LOCATION - DISLOCATION – RELOCATION ('WHERE IS LIVE ELECTRONIC MUSIC?')

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Abstract: The word 'dislocation' has a negative feel about it in English but we can reinterpret the *acousmatic dislocations* of recording, telephone, radio and synthesis as cases of technology bridging gaps rather than creating them – the possibility of bringing people closer together, especially in their more recent versions which include interactive and responsive dimensions. Such technological change has led to a 'relocation' of *the live*. Many are anxious, some critical of the apparent shift towards creating live music mediated through technology. There is a loss of certainty as to what *live* is any more. We are clearly in transition. For the listener there is a complex relationship of *cause* to *effect* in interactive music performances – especially where there are no *visible* causes. We may never know what causes the sound we hear … but need we know? Trying to find out may be a cause of unnecessary anxiety. I shall develop the idea of *meaningful response* as a better way of looking at interactivity - and perhaps liveness itself - in music making. I shall also develop the idea of the *animate net-work* as one way of conceptualising a fully mediatised performance. Whether in a room together or connected across the world, it is in the end how we *respond* to each other that matters.

Keywords: acousmatic, electroacoustic, live, interactive, meaning

INTRODUCTION – TECHNOLOGY, LANGUAGE AND THINKING

Speaking for myself I find that writing is a form of rewriting – I feel I 'edge forward' each time I talk about a topic[1]. Big eureka moments are rare – I have what I believe to be insights, but sometimes on a micro-level. A small part of the argument shifts each time – and slowly the whole landscape of the argument changes perspective. We all more or less adapt and respond to change around us and within ourselves, too.

My views on technology and liveness have clearly evolved – the journey is literal a well as metaphoric. I used to want to make an absolute distinction between 'live' (involving living beings such as ourselves) and 'real time' (essentially the domain of non-sentient machines, usually computers). Now I feel a lot less sure this distinction is valuable or even possible – though I insist it is the 'live' which is winning and permeating the technology and 'humanising it' – not vice versa.

Perhaps issues of machine thinking have been too rooted in discussions of 'intelligence'. I shall argue throughout this paper that it may be better to focus on *response* – whatever the

1 This paper combines arguments from two keynote addresses given in 2011 (Emmerson 2011a and 2011b) but my views on prior knowledge and knowledge of practice have shifted – largely as a result of the project 'New Multimedia Tools for Electroacoustic Music Analysis' being undertaken at De Montfort University (AHRC funded 2010-2013).

origin of what I receive, *how does it address me (and others)?*

Location – Time and Place

Music itself uses both spatial and temporal indicators. A performer might ask 'where are we?' in reference to a printed score or a given structure within the (perhaps unwritten) music; but this question can also be asked with respect to a venue, furthermore we can ask it about a historical or sociological 'position'. It seems this question is the most comprehensive it is possible to ask!

All our senses combine to help us locate ourselves. Denis Smalley has written with respect to a landscape described in sound –

> […] I can collapse the whole experience into a present moment, and that is largely how it rests in my memory. […] I ultimately sideline time's formative role. So space can be more significant than time, or at least we can profit by starting with the idea that time can be placed at the service of space rather than the reverse. Time becomes space. (Smalley 2007: 37–8)

But what he describes in this article is a 'scene' with relatively little foreground activity which might constitute a narrative – I concede that his description follows in a great landscape tradition, present in all the arts – a story without dramatic action[2]. Had something stood out suddenly his attention would have focused on it and the wholeness of the scene been moved to the background. Our memory triggers hidden narratives from the collective (the rhythm of the seasons) to the personal, sometimes intensely personal (Katharine Norman has written extensively on this (2000, 2004). It is clear that a comprehensive systematic musicology of our field will have to address wider social sites (which our cousins in popular music studies have taken for granted from the start).

Tim Ingold appears to reverse Smalley's collapse of time into space – in a section of his book devoted to the distinction between mapping and wayfinding he explains –

> Taking this view of place as my starting point, I now want to show how wayfinding might be understood not as following a course from one spatial location to another, but as a movement in *time*, more akin to playing music or storytelling than to reading a map. (Ingold 2000, p.238)

In the same way that a map is not neutral neither is an outside time representation of a musical work. But we can view these two approaches as complementary – time needs space, space needs time. The two are not independent or absolute.

