# The placement of sound in artistic contexts

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## Abstract
There are a range of compositional approaches and techniques to consider when producing work of a sonic nature; from decisions about source material and location, to set-up configurations and sound diffusion. The presented case studies will examine approaches taken by the composer for indoor and outdoor spaces and discuss the artistic intention of each piece within a specified space. The case study examples will range from contemporary theatrical sound designs to sound art performance and audio-visual installations. Comparisons will be made between the various disciplines of sound art in relation to theatre sound in order to seek common ground and the suggestion of a sharing of practice.

## Parallels between theatre and acousmatic music
Similarities can be made between aspects of sound art practice (such as acousmatic music, electroacoustic concerts and sonic installations) and theatrical sound design when considering how work is constructed, the functionality of the space a piece is performed or installed in, and how the sound is disseminated creatively.

It is apparent that critical academic engagement with these cross-overs seems somewhat limited across art-related fields. There appears to be a lack of awareness between practitioners and artists associated with the disciplines because their paths seldom meet. Their respective fields operate silently and separately from one another, despite strong parallels. Nonetheless, the creative practice of sound design – the production of sound and music to create atmospheric sounds for objects, actions and events to assist in the telling of a narrative, to portray mood and establishing place or setting – is based on the same principles of production found within some sound art practices, such as in the creation of soundscapes and acoustic ecology – the relationship of sound between living beings and the inhabited environment.

Spatialisation, sound diffusion and the immersive audio techniques that are often used in artistic sound disciplines offer complex multichannel solutions to enhance the listening environment for an audience, but they are used with different aims and objectives. Sound is only one component within theatre for example, whereas it is usually the only component in sonic art (with the obvious exception of audio-visual work).

This paper proposes that there are techniques and principles used within sonic art disciplines that could be adopted to assist the evolution of theatre sound and in turn, aspects of theatrical performance that could be used to enhance the listening experience in sonic art practice.

## Spatialising & Immersive Audio
The diffusion of sound refers to its movement or placement in and around a given space.

Spatialisation can be purely practical: in large conventional music concert halls and theatre spaces, there are often delays set between the front and back row of loudspeakers in

order for sound travel to meet the audience in a clear, coherent, un-muffled manner, regardless of an individual's seating position within the space.

Other forms of spatialisation have creative aims beyond simply achieving clarity: surround sound, or the physical distribution of sound, enables the theatre designer to experiment creatively with sound in space rather than being confined and restrained to working in mono or stereo formats. Multichannel spatialisation enables the composer to distribute specific aural sounds and generated events to nominated locations within a given space, heightening the listening experience for the audience.

For both sound designers and sonic artists, the aim is to creatively present aural material to an audience.

> Modern sound designers discovered the remarkable ability of surround
> sound to envelope their audiences in a newly discovered three-dimensional
> world of sonic spatiality (Thomas, cited in Brown, 2009: 181)

Rick Thomas suggests,

> Blackout, and dark scene[s] which imply a dramatic visual world above and behind
> the audience support the use of surround sound. Fantasy scenes, and dream
> scenes are also favorably disposed to the use of surround sound. Any scene which
> makes use of the entire visual space around the audience (or at least within their
> peripheral vision) may support the use of surround sound. (Thomas, 1995:18)

Thomas further suggests that in theatre there are two extremes in the use and perception of surround sound: 'total diffusion', where sound appears, from the audience's perspective, to be coming from all directions at once, and sound that is specifically localised in the imminent area around the audience.

> In a surround sound system no single member of the audience should be able to
> locate an individual loudspeaker. The sound should either appear to come from the
> stage, but somehow "envelop" the audience, or appear to be omnidirectional. In a
> localized surround system the audience should be able to accurately perceive the
> location of the sound. Often the sound will move about the audience and the
> audience should all be able to track the movements of the sounds through space.
> This requires that delays be used only to make the apparent acoustic delay from all
> surround speakers arrive at the center of the audience at the same time. The final
> requirement of this type of system is that each loudspeaker may be called upon to
> reproduce levels equal to those of the stage speakers. (Thomas, 1995:18)

A conceptual approach to spatialisation in acousmatic music will see the composer focus on creating an immersive spatial environment which may be referred to as the 'global perception of the surrounding sonic environment' (Lotis, 2003: 258). In some instances, the listener may be provided with information that may assist in understanding the sonic environment they are encapsulated in.

