

## **Listening in time and over time – the construction of the electroacoustic musical experience**

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### **Abstract**

The relationship of ‘music’ to ‘sound art’ is increasingly discussed. This seems to take two forms: firstly a discussion of terms – the meaning of words. Thus ‘is there a distinction in meaning?’ tends to become ‘is all music really sound art?’ (and vice versa!). On the other hand this must be based on a greater engagement with substance: what distinguishes these two descriptors *in their practice*.

A first stage distinction has often been made. Music maintains a ‘beginning-middle-end’ paradigm and demands attention from start to finish, while sound art can be ‘sampled’ without damage to the creator’s intention – indeed it may be part of that intention. Clearly such a simple dialectical split has been eroded and a continuum tentatively established. Human performance of any kind tends to be designated ‘music’ but may be sampled as if it were ‘sound art’ (especially) if extended in time and (crucially) if the venue allows or encourages movement of the audience. This clearly generates a new kind of work. Conversely, in ‘open’ spaces I have frequently observed focused listening for extended periods. Furthermore there are issues of signal to background noise ratio in the listening space. What function can dynamic range and frequency range have in ‘lo-fi’ spaces?

The freedom of some sound art (for example) to create the unexpected for an unpredictable audience cannot necessarily easily be disciplined into a narrative chain or any other kind of *through composed* ‘logic’. Several kinds of hybridization (and compromise) are at work here. The discussion will include issues of listening – the ‘forming’ of experience in a variety of spaces. The composer may try to create what I term ‘local forms’, sometimes ‘fractal forms’ (small segments that reveal the shape and order of larger structures). These are designed to have be grasped at shorter and more immediate timescales and to become meaningful ‘moments’. At the other extreme we may have ‘flux’ and ‘drift’ forms that seem to suspend the passing of time in their slow change – yet these, too, may allow a different kind of intense experience.

The principles of Stockhausen’s *moment form* in both mobile and fixed versions (*Momente* and *Kontakte*, for example) will be examined; I will argue that it may be reworked as a listening strategy and eventually an analytical approach that crosses the music-sound art distinction.

## Introduction

While writing this paper I decided it had an alternative title – ‘Grasping space in time – grasping time in space – or *Instant Eternity*’. The apparent contrast of *instant* and *eternal* – which turn out to be closely related in aspects of physics – will be useful in a discussion as to how we relate the space and time based aspects of music and sound art. In 2001 I presented a paper which outlined three listening strategies defining three ‘spaces’ of sounding art: extensive listening (to performance), sampled listening (to performance) and installation space which might combine extensive and sampled listening (Emmerson, 2001). These are clearly too simply differentiated, so while I maintain these different strategies do help us think about the distinctions of sound art and music, there is emerging a more continuous and open set of possibilities within these three spaces. At a symposium in Leipzig (Emmerson, 2008a) I argued that *performance* was inevitably the focal point of an aural music (such as electroacoustic music) and that listening was our only ‘way in’.

I suggest there are two distinct aspirations for an installation of loudspeakers in any performance space. First the loudspeaker as *sculpture*: the position, lighting, presentation and environment are a delight to the eye – especially from a tradition which claims the complete precedence of the aural experience. If we look at images of the GRM’s *Acousmonium* from early installations (St. Severin 1974 (Bayle, 1977)) to those in the Salle Olivier Messiaen in the 1980s (Bayle, 1993) we see an attention to visual detail and sensitivity to the place. The *GMEBaphone* (Bourges 1970s) was typically installed in the courtyard of the mediaeval Palais Jacques Coeur while its successor the *Cybernéphone* (Bourges 2000s) was always stunningly lit in its town hall setting<sup>1</sup>.

Secondly there are systems which seem to treat the loudspeaker system as *container*: the vessel within which the sound is held. Many of the classic geometric shapes have had an influence here: the tetrahedron, cube and sphere. The immersive spherical system designed for the German pavilion at Osaka (1970)<sup>2</sup> influenced a succession of systems including the ZKM *Klangdom* (from 2006)<sup>3</sup>. This was associated with a new generation of software control. A radical shift in this area was made somewhat later with the development of the *Wave-Field Synthesiser* at TU Berlin (from 2007)<sup>4</sup>.

