by the introduction of silences, or empty buffers. Process that eventually lead to the end of the piece where only the first recorded buffer remains and the sound of the center internal bells of the instrument, never heard as an independent element before, ring as the percussionist slightly lifts the instrument by balancing backwards and impacting the instrument back on the floor.

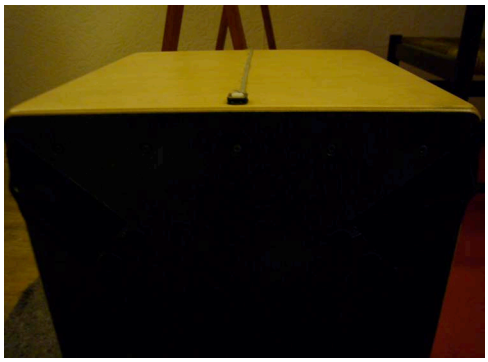
Use of Technology and sound control mechanisms

In every piece with an involvement of live electronic resources it is important for me to define the role of these processes in relation to instrumental technique. For instance, in a duo piece, when the computer is independent of the instrumentalist, I like to emphasize this relationship by defining a clear level of independence of each instrument, emphasis that at the same time would favor a better interaction and communication between the

Foot pressure sensor and left switch

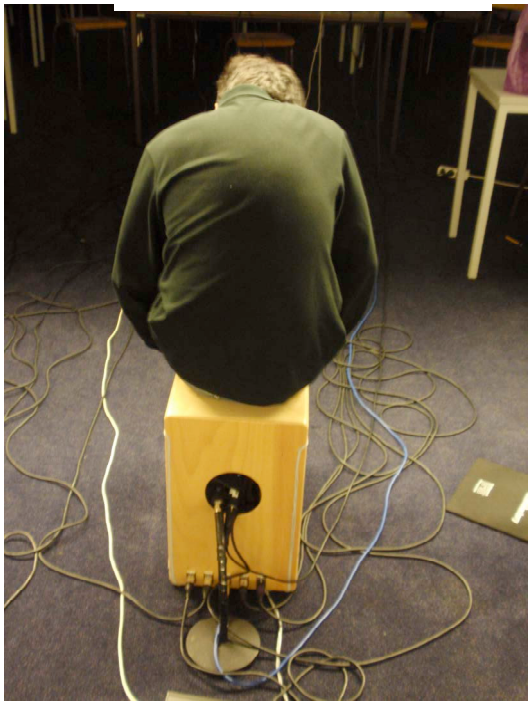
participants. Hence, in this case I wanted to emphasize the "solo" instrumental quality of the piece by creating a complete independent situation in which the performer has absolute control over the mechanical and digital sound processes[1]. Thus, favoring the interaction between instrument, performer and consequently sound.

For this reason a series of analogue controllers have been attached in strategic parts of the instrument in order for the digital processes to function as an extension of the percussionist's technique. Which in a long term creates a cohesive instrumental relationship and therefore a more solid and meaningful musical discourse.



Frontal switch and finger sensors

Microphone inputs and voltage to MIDI connector



Try out "Enclosure"

Side view of the instrument

[1]Once the sound system has been calibrated from the front of the house mixing console.

Transients

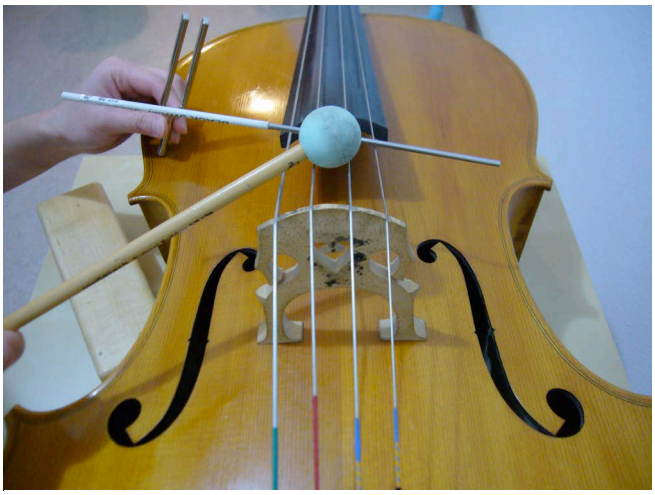
for harpsichord, percussion and cello.

Commissioned by the ensemble Brooomm! (www.brooomm.nl), composed between August and October 2008.

For this piece I decided to work separately with each instrument, concentrating on their independent characteristics and trying to create an amalgamation of all of these into a single sound structure. More than combining the different sound features of each instrument the idea of creating a meta-instrument was more appealing to me, probably due to the long previous term working specifically with solo instruments.

Violoncello

One solution to merge them into a similar sound structure was to make them coincide in their sound production mechanisms. This would mean, to transform the violoncello into a percussion instrument, since the percussion and the harpsichord (that even though has a plucked sound mechanism by the use of the keyboard becomes essentially a percussion instrument) work with similar sound mechanisms. Consequently the piece would have a clear prominence of percussive elements and sound articulatory principles.



Violoncello technique

I started working physically with the cello, whilst imagining the possible sounds of the other two instruments that could work together with those generated with this. These sounds emerge by laying down the cello onto a table and carefully precutting it with various soft mallets, in various parts and in combination with different objects that would change the vibration of the body of the instrument. This process soon became a research upon the diversity of resonances from the different parts of the instrument.

Percussion

For practical and aesthetical reasons I decided to use only a hi-hat as the percussion instrument. After some experiments I found the possibility of dividing the instrument into

two separate sound layers, one is the constant frequency that results from playing the upper cymbal with soft mallets and which pitch slightly oscillates by varying the distance between the cymbals with the pedal, and the other is the stable vibration of the hi-hat stand as a result of the constant strikes with the soft, but heavy, mallets that after a while put the whole instrument to vibrate. This last one sets the emerging beat that will govern for most of the piece.

