ICMC 2015 Keynote Address State of the Art? A personal reflection on the intersections of music, sound and the creative imagination

by Jonty Harrison
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I am delighted and honoured to be one of the keynote speakers for the 2015 ICMC, and I should like to take the opportunity, right away, to thank Jon and the organising committee for inviting me to take on this role. All the same, I'm a bit puzzled!

1. Why am I here?

As an ICMC keynote, I find myself in some impressive company. Recent keynotes, including my two colleagues at this conference, Carla Scaletti and Miller Puckette, have been true pioneers in the field of computer music composition and/or have developed programs or algorithms that have changed the shape of the computer music world. I have done neither of these things; I am a few years too young to belong to the 'pioneer generation', and my programming skills are embarrassing. So, without for a moment wishing to question Jon's judgement in inviting me, part of me nevertheless wonders exactly what I'm doing here today. Perhaps it was thought that my recently acquired emeritus status might give me some special insight on the conference's main theme – Looking Back, Looking Forward. (It is certainly true that my change of status has made me think about what I have done, do now and might do in the future.) Or, perhaps people thought I might spice things up a bit by being provocative. This is always possible – as I get older, I am increasingly curmudgeonly and critical of what I see (and hear) happening around me, and official retirement means I can say what I really think (what can they do – fire me?).

Whatever the reason for my presence, and despite my keynote address being scheduled between those of Carla and Miller, I hope that I can make a few observations about the state of the art – or, at the very least, the state of my art – that will make this presentation more than just a comedy interlude!

2. What do I do?

I shall assume, therefore, that I am standing here because of my work in the music part of the 'computer music' equation.[1] And, for the past 35 years, 'music' has meant three things for me: composition, performance and teaching. However, separating these three facets of my work is very difficult as, for most of what might loosely be termed my 'career', composition, performance and teaching have been inextricably intertwined. And this has had both positive and negative aspects, for there have been some years in which my total compositional output was 0'00" – thanks, in particular, to teaching (or, more accurately, to university administration, which seems the most time-consuming aspect of higher education these days).

3. My name is Jonty and I am… an acousmatic composer

Let's start with composition, as that is at the centre of my activities. Composition is what defines me – to myself. If I were not a composer, I would not be involved with performance and I would certainly have no justification for being in education. I am, first and foremost, a composer – an acousmatic composer, to be precise. But this was not always the case.
I am a classically trained musician: piano lessons at age six, horn player after that (not a bad one, actually, even making it into the National Youth Orchestra of Great Britain and I seriously considered trying to go professional), conductor, and member of a music theatre group at University (think Kagel, not musical theatre like Broadway and the West End of London). I am a composer who has always been involved in performance: an obvious but not unusual link. My musical passions during my teenage years were Wagner, Mahler, Debussy, Stravinsky and Schoenberg (though the Beatles, Bob Dylan and others also got a look-in!). My classical training has, of course, coloured my compositional thinking and has left audible traces in my music. For example, something that I can only describe as a sense of 'phrase' or 'phrasing' (even including a notion of 'cadence') when shaping musical time, as well as a related preoccupation with 'causality', have both found their way into my acousmatic music. I have an ingrained sense that, as a physical phenomenon, sound is related to and results from physical action. Sound does not just happen; it is made. As a consequence, my acousmatic music is articulated by gestural events, which appear to cause changes in the surrounding musical fabric. It may also explain the predominance in my work of 'real' sound materials over electronically generated ones – although there are plenty of those, too!

My age and the era in which I grew up are therefore important factors in my musical makeup. I am old enough to have been trained during a period – the 1960s and 70s – where composition was regarded as a highly intellectual activity, involving lots of pre-compositional

pitch charts, durational schemes, and so on. At the University of York in the early 70s, discussion among composers (and there were very many of us, including all the faculty members!) revolved largely around what we would now see as the high modernist project related to integral serialism, and around its leading figures – Boulez, Stockhausen and Berio (with whom my tutor, Bernard Rands, had himself studied). I was a fully signed-up member of this club, and I must confess that I am still a huge fan of much of this music.

But then something strange happened. After four years at York, and at the end of my first year as a graduate student, I decided that I should find out what the electroacoustic music studio had to offer me as a composer. What I expected to find there were ways of extending and expanding what I was already doing in the instrumental domain. What I actually discovered challenged everything I believed about what music was and might be. Looking back, I now realise that, despite signing the serial pledge, in my heart of hearts I never truly belonged in the serial/modernist camp, any more than I had what it took to be a professional horn player. Discovering the studio was like coming home.