But both these approaches have had a problematic relationship with the idea of ‘forward’ with respect to the human body<sup>5</sup>. Especially the immersive versions of such installations seem to imply that there should be no forward – that all directions are ‘equal’. But in fact it seems that the seat (most specifically in its institutional form<sup>6</sup>) is the greatest instrument of human time and space control. The listener is fixed (or severely limited) in the direction of facing, and it is usually impossible to move about the space of the performance. The close proximity of others also hinders flexibility of duration of engagement – there is probably an agreed protocol when

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<sup>1</sup> Details and images may be found on [www.imeb.net](http://www.imeb.net) (last accessed 09/14).

<sup>2</sup> See [www.stockhausen.org/osaka.html](http://www.stockhausen.org/osaka.html) (last accessed 09/14).

<sup>3</sup> See [www.zkm.de/zirconium](http://www.zkm.de/zirconium) (last accessed 09/14).

<sup>4</sup> In the case of the WFS the panels are designed almost to hide the loudspeakers from view. See [www.ak.tu-berlin.de/menue/forschung/wellenfeldsynthese/](http://www.ak.tu-berlin.de/menue/forschung/wellenfeldsynthese/) (last accessed 09/14).

<sup>5</sup> We hear more accurately in the forward facing (approximately) 120 degrees.

<sup>6</sup> For example the aula of the Bauhaus Dessau (1926) (Gropius/Breuer) is an archetype for the ‘modern’ space (<http://bauhaus-online.de> (last accessed 09/14)).

listeners can come and go. We even refer to the ‘serried ranks’ of seats in a quasi-military description which is not a metaphor.

### **First distinction – a dialectic simplification**

Many argue that there can be no distinction between *music* and *sound art*. Whatever the creator’s<sup>7</sup> intentions, these may not be clear and evident to the listener. So (the argument goes) there is no need to separate the two. But clearly there are differing approaches to the relationship of the performance to a listening strategy. It is with this I shall start the discussion. Let us make a simplified distinction –

*Music* – articulates a ‘beginning-middle-end’ paradigm, that is it demands attention from a defined start to finish. It is structured by its creator to have a particular shape and form and for that to carry some aspect of the meaning or expression of the work.

*Sound art* – can be ‘sampled’ with potentially *asynchronous* listening of those attending; that is people may come and go, listen at multiple locations, for different times and durations – and this is usually part of the creator’s intention.

### **The erosion of the dialectic: music – sound art**

My abstract originally referred to hybridization (and compromise) but I have decided finally to use the term ‘erosion of distinctions’. This plays down the genetic metaphor which is in turn based on a crude view of a dialectical pair whereby a ‘synthesis’ of the two original elements is the outcome. I shall describe a series of *erosions* of these distinctions.

#### **Erosion 1 – the listener’s choice: to sample**

Music may be sampled as if it were installation or sound art: a narrative work intended for complete listening in an environment where sampling is encouraged generates a new kind of work especially if extended in time and (crucially) if the venue allows or encourages movement of the audience. But more mobile forms of social listening can be problematic for some kinds of music or sound art. There is one important consequence of the space/time controlling fixed seat: it also encourages a reduction of social noise. While there is clearly a degree of social convention to this – I *could* be noisy in a fixed seat – mobility is often associated with a more interactive sociability reflected in contemporary social gatherings and media. The issue of signal to background noise ratio within the listening environment is critical. What function can extended dynamic range and frequency range have in a ‘lo-fi’ listening environment if significant material is masked?

#### **Erosion 2 – the listener’s choice: to focus**

But the converse can also be true. In ‘open’ works and spaces I have frequently observed focused listening for extended periods. If the listener creates their own narrative in such a

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<sup>7</sup> Many sound artists do not wish to be described as ‘composers’ for starters.

situation, it is effectively co-authored. In a video made at a performance in the vast turbine hall of Tate Modern in London (in 2010)<sup>8</sup>, Kaffe Matthews listens attentively to the ‘feedback’ which is the sound resulting from her actions and in so doing ‘carries’ many of the audience seen concentrating on her work in what is otherwise an open thoroughfare – at the periphery there is considerably more movement and noise. Most of the audience choose to fix their seat (sitting on the floor) and to face her directly. An island of focus and concentration has been created within a sea of sound and movement.

### **Erosion 3 – the instant moment**

William Blake’s wonderful short poem ‘Eternity’ is first found in his notebook of ca. 1793:

He who binds to himself a joy  
Does the winged life destroy;  
But he who kisses the joy as it flies  
Lives in eternity’s sunrise.