Contact microphone on hi-hat stand

The work with this instrument raised for the first time the question of using amplification in all the instruments, since cymbals are always recipients of fascinating sounds that just come into live by close amplification (as "Mikrophonie I" proves)

Harpsichord

Without any doubt, the most difficult instrument from the group. It is always a challenge to "own" the sound of an instrument when this has such a tied cultural identity and which sound mechanisms depend on intricate machinery (very difficult and delicate to access or manipulate) and not on direct tactile contact. One other example of such an instrument is the piano, however in the case of the harpsichord the situation is worse since the instrument is more fragile, their components are more susceptible to break, and harpsichordists are less open to "profanate" their historical instruments (although hopefully not the case this time).

My approach to the instrument was to emphasize the characteristics of sound attack of the instrument to the point that there was no pitch but pure attack. In this way the only audible feature is the sound of the key mechanism. Which in order to balanced it with the rest of the instrumental events required amplification.

More percussion and Tuning forks

As most of the material was turning to be sounds with no clear pitch content, it appeared to me that the addition of pitch would balance the content and would provide the possibility of extending the material further.

As the initial idea was to create a balanced situation between the instruments creating a conglomerate of sound rather than individual instruments in a defined dialogue, I did not want to derive the pitch material from only one of the instruments; and as I am not interested in creating sound structures based on pitch relationships but rather exploring sound properties I decided to use frequencies that, by short distance to each other, would result in an emphasis of sound properties by the emergence of microtonal sound related phenomena. In that sense all of them would have to have the possibility to generate the same, or slightly different, frequency.

Tuning fork using the hi-hat as a resonator

"Espacios Encordados" a piece that I was composing parallel to this one, was focused on the use of the piano as a giant resonant box (see next chapter). I was becoming increasingly interested in exploring the possibilities of objects to "naturally" amplify and transform the sounds by using them as resonators. So in the case of this piece the limitations imposed at the starting process, as well as my interests in object's resonance, suggested to me the possibility of using tuning forks of close frequencies that would use the instruments as resonators.

In order to put the tuning forks vibrating I needed a solid object to hit them on, and as the close amplification I was using for the rest of the instrumental sounds would pick up this "unintentional" sound and making it part of the musical discourse. I decided to deliberately integrate this "functional" action by using small percussion instruments as excitators for the tuning forks, hence transforming this "functional noise" into a musical/compositional element.

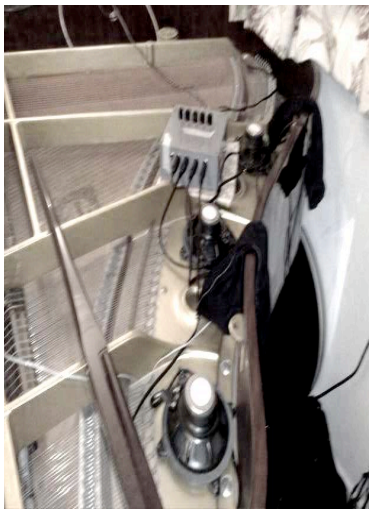
Woodblock set for harpsichord

After some experimentation I decided to use several woodblocks that should be placed next to each instrument, and that together with the rest of the instrumental actions and sound events would become coherent structural musical elements, once they become integrated into the individual instrumental technique.

Espacios Encordados
for cajón and live process

A work composed between July and November 2008 as a commission from the pianist Sarah Nicolls (www.sarahnicolls.com)

The commission from Sarah involved the use of the inside piano as a key element in the instrumental use. For that reason my interest was to find they way for using the piano as a huge resonant box and consequently being able to play the inside piano strings, but rather than doing that by a mechanical hand manipulation, doing it with sound.



Custom-built feedback speaker system

The final outcome of a long experimentation process[2] was to create three different approaches to the idea of resonant environments, as the amount of possibilities soon started to diversify. In this way each approach would be the creation of a "new sound space" that would emerge as the result of the distinct processes of sound articulation.

The solution to emphasize, vary and control the resonant possibilities of the instrument was to place a series of speakers inside the piano. These speakers would be placed upon the soundboard and amplify through a custom-made amplifier box. These would then acquire different functions depending on the represented sound environment.

Space I

This is the only space out of three is using the keyboard as mechanism for string excitation.

I was interested in creating out of the keyboard a mechanism that would send impulses to the inside of the box, as opposed to its standard use as hammer-string excitation system that would generate pitch material. For this I determined to mute the strings using a mouldable plastic material that would get rid of any pitch content, a process which seemed to work best in the higher stings as these have a shorter resonance than the long and heavy strings.

[2] A process influenced by some ideas that Sarah showed me from her previous work with other composers and her own experimentations.

Conversely this sound is picked up by a contact microphone attached to the structure of the piano, sending the signal to a bank of resonant active filters and playing it back through the inner speakers. Hence creating an inbuilt independent system which sound would be subsequently picked up by a pair of microphones placed inside the piano, which would project the sound through the PA system (a common process for the three spaces).

In this way, the impulses are transformed through a number of filters which resonance frequencies are controlled by a number of exponential ramps that increment their value in reaction to every attack. This process in relation to the density's material produces the impression of a granular pitch cloud, that consequently excite different registers of the instrument. A process highly controlled with the piano's resonant pedal.

Space II

The second space evolves by the interaction of the player with the internal speakers. The idea of using feedback inside the piano box was first suggested by the pianist Sarah Nicolls, although first used in pieces like "Wave Train" by David Beherman from 1966. The use of feedback represented a good solution to achieve a continued excitation of the different string registers however; the question was how to transform the use and control of feedback into a performable parameter. Attaching two mini microphones to the performer's wrists seemed to be a good solution for this problem. Thus, by varying the distance between the speaker and the performer's wrist, the appearance of feedback is able to be controlled. Furthermore, by having his hands free, it enables the operation of each speaker volume and the manipulation of strings.