My increased 'leisure time' since retirement has allowed me to indulge in a few vices, one of which is listening to Radio 4, the BBC's excellent 'talk radio' channel. (Bear with me – this is relevant!) One day, I heard a discussion about education – a perennially hot political topic in the UK, where successive government ministers are forever tinkering with the curriculum and what it should or should not contain. Someone mentioned 'the three "R"s'. I'm not sure if this label exists outside the UK, but there it is always cited by those of a more traditionalist outlook as being the essential basis of 'education'. The three 'R's are, allegedly, reading, writing and (a)rithmetic. Now, apart from the obvious problem of basic literacy in respect of the letter 'R', I had often wondered why 'reading' and 'writing' were both in there, as they are strongly complementary skills, if not actually the same. In a flash of enlightenment for me, one person in the radio discussion explained that, in fact, the three 'R's (while equally compromised from the literacy point of view) actually refer to the three life skills of reading, *wroughting* and (a)rithmetic. Of course! From the dictionary, wroughting means: 'to make or do in a careful or decorative way' (as in 'wrought' iron or a carefully-'wrought' poem), and: 'to cause something to happen' (as in 'the director wrought major changes in the company').

A lot of things in my life clicked into place with this chance radio encounter, because I recognised myself. I am essentially a wroughter – a maker; a doer. My exam results at school suggested that I was fairly intelligent, but I have always felt like a bit of an interloper on this front, not least because I have always been sufficiently self-aware to know, deep down, that the nature of my intelligence does not lie in my grasp of, nor my ability to create (and then realise), grand concepts. My intelligence, such as it is, is not so much standardly 'intellectual' as *practical*, *applied*, and therefore, *pragmatic*.[2] I say 'therefore' because it seems to me that the verb 'to wrought' implies getting one's hands dirty. Vision and ideals have their place in human activity, but if you actually want to get anything done, you have to be pragmatic: you have to grab hold of the materials and shape them; interact and negotiate with them; and respond to their particular characteristics, in much the same way that sculpting implies a sensitivity to the grain of the wood or the striation in the stone.

Now, I am aware that this is in danger of becoming a confessional and I want to avoid that, but there is a key principle here that has informed everything I have ever done across my composition, performance and teaching, and that is pragmatism. I should like to explore what this actually means, and we can start to illustrate this by returning to my narrative about the studio.

4. Rethinking music: what did I learn in/from the studio?

It is tempting to claim that I am self-taught in the field of electroacoustic music – I did not take the undergraduate studio course at York, and had only the briefest of introductions to the facilities by another student. Luckily for me, Denis Smalley was by then approaching the end of his doctorate, following a year in Paris, and was prepared to spend many hours discussing *musique concrète* and the GRM with me. He even, with astonishing generosity, let me sit at the back of the studio and watch him work, which was how I acquired most of my studio technique. Nevertheless, it was the things I discovered for myself (and what does this imply about 'education' as it is so often practised today?) that had the greatest impact on me as a composer.

In basic terms, the studio turned everything I thought I knew about composing on its head. I mean this quite literally, because it made me realise – and truly (re)experience – that music is made from sound. It made me remember that 'works' are not composed from abstract structures, ideas and concepts that just happen to use sounds to articulate themselves, but that sounds take shape over time to form works. For me, at least, this means that the most successful pieces are those that demonstrate a

profound link between the component sound materials and the overall form. It is the properties and qualities of the sound materials themselves that generate structure, and not the other way round. So the studio enabled me to reconnect with sound – the fundamental raw material of music – and to reconnect with it in a very direct, hands-on and sculptural way ('wroughting', again). And because I was manipulating actual sonic events, not notational representations of them, I was able to check during the process of composition that the sounding relationships were actually there, rather than simply assuming they were audible because they were visible in notation. As Trevor Wishart once said to me: 'If I can't hear it, it's not there'.

So, to summarise: I began to compose, not from the top down (as with notational approaches), but from the bottom up.

5. Reference points

There are many aspects of studio work that feed into and inform this basic approach. In my experience, the most significant considerations can be summarised under the themes of 'sound storage & access', 'primacy of the ear' and 'interactivity':

5.1 Sound storage & access

I believe the ability to record and store sound (and the ensuing possibilities of modifying it) to be the most important development in the history of music.

• It provides instant access to sound itself, not via memory or via the intermediary agency of notation;
• It allows repeated listening, which leads, incidentally, to Schaeffer's notions of the objet sonore and écoute réduite. Such privileged access is not without its dangers, however. Basing compositional decisions on fine differences that may not be apparent to the first-time listener is one such problem;
• It permits a re-engagement with fundamental aspects of sound phenomena (in my case, this led to a (re)discovery of octaves, fifths, thirds and other serial taboos).