Blake’s poem seems to herald the 19thC romantic discussion of the ineffable and the sublime – the instantaneous grasp of a moment, the intensity of that experience and its apparent transcendence to the eternal. This might be an instant feeling of awe which may lead to a sense of totality, perhaps what Gaston Bachelard (in his work *The Poetics of Space* (1964)) called ‘intimate immensity’. I recently had such an experience as I entered the Olympic Arena in London (2012). The feeling was well summed up in Mary Bauermeister’s phrase from a letter to Stockhausen, used as a text in *Momente*: ‘everything surrounding me is near and far at once’. Blake’s poem is, of course, also a key text in *Momente*.

The freedom of some sound art (sound installation, for example) to create the sudden and unexpected *moment* for an unpredictable audience cannot necessarily be disciplined into a narrative chain or any other kind of *through-composed* ‘logic’<sup>9</sup> – at least not one created *a priori* by the composer. It will be created at least as much by our time and space mobile listener.

### **Erosion 4 – the extended moment - from eye tracking to ear tracking**

The glance has no equivalent in sound. A sound ‘sample’ would be the equivalent of a small area of a picture, and while we do possess a more sensitive focal area at the centre of our vision we cannot confine our attention entirely to it. A glance may perhaps give us a sense of the whole and suggest points of potentially higher interest or importance. We may then proceed to a complex tracking that builds up the total picture in more detail *over time*. The technology for tracking eye movement is now well established with some interesting recent work on what draws the eye’s perceptual focus to certain features (Quiroga and Pedreira (2011)).

I would like to suggest the possibility and desirability of an equivalent *ear tracking*. While we have made substantial progress in machine applications to auditory scene analysis and the way the human ear discriminates particular characteristics within the sometimes complex

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<sup>8</sup> See [www.youtube.com/watch?v=r21W46LKDGg](http://www.youtube.com/watch?v=r21W46LKDGg) (last accessed 09/14).

<sup>9</sup> Such as those devised by Stockhausen for his moment form works – mobile or fixed – as discussed below.

flow, I suggest we have not yet developed *trackers* able to follow real listening focus in the same way as for eye movement.

## **Music aspiring to the condition of sculpture**

Music and the arts in general seem to be a necessary solidification, materialization of this intelligence. (Xenakis, 1985, p. 1)

Xenakis's Apollonian and Platonic idealization suggests that music is a spatial 'substance'. If we are to imagine this then it must necessarily be held in memory. So the experience of music performance transforms time into the space of form through accumulation in memory. Conversely sound installation in space transforms that space into an experience in time, and although reformed into the space of memory there is no equivalent definitive *a priori* form. Thus we have an imperfect mirror process: from the parts to a totality (music) – and from a totality to its parts (installation).

## **Heisenberg's uncertainty principle (1927)**

The theoretical physicist Werner Heisenberg first articulated this principle in 1927. It basically states that there is a limit to the accuracy of what we can know of the behaviour of a particle: namely the impossibility of knowing exactly both its position and its momentum. This is not a function of how accurate our measurement devices are, nor is it to be confused with the inevitable interference of the observer. Following Heisenberg's formulation it has been shown that it can be generalised to all wave phenomena, including sound.

A simple way of seeing this duality at our real world level is through Fourier functions which (unknowingly at the time) have an equivalent principle 'built in'. On the one hand in the frequency domain a unique and perfect sine tone would be represented by a spectrum line of no width. For this to be absolutely true it would have to exist in all space and time. Conversely in the time domain an exactly timed click would have to have infinitely short duration and would also be represented by a line of no width. For this to be absolutely true it would inevitably possess an infinite bandwidth (frequency) spectrum. As we tend towards either of these impossible endpoints we can say that the greater the exactness of knowledge in one domain, the greater the inexactness in the other.

But this principle takes us back to Blake's *Eternity* and the romantic ideal - that we strive for this impossibility to be resolved. I wish to harness this pair of apparent opposites, to see how they might help us conceptualise the steady erosions we have described above. How to bring together the musics of the moment with the musics of the eternal. Let us examine two paradigm instances where composers have tried to address these extremes; in both cases the ideas evolved at about the same time – from 1950s into the 1960s.