Interestingly these same two authors suggest that soundscape and landscape cannot be dislocated from the visual – in fact the two faculties are interactive and reinforce each other. This is not the place to discuss the role of the 'imaginative visual' in the case of acousmatic music – clearly possible even when the sounds are not referential or source bonded. From an ecological and anthropological viewpoint Ingold argues -

> Sound, in my view, is neither mental nor material, but a phenomenon of *experience* […] To put it another way, sound is simply another way of saying 'I can hear'. […] When we look around on a fine day, we see a landscape bathed in sunlight, not a lightscape. Likewise, listening to our surroundings, we do not hear a soundscape. For sound, I would argue, is not the object but the medium of our perception. It is what we hear *in*. (Ingold 2007, unpaginated)

And in a barely concealed reference to philosophers from Plato to Descartes –

> We need to avoid the trap, analogous to thinking that the power of sight inheres in images, of supposing that the power of hearing inheres in recordings. For the ears, just like the eyes, are organs of observation, not instruments of playback. (Ingold 2007, unpaginated)

2 This can in and of itself create an emotional response. Gaston Bachelard (1964) describes the phenomenon of *intimate immensity* – which I have often felt in the presence of painting, music and occasionally in semi-sleep contemplation. See also Trevor Wishart's discussions on landscape (Wishart 1996).

This gives an interesting take on the observation that we do not put up our umbrella in a concert hall when we hear a recording of rain – providing we know where we are. This is a theatrical scenario – rather like the 'suspended disbelief' encouraged in Western theatre. We know where we are but minimize that awareness to maximize our potential empathy with the characters on stage[3].

I have suggested the division of our sound and space universe into four components of increasing scope: event, stage, arena, landscape. The first two I designated as 'local', the second two as 'field' descriptors (Emmerson 1998). I observed that technology has allowed the removal of the proscenium and the transformation of these one into another. John Cage can project the small event into an entire arena, the landscape becomes a stage, etc in any combination. Let us look at this new found flexibility of location in more detail.

DISLOCATION

The word 'dislocation' has a negative feel about it in English – a dislocated shoulder or hip needs medical attention. Almost metaphorical to this we can refer to dislocated transport or communications systems – the meaning has drifted from simply 'not where it was before' towards 'not where it *should* be'.

Pierre Schaeffer's original redefinition of the acousmatic seemed to derive from the consequences of the development of the new 'technologies of sound' – telephone (1876) and radio (1890s, transatlantic 1901) allowing us to displace sound in space, while recording (1877) allows displacement in time. I called these the 'acousmatic dislocations' [1994: 95].

Although more commonly described as *telecommunication* technologies (morse code telegraphy was successfully demonstrated ca. 1838), we musicians know this is a limited concept. In fact since the earliest days there has been a distinction between systems that transmit *symbols* (which tend to use the suffix '-graph' – as in *telegraph*) and those that transmit *sound* (which tend to use the suffix '-phone' as in *telephone*)[4]. This reflects deep distinctions of *signal* (sound) and *code* (information) which remain to this day (see MIDI, for example). The term *telecommunication* is limited simply because music is so much more than communication – as poetry is so much more than what its language symbols convey.

I added a third kind of displacement to those of space and time, that of *mechanical causality*. Sound synthesis was one of the most radical ruptures with the past – no longer were mechanical objects hit, scraped, blown (etc.) to be heard[5]. Synthesis developed from the 1870s to the 1890s, culminating in Thaddeus Cahill's *Telharmonium* designed in the 1890s and versions constructed in the years up to 1906).

It struck me forcibly on my first trip to ACMA New Zealand last summer that far from being a 'great distance' away there were many ways it seemed close (and I do not simply mean culturally and the weather!). Suddenly history made more sense – the 16th-19thC European-American world order increasingly demanded that such great distances and times *be more efficiently controlled* – and *telecommunication* was the right word here, though behind it lay the *telecontrol* of the imperial powers.

But this is a *distancing* not a *dislocation*[6] – 'something that needs crossing' not 'something that needs correcting'. I realized that this whole notion of *acousmatic dislocation* could be

3 Berthold Brecht's well known use of the *Verfremdungseffekt*, whereby the actors challenge the illusion of the audience as non-participant observers through (amongst other things) directly addressing them 'through the proscenium' has had relatively little application in electroacoustic and acousmatic music.