5.2 Primacy of the ear

The ear is the means by which sound reaches the brain; composers should therefore:

• Be sensitive to the unique properties of sound materials and what they offer;
• Recognise that sound materials already imply how they want to develop/be processed;
• Be willing to structure musical time on what works in sound.

5.3 Interactivity

I should like to challenge the more usual definition of interactivity within our field, by proposing the following observations about interactive engagement in the studio:

• The constant 'testing' and 'probing' of material in a dialogue is actually interactive (in fact, I consider all focused listening to be interactive; as Nattiez points out, 'the work' is constructed not only by the composer's *poiesis* but also by the listener's *esthesis*);
• Results are assessed by, and changes made, entirely on the basis of how they convince the ear – a recursive process involving reflection / rejection / transformation / improvement / pushing the boundaries;
• 'Performance' (e.g. manipulating faders, EQ, tape recorder starts and stops, etc.) was an integral part of composing in the tape studio, even though this is more usually done today through digital surrogacy.

As an acousmatic composer, then, I work almost entirely instinctively, or by ear. Now, this makes a lot of people, especially those in academia, very jumpy. In such circles, working 'instinctively' tends to be perceived in negative terms. Because of the lack of a demonstrable 'vision', or qualifiable 'inspiration' of the composer-genius prior to the creation of 'the work' (beyond the collecting of musically promising sound materials, that is, a process which may well predate the compositional period by some time), 'instinct' is assumed to be the exact opposite of intellectual rigour. It also makes acousmatic pieces extremely difficult to analyse (instinctively composed acousmatic music is a double whammy for analysts as there is no score to allow 'out of time' access to the music). However, in my experience, working instinctively does not mean working in a vacuum, without reference to anything else; furthermore, it does not mean working without intelligence, for one's 'instinct' is clearly shaped by one's previous listening experiences – both musical and otherwise. And this listening constitutes the gathering and application of 'intelligence' in every sense of the word.

My composition practice can be characterised as a constant feedback loop in which I improvise – trying things out (timing, levels, placement, balance, signal processing, etc.) and accepting or rejecting the results on the basis of aural assessments: does this work? what would make it better? And so on. My judgements are not based on preconceived strategies, structures or formulae, and there are certainly no predetermined rules. What 'works' and what is 'right' are context dependent: they may be completely wrong

in another situation. My judgements are based on close listening to my chosen material, and they are informed by all the other musical and everyday listening that I have ever done. Furthermore, my aural assessment is holistic, involving all the aspects of a sound's behaviour and energy profile at once: spectral, dynamic, spatial, etc. In my view, these characteristics are intrinsically linked, and not easily broken down into separate (and separately controllable) 'parameters'. So I am not imposing my will on sound material, but working in partnership with sound material and its unique characteristics. Together we feel our way towards the creation of a context and a final 'form'; one in which my musical – that is to say my emotional and intellectual – curiosity is somehow engaged, involved, and ultimately satisfied by what I hear.

This way of working means that I move gradually from concrete sonic events to what the piece is 'about' (the concept). Note that this is the reverse of the way that 'music' (in the western art music tradition, at any rate), with its canon of established 'geniuses', is traditionally understood to work – not least within academia. I use no (or very few) sketches or plans, and I make no pre-emptive decisions about structure (and usually not about duration unless this is imposed by a commission). All of these emerge during the compositional process, which is driven entirely by what I hear. I should add, though, that this is also a frustratingly inefficient way to compose, as I spend a great deal of time floundering about without a clue as to where I'm heading. But I see no real alternative, for to propose 'a method' would be to risk becoming formulaic. Each piece of acousmatic music needs to discover and define its own terms of reference, precisely because it is based on unique sound materials. I have written elsewhere that it seems to me that acousmatic music, almost by definition, will always be in a situation rather similar to Schoenberg's 'free atonal' period, where he really was living on his wits and literally 'making it up as he went along'. I can think of few examples from his later 12-tone period that compare with the creative energy and vitality of a work like *Erwartung*.

The underlying point of all of this is that acousmatic music – mine, at any rate – is based on the qualitative assessment of sound's unique characteristics, not the quantitative measuring of 'intervals'. And, of course, this was essentially the approach of composers of musique concrète (which, incidentally, I think is more to do with this way of working 'concretely' with sound material of whatever provenance than with any simplistic definition that implies only the use of only 'real' sounds, recorded with microphones: synthesis was an integral part of the GRM from the 70s, as Parmegiani's *De Natura Sonorum* audibly demonstrates – indeed, the interplay of recorded and synthetic sound is what that piece is about!). So you will probably not be surprised if I claim that I believe I still compose musique concrète, but now use computers and software to do it.