*Copper Vibrations* (2009), an exploratory audio-visual sonic art work, was constructed and diffused as a 5.1 surround sound piece on a multichannel diffusion system, accompanied by single-screen moving visuals. The piece experimented with the variety of sounds that can be produced from interacting with a single object. Binaural and close mic recordings were made of small sections of varying sized copper pipe. The composition fused and layered the sounds that were produced by bowing and striking the objects, some of which were further processed to change their sonic properties. The accompanying visuals –

which provided the listener with a certain measure of context – were similarly produced by manipulating and subsequently layering photographic images of the pipe segments that represented the primary sound source. Both the audio and visual elements were created simultaneously, meaning that during the creative process the audio informed the video and, conversely, the video informed the audio with regards to structure and style.

From the outset, *Copper Vibrations* aimed to evoke an immersive sonic environment. The use of 5.1 surround sound allowed for the creative use of sporadic, impulsive spatialised movement that formed the body of the composition. Which – particularly in a live performance environment – created dramatic musical contrast and disparate types of spatiomorphology (Smalley, 2007).

## Set-up Configurations

In theatre, configurations have advanced from mono and stereo to 5.1, 7.1, 9.1 and 10.2 in order to create a fully immersive listening environment (Brown, 2009).

In the case of acousmatic music, concert hall set-ups can take these configurations further, with 24, 48 or in the case of BEAST (Birmingham ElectroAcoustic Sound Theatre), 70 speakers, arranged in a specific formation around the space, with a number of loudspeakers placed on the stage area with the audience seated facing the loudspeakers, in a typical proscenium-arch layout. Composers have the ability to perform from a central position in the middle of the auditorium and disperse sound around the space, creating a fully immersive environment.

The process of creating work for such configurations can be challenging, as composers must approximate the spatial layout in a studio set-up or make-shift environment, and must subsequently re-configure their work to the setting of the performance space. Typically composers do not have much time to adjust many of the parameters when in the space however, and a comprise needs to be found, much to the composers dislike.

## Alternative Set-ups

Theatrical performance set-ups, such as theatre-in-the-round, can take the diffusion of sonic events further than the end on, proscenium-arch configurations such as the above BEAST example. Theatre-in-the-round layouts expose the central section of the main performance space, resulting in very few places for loudspeakers to be hidden within set or scenery on stage as would typically be expected in theatre practice. However, compared to the tried and tested proscenium-arch layout, which has become the standard solution within acousmatic concerts, theatre-in-the-round offers greater creative freedom in the placement of immersive sound.

The configuration of loudspeakers in the theatre-in-the-round format would typically consist of speakers that were strategically placed behind, in front of, above and below the audience – who would be placed around the immediate centre of the stage, in a circular formation, directly in front of the action or empty space in this instance.

At The Royal Exchange Theatre, Brown (cited in Brown, 2009) uses between 70-120 loudspeakers on any one production. There is not a standard formation for speaker placement, as every production has different requirements. However, loudspeakers are generally rigged on all three levels of the capsule-like structure, as well as above and below the audience, to create as close to a full 360 degree surround experience as possible.

Although composing for such a set-up is still a challenge, there is a distinct advantage to theatre-in-the-round staging: the configuration is relatively static. Consistently working in a familiar space can provide the composer and designer with more of an advantage and a standard way of producing sounds for a given space. Designing for a known or familiar space also enables the composer to understand its distinct aural characteristics, which can be exploited (or worked around) by the space-specific placement of speakers – on- or off-stage, above and below the audience – creating an interesting spatial platform from which to work.