4 In English, well Greek.

5 That is we perceive (say) what we believe to be a human voice from the vibrations of a loudspeaker cone which remains mechanical. This is discussed elsewhere in this paper.

turned on its head. Thus the new technological discoveries were an *answer to distancing* not its prime cause – the new media allow us to reach out[7], to bridge the gap – to link together. This demands a creative response to dislocation, *enabling space and time 'distance' to be overcome*[8]. We can reinterpret the *acousmatic dislocations* of recording, telephone, radio and synthesis as cases of technology bridging gaps rather than creating them – the possibility of bringing people closer together, especially in their more recent versions which include interactive and responsive dimensions. Thus while local links appear broken by the technology, - we send an email or text to someone in the adjoining room - far removed spaces and times can join up, the network emerges.

There has been much discussion recently about the problems of syncronisation of musicians playing remotely from each other and connected via the internet. Clearly some historical practices of music cannot be 'translated' into these terms. Entrainment - which is at the root of cooperative collective music traditions until now – that is coming into tight rhythmic relationship (not always syncronisation) with a fellow musician – will not have the same easy practice. We simply do not know what internet latency will do to such relationships. Models of linguistic interaction – call and response – might produce better viable models. Traditions of heterophony and desyncronised polyphony are well established in cultures from across the world. Textural, drone and flux traditions of music making – which might benefit from the unpredictable timing errors of latency – might blossom[9].

RELOCATION

So *dislocation* gives way to *relocation* – but perhaps only really true when our anxieties over the process have been reduced and we feel comfortable with our new position. Although many such migrations have taken place, technological change has led to a 'relocation' of *the live*. It is on this that I shall now focus. The root of the problem is *verification* and *trust* – I trust my eyes and ears that you are here in front of me. Yet if the technology we have just described is somehow extending my perception to far off places (and times) we learn only slowly to trust the system[10]. An audio-visual link replaces my direct soundpath and siteline.

Many remain anxious, some critical of the apparent shift towards creating live music mediated through technology. There is clearly a loss of certainty as to what *live* is any more. We are clearly in transition. For the listener there is a complex relationship of *cause* to *effect* in interactive music performances – especially where there are no *visible* causes. This is a product of the anxiety about our position – we felt sure before that we knew – at least in principle. Now we may never know what causes the sound we hear … but *need* we know? Trying to find out may be a cause of unnecessary anxiety.

We do not worry too much about the origin of sounds in a traditional acoustic concert. The cause of instrumental music – musicians playing instruments - is not an issue. That is not to say the meaning lies in the sound alone. Christopher Small has argued that it is in the interactions and relationships of music and musicians, venue and listeners that the foundations

6 In 1996 I had given a presentation in German in which I had translated 'dislocation' as *Verrenkung* – better used for a medical condition! It is better translated as *Entfernung* – which is nearer *removal* or *distancing*. This mistranslation/retranslation lies behind my rethink.

7 The imagination had dreamt of this for centuries. See the oft quoted Francis Bacon, writing in 'New Atlantis' (1624/27) "We have sound houses, where we practise and demonstrate all sounds and their generation. … We have all means to convey sounds in trunks and pipes, in strange lines and distances."

8 To preserve and hear the absent voice (in both distance and time) was a dream that Edison specifically addressed at the time of his invention.

9 La Monte Young's *Dreamhouse* idea could easily be recreated worldwide, for example.

10 I suspect this is a generational matter - younger people have grown up to use (and basically trust) such systems.

of the music's meaning is constituted (Small 1998, p. 193). This becomes complicated but not impossible to decode where the 'performer' is a loudspeaker and the venue a darkened hall.

The loudspeaker is ubiquitous and can produce (almost) any sound. But the loudspeaker strips us of the certainties of the mechanical world – we are provoked to search for causes. But this gets in the way of the very musical relationships composers seek. Pierre Schaeffer argued that searching for sources and causes is a distraction - this 'explains' the need for the *reduced listening* at the basis of his strategy for *musique concrète* – just listen to the sounds!