6. A street with two names
(© B. Truax)

Much of my work weaves a drunken path down a street that, on one side, seems to be called 'Rue Pierre Schaeffer', and on the other, 'R. Murray Schafer Street'.[3] Interestingly, Schaeffer himself apparently expressed discontent with his *Etude aux Chemins de Fer* for sounding too much like railway locomotives in a shunting yard. In other words, he was concerned that the sounds were too reminiscent of their origins and insufficiently abstracted from their real-world associations. Time does not permit me to explore this in detail, but I mention it because it is important for me and my work that the acousmatic medium is pliable enough to embrace sound materials from virtually any source, and certainly from sources that lie beyond the relatively small pool previously considered 'musical'. I am talking here about the stand-off – and therefore the vast expressive potential – that exists between 'abstract', 'pure music' (whatever that is) and anecdotal reference to everyday sound materials, with audience recognition of sources as an integral dynamic of the work. I have examples of both in my own catalogue.

6.1 Works that veer towards abstraction:

Although I didn't entirely realise it at the time, my earlier acousmatic works could be considered classically 'Schaefferian'. They are not concerned with the source sounds' real-world origins, nor with their role or implications in that context, but with a musical discourse teased out of their spectromorphological (Smalley, 1997) – their abstract, 'purely musical' – characteristics. Works of mine that exemplify this approach are *Pair/Impair, Klang, …et ainsi de suite…* and *Surface Tension*.

6.2 More 'referential' works

Occasionally, however, my music would allow a glimpse of the real world to sneak in. Since the mid-90s, I have consciously exploited the original contexts (and signification) of my source sounds, to the extent that recognition of provenance has a key role in the musical structure and 'meaning' of my pieces. Even so, I was always very keen to retain a certain ambiguity of function or meaning in my music; this is certainly not phonography, soundscape composition or sound documentary. Works leaning towards this

side of the street include *Sorties*, *Unsound Objects*, *Hot Air*, *Splintering*, the four works of *ReCycle*, and others.

From the late-90s onwards, my works have continued to explore this continuum between 'abstract' and 'anecdotal'. These have nearly all been multichannel – 8-channel to start with, and much larger channel counts – up to 72 in *BEASTiary*! – in more recent years. But to explain how on earth something like that came about, I need to discuss the flip-side of composition: performance.

7. The performance practice of acousmatic music

From what I have already said, you will not be surprised to hear that I regard the whole business of presenting acousmatic music in public contexts as a huge exercise in what my father used to call 'the art of the possible': doing the very best that can be achieved in the prevailing circumstances. Because of this, I tend to take the view that the tape, disc or sound file – certainly in the case of my own works – is a blueprint for potential future action, rather than a definitive statement. I fully understand and respect composers who take a different view and who maintain that what is stored on the medium is 'the work', requiring only accurate reproduction in performance. My problem is that I don't think accurate reproduction in performance is actually possible! In a straight battle between ideology and the real world, the real world will – ultimately – always win. Enter, once again, pragmatism.

What I am going to discuss here is the practice of sound diffusion – performing acousmatic music over sound systems made up of multiple (and possibly varied) loudspeakers. I am not talking about laptop performance, which I have done only twice in my life. But this experience did confirm that, for me, 'improvisation' is best done in the privacy of the studio and then subjected to the scrutiny of reflection, selection and improvement. I wish that more people would come to the same conclusion.

I said earlier that 'performance' – by which I mean shaping and moulding material in the studio; starting and stopping tape recorders at the right time; and using faders, panners and processors in a complex choreography – has always been embedded in the composition of musique concrète. Furthermore, the physical limitations of the early storage media, particularly with regard to restricted dynamic range[4] made it desirable, if not essential, to 'make the quiet bits quieter and the loud bits louder' in concert. The gestures that had shaped material in the studio were thus essentially 're-enacted' in performance to restore the profile of the work to something that carried over to a public listening context. So massaging the dynamic profile in performance is arguably as essential as manipulating 'space', which is what most people initially think of in connection with diffusion. Inevitably, if one is using multiple speakers, then their spatial configuration is a factor in what is heard. But my approach to diffusion is based on an assumption that 'space' (or what Smalley calls 'spatiality') is just one aspect of that holistic bundle of characteristics that make up a 'sonic object', and that energy in the spatial domain is likely to be strongly allied to energy profiles in dynamic and spectral domains.

