# Caveats from a dyed-in-the-wool futurist

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**It is recommended that we collaborate with science and industry in the search for technological innovation in media-related fields, in order to help design a future environment that will benefit a healthy musical culture. Since those of us who are already immersed in the technology are accustomed to its less attractive attributes as well as its potentials, we can consult with colleagues about essential characteristics of the old-fashioned world which we and they do not want to lose. With our collective imaginations, it should be possible to preserve many of these aspects by transforming them, with sensitivity, to fit new contexts. A few diverse examples are given of features that might be considered both attractive and endangered. Suggestions ranging from the practical to the whimsical illustrate some possibilities for injecting the essence of these experiences into a more technological world, thereby enriching it.**

It is possible to imagine various scenarios for the musical world of the near future, ranging from wondrous laboratories and listening environments to a society full of people with damaged hearing isolated from each other by implanted headphones and listening to music with little diversity or richness. In order to cast our votes for the former scenario, we need to contribute to the creation of valid and versatile design schemes ourselves, and also to voice our opinions on existing and proposed technology and contexts.

To many of us working in and around electroacoustics and sonic art, the apparently endless potential of new technologies is thrilling, from the efficient performance of mundane tasks such as splicing and spectral analysis to the ability to shape sound with nuance of timbre and frequency at microscopic levels, whether by intuition or algorithm. We revel in the new modes of organisation inspired by hyperlinking, and are astonished to be able to measure performance detail and perception thresholds and study their correspondences. It might then be assumed that we are the ones exceptionally well qualified to offer recommendations for improvements in software, hardware, studio design, and general environmental improvements, as we are supposed to manifest both imagination and intimate knowledge of technological developments. However, we who have worked for years in electroacoustics are converts to a technological world. It may be that when our colleagues wince at our voluntary exile to electronic studios it betrays an amazement that we are so intrigued by these new toys that we willingly abandon many of the comforts of the more traditional world of music: we traded the quiet ambiance of the wood-and-draperied recital hall for the whirring motors, flat walls and grey colours of the computer room; the warmth of human breath in the ebony clarinet for the filtered noise band; the reflections on issues of analysis for reading of software manuals and list-servs about hardware configurations. What about those who were interested in the potentials of the new technologies, but thought that such a price – the drab and sterile rooms that kept out all but the boldest aficionados – too high? I propose that, rather than dismissing such sentiments as complaints, we should encourage them as being votes in favour of particular design options of a future world. While defending the field, we have often down-played our own reservations. Music technology is now firmly entrenched in our world, so it is time for us to bring out our pet peeves as well as our preferences. I suspect that we would also benefit from encouraging colleagues who have not spent the last couple of decades in the electronic studios to participate in these design brainstorming sessions, as they may have some clearer insights or at least a healthy reticence about the glories of the present-day situation.

Now is a good time to ensure that the future make room for any and all characteristics that we were reluctant to abandon in the first place, and create spaces where musicians and scholars of all types may be more likely to encounter each other. Although the psychologists have not yet proven that we think and create better in more organic environments, intuition says it might be so. Certainly it is clear that significant advances in critical thought will benefit from at least occasional encounters with those whose fields of activity are not completely identical with our own. In a parallel mode, we can examine characteristics of older and newer musical forms and techniques, to see whether anything which we treasured in the past is in danger of being needlessly abandoned. There are diverse features that seem both attractive and endangered; I recommend that we carefully examine them in order to identify those elements or characteristics which we wish to carry through into the new forms of the future. With our collective imaginations, it should be possible to preserve many of these aspects by transforming them, with sensitivity, to fit new contexts.

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I have to admit that, despite the admonitions of colleagues, I still copy music by hand. It reminds me of the arguments I had years ago about electronic music. If it takes me one month to compose a piece with pen and paper, and three months to compose one of equal quality by computer, I argued, then I should compose with pen and paper because I will contribute more pieces in the course of my lifetime. Now, it has been pointed out that there are flaws in this argument: if everyone thought that way, no one would develop better computer programs for composition. However, I have never doubted that there are others who think differently than I. Such diversity in humanity is one of the most precious characteristics of our world, and is an aspect that I sometimes fear is threatened. Meanwhile, as more diverse solutions to technological problems appear, the more likely I am to find software, hardware and interfaces that appeal to my compositional methods. However, when writing in traditional notation, I enjoy the feel of pen and paper and the degree of control that I have with them after years of being a music scribe. I will switch to computer notation when I perceive that it will provide the same pleasure and control. I am convinced that if I keep holding out, someone somewhere will design a program that I find appropriate, and not too time-consuming to learn.