But many of us find that very difficult - hence the anxiety. Perhaps we may live to see a new generation who do not think this is a valuable question. There's nothing to worry about they seem to say … perhaps this obsession with origins (Where was it from? How was it made?) has been a 30 year distraction from simply creating wonderful new sounds and from following the musical 'flow' (or 'argument') made with them.

Time is a great teacher. People *get used to things* – they learn. This first generation of 'origin seekers' (myself included) concentrated on relating sources and causes to the 'lost world' of *mechanical* causality - sometimes literally (as in soundscape, or 'expanded listening' (Harrison 1996)), sometimes by similarity (as in Denis Smalley's notions of *surrogacy* and (most importantly) of *indicative field*). I have suggested that a new generation of listeners has now extended this memory of the mechanical world of sound to include electronics sounds – thus new indicative fields emerge that indicate 'computer games', 'sci-fi' sounds[11] etc. which are just as much part of a child's soundworld as they learn about sound sources and causes. If we accept that sound is now mediatised, that we can expect and might get any kind of sound whatsoever from a loudspeaker, then maybe we can relax a bit.

Following this, as we enter a new century of mediated music there is another whole area that has been 'off limits' in Schaefferian and post-Schaefferian thinking. It is related to Denis Smalley's idea of 'technological listening' that is seeking to identify technical processes in the sounding flow (as in 'that was a GRMTools resonant filter bank at work'). This is also seen as a 'distraction' from reduced listening proper.

But what if we suspend this judgmental prohibition? We know in practice that many listeners (especially fellow practitioners) do ask such questions. Furthermore such information enriches and often 'explains' in ways that profoundly influence the aesthetic experience. It is also (contrary to this) perfectly feasible to take a line nearer to that of John Cage and steadfastly suspend judgement. In this he has an affinity with Pierre Schaeffer – knowing sources and causes is not a necessary part of the listening process for either composer. Letting sounds be themselves tends to brackets out the social critique dimension – though many post-Cageians have reintroduced it of course.

From liveness to meaningful response

I shall develop the idea of *meaningful response* as a better way of looking at interactivity - and perhaps liveness itself - in music making. I shall also develop the idea of the *animate net-work* as one way of conceptualising a fully mediatised performance which might connect together different agents in different locations. Whether in a room together or connected across the world, it is in the end how we *respond* to each other that matters. For the moment at least, behaviour is all we've got to go on – especially when 'other people' are not in the room directly in touch with our six senses.

So we have machines and we have human beings in relationship. Over the last decades since the advent of live electronic music we have had endless debates about causality –

11 If György Ligeti's music had already played a major role in Stanley Kubrick's *2001* then to my ear the same composer's *Artikulation* is heard in the 'robot talk' (C3PO and R2D2) of George Lukas's *Star Wars*.

whether we need to know what causes a musical result. Let us look at this in more detail.

Interactivity & causality - a response is more than a reply

Before we look at causality I wish to make a distinction between *reply* and *response*. Reply suggests something simple, sometimes factual – we reply to a phone call, an email etc. While I acknowledge there is no clear borderline between the two, *response* is something more. My dictionary[12] tells me -

Interaction - reciprocal action or influence;

Reply - a verbal or written answer;

Response – a verbal or written answer to a question, possibly a reaction to something;

but this sounds like 'reply' again although there is a hint of a more empathetic feeling or at least a 'reaction'. More relevant here is the Latin origin (*responsum*) my dictionary tells me means 'something offered in return' which has a much closer ring to how I understand the word.

I do think it is useful to make a distinction between *reply* and *response*. A true response adds value or meaning, solves problems or develops ideas; it engages and addresses the receiver almost personally. I think this is illustrated well in the phrase which describes one of the basic types of musical exchange – *call and response*. 'Call and answer' does not have the same ring (in English)!

In computer processes we often set up simple causal chains - in a world of *agents* called X, Y, Z etc. we might observe *actions* A, B, C etc. -

Thus if causal action is simply of the form:

Agent X does action A – this causes[13] agent Y to do action B -

then *interaction* adds the return path:

Agent X does action A – this causes agent Y to do action B – which causes -

Agent X to do action C – and so on …

Of course recent music improvisation software is not so crude and linear and we may build models of a 'fuzzier' kind. We create more complex systems that branch, make choices through measurement of input, use chance etc. but the principles remain much the same though we add interest through extending the repertoire of possible responses.