8. BEAST (Birmingham ElectroAcoustic Sound Theatre)

After finishing at the University of York in 1976, and following a period of four years freelancing in London, I was appointed to a Lectureship at the University of Birmingham. This was 1980, and I immediately set about improving the Studio and building a loudspeaker system designed specifically for the public presentation of acousmatic music. After spending a couple of years getting used to this strange new world of academia, I decided it was time to get some of this music out to the public. So in December 1982 I organised a concert using the Studio's four loudspeakers together with four more of my own, plus some Motorola tweeters that I had bought. I felt that the event needed a catchy name, so I idly jotted down 'BEA' for 'Birmingham Electro-Acoustic' (I used to hyphenate the word in those days). I then thought it would be good if I could find something appropriate to complete the acronym these three letters seemed to suggest: 'BEAST'. 'Sound Theatre' seemed to fit the bill exactly. And the rest is history! (Well, no… even I would not be that pompous!) Though it is nevertheless the case that, for me at least, BEAST is, effectively, history. This is something I shall return to later, along with a few observations about being part of an academic institution.

Returning to our discussion of concert presentation, it is important to remember that the great majority of acousmatic music is in stereo. This format is, however, artificial. In our everyday lives, sound does not only propagate within a frontal 60 degree vector on the horizontal plane, but can stem from any number of positions around the listener. However, we accept stereo and feel comfortable with its limitation – largely, I suspect, because of its obvious relationship with the stage or concert platform in musical performance, and because most of the music we listen to is recorded and distributed in that format (even if we listen to it on headphones – which, technically, distorts

the stereo image). Stereo is also relatively simple to understand and to set up, and is thus 'portable': everyone (in theory) knows how to play back a stereo piece. Nevertheless, stereophony is based on an illusion – albeit one that, if handled well, can be unusually convincing. Because what stereophony can do is deliver sonic images – and deliver them quite efficiently (using just two channels rather than 5, 8, or n). The sonic images I have in mind are, once again, things that I think of in qualitative terms: close and intimate; broad or narrow, dramatic and sweeping; focused or diffuse; delicate or aggressive; etc. Incidentally, sources originally recorded in stereo contain many spatial cues that can suggest particular strategies for both composition and diffusion; moreover, the fact that the encoded space is 'real' (rather than artificially created by placing mono sounds within the stereo stage) can significantly enhance the believability of images available in performance.

Starting from the standard stereo loudspeaker set-up picture in Figure 1, we know that we should be at position A if we want to hear a stereo image at its best, Whether in the studio or at home in our living rooms, we organise things so that we are in the 'sweet spot', allowing the illusion of stereo to be fully audible. These illusions permit the creation of a sound-field that exists both between and behind the loudspeakers. Sounds can believably appear at the centre even though there is no actual speaker there; sounds travelling across the image can be tracked accurately; and sounds disappearing into the distance can seem, in these relatively controlled listening environments, to move away, well beyond the walls of the actual room in which we are sitting. (Note that, in order to be believable, compositional techniques such as reducing the amplitude and the high frequency content, adding reverberation, and possibly even narrowing the image by panning it towards the centre – thereby resembling the vanishing point we all know from perspective in the visual domain – may be required.)

If, however, we now imagine that my diagram represents a performance space capable of seating 200 people, rather than an acoustically controlled studio or even a relatively damped living room (curtains, carpets, soft furnishings, bookshelves, etc), things will be very different. Even at position A (Figure 1), the dimensions of the hall, the longer reverberation time of the space and the larger distances of the listener from the loudspeakers will all contribute to a loss of detail and precision in the listener's perception of the image. And if we are not in the sweet spot, things are even worse! Off the central axis at position B, all lateral distribution and panning is distorted; too close to the

