

# SOUND=SPACE OPERA

A P Almeida<sup>1</sup>, L M Girão<sup>2</sup>, R Gehlhaar<sup>3</sup>, P M Rodrigues<sup>4</sup>, P Neto<sup>5</sup> and M Mónica<sup>6</sup>

<sup>1</sup>Fundação Casa da Música, Serviço Educativo, Av. da Boavista, 604-610, Porto, PORTUGAL and Universidade Nova de Lisboa, FCSH/ CESEM, Av. de Berna, 26-C, 1069-061 Lisboa, PORTUGAL

<sup>2</sup>Artshare Lda., Rua Dr Alberto Souto, nº 52 4º e 5º Andar, 3800-148 Aveiro, PORTUGAL and Planetary Collegium – CAiiA Hub, Faculty of Technology, University of Plymouth, UK

<sup>3</sup>Coventry School of Art & Design, Coventry University, Priory Street, Coventry, UK

<sup>4,5,6</sup>Fundação Casa da Música, Serviço Educativo, Av. da Boavista, 604-610, Porto, PORTUGAL

*ap.rochalmeida@gmail.com, luis.miguel.girao@artshare.com.pt, r.gehlhaar@coventry.ac.uk, prodrigues@casadamusica.com, zneto@yahoo.com, pinchas2002@yahoo.com*

## ABSTRACT

Over a period of three and a half months an artistic project using Rolf Gehlhaar's SOUND=SPACE, was held at Casa da Música, Porto, Portugal, in the context of the meeting «Ao Alcance de Todos», with a group of young people with special needs. Two final performances were the public surface of a very rewarding process that improved the quality of life of those who participated.

## 1. INTRODUCTION

SOUND=SPACE *OPERA* was a challenging proposal made by Paulo Maria Rodrigues, Director of the Educational Service of Casa da Música to Ana Paula Almeida, Luis Miguel Girão, Maria Mónica and Paulo Neto. The goal was to run a series of creative workshops for several weeks with a group of disabled people and to present a final and public performance in that institution. The invitation happened in the context of the second edition of «Ao Alcance de Todos» («In Reach for All»), a meeting held on 15 – 19 April of 2008, that included workshops, performances and discussions about the contribution of technology to increase the accessibility of music, with resources that can give responses tailored to each individual, regardless of their capital gains or limitations. It was also intended to provide concrete opportunities to make music and to discover new forms of expression.

## 2. SOUND=SPACE AT CASA DA MÚSICA

### 2.1 Definition

SOUND=SPACE is an electronic musical 'instrument' 'played', by one or several persons at the same time, when they move around in an empty space, surveyed by an ultrasonic echolocation system (Ranging System). This system detects, with a high level of precision, positions and movement of bodies in space. The acquired data is sent to a computer that converts it into sounds. The typical physical space layout is normally square and measures from 6x6 m. to 10x10 m., sufficient for 8-15 people simultaneously. The ultrasonic ranging units are set up on two contiguous sides looking inwards across the space, creating a 'grid'.

SOUND = SPACE came from an idea that Gehlhaar had in 1983, which envisioned the creation of a non-deterministic piece that 'lived' in a computer program and was 'performed' by its audience. People with no previous experience or musical expertise could make music in that space. The audience would become an active participant of the creative process, questioning the classic role and the *status quo* of the musical performer and composer.

## 2.2 Musical Topologies

A musical topology results from the analysis and processing of information gathered from the movement of bodies in a space equipped with sensors. The information is fed as control variables to compositional algorithms, that via synthesis routines, produces sounds.

These musical topologies - spatially distributed sounds or musical functions – can be either ‘passive’, ‘active’ or ‘hybrid’. The first one, the most used at Casa da Música, is characterized by the triggering of a sound when someone steps into a precise area of the surveyed space. An active topology, in contrast, consists of an algorithmic composition being calculated in real time and ‘performed’ by the computer, but under the influence of the presence and activity (amount of movement) of persons in the space. The hybrid topology combines both of the above into a space that reacts not only to movement (in a nondeterministic or non-linear fashion) but also to position.