Also we must be careful about the word 'cause' here. As a human musician if I 'call' and you 'respond' – I have not *caused* your response in the same deterministic sense. I might be said to have *provoked* your response through social and musical convention. Computers are lumbered with a deterministic and behaviouristic paradigm. Can I provoke my computer into action? Does it have free will to say 'no thanks'?

Thus the perception of an appropriate and meaningful link in this interactive chain pertains to the *nature of actions* B with respect to A, C with respect to B etc. not simply to the *nature of the causes*. Where the nature of the result is *appropriate and meaningful* crude interaction becomes *true response*.

12 Oxford Dictionaries http://oxforddictionaries.com/

13 'Causes' here includes 'influences' – this may result in a small change in the other agent's behaviour.

Do we hear (or otherwise perceive) causes? Do we want to search them out? Is it useful to know them?

For most music we do not really hear an action or process directly – what we hear is the *result* of an action or process. This seems more obvious if I put this in the form – you do not hear a *cause*, you hear its *effect*. You may choose to work out a possible cause from the sounding flow - if you did not know it already from a programme note or a composer's workshop[14].

With this in mind I have always doubted the very limited debate about 'hearing systems' or indeed any generative procedure whatsoever[15]. We do not hear 'star maps' directly in Cage's *Etudes Australes* or Stockhausen's *Sternklang* – but we hear the effects clearly and possibly group by ear in the same way we group the stars by eye and imaginary association into constellations. The system may generate sense without being itself explicit.

It would surely distract from our musical attention to be drawn into a game of guessing where sounds came from and how they were made. We might accept this for professional composers (and music conferences such as this) because we really do want to know how things work! – but I do not think this is helpful for a wider audience in gaining an expressive musical experience. (I shall discuss an important exception below.)

The discussion of cause has dogged discussion of all kinds of music made with technology – most especially acousmatic and interactive electroacoustic music. We forget that 'cause' has several dimensions and when preparing this paper I returned (as ever) to Aristotle's four causes[16]. But this proved problematic when applied to loudspeaker music. The *efficient cause* of the sound of me hitting this desk is me – but if you record this act it becomes an electrical signal driving the loudspeaker cone. Mediatised music has been confused on this issue for many years – we are all essentially discussing 'apparent' causes perceived 'through' the recorded medium. The 'apparent' efficient, formal, material and final causes which we attempt to deduce from the sound flow are usually not the same as the real ones.

This is the nub of the debate about the *transparency* of technology. For traditions where this is paramount we are forced to deal with 'apparent' causes – we act as if the medium is not there and focus on what it purports to have 'conveyed' – this is as true of movies as of hi-fi recorded sound; we are fooled into believing that the efficient and material cause of a recording is the object recorded. But it isn't – it's an electrical signal and a loudspeaker cone. Thus the counter tradition – foreground the technology – it's really there – don't avoid it! It is an instrument, so play it!

Let us look at these two contradictory tendencies again through the music which was inspired by them. In the earliest years of *musique concrète* we have been told by Pierre Schaeffer to 'bracket out' the sources and causes of the sounds (*écoute réduite*). Furthermore Schaeffer expressly declared the technology to be progressively 'removed' from our perception. Following the presentation of the three 'postulates' of *musique concrete* he adds – "These three postulates [...] are not at all conditioned by any technical context. [...]" (Schaeffer 1973, pp.29-30). That said the French tradition certainly foregrounds the loudspeaker as the performing instrument – far from being invisible, we find *orchestres d'haut-parleurs* in beautiful locations, sensitively lit to please the eye![17]

14 I am talking here of apparent causes of the sounds and their ordering – this is subtly different from *musical cause* which relates to how we make *musical sense* of the sounding flow. The two are related but I do not discuss this here.

15 The nearest we come to 'hearing a system' directly is in the early works of Steve Reich where a process is set in motion to run its course, e.g. *Come Out*, *Piano Phase* etc. (Reich 2002).

16 The causes of this room: material (bricks), formal (plan), efficient (builder), final (to lecture in).

17 It seems that only in the cinema are loudspeakers truly considered *acousmatic* – see an IMAX demonstration

I have written extensively elsewhere about how I think *écoute réduite* is nearly impossible (Emmerson 2007) – and source bonding (and presumably the demand for a degree of recognition) has clearly crept back progressively into more recent acousmatic music practice. Source bonding is a search for a kind of 'apparent material cause' (with sometimes a search for an 'apparent efficient cause', asking is there an agent or performer at work?).