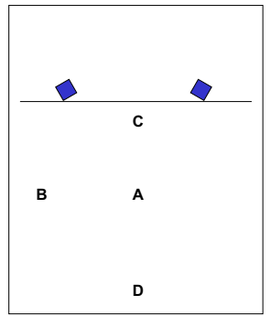

Figure 1: Stereo

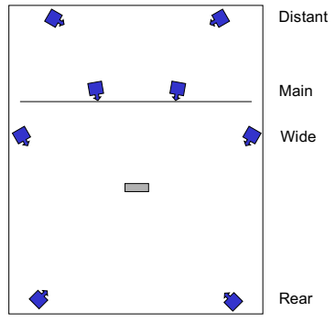

Figure 2: BEAST Main 8

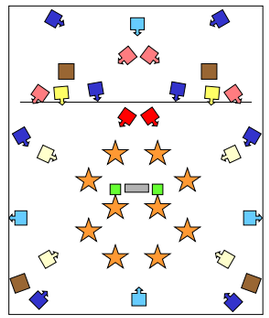

Figure 3: BEAST set-up for stereo diffusion

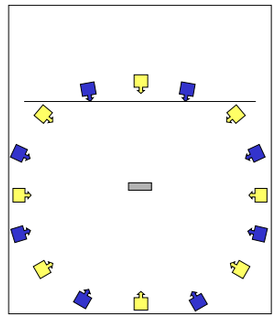

Figure 4: Two incompatible 8-channel 'standards'

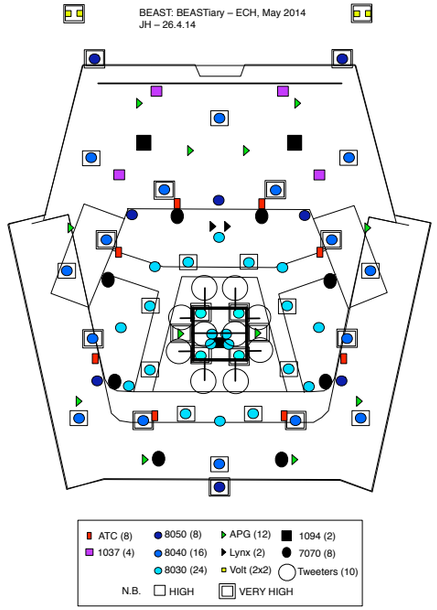

Figure 5: BEAST May 2014

in position C creates a hole in the middle; too far away, as at position D, and all the sound is distant (and probably mono!). So here we have the fundamental rationale for diffusion: in a large, public space, the original stereo images of a work are compromised unless you actively take steps to address the problems of room acoustics, audience size and position, the limited dynamic range of magnetic tape, which can seem inadequate in a public space, etc. All performance spaces are different, and there is no such thing as a neutral acoustic. (In fact, I personally find most concert halls, designed for singers and instrumentalists, too reverberant for acousmatic music.) And even if you set the levels in rehearsal, the acoustics of the space change when the audience arrives. So it is always necessary for someone to be able to intervene, to adjust what's going on, in realtime. And, of course, the ears of that person have to be in the same acoustic space as those of the listeners: the diffuser must be part of the audience.

Figure 2 shows what I call the 'BEAST Main 8', which I consider the minimum number of loudspeakers for the diffusion of stereo works. Diffusing stereo over a system like this enhances the composer's implied sonic images in several ways:

• The Distant speakers ensure that a sense of 'distance' can be accomplished, by moving the sound to loudspeakers placed in truly distant positions;
• The central location of the Main loudspeakers allow for the creation of a focused, intimate, universally audible 'central' image;
• The Wide speakers deliver dramatic lateral movement to every seat in the hall;
•And the Rear speakers allow for the effect of 'envelopment', surrounding or immersing listeners in sound.

In my style of diffusion, these pairs are not necessarily used alone. Dynamically balancing between them further extends the range of sonic images available, right up to very rapid movement across and between these eight, thereby enhancing the fast, fleeting energy characteristics in the sounds. In other words, the role of the diffuser soon moves beyond mere 'correction' to become active and interventionist. And adding even more speakers extends the range of images that can be delivered. Figure 3 shows a typical BEAST set-up of the 90s for stereo. It includes speakers on the floor, in galleries, at the mixer, and so on. BEAST in this setting becomes a subtle and extremely malleable performance tool – an instrument, if you like.

Now, one of the things that frequently happens – I would like to say 'should happen' – when composers meet an instrument like this is that it starts to influence their compositional thinking. Performance practice feeds back into composition. This certainly happened to me and it continued to happen, even as the BEAST system kept growing.

9. Public vs. private listening

Despite the fact that most people these days listen to music (all/any music) on ear-buds attached to iPods and the like, I continue to find merit in the notion of people coming together socially with the express purpose of listening to music. Despite the above-mentioned problems associated with it, there remains a continuing and thriving practice of playing acousmatic music in 'public listening situations'. However, many people (including some of my students) have criticised me for favouring the 'concert' format (i.e. people sitting in rows facing the front) over installations in galleries and other venues (though I have done those too, of course!) in which people are free to come and go and to move about.