## 2.3 SOUND=SPACE Workshops

Since October 2008, SOUND = SPACE is installed on a permanent basis in the Orange Room at Casa da Música. The classical SOUND=SPACE system is running as an interactive installation. While in this mode it only uses 4 sensors. When workshops take place another 4 sensors are added in order to complete a double matrix set with a total of 8 sensors.

Numerous workshops have been run by Factor E - a group of specialized musical facilitators of the Educational Service -, addressed to the different publics, with and without musical expertise. These workshops are unique experiences of only 1 hour and 15 minutes, for groups, like school classes, associations and for anyone who wants to come individually. In the first case, we soon realized that it was impossible to have an ideal number of 10 to 15 participants attending the workshops, because, in Portugal, 28 is the average number of students in a class. This meant that to effectively carry out these workshops, it was necessary to increase the number of entries and, thus, have two facilitators per session. Half of the group was in SOUND = SPACE during half an hour, while the other half was in another area playing games using active listening and movement. After that, the groups exchanged. In the last 15 minutes, both groups met in the Orange room, observing each other’s movements in space.

The workshops have a very flexible structure. Each group has its own dynamics, special skills and special needs. The process will always differ widely attending to the number of individuals and groups inscribed. Therefore, facilitators need a great deal of malleability and adjustment to specific situations. Objectives in the short and long term may be changed, reformulated or dropped as the interest and the concentration of individuals change or decline. This is perfectly understandable if we assume that SOUND=SPACE users are those who, by participating, drive and control the musical experience.

Although there is not a fixed script to run the S=S workshops, it is possible to describe some of the usual procedures of the facilitators. When a group arrives to the Orange Room, it is invited to cross SOUND=SPACE towards the place where they will sit down. As the 8 sensors are connected, sound (usually one of the Gehlhaar’s topologies) is immediately produced.

Participants become very intrigued. Instead of explaining verbally what happened, one of the facilitators connects only one sensor and does a demonstration – a little “solo”. Then he/she asks for a volunteer to move freely in space. After a moment of indecision, participants defy the inhibition and the evaluating look of their peers. It is normal to find someone reluctant to participate, and in that case we let them be seated observing others having fun. Like Gehlhaar once said, this is the best encouragement. We usually use the *Marimba Topology* because it gives a more accurate idea of the imaginary ‘keyboards’, enabling a better understanding of SOUND=SPACE. The laughter of the participants -that normally happens in this part of the session- is an important sign for the facilitators. It reflects their engagement and, also the transformation of this initial experience in something fun and relaxed. Soon, participants (one by one) want to be involved and to try out the sensed space.

When questioned, facilitators add more information about this musical ‘instrument’. Then two volunteers are asked to be simultaneously in the space, and 2 sensors are connected. Usually, in this part of the workshop the ranging units become a very exciting object for the participants and the facilitators have to rethink their strategy. The visible part of the interactive environment tends to induce the movement rather than the musical content. When this happens the facilitators try to create an activity that will make participants concentrate only on the audible consequences of their movements. This interactive environment is for many of them the first opportunity to feel really powerful and to make loud and wild things happen

without any disastrous consequences. Like Gehlhaar affirmed, this experience can be overwhelming, but the emotions they cause are an important aspect of the creative act.



**Figure 1.** *SOUND=SPACE* setup at *Casa da Música*.

During the workshop, facilitators would be moving from a particular mood to another (the marimba, more melodic, is alternated with for example more energetic rhythms), asking everyone to leave the area while changing the version and to return afterwards to play again the *SOUND=SPACE*. With this approach, and using very few words, facilitators encourage participation and concentration on the activity happening in that moment, in order to focus or shift attention of the participants.