Algorithmic music sometimes has this 'search for causes' too but not in the same way. Denied the knowledge of a 'common practice' learnt in schools, academies and in simple 'home music making' we can (if we wish) ask 'how is this music organised?' or 'what is the cause of its flow?' As I argued above, we confuse two things here: hearing the result of an algorithm at work is not the same as hearing the algorithm – that is decoding it – 'Aha, that is a fractal equation at work'. Of course a fractal process may have clearly perceptible and identifiable qualities which I can clearly perceive but that is not the same thing. We can hear an effect not its cause.

But to an extent also Schaeffer demanded another impossible task – a kind of *tabula rasa* with respect to our knowledge of the *making* of the work. Demanding the technology was to be transparent meant effectively a 'bracketing out' of the studio itself. *The music lies in the sound as perceived*[18]*.* The practice beyond the act of listening simply isn't part of the aesthetic. This was bound to be challenged.

PRIOR KNOWLEDGE

Other genres, however, encourage – even demand - a *knowledge* of causes which is not always the same as a search for them - some algorithmic music, for example created from a chaotic algorithm, may gain from this background knowledge, creating a kind of resonance in the listener. This can be done through many means from the programme note (written and spoken), but also the composer, performer, performance manner and venue contribute expectations to genre, materials and procedures. Thus glitch, hardware hacking, failure and dirty electronics come from profoundly *social* practices and critiques of more conventional forms of music making, challenging accepted uses and replacing with extended or even abusive techniques of performance and sound production and presentation.

With algorithmic composition, too – composers vary as to what they believe listeners may need to know. Some retain their secrecy and believe the algorithm generates the meaning with no need to be revealed. Other composers are not so secretive and feel that some information to the listener (programme note, talk – or even the venue as a 'scene' for a subculture – and that includes conferences! – with a built in set of expectations) enriches the experience. Chaos, fractals, genetic algorithms, sferics etc. all have a certain resonance within our minds and influence their sonification. I call this 'poietic leakage' to the listener. There may be a kind of 'suggestive feedback' at work – we may not have been able to decode 'chaos algorithm' from the listening act (as previously discussed), but if we are *told* about it – then maybe we believe we can hear it in the music! This may really be true and perhaps we can learn the characteristics of chaotic music such that in time we *do* recognize it without such prompting or suggestion.

Then we have genres intimately bound up with hardware becoming once again to the forefront of our concerns - glitch and hacking for example. Here some knowledge of the causes of the sound add some 'meaning' to the activity – the image of a hacked LP or CD, the crackles and errors of electrical circuits token the breakdown and failure which is at the core of this aesthetic. Music as social critique and explicitly a challenge to the 'smooth and transparent'

for the extraordinary sophistication of the loudspeaker set-up hidden behind the screen.

18 This suggests a Platonic approach to the work with elements in common with 19th century German idealism (Schopenhauer).

production values of a previous music which sought to exclude the technology of production (the studio) from sight. So what do we perceive when we perceive 'interactivity' – actually this becomes a measure (but not *the* measure) of liveness.

I concluded a previous section by saying "where the nature of the result is *appropriate and meaningful* crude interaction becomes *true response*". The definition of appropriate and meaningful crosses the boundary from technical cause to musical affect – at last! It is essentially what music is about. The performer is key here and we have tended to neglect their feelings in many of our discussions.

When we discussed cause and interactivity above we did not specify who was perceiving (or trying to work out) the cause. It is surely the performer who must first and foremost *feel* a true response from a live electronic system. Performers through their very nature in the process do not usually 'stop to think'[19]. They may reflect and discuss their work before and after but finally (arguably) they rely to a greater extent than composers or listeners upon autonomic responses and reactions. Any great music combo of any tradition does this – electronics is no exception.

From live electronics to responsive electronics

My final section is more of a suggestion than a call to action. In summary I have argued that the continuing debate over the 'nature of liveness' should now give way gently to one on the 'nature of response'. In my ACMA New Zealand paper in 2011 I envisaged an 'animate net-work' where human and non-human forces meet to create music. For example we might have website feeds of natural sounds, sonifications of other phenomena, human performers, machine performers. The question is would each be aware of the *nature* of the others and be able to respond appropriately?