Hugo Morales trying out the feedback system

This possibility expanded the idea for further feedback control and instrumental performance.

While in the "Space I" the resonant frequency of each filter was related to the keyboard's attacks, in this space the resonance frequency is determined by the frequency analysis of a plucked string as being received by one microphone while the other enhances and continues this same frequency by gradual feedback emersion from the speakers. Or in other words, while one hand plucks one string the other continues this note by creating feedback. Further digital amplitude mapping and control, elaborate further this initial idea.

Through this method, microphones and speakers become part of the performance process becoming musical instruments, and at the same time helping to articulate the initial idea of playing strings with sound.

Space III

While "Space I" is generated through the impulses of the keyboard and "Space II" emerges by the combination of feedback and the performers actions, in this third space the control mechanisms are carried out with no physical presence of the performer on stage.

During the development of "Space II" the performer is asked to carefully place some resonant objects on the strings, objects that would emphasize some frequencies while mute others by their contact with the strings. This process gradually develops as more objects are placed on the strings, transforming the initial sound purity into a richer environment. Environment that suddenly becomes more independent an complex throughout this last space.

In "Space III" I tried to make my most radical approach to the idea of the enormous stringed resonant box by closing the lid of the piano and allowing the resonances and vibrations to interact "freely" inside the space. Therefore the performer closes the lid of the piano and leaves the stage to influence the resonant frequencies of a omni-directional microphone placed inside the instrument through the aid of a physical interface.

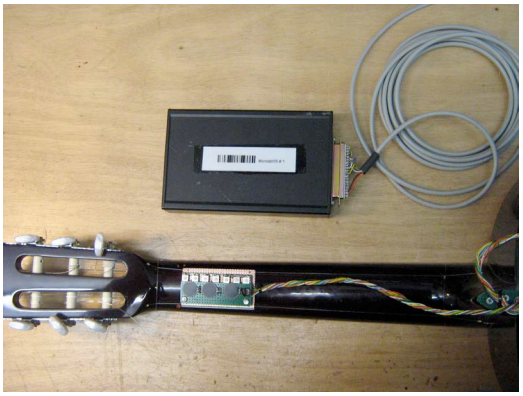
Hybrid-Guitar
Personal instrument

Although my performance activity stopped after my compositional work took over a more relevant aspect in my musical interests, I have always considered instrumental practice, technique and experience, of great value for composers aiming to write music involving performers. The encounter of electronic music, and along with it a number of tools to expand performance practice, signified the possibility of re-engagement with my previous performance interests, although now these interests were strongly linked to my compositional ideas, not to gain a level of technique and expertise towards the interpretation of somebody else's music (an extremely rewarding experience when it comes to write your own music) though acknowledging performance as an element of creation and exercise of constant questioning upon my own musical principles.

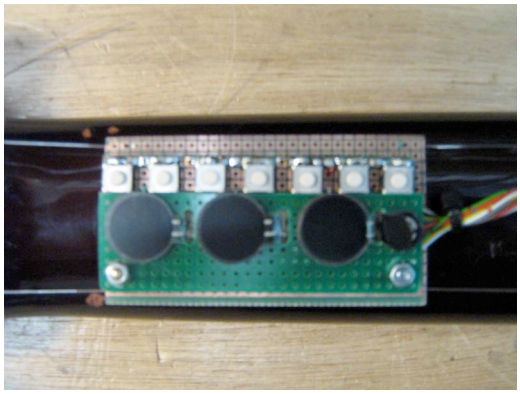
This project derived from a work composed for guitar and live electronics, "Top your Buffer" from 2006, in which the exploration of the computer as an instrument in constant interaction with the guitar was a key element. Even though I created the part of the computer to be performed by myself I composed the part of the guitar by experimenting myself with the instrument, not just because that was already part of my own compositional practice but because I am a guitar player myself, which allowed me to have already a different relationship with the instrument. While performing the piece I explained to the guitarist what were the main ideas and how to obtain the different sounds from the instrument, which included unconventional techniques like having to play the instrument vertically. This soon transformed in a good interactive game and one of my first pieces in which I felt comfortable with the sound relationship between traditional instrument and computer processes. However, the various opportunities to play the piece made very difficult to find and pay for the guitar player every time. Since I had composed the guitar part by playing myself and had gained confidence to play the part, it was jut a matter to find the way to incorporate the kind of controller I was using for the computer processes into the guitar in order to play the piece by myself.

Thus, I started designing the controller with the idea that this should allow the control of all the parameters used in the original piece, and not only do not interfere in any other of the guitar's actions but that would even allow the possibility to a further development and technique integration. In the process of building the controller I have the help and assistance of Lex van den Broek, technician and instrument developer from the Royal Conservatory of

The Hague. It resulted in a small moveable pcb board mounted behind the guitar fingerboard to be manipulated with the thumb, and consisted of 7 switches and 2 pressure sensors connected to a voltage to midi converter.



Mounted controller connected to a voltage to MIDI converter



Controller consisting of 7 switches and 3 pressure sensors

The possibilities of the new controller soon showed themselves to be very difficult to control the original parameters in the same way, and on the other hand it had other possibilities to be explored. Hence the exploration of this possibilities in combination with new sound explorations from the guitar give origin to a number of pieces called “Sessions”, pieces with a fixed structural content but which are always changing as the instrument is in constant development.

The first one of these series was composed in March 2008 and consisted of the various uses of the control including, buffer reading and portion selection, switching between processes and granular synthesis control. Moreover, the exploration of new guitar sounds with the incorporation of objects like a metal bow and a dc motor gave a piece a completely different angle than its original approach.

“Session 1”, pizzicato technique

Continuous string excitation with a DC motor

In “Session 2” the incorporation of voice for this occasion resulted in a major change on the instrument.