I still believe very strongly that time is an important factor in accomplishing something. This is not only for the sake of the value of time itself, in calculating how many hours I can afford to spend on composition, for example, but also because during the compositional process, the longer the time between concept and realisation, the more opportunity for losing the original idea, with its associated freshness. Of course, I am all for the polishing and refining of an idea, but when a large proportion of compositional time is spent in trying to process the idea through unconducive channels of a program, then the energy is often deflected from the objective of creating an artwork. Exactly the same thing can be said of notation: composing music which is not organised mainly by pitch and metre can be hindered by trying to use traditional notation systems evolved for such priorities. If, however, we persuade our colleagues in technology and industry to develop tools which promote playful investigation, the time spent on creating will not be regretted. The present paper is a plea to take seriously all complaints that are lodged against computers, electronics, electroacoustic music, and related fields, and try to isolate the unreasonable fears from the valid criticisms. If we can manage to stimulate our more technologically minded associates with the sense of playfulness that is central to compositional endeavours, then we may benefit from imaginative solutions to our problems.

My own preferred image for a future involves the designing of an environment that could be conducive to the highest level of technological access while preserving, probably in a transformed state, those essences of past musics and environments which seem to have been invaluable for musical and cultural growth. This paper presents some suggestions – some practical, some fanciful – that would help facilitate the creation of such an environment.

We might start with the title of the conference. Do we want to get rid of walls and instruments? Beginning with the most ridiculously literal interpretation and stretching all the way to the metaphorical/philosophical, I can think of multiple uses for walls, and reasons not to do away with them. First of all, without walls we have little reverberation. Now, we could create virtual spaces, even multiple coexisting ones, as Jean-Claude Risset does so entrancingly in his work *Invisible Irène* (1995). If, on the other hand, we want to get rid of walls altogether, we will need to rethink the speaker set-up – will they be scattered about the city and countryside, free-standing, for anyone to diffuse to at will? And this, although it has a certain appeal if we assume that only compatible musics are emanating from nearby speakers at any one time, implies a drastic rethinking of the studio – if the sounds are not going to be diffused in a rectangular enclosed space, then the studio where the composer works should not be an enclosed space either. So if we were to settle for an array of speakers out in the open, they would probably be used during the compositional process as well as for the diffusion of the finished product. This could be interesting, as it would erode the often clear divide between work-in-progress and completed piece, moving towards free jazz improvisation and happenings. The 'speaker in the countryside' scenario also implies that there should be no unwanted sounds to detract from the improvisations/compositions which are being broadcast – implying that all the sounds of the environment should be either natural or designed to complement the natural – or is this showing an old-fashioned aesthetic again? Assuming that the wall-less free-standing speaker diffusion were to become prevalent, how many years would pass before Microsoft or a similar body would see fit to beam out the music by satellite? We could urge the technologists to design reverse speakers which suck sounds out of the environment, to promote more quiet spaces.[1] The cheaper models of these 'sound vacuums' would probably work at a fixed, mid-range level, while the more sophisticated versions could be fine-tuned by the owner to operate on specified frequency bands, programmable to alter over time. Some composers would doubtless manage to become involved in the programming of the sound vacuums to produce works which could sculpt noise, scrubbing out different frequency bands at different moments in time. However, I suspect that some people would still prefer to create their sonic art in isolation, insulated from other noises and sounds.

[1]Credit for the idea of 'reverse speakers' goes to Harry Mountain, who contributed it on hearing a draft of this article.

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In any case, without walls, where would we hang our paintings? Another thing about walls: some of them are very attractive. Should we not demand attractive walls for our studios and performance spaces of the future? These days, designing a piece for diffusion over varying speaker configurations is becoming more standard; some composers like to specify an ideal and hope that they will approach it more and more closely. But why not design works that are expected to interact with the peculiarities of different acoustic contexts? Sonic architects in different parts of the world could design particular spaces with individual properties, and those which appealed to the greatest number of composers could be then reproduced with variations in different countries, so that a collection of interesting acoustic spaces would become familiar and available for play. One could be a room lined with tiny spheres of marble laid into grids of copper; another with ivy growing on stone walls; one with water surrounding the stage (such as A Mãe d'Agua, in Lisbon); one in a huge underground cavern. The idea of a studio in a forest near a stream, for example, has long appealed to me. The birds, water, wind and rain would be a potentially integral part of each piece, with variations depending on the time of day, the season, and the particular state of the weather. For days when I preferred a more cocoon-like environment, I would like a studio where I can have rich tapestries around me, and candles, and comfortable chairs, and paintings on the walls, and woodwork, and richly textured drapes. In this era of powerful laptop computers, such a dream is not very difficult to attain, although we seem to feel that within the context of a university, such designs would be inappropriate, or at least show a frivolous concern for irrelevant aspects. Are they so irrelevant? How many potential students do we lose by paying little attention to the physical environment of a sound studio? As a starting point to answering such questions, it would be interesting to conduct a survey of the physical characteristics of the studio where various works have been produced: this piece was composed using a Brand X synthesizer and software Y, in a small room with soft natural light from an upper window, drapes and carpet predominantly in blue, polished oak chair, and a view of the ocean through the door. Would it turn out that my favourite pieces were composed in studios where I would enjoy spending time, whereas works composed in studios which I consider sterile and unfriendly seemed less appealing?