My response to these possibly interconnected issues is twofold. Firstly, the reason I started doing diffusion seriously was to present established and new repertoire, the majority of which comprised concert works with beginnings, middles and ends. People wandering in and out at will are thus unable to hear a crucial aspect of such works: their unfolding over time. So while I have no problem in performing in galleries, I prefer to present works composed specifically for that context (it is simply a question of appropriate repertoire). Secondly, if you do not know the direction in which people's ears are facing, it becomes very difficult, if not impossible, to deliver coherent diffusion performances of pieces. This is for the simple reason that the human hearing mechanism does not work equally well in all directions: a fact that is unalterable by any fashion, trend, personal taste, or style. In very much the same spirit of 'fitness for purpose' (an example of the kind of 'admin-speak' unfortunately now so popular in universities), I feel strongly that acousmatic works fare very badly in 'club' contexts such as upstairs in a pub with people having loud conversations and ordering drinks at the bar. While I welcome attempts to broaden the audience for acousmatic music, and I genuinely believe that there is a huge potential audience 'out there', presenting acousmatic music as something it is not, and in inappropriate contexts, actually misrepresents it. Remember that acousmatic music is based precisely on the qualitative aspects of their sound materials, and therefore relies heavily on this subtlety being actually audible. Performing it in bars and clubs opens up the risk of rejection on criteria that do not even apply!

9. And then came 8-channel. . .

I was talking about BEAST – or, indeed, any speaker system – as an instrument and about how it could grow. But so far I have only really touched on stereo diffusion. With new the availability of ADAT and DA-88 machines, and sound cards with 8 outputs in the mid to late 1980s, there was a fairly serious explosion in the use of 8-channel as a compositional format. But what does '8-channel' or 'octophonic' actually mean? What is a standard 8-channel speaker layout? Figure 4 encapsulates the problem: the eight blue and eight yellow boxes represent two conflicting 8-channel 'standards' that are completely incompatible, thus presenting composers with a problem of portability: a work composed for the blue array cannot be played on the yellow array without misrepresenting its spatial contents.

I did not like either of these regular, circular set-ups back in 1999, so I stubbornly decided that I would use the BEAST Main 8 configuration (Figure 2) as my 8-channel configuration. This was largely in order to be able to place different images on different speakers: using the Mains and Wides to allow spatially detailed but wide frontal images (exploiting the area of our perception that is most sensitive to detailed 'location information') in my piece *Streams* (1999), for example; or using the Mains as a close, intimate image, surrounded by a more 'ambient' sound field in *Rock'n'Roll* (2004). This ability to deploy different materials on different parts of the array, as they are not part of a regular circle of speakers, comes from my experience with stereo diffusion, and is a major advantage of this configuration. Yet there are disadvantages, too, not least regarding what I earlier termed 'portability': the difficulty of sending the piece to other performers, promoters or festivals, since the chances are high that they will have one of the standard circular arrays seen in Figure 4. So for more practical (i.e. pragmatic) reasons – in this case, the base desire for more performances – most of my later 8-channel works have used regular arrays so as to meet the conventions of regular concert halls. Within BEAST, however, I was able to obtain the differentiation of images I was looking for by diffusing these pieces over multiple 8-channel arrays: a 'main' array, a 'diffuse' array, a 'high' array, 'close' array and so on. Luckily, a large grant enabled us to expand the system in 2004-05, and the enlarged system even enabled our pragmatism to extend to the inclusion of approaches based on idealised playback over regular arrays: these included ambisonics and VBAP domes.

Let us now turn to the issue of 'driving' a large system premised on the notion

course virtually impossible to do even a simple cross-fade from one 8-channel array to another (humans do not have enough fingers), so control surfaces and software routing enter into the picture. The BEASTmulch software allows not only the grouping of multiple outputs under one fader, but also the independent mapping of inputs, outputs, faders, and much more. Indeed, almost all of the functional control aspects of a diffusion system, as well as the specification of speaker positions (for techniques like VBAP) are implemented in the system. Once again, this leads to new creative possibilities – in my own case, the idea of composing in 'spatial stems' that were intended for spatialisation in realtime during performance over a large system. This was in contrast to the act of treating a format like '8-channels' as a simple indicator of a predetermined spatial arrangement. I explored these features in my work, *BEASTory* – a 'portrait' of the BEAST system and its personnel.