Especially in the versions that are melodically rich, facilitators suggest a simple choreography. For example, with the 8 sensors all connected, 8 people are asked to move up one by one, each in its sensor. Gradually this semi-structured movement evolves to a free and chaotic movement and the rest of the participants join in the space. This is an activity that they enjoy very much, but it requires a high level of concentration on the sounds induced by body movements.

As the workshop follow, facilitators propose different ways of playing with *SOUND=SPACE*, not yet explored by the group, such as, to move in small and repetitive patterns, to cross the space very fast, to explore different forms of achieving silence, to do only one sound, to do what the other has done (mirror game), to create a set of musical movements in which everyone have to do according to a group sequence, and so forth. Usually, the session finishes with a free movement dance to the sound of, for example, House Music (another of Gehlhaar's topologies) with all participants in the space.

In this interactive environment there is not a wrong or a correct way to do it, we can only do it better. This is an experience where we can improve its quality. The structure of the topologies was built so that a movement more or less chaotic, disorganized and random by a group of people in space is transformed in a music flow that sounds elegant, planned and structured. The more variety there is in the movement when a participant "explores" the space, the greater the difference and diversity of music. Understanding how the space works is an advantage for "playing" it well. Furthermore, the participation is not only to be in space - sometimes alone but usually with the others - but is occasionally to sit and listen and observe the others.

*SOUND = SPACE* is essentially a social environment where interactivity happens and it is not limited to the interaction between person and "tool" but also includes, and perhaps more importantly, the interaction between person and person, while "playing" the environment. We should not forget that «interactive art focuses on interaction itself» (Fujihata, 2001). In an interactive environment such as *S=S* we realize that there is a real-time interaction between our actions and their consequences. We always have a truthful feedback of our choices and of the relationship with ourselves and with whom we share the space. Interactive art is not something that can be preserved as a document or as an artistic object. It is an event, something that takes place here and now, and that we make it happen. Nonetheless, those actions and interactions are embodied. They are imprinted into the memory of those who participated in the experience.

## 4. SOUND=SPACE OPERA PROJECT

### 4.1 Preparatory Phase

After the invitation of the Educational Service, facilitators chose as participants six young persons - João Pedro, Jorge, Alexandre, Catarina, Maria Lopes e Maria Ribeiro - mainly suffering from Down Syndrome - from the *Associação Somos Nós*, an association for the autonomy and the integration of young disabled people. This decision was taken because the group in question participated regularly, on their own initiative, in workshops at Casa da Música, always with enormous enthusiasm.

With a sense of continuity and unlike the unique experiences of the SOUND=SPACE workshops, this project was composed of seven morning sessions (1 h 30 min each), distributed between January and March 2008, two rehearsals and two public performances in April. Alongside, one of the facilitators worked weekly on the visual expression of participants in the room of the *Associação*.

After considering different approaches (for example, the narrative one) facilitators agreed to undertake a project that was an “open work” and consequently more focused on the creative process rather than on an evident public result. Without a pre-determined structure we left the participants *experience* to drive the creative process, in its different meanings (the knowledge gained in the course of our lives, our sense perception and the concept of experimentation). Although the title of the project appears to direct our attention towards the conventional musical genre of ‘opera’, our purpose was to create the opposite, i.e. an *opera* (Latin word for “work”), very informal and exploratory.

This decision was then communicated to the carer, the psychologist - the only carer that participated in the rehearsals and in the performance -, the drama and the visual art teachers of the *Associação*, who over the sessions were giving us some information about the special needs of each young participant.

The first contact of the three facilitators with the participants happened in a casual conversation, in which there was a sharing of musical tastes with the group as well as some trivial and funny episodes of their lives. After winning their trust, facilitators invited them to translate into sound (with and without words) and through movement some of those situations described. The other part of the session (45 min.) happened in the Orange Room, where participants tried SOUND=SPACE for the first time. As in the workshops, a flexible structure was used. After the initial minutes of some perplexity, there were some enthusiastic reactions and an evident sense of fun. Although this multifunctional system is complex, its non-invasive environment makes it uncomplicated, friendly transmitting confidence to users that were not even a bit intimidated. The fact that it does not require any musical knowledge, as a condition for the participant to create sounds and musical sequences, makes the all experience very exciting, engaging and pleasant.