Returning to the question of speakers against walls, I have been thinking recently of the advantages of speakers that are like helium balloons, which could stay suspended wherever placed. In the earlier stages of the technology, this would simply permit the quick adjusting of multiple speaker placement for a concert. As the technology became more affordable, it would become a standard feature on all home systems, so that we could easily distribute them throughout the living room (and other parts of the house). Graduates from sound programmes would make money by visiting people's houses to fine-tune the balance and frequency response of each speaker, to maximise the effect of the music within the particular house architecture. Eventually, the speakers would be able to be moved around by remote control, and enterprising composers could add a data track to the CD recording of their works, specifying the appropriate motion of the speakers during the piece: speakers would swoop in towards the listener for certain gestures and chords, then retreat into the far corners of the room for calmer parts, and sometimes one or two would dance closer and farther away with a solo line, while a lone speaker up against the ceiling would play a little ostinato while circling.

What about metaphorical walls? Here, I am less sceptical, at least to some extent. Much of my favourite music is from different cultures and recently I have found artists who are successfully creating works which draw on different styles and aesthetics: Rabih Abou-Khalil, Ekova, Jon Hassell, among others. However, although I like such porosity, I do not envision with any excitement a world where all the music is going to be a mishmash of all styles. I have definite tastes in sound configurations, and I would like to be able to sort through new additions to the sonic world by effective filtering. Although I agree that artificial 'walls' may be unhealthy, I disagree with the argument that distinctions are somehow unfair. So, we might accept music without walls, conditionally.

What about music without instruments? One aspect that has been frequently ignored by composers and theorists in the last several decades is that, in the past, music was often an active sport. Audiences who sat passively to be entertained were rarer than those who played; exceptions were situations of ritual, where in fact entertainment is not the goal. This is still found in many cultures. To be blunt: playing instruments can be fun, and satisfying; although many performers might feel that this does not always seem to apply to the complex interpretation required by a Xenakis or a Ferneyhough, there is nonetheless a satisfaction in the successful reproduction of even the most complex work. The actual physical movement of playing is an integral part of the enjoyment for many performers, and being able to achieve a new level of difficulty in the coordination of fingers and breaths, especially when other friends are involved in the production, can be a significant reward.

Instead of trying to imagine music without instruments, I think that time would be better spent in creating computer interfaces that resemble the traditional instruments in their essential physical configurations (instead of in their timbres). To start off more freely, we could simply examine the actions which we find satisfactory within musical contexts: finger-tapping, singing, whistling, dancing, drumming, swinging the arms, etc. Then, we can figure out what parameters of a sound complex

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we want to be able to change at what rate: faster, ornamental-type rhythms are much more easily produced by breath or fingers than by legs, for instance. I have elsewhere (Mountain 1993) suggested that our perception of sounds and categorisation of their functions is to some extent influenced by such links between body movements and their expression of energy and state of mind/mood, and subsequent reinforcing of those links by centuries of compositional and performance practice. Thus, our ears seem particularly tuned to the frequency range we use for speaking, and our sense of rhythm closely tied to our capacities for limb movement, whether walking, dancing, drumming, or playing a flute. Our appreciation of variation in a sound appears to occur in the 3–15 Hz range – what Max Mathews (2001) has dubbed the 'haptic frequency' as it corresponds to typical digital (finger) movement such as found in vibrato and tremolo in traditional music. Quivering from excitement or nervousness is easily transferable through fingertips, and received by the listener as an expression, even if artificial, of that particular state. Therefore, it would make sense to invent new instruments where some parts are controlled by legs, some parts by arms, some parts by breath, some by fingers. There is currently some exploration of these movements and corresponding sounds by contemporary dancers using various means such as motion sensors and contact microphones. However, except in the most experimental stage, the dancer is by definition more concerned with the movement itself, and the sound more as a by-product. In music, we can focus more clearly on movements as appropriate triggers or manipulators for sound.

Imagine a platform with two poles, for instance, where a person could control certain parameters, such as timbre, by grasping the poles in the hands and working them like giant joysticks, with finger-controlled activators for fine-tuning. The platform could be programmed for other parameters of the sounds, such as frequency and duration, according to an *x*–*y* graph, with a further *z* axis procurable by the force of the step (probably amplitude, to be intuitive). The platform floor could also have some storage areas around the side, so that sound configurations produced could be tapped for repetition later on in the piece. Those who wished to explore ensemble playing and social interaction could develop more complex models for two or more players.