When composing for a recent theatre production of *The Odyssey* (2008), the space and layout were both familiar and adaptable.

Loudspeakers were positioned in front of and behind the audience in addition to fixed loudspeakers that were positioned from the sides of the auditorium, and smaller incidental speakers discretely placed around the stage. This enabled the design to be localised from within the stage area as well as fully immersing the audience in the atmospheric soundscape. To further envelop the audience in the acoustic world, microphones were strategically placed around a section of the performance space to capture specific on-stage sounds. These were then routed and diffused to the surround speakers, enhancing the pre-recorded sound design and ultimately adding to the encapsulated experience of the audience.

## Improvisation & the performer in the performance space
In acousmatic concerts, there are a multitude of spatial arrangement options that need to be considered by the performer when working in the performance space. For instance, there is not a definitive position for the performer – unlike in theatre, where the 'performer' would typically be on stage.

In live electronic concerts or laptop performances, performers tend to favour traditional set-ups, with the performer(s) at the front of the stage, with an array of loudspeakers facing the audience. In stereo, or even multichannel, performances, this set-up forces the audience to compete for the 'sweet spot' in the centre of the seating area, around the middle of the room, to fully experience the performance. The composer/artist is in control of the performance from the front of the stage, listening and mixing the sounds as they are produced. They are the focus of attention for the performance.

Similarly, *Listen* (2006), a live laptop improvisation performance, staged at the Teatro Trieste, made use of a conventional proscenium-arch layout, with eleven laptop composers/performers on stage. However, the control desk for the final mix was positioned and operated from the back of the auditorium, as with traditional theatre productions (and mainstream music concerts). Nonetheless, it was still the performers on stage which were the main focus, as they were creating the sound.

Lastly, in diffusion concerts – where composers distribute their pre-composed multichannel work live to a fixed arrangement of loudspeakers – the focus of the audience is traditionally directed towards the speakers that are positioned on and around the front stage area, rather than to the composer/operator who is located in the centre of the audience behind a large mixing console.

There is however one fixed constant between both types of performance, and that is the

role of the performer/composer. Within theatre, the actors tend to be the only visible performers on stage, as the loudspeakers tends to be concealed (Brown, 2009), whereas in sound art fields such as electroacoustic concerts, the loudspeakers are the main focus and the performer diffusing the composition is less of a visual focal point as they are facing the same way as the audience and tend to be part of the audience when they are performing.

New approaches to the idea of the performer's role incorporating that of the traditional sound operator within theatre are being experimented with by contemporary theatre companies, such as Sound & Fury, who prioritise the aural in enhancing the visual experience of their performances. In a recent production, *Going Dark*, the company fuse the roles of "live performer" and "operator" as one person, placed in the middle of the performance space in a theatre-in-the-round layout. Sound & Fury are interested in 'developing the sound space of theatre and presenting the audience with new ways of experiencing performance and stories by heightening the aural sense' (www.soundandfury.org.uk).

The work-in-progress production of *Going Dark,* recently previewed at the Roundhouse, demonstrated their concept of putting the aural sense at the centre of the audience experience. The surround sound set-up consisted of loudspeakers positioned around the performance space, with the audience invited to position themselves around the centrally-located mixing console, experiencing the operator as a performer in his own right – blurring the traditional lines and indicating a fusion and potential for further developments that could be explored in advancing interdisciplinary methods and practice.


## Location and Space

The performance space is of utmost importance to many acousmatic composers as well as sound artists and designers. A concert hall provides a typical performance space and set-up for electoacoustic performance, but is restricted with regards to layout, especially with fixed-seated venues. Unconventional performance spaces can be more challenging to work in, but offer more scope for an experimental approach to staging and constructing the work. The case studies that follow examine unconventional performance spaces with multichannel diffusion systems that fuse elements of theatre performance with sonic art principles.

Working in an unusual space can encourage the composer and designer to break away from the formulaic placement of loudspeakers and to use more conceptual and interactive positions, which in turn can break an audience's expectation.