At this stage of the project different versions of topologies were used, contrasting from one another in terms of their nature and mood (ethereal, earthy, abstract, recognisable, calming, exciting, lyrical, rhythmical, percussive, sustained, physical, strange, and so forth) and consequently suggested to the participants completely different movements.

S=S was first understood through the facilitators demonstration and by a brief verbal explanation. The interactive environment was thus gradually revealed through the exploratory movements of the participants. Once verbal communication was (almost) eliminated, body movement and expression became the main channel of communication. The major goal of the session was the free exploration of the creative possibilities either individually or through small groups, that acted simultaneously. Another aim was to focus upon the enjoyment of this experience, the empowering nature of the creative musical experience made available by SOUND = SPACE and the social interaction among the participants arising as a result.

The role of the facilitators was consciously passive, so that the participants could explore the space to the point of feeling comfortable and start to “play” spontaneously with the “instrument”. Then we start to slowly introduce games to catalyze some movement forms that have not been carried out, and to discover some of the areas not yet explored. Those who understood, by listening, that their movements produced music, managed to explore different types of movement and became also the leaders of the group, while other participants were in a different stage of understanding.

#### 4.2 *SOUND=SPACE update at Casa da Música*

In order to promote the creation of new material by both the facilitators of the workshops and the participants, Luis Miguel Girão developed and implemented an extension of the original SOUND=SPACE digital control system. SOUND=SPACE at Casa da Música is now a Laboratory for the Creation of New Musical Topologies.

Besides the Orange Room, another part of the public space of the building was used. In the Purple Room a temporary computer system was installed specifically for the workshops.

*4.2.1 Technical description.* The central part of the update made to SOUND=SPACE was the adding of a second computer to the system. This machine is installed in a moving stand in order to be easily put in and taken of the space. It has two video monitors: on the right hand side the participant can use a graphic simulator of the array of sensors, while on the left hand side monitor an instance of Ableton Live is running.

The simulator allows the user to test the position of sounds in the topology being created. This is achieved by moving the mouse on a top view of the array of sensors. When the mouse is over one of the division units, the correspondent sound is triggered. The user can choose to divide the ranging area of the sensors in 2, 4, 8 or 16 portions. Furthermore, a choice between testing 1, 2 or both layers of 4 arrays each, is also available. This program was written in Processing and communicates with Ableton Live via a MIDI internal bus. Ableton Live is a popular multi-track sound editor and sequencer for real-time applications.

When in use, this computer is connected via LAN network to one at the Orange Room, so that after creating their topologies the participants of the workshop can immediately try their creation in physical space.

In the Orange Room stands the classical SOUND=SPACE set-up with the exception of a new simple program that converts the data coming from S=S interface into standard MIDI messages. When SOUND=SPACE was built, Rolf Gehlhaar design it in a way that would allow the interface to use MIDI buses common to other instruments without taking one of the standard channels. The MIDI protocol allows only 16 channels per 'cable': by making the information provided by sensors to be communicated via a 'negative' MIDI channel, SOUND=SPACE could be integrated in a *through chain* without interfering with the other instruments. The problem is that the previously stated is not compatible with Ableton Live. A simple MAX/MSP patch was written in order to make the integration of Ableton Live in the new system.

*4.2.2 Advantages of the update.* The structural update made to SOUND=SPACE allows workshops for groups of about 25 participants to be held. The maximum number of participants playing SOUND=SPACE simultaneously is of about 5. As for the social and group interaction to happen, a number of about 12 participants is allowed. This means that users alternate in sharing the effective use of the instrument.

The second room makes it possible to double the number of participants. After a brief introduction, the group is divided in two, and while one of the groups is recording, manipulating sounds and finally put them together in the final topology, the others are playing with SOUND=SPACE and vice-versa.