Of course there have been examples of this already creating a *Roaratorio* like simultaneity of sonic events. But on the other hand each node performer could be a properly *responsive agent*. So rather than worry whether I am performing with a 'real' or an 'artificial' intelligence, the question becomes one of the quality of the response to my actions, my input.

Firstly I may have given the impression that responses are always 'nice things'. Anyone knows (especially musicians!) that creative relationships are not always so simple. A response can be provocative, mischievous, contradictory, disruptive, humourous – and here we move to the heart of creativity and the unexpected. It is not simply that the response *is* humourous or provocative – but that the agent (possibly a machine) somehow *knows* that this is what they are doing – clearly machine awareness is outside our scope today. But this illustrates the simple fact that for some time to come we can only operate within a behaviourist paradigm[20] – we design systems that *behave* in ways we wish – this does not mean we have understood how similar human behaviour has come about[21].

Thus the composer and performer design and test responsive systems from whatever agents are available. There is of course no definitive answer to what is appropriate and meaningful – that is for you to decide.

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19 In many experimental works of the 1950s/60s the score appears to demand a large amount of 'conscious choice' in performance – but this was very often sorted out in rehearsal, including the indeterminacy of Cage and others. [Realisation scores on display at the ZKM (Karlsruhe) exhibition 'Notation: Calculation and Form in the Arts', 2008].

20 I have written elsewhere on the relationship of Alan Turing's 'imitation game' (not a test – and badly summarized in the literature) to live electronics (Emmerson 2011a, 2012).

21 Though of course machine modeling has a part to play in this research towards understanding human behaviour.

References

BACHELARD, G. **The Poetics of Space.** Boston: Beacon Press, 1964

EMMERSON, S. "'Live' versus 'real-time'", **Contemporary Music Review**, 10(2). Harwood Academic Publishers, 1994.

EMMERSON, S. "Aural landscape: musical space", **Organised Sound**, 3(2). CUP, 1998.

EMMERSON, S. **Living Electronic Music.** Aldershot: Ashgate, 2007.

EMMERSON, S. (2011a) "Living in a Performing World – Performing in a Living World" (Keynote Address). **Australasian Computer Music Conference, Auckland New Zealand, July 2011.** (Proceedings forthcoming). [2011a].

EMMERSON, S. "Music Imagination Technology" (Keynote Address). **Proceedings of the International Computer Music Conference Huddersfield, July-August 2011**. San Francisco: ICMA, 2011. [2011b]

EMMERSON, S. "Live Electronic Music or Living Electronic Music?". In: Peters, D.; Eckel, G.; Dorschel, A. **Bodily Expression in Electronic Music - Perspectives on Reclaiming Performativity.** New York & London: Routledge, 2012.

HARRISON, J. **Articles indéfinis.** CD, Empreintes Digitales: IMED 9627, 1996.

INGOLD, T. **The Perception of the Environment – Essays in livelihood, dwelling and skill.** London: Routledge, 2000.

INGOLD, Tim. "Against Soundscape". In: CARLYLE, A. (ed.). **Autumn Leaves: Sound and the Environment in Artistic Practice.** Paris: Double Entendre, 2007.

NORMAN, K. "Stepping outside for a moment: narrative space in two works for sound alone". In: EMMERSON, S. (ed.). **Music, Electronic Media and Culture.** Aldershot: Ashgate, 2000.

NORMAN, K. **Sounding Art – Eight Literary Excursions through Electronic Music.** Aldershot: Ashgate, 2004.

REICH, S. **Writings on Music 1965-2000 (ed. Paul Hillier).** New York: Oxford University Press, 2002.

SCHAEFFER, P. **La musique concrete.** Paris: Presses Universitaires de France, 1973.

SMALL, C. **Musicking – The meanings of performing and listening.** Hanover: Wesleyan University Press, 1998.

SMALLEY, D. "Space-form and the acousmatic image". **Organised Sound**, 12(1). CUP, 2007.

WISHART, T. **On Sonic Art.** Amsterdam: Harwood Academic Publishers, 1996.