The idea of using an instrument as a resonating body, a common interest in my last works, had also its output in this instrument. In this case I was interested in using the body of the guitar and the strings as resonators from the voice’s sound material. This resulted in the incorporation of different speakers inside and outside of the guitar body.

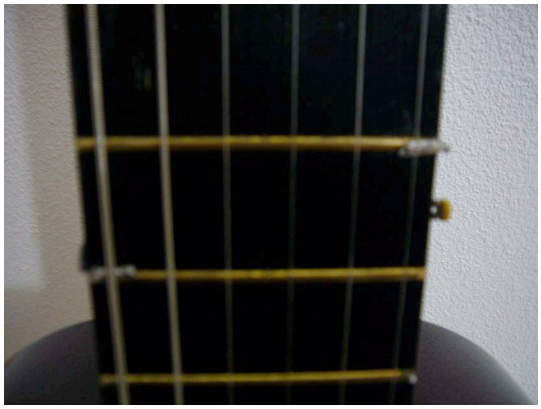
“Session 2”, strings played through a corked speaker

To be able to excite the strings I attached a cork and a piece of metal to one of the speakers and tried to fit it onto the guitar’s hole, but the size of the frame would elevate the strings as it was to big to fit in completely, this allowed me to have a wider control over the strings by pressing them onto the speaker or muting them, one of those happy accidental discoveries.

For the 3rd Session I tried to expand the sound possibilities of the guitar by implementing the control of a bank of six custom-built analogue oscillators. The implementation consisted of a set of wires soldered down to some of the metal strips from the guitar’s frets, which function is to activate each oscillator whenever the strings make contact with the proper metal strips. This allows the combination of different connections, depending of the different positions of the fingers, which conversely activate different oscillators that interact by multiplying each other. The frequency of all this oscillators is independently controlled by a series of photocells placed along the guitar neck as showed in the picture. One of the most exciting results of this

Custom-built analogue oscillator

implementation is the addition of non-linear instrumental reaction, as the same finger combinations can render different results each time, a feature that is also evidenced in the sound behavior itself, one of the first motivations to apply analogue sound generation in the first place.



Soldered wires to frets and photocell

Backside view, oscillator and thumb controller

Photocells and PCB controller

Chapter III
Notation in Practice
principles and strategies in music notation

The idea of a habitually used inscribed form of an abstract complex phenomena, like sound and music, seems to be contradictory, or at least a futile reductionistic exercise of describing something that is impossible to describe, or at best, partially possible. In other words, there is a natural impossibility to any descriptive notational system to be able to encompass all the variants and aspects of an acoustic phenomenon.

However, with all its incapacities, notation has driven the history of Western musical development. It has been the invisible line leading music composition, performance and instrumental technology, as an early method of registration, philosophical analysis and political power to a pragmatic language between composers and performers, growing to denominate music itself, affecting its own conception and reception with the compositional and interpretative systems that emerged by the limitations of notation, creating conventions and ultimately traditions. Traditions so powerful that even today still persist. Anyhow, it is through notation that the musical praxis reached a level of contrapuntal complexity and structure, which would have been impossible to achieve without.

It is only within the second half of the previous century that other aspects and sound parameters that gained consideration, besides note structures and pitch organizational schemes. It then became important to find ways of depicting them beyond the conventional means of representation. Also, the introduction of indeterminacy and performance systems requiring more participation from the performer in the compositional processes, opened up a window for new methods of representation which had a direct impact in musical conceptions and interpretations.

Hence, notation became part of the individual concerns of each composer work, a symbolic language in need of reconsideration by the interpreter, who in an absence of tradition or direct reference is required to understand the particular musical necessities and sound worlds of each piece.

Nevertheless, the value of musical notation seems to be overlooked nowadays. A positive polarized aspect of this is the academic recognition of previously neglected non-notational musical languages, like jazz, world music and improvisation in general. However, the understanding of musical notation as a powerful vehicle for compositional organization, analysis, communication, expression and interpretation, are somehow blurred by the one-dimensional view of musical score as a pragmatic tool to provide performers with the necessary cues to play the right notes at the right moment. This is an unfortunately reduced view, perhaps related to the way in which new music is performed, normally with a tied

agenda of presentations leaving little or no time to grasp each notational language (even if this is embodied in the language of the music itself), or in the increasing popularity of notational software, based on conventional notation, and that avoiding handwriting is becoming a common requirement of ensembles and musicians, encouraging standardization for the benefit of an easy and quick note rendering, without any further interest of involvement with the musical language of the work in question.

The complexity of interpretation

As mentioned before, none of the existing representational systems could assume the entire depiction of a sonic phenomenon. And precisely in the holes of this incapacity resides the arguably most interesting and enriching aspect of notation, interpretation.

Any symbology acts back on itself and limits what can be expressed in terms of it (Gaburo, 1977). As it is clear that is not possible, and perhaps nor wishful, to graphically represent the totality of the musical phenomena, the choice of the composer to establish iconic priorities as to which compositional elements, or particular concerns, are to be represented is of essential value. It is important to provide the performer with the necessary information for the recreation of the work, whilst avoiding any unnecessary speculations or confusions as the result of ambiguities or a lack of clarity.

In this respect, any original notational system resulting from the individual compositional concerns is to be subjected to the traditional one, as the large corpus of standards and rules formulated along its development have created musical conventional symbols. Substitution or re-ordering of these symbols would have to be taken into careful *musical* considerations in order to avoid confusion and unnecessary re-learning of symbols. To ignore completely any notational conventions would be to create a completely new and unfamiliar language for the interpreter that, depending on the difficulty of that language, would be expected to learn from scratch, certainly a problematic situation if he is to do it for every new piece. Therefore, it is my belief that a consequent method of notation is “additional” to the already well-established practice. It embraces the contributions of the conventions through the addition or extension of notational methods depicting unconsidered sound parameters and/or describing the actions to their achievement, as well as directly affecting the responses and perception of the interpreter.