The whole structure of the workshop also permits a better understanding of the system to the participants. To this, adds the creation of their own sounds which increases the engagement of the group. This feature is a very important one in the demystification of the processes of music creation. Music making becomes accessible to more people, including people with special needs.

#### 4.3 *Creative Process – “translation of the day by day experiences”*

After the first session, the facilitators became more and more aware of the individual and collective idiosyncrasies. For example, João Pedro was always talking about his clarinet and doing mimetic movements related with playing that instrument. Catarina used recurrent movements of karate when she was trying SOUND=SPACE, and had always a football red card in her pocket that she would show us from time to time. When Maria spoke about “Dzrt” (a Portuguese pop band) her eyes sparkled and she would start dancing and singing forgetting about her equilibrium problems; Hip Hop was also the magic word for all the participants, who immediately embodied the attitude and style associated with that musical genre. Inevitably those significant actions and other meaningful events of their daily lives constituted the main vocabulary for the performance.

That decision drove us to the Purple Room. There, we recorded the sound material for the presentation. Different atmospheres and temperaments were registered, such as: funny episodes like an allergenic attack

with sneezes (strange nose and cough sounds); restaurant sounds and the non noble eating sounds (chewing or burping); a football match with the screams of the fans in the stadium and the accusation of a fault, penalty or goal; the invention of a human beat box sequence; or the simple recording of the participants' names. The next step was to create the musical/sound topologies using the SOUND=SPACE simulator. As soon as the interaction between music/sound and movement was understood by all, the compositional process flowed and they could immediately and physically try the topologies previously tested in the simulator.



**Figure 2.** *S=S Simulator and Audio recording setup (Purple Room).*

Naturally, different choreographies arose from the work of the group. These semi-structured movements were gradually put in sequence giving origin to a performance scheme. Each one of these sequences answered questions such as “How can we *listen* to an inebriant perfume of a beautiful rose, or delight ourselves with the *musicality* of a delicious meal?” The background idea of these experiences is to promote the intersection of different perceptive channels.

The identification with the sound vocabulary and its associated movements produced a significant change in the behaviour participants. We could see them awakening, ‘having an experience’, as John Dewey once affirmed. Participants of this project took ownership of the environment, developing their creative autonomy and cooperation with their peers. At this point, SOUND=SPACE was «not an instrument that meant to be manipulated or mastered [but] an interactive environment that is meant to be experienced, and, if time and skills permit, to be explored and controlled» (Gehlhaar, 2007).

The facilitators could also observe other changes in the participants. During the first sessions, they were able to find that their positions and movements in space were inducing the generation of sound. They realised that sound was a ‘feedback’ of what they were doing. But when they became more aware, in terms of global perception, they realised that, in fact, sound also induced movement. From that moment on, their bodily expression, although autonomous and independent of external agents, was transformed: it became more controlled and structured. They began to adapt their movements in order to obtain what they wanted to hear. Now, the intentionality of their body movements controlled the sound produced.

The translation of significant day by day experiences into sounds and movements was the opportunity for the participants to express and relive the meaningful emotions associated with those events. “[The] significance must be sought in the capacity of movement, not to represent, but to generate the self” (Rick, 2001). This emerging self and the participants’ direct control of the experience - without any apparent effort, but with an intense concentration and spontaneous attitude - made them merge with the environment. The sense of a self being separated from the world was lost. They “become one”, and acquired an extended body. In this optimal and autotelic experience (flow) participants loose the conscience of self. Time is distorted and they do not expect anything else more than what they are experiencing - like enjoyment, fun, pleasure, fulfilment, autonomy and agency in life (Csikszentmihalyi, 1991).

From the beginning of the project, facilitators (with reduced experience of working with people with especial needs), had to rethink and readapt their behaviour. It was difficult for them to be quiet, just observe and listen to what participants were doing. They always had the impulse to help and guide, especially using verbal communication. After being confronted with the video recording of the first sessions, they understood the urgency of a non-directive approach. They also realised that the best facilitator is one that does not

impose his own limits to others; someone who is a real person and not a mask; someone that puts the needs and interests of participants in first place; someone who dilutes himself in the group. As Lao Tzu once said, a leader is best when people barely know he exists.