## **Stockhausen and Goeyvaerts: 'zero time' sounds**

Richard Toop quotes a letter from Karlheinz Stockhausen to Karel Goeyvaerts, written in December 1952. In an extensive correspondence around this time both composers were concerned with the reinvention of sound and music from the smallest building blocks. Written

in response to a proposal from the latter in his ongoing quest for ‘dead sounds’ that existed outside of time, Stockhausen writes –

Your notion of a “stationary” tape-recorder that takes sounds out of time is a good idea, but impracticable. Even if one were to let one or several sounds run together in a temporal “zero,” the statically recorded sound would still have a temporal duration, albeit an infinitely small one (at least as small as the tape-head [...]). [...] Now if you were to have a sound recorded on the 2-5mm. I was talking about, on this “stationary tape-recorder,” it would be about 1/400 sec. long, under the most favourable circumstances. But you can't just stretch this result out into time like an elastic band. (Toop, 1979, pp. 387-388)

While technically naïve, the idea was imaginatively very rich. It clearly resurfaces a few years later in Stockhausen’s ideas around *moments* and *moment form* which will be discussed further below.

### **La Monte Young’s *Dream House* and *The Theatre of Eternal Music* (ensemble)**

While perhaps best known for his *Composition 1960 #7* (a bare open fifth ‘to be held for a long time’), La Monte Young’s innovative development of performance practice in subsequent year’s deserves greater attention<sup>10</sup>. The increasing detail of his use of intonation (using rational frequency ratios) applied through the blend of electronic sine tones with the interaction of live performers created an entirely new sense of musical continuity. He wrote -

By 1962 I had formulated the concept of a Dream House in which a work would be played continuously and ultimately exist in time as a ‘living organism with a life and tradition of its own’. [...] in September 1966 I was able to create my first truly continuous electronic sound environment. [...] I maintained an environment of constant periodic sound waveforms almost continuously from September 1966 through January 1970. Marian [Zazeela] and I sang, worked and lived in this environment and studied its effects on ourselves and the varied groups of people who were invited to spend time with the frequencies. (Young and Zazeela, 1973)

Related through a kind of uncertainty principle we may begin to see how these apparently opposite notions of time might be related and both contribute to our listening strategies for music and sound art.

### **Moment form: how long is *Now*?**

Stockhausen had clearly absorbed the ideas of ‘zero time’ (introduced above) in his development of *moment form* (which he sometimes called *now form*):

Each Moment, whether a state or a process, is individual and self-regulated, and able to sustain an independent existence. The musical events do not take a fixed course between a determined beginning and an inevitable ending, and the moments are not merely consequents of what precedes them and antecedents of what follows; rather the concentration on the Now – on every Now – as if it were a vertical slice dominating over any horizontal conception of time and

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<sup>10</sup> Keith Potter (2000) points out the importance of Young’s performances to his growing reputation at the time, but this has been less appreciated recently, possibly due to disputes on authorship stopping the reissue of recordings – see documents by La Monte Young on his website, [www.melafoundation.org/](http://www.melafoundation.org/) (last accessed 09/14).

reaching into timelessness, which I call eternity: an eternity which does not begin at the end of time, but is attainable at every *moment*. (Stockhausen, 1963, p. 250, translated in Wörner 1973, pp. 46-47)

In a series of works composed from 1958 to about 1968 he applied this idea in both mobile (where the performer could choose the order of the moments usually according to combinatorial rules) and fixed forms.

## Mobile moment form

If we compare the well known form-schemes<sup>11</sup> for the 1965 and 1972 versions of the monumental *Momente* – we see immediately the Calder-like ‘swing’ of moment groups around pivots. Although of course such mobility cannot be grasped in a single performance the existence of recordings of both versions brings us nearer to appreciating what such differences can articulate<sup>12</sup>. In his later work *Stimmung* (1968) the original score allows in principle for performer choice of ‘model’ order *during performance* – this was never put into effect<sup>13</sup>.

Henri Pousseur’s *Scambi* (1957) is a rare example of a mobile form electroacoustic work. The individual sections are ‘fixed on tape’ but their performance order is open – there are ‘connection rules’ laid down by the composer allowing several different possibilities. While Pousseur himself would not have described this as moment form, there are clear parallels due simply to its ‘mobile’ possibilities – how can one section have preconceived ‘consequences’ in another when their order is not fixed? The individual parts are not however conceived as self-sufficient in Stockhausen’s terms<sup>14</sup>.

## Fixed moment form

Stockhausen’s electroacoustic studio works are not mobile yet are described as in moment form. The individual moments are fixed in sequence and have been ordered by a separate transcendent organising principle – a ‘form scheme’ or ‘connection scheme’. For example in *Kontakte* the ordered sequence depends on a scheme articulated through a *Veränderungsgrad* (scale of rate of change). While in *Telemusik* the ordered sequence of moments<sup>15</sup> is based on periodicities derived from harmonic series relations.