On the other hand, it can be argued that notation should be as practical, efficient and straightforward as possible. In any case the visual-psychological abilities of the notation in

question should consider, or describe, a musical outcome, independent of the level of difficulty or complexity. If we separate the visual form from the sound experience, if the score is the consequence of a pure visual arrangement without ever envisioned the possible musical outcomes or the real physical possibilities of performance, then we would be falling into the mystification of scores as pure visual art, far from any musical significance.

Either way, whether extremely reductionistic or complex interpretation of new music, the notational method should demand a conscious and intelligent involvement from the performer, just as any other style or musical genre. For this reason notation should act as a picture of the composer's musical intentions, an object from which the interpreter can not only take enough data to render a set of notes or sounds that hopefully make some sense for the listener, but a symbolic visual system that represents the musical order of elements and choices allowing the performer to reconstruct the musical discourse through the conscious process of practice and associative analytical visual and aural integration.

In this way the interpreter is engaged in the compositional gestation of the work, a process that culminates with the actual performance, giving birth to the work via its own sensibilities and an intimate process of involvement (Ferneyhough, 1998).

Consequently, the representational power of notation makes it a necessary means of music preservation, as it is within the symbological influence of it's own systems, where the music becomes alive and involved in an ever-changing process through the complex art of interpretation. If the preservation of musical performance would reside exclusively in other registered media, visual or aural, then we will be subjecting musical interpretation to an ongoing process of poor imitation.

There are various approaches to musical notation, from the simple set of more or less general *text* instructions on how to approach a musical idea, to a complex, detailed organization of symbols describing musical processes, sounds and actions. There is no invalid notational conception as long as the composer is aware of the implications (musical, social, political, etc.) of it. However, we should reconsider the understanding of notation as a purely practical *tool*, a solution for easy and quick communication between composers and instrumentalists, and value the concept of a complex, multifaceted vehicle of creativity, analysis, communication and expression, flexible to our musical needs and always open (in different degrees) to interpretation. In that proportion we can enhance creative individuality, not just in the compositional but in the performance practice, as well as to demand a re-evaluation of the conditions in which new music is realized, which commonly relies in very limited rehearsal

time in which just very *limited, simplistic* compositions survive and the rest lacks in involvement, understanding and consequently musical intensity. Among many others, this is a possible reason for why new music has failed to arouse enthusiasm among the majority of standard listeners.

But the phenomenology of interpretation of new music is a complex one, and this heavily relates to music education, where there is in many instances a radical standardization of notational symbols disregarding the musical context in which they were written. For that matter, it is the same to play Bach, Mozart or Schoenberg. Performers becoming score-readers by failing to establish any connection with new music in the search of traditional relationships and the application of the same technique to early as well as new music. Many classical performers also consider performance exclusively in terms of scores, being completely unable to produce any sound with their own instruments if this is not coming from a piece of paper in front of them.

For the same reason it is impossible to demand an understanding and exciting interpretations of new music when there is no tradition in which they can rely, as in the case of other well-established musical languages, or considering the plurality of languages and aesthetics within new music. In this case it is the responsibility of the composer whom, by means of notation, has to designate clearly which are his intentions as well as to provide a self-referential frame in which his music may relate, or differ, within other aesthetic contexts.

Thus, it is of relevant importance to expect a substantial instrumental experience from the composer, in the form of a level of expertise with a certain instrument or in a constant communication and collaboration with other performers. In this way, composers and performers can understand the levels in which they operate without necessarily blurring the line as to which are their own duties.

Only in this way we can aim to make some sense and take advantage out of the complex and intricate phenomenon of musical notation and interpretation.

Analysis through notation

"*Recently I worked four days in our studio. At the end, I had to spend another four or five days analyzing what I had done in order to write it down."*
Stockhausen

Any chosen media in which the composer expresses his ideas will limit as well as potentialize some aspects of the work; it will speak back to him throughout the compositional process, it will suggest certain mechanisms and dispositions for the proliferation of musical material, it will turn apparent certain relationships that otherwise would have been difficult or impossible to notice (Gaburo, 1977).

Musical notation offers the possibility to "see" music, at least partially. It makes possible to visualize aspects and relational mechanisms that at a superficial aural level would have been unperceivable, but that are structural essential parts of a work.

In this way the theory and development of Western music was possible. Through identifying relations, combining and disguising differential atoms of music, creating concepts, styles thesis and antithesis. All of this became possible due to an existence of a notational system. Conversely, it prevented music to go in other directions, but it's apparent that notation (in general terms) as a system for rationalizing ideas, favored rational development.

However, there is a common criticism against the *visual-rationality* as to generate a notational/experiential dichotomy (Wishart, 1996). An opinion based on the formulations and relationships represented in the analytical notations on the score, rather than *experimental immediacy,* that bear no relation with the musical experience. A critical approach to score as way of communication between composer and performers, in which a composer establishes a set of relationships that the performer, or scholar, is trained to catch. After which, successful musical communication may take place. In that respect, Wishart goes so far as to designate the notation of music as the realm in which music enters intellectual respectability, a control method by the *scribal elite* who designates what is good and bad music in a *writing-dominated world*. But, although it is indeed clear that the composer cannot rely in his methodology, meaning compositional processes and algorithms, as the generators of the musical experience, these operations (which sometimes could appear arbitrary and outside any musical validity) have proved to be valuable tools for the expansion and manipulation of musical material, not just for new music but for the history of music in general.

Any visual, mathematical or geometrical arrangements and processes operate in a rather different level than the aural-experiential one. These perform in a sub-stratus of the musical discourse, holding and keeping the materials together. They are the invisible pillars of the structure, which can sometimes only be seen through visual analysis or repeated listenings. But in my opinion these processes are best employed when they act in a rather subconscious level of listening, forming a silent part of the musical experience.