> A listener needs time to progress from an initial listening encounter with the soundscape to a state of engaging actively and fully in scanning and exploring the spectromorphological and spatial properties on offer. I cannot listen to everything simultaneously and need to devote attention to each of the zones in turn, accumulating a global view, which emerges over time (Smalley, 2007: 37)

Smalley's (2007) suggestion of the listener requiring time to become accustomed to the spatial dynamics of a piece led to initial research exploring the possibilities of using unusual indoor spaces with multiple sound sources. Such spaces are not typically known for concert performances and require particular planning with regards to the spatialisation of multichannel works, but can be effective in creating unexpected listening experiences and encouraging a certain amount of "exploration" on the part of the listener.

**Indoor spaces**

*Cities of Sound* (2009) is a sonic composition with incorporated visuals. The composition features binaural and environmental field recordings from a variety of locations, including China, Denmark, Italy, Indonesia and the Czech Republic. The composition fuses the raw material of the original recordings, which capture the essence of their respective environments, with more heavily manipulated and processed variations, in order to create an organic soundscape. The visuals consisted of a series of ten A3 sized pictures, representational of the different recording locations, that were suspended from various points around the space, acting as initial focal points (see fig 1).

The work was installed in an old, run-down warehouse in Liverpool. This unusual space was in essence an empty shell, with wooden beam supports and floors. Free reign was given to the construction of the performance piece within the space and to the design and composition.

One of the primary challenges of the space was the natural acoustics and reverberation of the building itself and its surrounding environment. The floors were wooden throughout and the partitions between adjoining spaces were remarkably thin.

Having access to the space prior to the performance meant that the space's unique characteristics could be considered directly at the composition stage, rather than undergo changes to settings and configurations at the point of installation, which although manageable, is not desirable from a composer's point of view.



Fig 1 - Cities of Sound (Image © Patrick H Lauke)

The spatial configuration of *Cities of Sound* consisted of an array of primary speakers

placed around the perimeter of the performance space. These provided the sound basis for the composition. Attached to each frame, a small bespoke speaker cone provided an additional discrete source for the representational sounds associated with each picture. Because the sonic material associated with each picture was of a limited dynamic range, it was possible to use relatively small speaker cones with limited frequency response.

There were no specified seating arrangements marked out for the audience in this particular piece, similar to Sound & Fury's *Going Dark* production. The objective was for the audience to participate and explore the space, thereby immersing them into the composition. Ultimately, the realisation of the composition was specific to the space in which the work was installed. The unique resonance of the space defined the best position for each speaker, and further each bespoke speaker was chosen for its suitability to the sonic material – unlike the more conventional set-ups where a static formation is decided upon and a 'one-size fits all' approach taken.

## Outdoor spaces

*Memories Unearthed* (2009), was an outdoor site-specific multichannel performance piece. It was site-specific in terms of its set-up and composition having been specifically devised for the performance location – a disused colliery in a country park – as well as thematically – aiming to evoke the lives of men, women and children that once worked day in and day out at the colliery.

The sonic composition featured binaural and environmental sounds that were recorded in a variety of locations around the site. The final piece fused the raw material of the recordings, which capture the essence of the environment as it is today, with sounds that have been reproduced to try and capture the workings of the colliery, as well as more heavily manipulated and processed sounds, to create an engaging soundscape.

The site's naturally secluded location – in the middle of a quiet country park, surrounded by a small forest, and set into the side of a hill – provided an interesting space in which to work (see fig 2). The site features a range of different levels – the top path, ground level, the pit entrance and a  spiral staircase down a brick-lined shaft – offering numerous options for  speaker placement that could be experimented with to immerse an audience in the soundscape. In addition, an existing footpath led listeners along the perimeter of the site and, through a small gate, into the space itself.

After deciding on the location for the piece, thought had to be given to the surrounding environment, taking into consideration the dynamics of the site, spatial qualities, and acoustic characteristics – in particular, the natural resonance of the shaft and the sound-absorbance of the forest setting.