## Moment forms related to flux forms

There is a complex reciprocal relationship between a continuous sounding flow (as in La Monte Young’s ‘eternal music’) and the generation of significant moments of intensified

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<sup>11</sup> See (for example) the liner notes to Stockhausen Verlag CD7 (*Momente*).

<sup>12</sup> For example the very different function – due to very different position – of the M(m) (‘portrait of Mary’) moment in each of these versions.

<sup>13</sup> At least in performances sanctioned by the composer. The ‘models’ of *Stimmung* are effectively *moments*.

<sup>14</sup> None of his studio works is mobile; of his live electronic works *Mixtur* (1964) is an example of mobile moment form with relatively simple ordering options of the moments.

<sup>15</sup> There are 6 moment types ‘announced’ by a specific Japanese temple instrument, each associated with a particular (fibonacci derived) duration.

experience (of short duration). There may be a distinction between ‘events’ which involve noticeable change within the flux<sup>16</sup>, and a more subjective ‘accumulation’ of intense experience which may lead to unpredictable moments of clarity and insight *within* the flow. Listening strategies may allow the listener access to both. These may in turn create ‘moment clusters’ – that is the grouping of moments into threads of an ongoing weave within listener aesthesis<sup>17</sup>.

### **The creator tries to regain narrative (of a kind)**

The composer may try to influence the range of possible receptions, the options that the listener has, by embracing the new flexibility and mobility. There may be creative strategies to encourage short-term experiences that can indeed be put together by listeners in many different ways that can make some kind of narrative aesthetic sense – even with shape and direction. The composer may even risk ‘micro-narratives’ which are woven together by the listener: the formation of ‘local forms’, perhaps ‘fractal forms’ - small segments that reveal the shape and order of larger structures, which are designed to be grasped at shorter and more immediate timescales and pieced together in many possible ways. The present author’s own work *Memory Machine* (commissioned by *Inventionen* 2010 for the Wavefield synthesis system at the TU Berlin) is a ‘concert installation’. Its basic building block is a 12 minute *local form*. This is repeated for as long as required. The contents (individual soundfiles) are remixed live and are unlikely to be the same on each repeat.

This approach suggests a reinvention of moment form – the potential material for meaningful moments remain to some degree in the domain of the composer, while responsibility for their combination shifts drastically towards the listener (and other participants). I will take as an example a performance that has remained fixed strongly in my memory. In 1982 to celebrate his 70<sup>th</sup> birthday, the Almeida Festival (London) put on a weekend of John Cage’s music in a disused church specially converted for the event. I remember particularly vividly performances of *Inlets* (1977) and (as climax and conclusion) one of the earliest concert versions of *Roaratorio* (1979). There were traditional Irish musicians in several groups in the gallery, Cage performing ‘James Joyce’ mesostics derived from *Finnegans Wake*, a multichannel sound system above the space (which had no seats and hence total mobility possible) playing recordings from contemporary Dublin. It was I as listener that grasped individual moments through concentrated listening, sometimes prompted by a sudden change in the sound, at other times prompted by my choosing to concentrate on a particular sound strand for a longer period. This succession of moments became a narrative ‘walk’ through the piece with a clear shape and direction – which was indelibly written to my memory.

### **The liberation of moment form from composer-driven narratives**

In the years following the early performances (and more importantly recordings) of Stockhausen’s mobile moment form pieces he increasingly tried to ‘fix’ versions according to those he had worked out – even to the extent of publishing new fixed scores, for example of

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<sup>16</sup> I discuss different meanings of the term ‘event’ in electroacoustic music in Emmerson (2008b).

<sup>17</sup> David Toop’s *Ocean of Sound* (1995) examines the interaction of immersion, flux and ambience within many forms of listening.



the ‘Paris version’ of *Stimmung*. This ‘lost nerve’ coincided with a move away from moment form thinking in his work – and effectively its temporary eclipse. I suggest here that he gave us a tool which he did not in the end exploit to its full potential<sup>18</sup>. As well as evidently a compositional tool, if we shift our approach to embrace the idea of ‘moment creation’ as a significant part of contemporary listening strategies then *moment forming* is potentially a powerful analytical tool for the understanding of this brave new world. It can potentially cross the divide between what we have known as music and sound art<sup>19</sup>.

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<sup>18</sup> I would draw a parallel to Schoenberg with respect to *Klangfarbenmelodie* – which he invented and defined but did not in the end exploit further.

<sup>19</sup> This paper itself is in a kind of moment form – though not all orderings of headed sections may be equally comprehensible. While the printed page does not allow such mobility a software copy, of course, could.

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