In this case, analytical notation integrates these procedures in a conscious and efficient manner, making possible organization, distribution and juxtaposition. Manipulations very difficult, and sometimes impossible, to achieve in a compositional exercise based on a pure aural experience.

Hence, the criticism against listening to music in terms of a score makes sense if we require the standard listener to do so. The score is just a code between the composer and performer; musical notation (in a form of score, sketch, graphics, etc) can be a picture of our conscious and unconscious musical processes, and this becomes a musical-cultural artefact for scholars and other interested in such processes, *but it should never be determinant for a significant musical experience.* Music should be self-supported. It is possible that we may enrich our perspectives of a work by visual and notational information, but if it only makes sense by relaying it in one of these media, then it is a sign of musical weakness.

Examples

In my own work notation has encompassed different purposes in search for specific musical results that would emerge from the relations between score, performer, practice and/or collaboration. These elements, at the same time, affect and derive the compositional process.

I would make reference to three different approaches where each notational use depicts a different compositional process depending on the specific performative and conceptual situation.

Use of conventional notation

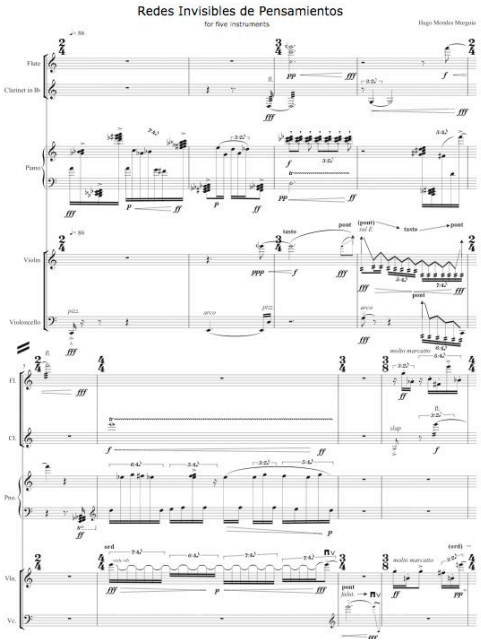
During the compositional process I have tried not to use notation as a "bottle neck" from which I have to squeeze and compromise my compositional material in favor of communication or possibilities of realization. Nevertheless one is always obliged to a certain extent of compromises during the compositional process, but I would rather put those compromises in other means and turn notation into a useful tool, rather than compromise certain musical ideas.

Classical musicians, meaning instrumentalists with a traditional training relying heavily in notated instructions, have normally developed a sense of preciseness and technical expertise based on a reflex to what they read on paper. They may have their own technique, their own sound, their own musicality and skills, but all of these are best enhanced when they have a clear and detailed image of the composer's intentions in the form of a score. If this is, on the other hand, ambiguous, contradictory or too vague they might generally loose interest or being forced to improvise to compensate for these compositional gaps, an unfortunate situation since, generally speaking, they are not the best improvisers. With this I am not trying to make a pedantic psychological categorization of "musical individuals", nor I am trying to criticize or diminish any specific musical practices. It is obvious that there may be many exceptions and different gradients of cases within these, however, I am trying to show the different options and choices I have taken in terms of notation and the exercise of gestation of specific works based on my experience with different musicians, involving different backgrounds and these have had a clear and definitive impact in musical approach and realization.

"Redes Invisibles de Pensamiento"

It was commissioned by soloists of the Ensemble Intercontemporain and realized in the summer of 2007.

Besides being a tool for the enhancement of certain musical instrumental skills (as explained before), the use of conventional notation can be an efficient tool for the realization and organization of several compositional parameters. One of them is the coordination and synchronization of sound material; hence a useful system when one is to explore this sort of interaction in pieces for ensemble.

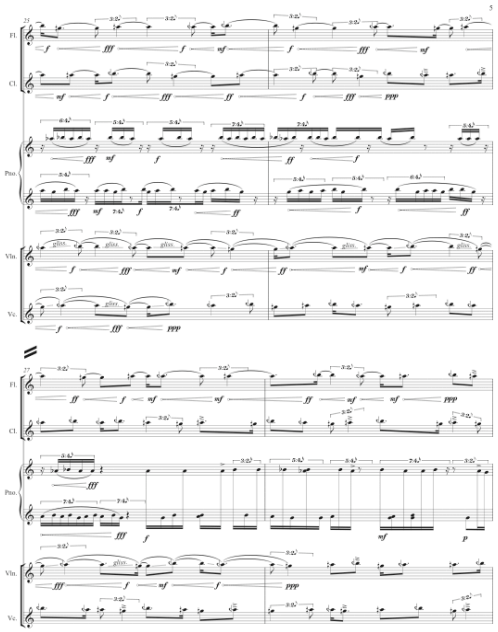


"Redes Invisibles de Pensamiento"

In most of my works for ensemble, especially large ones, I am interested in the exploration of sound as the result of the collective combination of sound events. In other words, as opposed to my solo pieces where there is an emphasis in the possibilities of individual experimentation that evolve an intimate relationship with the instrument, in my ensemble works the emersion of the sound world relies in the interaction of the different layers of activity and internal machinery of the instrumental group.

Hence, the individual sound structures are not as relevant as the relation of this within the rest of the group. For this reason I normally employ techniques that, for any instrumentalist with a certain experience in new music, would find familiar. In that sense there is a linear relationship between what is written and the aural result of it, in the way that I am not just describing the actions but the sounds (as opposed to other pieces where there seem to be a less apparent relation between this two which has to do with the complexity of the sound structures in relation with their causal actions), and by doing this I am using a traditional language, which by juxtaposition and careful balance of its internal elements would hopefully loose its traditional identity.

A more practical aspect of this instrumental use has to do with the criteria on which the majority of large ensembles work with, which mainly consists of tied agendas, no rehearsal time, a lack of interest in unconventional musical resources (especially if that implies using their instrument in any "strange" way) but on the other hand, (especially if it is a professional and "good" ensemble) impressive sight reading, and a highly refined level of expertise in dealing with conventional language. So, my feeling is that one has to take advantage of these characteristics while more "unconventional" instrumental techniques become more conventional for them.