In the final layout, speakers were placed over the top side of the pit and along the side of the footpath, giving the piece overall height and a fuller dynamic range while also providing an initial sonic experience to the audience approaching the site from the footpath.

Fig 2: Memories Unearthed (Image © Patrick H Lauke)

In the site itself, loudspeakers were placed around the top section – where the pulley system once operating the cage would have been positioned. The remains of the old wheel chamber, with the spiral staircase leading down into the mine, offered an ideal location for concealed speakers – the darker mining sounds reverberating in the shaft itself providing the composition with depth and a further spatial dimension.

The different levels and disparate locations of the speakers offered the audience a varied sonic experience. However, this results in added complexity when planning and composing for such a space.

The natural reverberation of the sounds below ground level were particularly difficult to control because of the uneven brick surfaces. Particular attention had to be given to the composed sounds and field recordings in order to work with the acoustics of the space.

The piece was a stand-alone installation, therefore no live diffusion or manipulation took place during the event itself. All spatial movement was precomposed prior to the performance. As with many spatialised compositions, it was important to enable the audience to gain an understanding of the space and the piece in its most rudimentary form, in order for them to understand the many complex levels the piece had within it, both physically and metaphorically. In order to set the initial scene, sounds were associated with the specific location of the speakers before manipulation, the morphing of sounds and the addition of complex textures and rhythmic variations introduced, which inevitably move away from the clean original source sounds.

The presented case studies attempt to highlight some of the creative possibilities that are available when working in site-specific performance spaces, in contrast to some acousmatic music concert settings. There is unquestionably greater flexibility towards speaker placement and the spatialisation of sonic material in some of the mentioned site-specific spaces. The composer is in control of the space in these circumstances and not limited to standard loudspeaker formations as they might be in other forms of sound art practice, such as when performing in standard concert hall venues with limited flexibility. In addition there appear to be more approaches being made to working in experimental multichannel spatialisation set-ups by contemporary theatre companies such as Sound & Fury which start to illustrate where a sharing a sharing of practice could be formalised.

## Conclusion

It has become apparent that in acousmatic music performance, the interaction of the audience and the sound diffusion system can be limited by the physical restrictions of the venue. Where there is no fixed seating, or if alternatives to the traditional concert hall configuration are available and experimented with, principles from theatre practice may be explored.

The case studies suggest approaches that can be taken when considering the layout of loudspeakers in a performance space (inspired by contemporary theatre-in-the-round set-ups) and compositional objectives which prioritise the musical investigation of the space. There is perhaps more freedom to explore the performative possibilities in relation to the performance space when a site-specific approach is taken.

Experimental theatrical layouts, such as theatre-in-the-round, break the traditional conventions of speaker placement and contemporary companies such as Sound & Fury appear to be pushing the already blurred boundaries of what constitutes theatre sound and the conventions of distributing sound in space.

The boundaries between artistic practice in sound art and in theatre sound have become blurred to the point of almost indistinguishable difference (specifically when considering aspects of compositional style and the approach and techniques used). It seems irrelevant to attempt to consider the remaining distinctions between them (Licht, 2009).

It could be suggested that there is a distinct 'silent' sharing of practice between sonic art and theatre disciplines. There are opportunities for both to push the boundaries further and discover potential benefits of developing new compositional techniques and approaches to multichannel sound diffusion that are informed by space.

**Karen Lauke**

Karen is a lecturer at Edge Hill University and a PhD student at Leeds University. Her work has been performed and featured both nationally & internationally at festivals and exhibitions in Barcelona, Prague, Italy, London, Canada, Portugal and most recently in Korea at the World Stage Design exhibition where she was awarded a prize for her sound design on The Odyssey. Karen was commissioned in 2008 by the V&A Museum in London to design for the Listening Shell Exhibit and more recently was commissioned at Clifton Country Park in Salford, Manchester to create a site-specific contemporary piece entitled Memories Unearthed.

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