The need to empower participants and to let them develop the necessary confidence to make their own musical choices, to decide their movements in space and to reinforce their identity without asking permission, was one of the initial goals of the facilitators.

The facilitators decided to include the carer throughout all the creative process, so that she could share the same experience as the rest of the group. As a collective, participants and carer could express, in a non-verbal manner, what they were feeling in a more freely, direct and embodied way. Cooperation overtook competition and helped the building of the social environment, and also to solidify relations in between the group.



Figure 3. *SOUND=SPACE OPERA* (photos by João Messias).

#### 4.4 Performance

The final performances, preceded by two big rehearsals, were held on the 18th and the 19th of April, in Room 2 of Casa da Música. *SOUND=SPACE OPERA* was one of three projects of *INtermezzo*, among with *Sound Carousel* and *Digital Orchestra*. *INtermezzo* was a concert presenting results of the work developed by these groups. All of them included people with special needs. Two of the projects, had technology and interactivity as keywords.

In *SOUND=SPACE OPERA*, the only scenic objects on stage were sound objects. We thought that this would be truthful and coherent with the experiences lived by all. We all decided to wear a white monkey-hood to reinforce the idea of group, and to allow the projections of images onto our bodies. The audience was considered as another participant experiencing the sound movements of the participants on the stage.

The carer and one of the facilitators were always on stage. Facilitators alternated between them in order, either to be on stage, or to be operating the system.

What could be seen on stage was not a representation (extrinsic) but the expression of the collective inner self (intrinsic). It was something that has always been with the participants, and therefore belonged to them. They were just being themselves. Catarina's obsession with football, especially with the judge's red card, made her unexpectedly lead that part of the performance. This happened spontaneously without any external imposition. The same happened with other participants when they immediately started dancing Hip Hop as a strong beat was listened.

Two weeks after *Intermezzo*, when participants of *SOUND-SPACE OPERA* were asked to state what they enjoyed the most, Catarina said that she loved to be the judge in a football match, and the others to dance Hip Hop and sing. To the question: «Were you nervous?», João Pedro answered «No, no. It was normal». His answer meant a lot for the facilitators because it expressed the idea that the performance was something familiar and comfortable, confirming that the stage merged with his life.

We have found that the creative *process* of *SOUND-SPACE OPERA* was definitely the final *result*. Having a process as the final result, means that we are before something that is not static or passive, but dynamic and that will extend our experience beyond the workshops and the performances.

The global experience will dilute itself in participants' lives and will overcome all eventual barriers in time and space.

## 5. CONCLUSIONS

SOUND=SPACE OPERA revealed it self to be an intense process of self-discovering and interaction with the *other*. The translation of the significant events and the day by day experiences of the participants of this project into sounds and movements, made them relive and share those emotions on stage. They were not representing but expressing and exposing their emerging self. The interactive space became the stage where life and art blended.

## 6. REFERENCES

- M Csikszentmihalyi (1991), *Flow: The Psychology of Optimal Experience*, Harper & Row Publishers, New York.
- M Fujihata (2001), On Interactivity, In *Ars Electronica – TAKEOVER: who's doing the art of tomorrow* (Gerfried Stocker & Christine Schöpf, Eds), Springer-Verlag Wien New York, Vienna, pp. 316-319.
- R Gehlhaar (1992), SOUND=SPACE, *Contemporary Music Review*, **6**, 11, pp. 59-72.
- R Gehlhaar (2007), SOUND=SPACE workshops for disabled children – report on a Research Fellowship at Music Department of the University of New England, *Sound as Object*. DLitt, Coventry University, UK, pp. 1-10.
- C Rick (2001), Movement and Meaning, *Psychoanalytic Inquiry*, **21**, 3, pp. 368-377.