A dense section of the piece where the sound is the result of the different layers of activity

Notation A Posteriori

This method of notation usually comes as the end result of the experimental, compositional and performance processes. And it is normally the result of pieces with a high degree of collaborative work, which implies that the performer constantly influences the different stages of the compositional processes, from the first stage, the experimental process to the performance. Consequently there is no real need to write a score for the piece, apart from maybe a very simple mnemonic guideline. However, the realization of a "posteriori" score enables the possibility for other performers to play the piece, which is always a very fruitful and rewarding experience for the different perspectives that a single work can acquire, as well as serve as a tool for analysis.

Nevertheless, it is a time-consuming process and sometimes very difficult to realize. In the sense that it involves the translation (sometimes months) of experimental and rehearsal work culminated in a premiere, into the arid work of description into a flat bi-dimensional plane. In my personal work this process is even more elaborated since normally this system of notation involves the higher expansion of the conventional system due to the necessity of finding coherent graphical methods for representing unusual techniques and sound structural ideals as it is the case of most of my works for solo instrument.

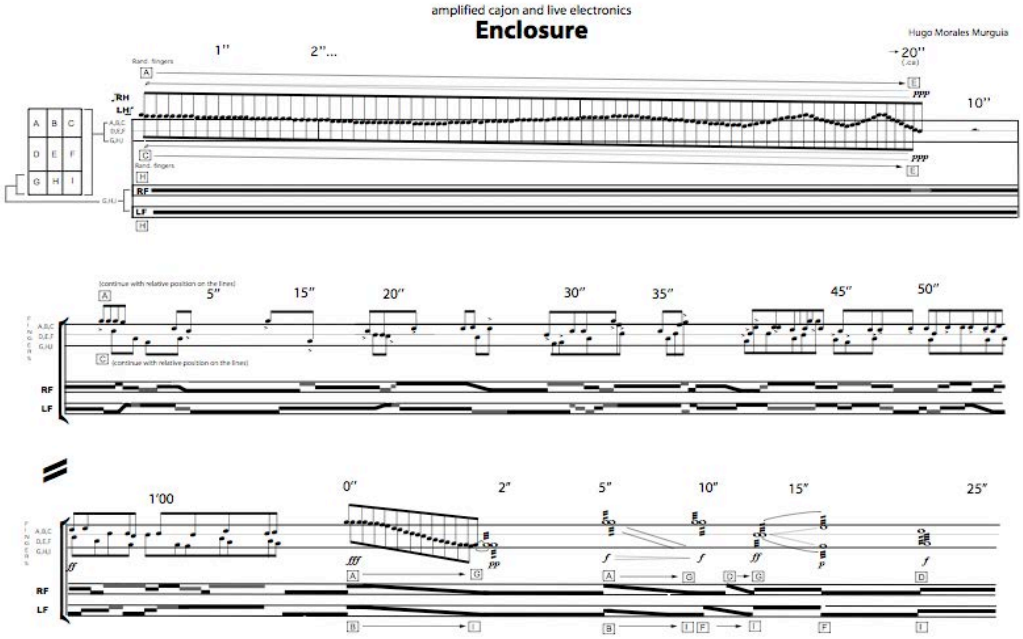
But once the process is completed the possibilities of analysis prove to be a very efficient tool to rationalize intuitive compositional strategies, in other words, by translating ideas to graphic representations one gains perspective and awareness by discovering relationships that with a pure aural or intuitive perception would have been impossible or very difficult to realize. Furthermore, the possibility of preserving a scribal form of a work enables the opportunity for future personal, or scholar analysis.

"Enclosure"

To be able to describe and represent a complex set of physical movements without a predetermined sound ideal (as in the case of traditional notes) or traditional technique, is as much an exercise of chorographical description as it is an exercise of representing sound producing actions.

In the case of this piece, the intricate physical actions required to generate the various sounds across the instrument called for systems to break apart this actions as well as to divide the instrument in fractions allowing a more precise manipulation of it.

The frontal panel of the instrument is divided into 9 equal fractions, each one represented by a letter. As the sound of this areas do not change dramatically from one to the other, these are represented in three lines that determined the relative position of the sound events. Thus, while a letter inside a box represents the horizontal position, the vertical position is represented by the proportional position of the sound event in the vertical axis. The same system applies for the representation of feet's movements, however in this case each of the two regions represent a whole fraction of the instrument, again indicated by a letter, and the pressure is represented by the color of the line.



"Enclosure", Section 1

I tried to emphasize the importance of certain musical parameters, while others remain more open and indeterminate (as in the case of any other notational system) as a desire to establish musical priorities. i.e. While I tried to accentuate the importance of the combination of physical actions in relation with musical gestures and sound densities, the durational aspect of these remains quite flexible, as I am not so concerned with the precise duration and coordination of these events.

Notation as a tool for conventional communication

In the first example the relation between reading and listening is apparent for somebody who is familiar with reading notes ("what you see is what you get"), in the second this relationship becomes more complex as the notational system is derived by the instrumental architecture in relation with its sound producing actions, which implies a deep expansion of the conventional system of notation that calls for a deeper understanding and sharper observation.