But once you have, and can control, a large loudspeaker array like BEAST (now operating at 96 channels), then composing directly for the system (differentiating material types and characteristics during composition as composed stems for deployment directly onto the appropriate speakers) is an obvious next step. It is a similar approach to composing differentially for the Distant, Main, Wide and Rear speaker pairs of the BEAST Main 8 (as in my works, *Streams* and *Rock'n'Roll*), albeit on a larger scale. This possibility became clear to me during a week of testing the system in the Elgar Concert Hall, the auditorium in the new Bramall Music Building, into which the Music Department at Birmingham moved in 2012. During this week I was able to experiment with speaker locations and learn which types of material best suited which specific sub-sets of the full array. The result was *BEASTiary*. Composed for 72 channels, and performed at the opening festival of the Elgar Concert Hall (and coinciding with BEAST's 30th anniversary), *BEASTiary* is based on the same source sounds as *BEASTory*, but is developed in a completely different direction. Figure 5 shows the full 96 channels for this event, which was replicated for my final concert as Director of BEAST in 2014.

10. Back to the future… and time is running out

So here I am, looking backward, looking forward… and I am no longer Director of BEAST. This means that I no longer have 96 loudspeakers at my disposal on a regular basis, so – as a pragmatist – I'm wondering how feasible it is to continue working in the way I have described. I recently bought a new pair of high quality monitor speakers, so perhaps I shall

return to my roots and start composing in stereo again. But what about teaching? Just as I am no longer Director of BEAST, I am also, apart from my last completing PhD students, no longer an academic – if I ever really was (I have often referred to myself as a 'reluctant academic', and I must confess that I took a post at a University at least in part because I could not afford to buy the equipment required to make acousmatic music in 1980). But I am approaching the end of my keynote and I have not really discussed teaching yet! On the other hand, maybe I have; teaching has been lurking underneath all of this keynote. Because I take the view, allegedly expressed by Socrates, that 'I cannot teach anybody anything; I can only make them think.'

To me, to 'teach' in the top-down traditional way would be anathema. To claim or even imply that, 'I am the fount of all knowledge and you know nothing,' is completely out of character and, anyway, is fundamentally untrue. Even though the text you are reading is based on a lecture, and therefore suggests one-way traffic in knowledge, the simple fact remains that, while you can 'teach' until you're blue in the face, 'good teachers' are only good if students want to learn.

Because of this fact, and because, as I said earlier, I am essentially a self-taught composer (and I don't have a teaching qualification either, which is now a requirement in UK universities), my approach to teaching has been simple: first, try to excite and interest students; and second, try to create a situation or context inside which they can learn. And this learning should be through experience, through experiment; through making mistakes and figuring out how to fix them. Sure, the odd bit of guidance, largely based on my own past mistakes, doesn't go amiss. But I am not trying to create compositional clones of myself. This is why my main efforts at Birmingham went into building up the studios, building up BEAST into what is nowadays known as a 'research resource', and – most importantly – building a compositional community: a partnership of equals in which creativity was enabled, had an outlet (BEAST), and in which you could pretty much guarantee finding somebody who knew about a particular piece of software that could accomplish a certain task (because I certainly didn't!). In this model, I'm not there to say 'this is right' or 'this is wrong'. If anything, I'm there to say 'I have no idea – let's try it and find out!', while also providing another pair of ears to bounce things off in an attempt to help students discover their own responses to what they hear (Socrates again: 'To find yourself, think for yourself'). I don't know if this was the right way, but it was the only way I could do it.

And it seems to have caught on (you might consider it a virus!), as I can produce a list of over 40 of my students (mostly PhD, but also Masters and undergraduate, plus occasional studio sessions with other people's students) who are currently teaching, or have recently taught, in the Higher Education sector.

Like my approach to performing and to composing, my approach to 'teaching' is pragmatic, then. I do not – cannot – set out from certainty, from a vision or from a concept, or from an all-embracing knowledge of anything. Indeed, I don't know if anyone can. I set out merely in a spirit of open-minded enquiry, to explore this astonishing universe of sound and to discover what works and what doesn't in a particular context. I am delighted to have found so many talented fellow travellers over the years, and I am sure that I have learned more from them than they have from me. So, to them, and to you for listening to me today – thank you!

Footnotes

1. I say this because it should be obvious to anyone who knows my work that I use the computer as a tool: a means to a musical end, not an end in its own right.

2. The 'applied' stands in contradistinction to 'pure' science and mathematics. I have often detected more than a whiff of prejudice against the applied forms in certain parts of academia.

3. My thanks to Barry Truax for this wonderful image.

4. About 63dB between hiss and distortion for magnetic tape, which is what I first worked with.

5. BEASTmulch was written as part of a research project led by Dr Scott Wilson, funded by the UK's Arts and Humanities Research Council: Development of an intelligent software controlled system for the diffusion of electroacoustic music on large arrays of mixed loudspeakers.