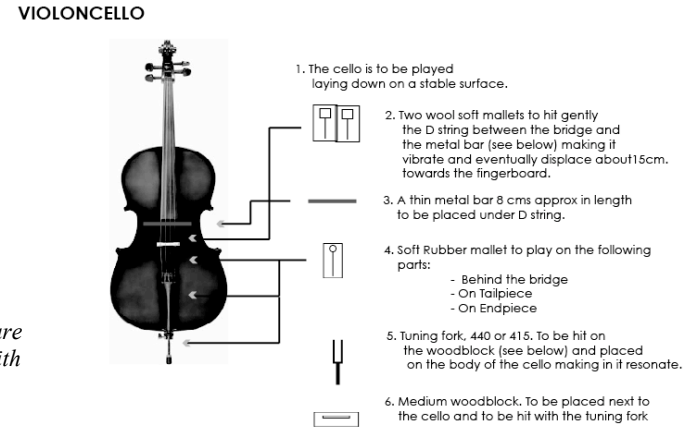
In this last example the use of notational conventions is in service of communication, since the relation between the scribed form and the aural product is more dubious. There is not a clear correspondence, but instead of representing the sounds and asking the instrumentalists

to generate them by means of extended techniques or other systems, I set up the conditions for this sounds to happen and represent the processes to achieve them by the familiar traditional language[1].

" Transients"

In this case the use of conventional notation was important since the coordination and precise synchronization is determinant for the work, However, as opposed to the first example, the complexity of the sound structures is not intended to emerge from the addition of layers of conventional techniques, but rather from the addition of individual sound refinements of instrumental activity, process that eventually embrace the same desire to fuse into a single sound machine.

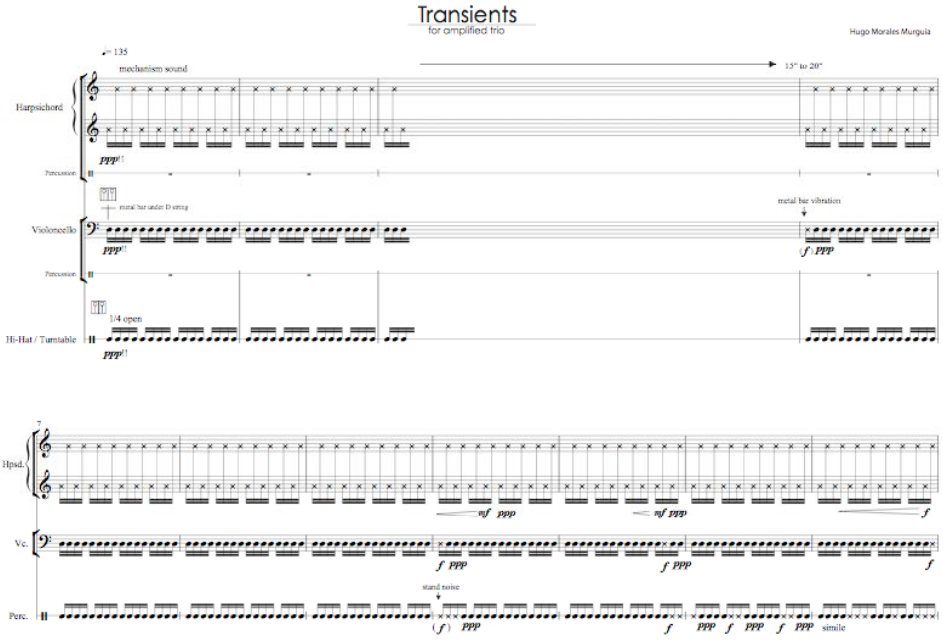
After experimenting, combining and writing the music I wrote a set of instructions referring to each instrumental preparation and set of objects to be employed in each instrumental use.



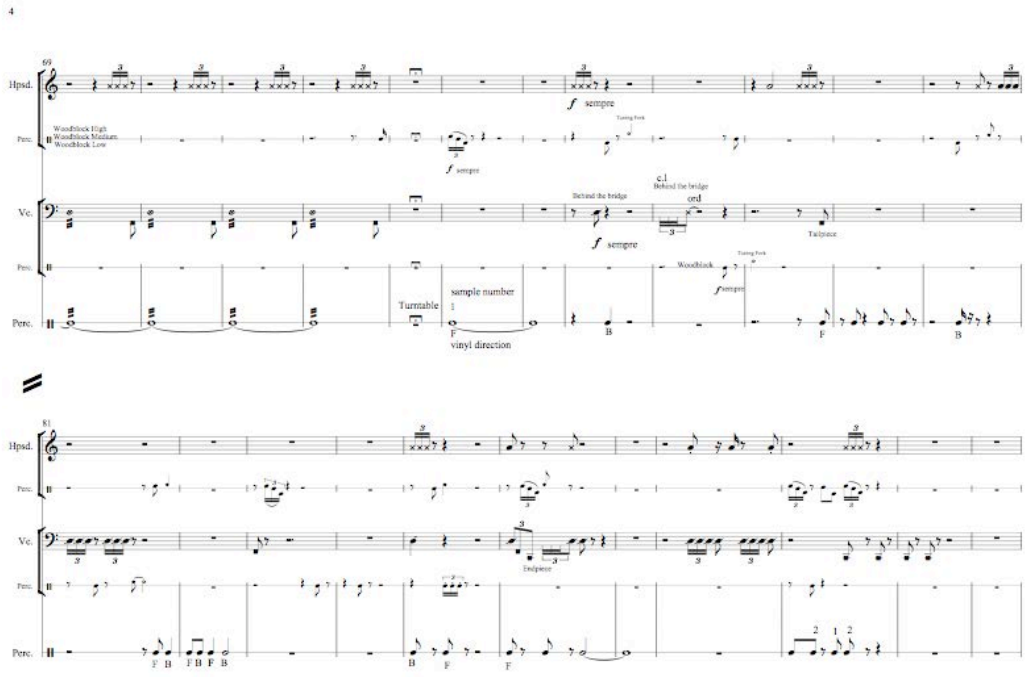
Instructions to prepare and objects to use with the cello

Although the score is pretty traceable, especially in terms of rhythmic elements, some of the most distinctive sound elements are not depicted in the score, as they are the product of close amplification, vibration of physical objects as the result of a notated rhythm or simply the complex sound result of a pretty simple notated action.

[1] Similar to Cage's prepared piano pieces



"Transients", p.1



"Transients", p6

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