One aspect of much electroacoustic music that I feel has not been sufficiently considered is the frequent abandonment of discrete steps. Many instruments favour the production of sound in non-continuous grains. The glissando was used quite sparingly until recently. I believe that the growing interest in granular synthesis is due in part to the possibility of having sound which is somewhat continuous but with distinct, if minuscule, breaks between each grain. The effect of continuous sound is tedious for many listeners; I think it is a major cause of the typical first reaction of many people to electroacoustics: science fiction. In our world, continuously sliding sounds are much rarer than discrete ones. Our bodies (and thus our musical instruments) tend to produce discrete contact points – footsteps, finger-tapping, speech – even skating, though it produces long sliding sounds, is made up of alternating foot slides. The effect in many electroacoustic pieces where a single sound undergoes constant shifting over many seconds is often one of slithering around on an unstable surface: sufficient to distress all but the hardiest of EA fans. Perhaps the development of instruments/interfaces which involve finger- and toe-tapping would promote a more natural balance of discrete with continuously transient sounds. The more continuous sounds might be contributed by whole-body movements, affecting the frequencies, timbres and dynamics through interaction with sensors. I think that we would tend to distinguish readily between the sounds produced by a supple and sensuous bend of the body and those produced through quick, sharp and rather stiff movements.

If you disagree with me about the benefit of discrete steps in electronic sound, then you are adding weight to another argument about innovation in technology. We do not in fact have to agree as a collective community before encouraging the development of a particular model of hardware, software, or interface. A fundamental aspect of such design necessarily involves a rejection of the assumption that we strive for efficiency, perfection, or majority acceptance. Such an assumption reveals an invidious influence of science and economy, which tends towards the model of assessing our needs and proposing the single most appropriate compromise for addressing those needs. There are two main problems with this approach. First of all, there cannot be a single most appropriate method as long as there are two or more artists involved. The creation of an interface which will be the most satisfactory to the greatest number of people is good economics, and dismal means to the promotion of highly creative work. Synthesizers are merely one case in point. There need to be at least as many types of interface as there are musical instruments. Secondly, music is not about efficiency, and never has been. If the objective is to end the piece on the tonic, why wander into a distantly related key? If the aim is to cross the stage, why whirl around and back numerous times before the curtain can close? If the goal is to produce the linear interval of a perfect fifth, why design a nyckelharpa and a saxophone when the voice and the flute are already in existence? The objective of a musical software – and interface – should not always be that of providing an effective way of producing a particular set of actions, but rather to be so fascinating and enjoyable in itself that some creative people will want to play with it, and some, as they play, will find an appropriate means of expression through it. My own interest in creating work on computers has increased dramatically with my

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acquiring a laptop, which not only enables me to work in the visually rich context of my living room, sitting in a comfortable sprawl, but is also sufficiently quiet that it does not interfere with the calisthenics of my sonic imagination. I am convinced that I would be even happier with fifteen or twenty similar types of machine, so that I could set up patterns or gestures on separate ones and then physically move the sound producer around, placing two or three in a group here, and another couple over there. This is most apparent when I try working with a music notation software, because I like to scribble down ideas and then sort the scraps of paper, physically, into compatible bits; if I were able to do the same with the computer, without having to change screen view each time, or make them so small that they are not meaningful, then I would be much more efficient in my composition.

One problem that can occur in the composition of electroacoustic music is the lack of significant visual imagery corresponding to the sonic material. File titles are chosen which are often quite inadequate in their representation of the material to which they provide the link. After amassing numerous little sound bites, the directory can become overloaded with short titles which are quite inadequate for quick identification of the different materials. By having a system – and the technology – by which the various sound bites could be placed into small cards, it would be much simpler to play with organising those sounds into meaningful groups. Making duplicates of a sound would be as easy as clicking together two forms; subsequently either one could be further altered. Labels could be affixed to each sound, using graphic codes, colour, words, pictures or whatever else was felt to be meaningful. The ability to pick up a sound, hear it, and physically place it next to another compatible (or contrasting) sound might hold considerable appeal for many contemporaries.

The problem of not being able to retain numerous and diverse sonic shapes in one's mind is part of another far-reaching problem whose effects have not apparently been well researched: that of the non-reliance on auditory memory. For me, one of the most crucial yet ephemeral casualties of the modern technology is that we are in danger of losing our sophistication of hearing inside the head. It is quite simple: in the studio, and even in composing in a traditional style for acoustic instruments using a music notation software, the composer is able to play back, on the machine, practically any musical idea that occurs to her. The two situations are a bit different: with the notation software, the composer thinks of a melody or gesture or chord and writes it on the virtual page. In order to verify the notation, a button is pushed and playback begins. The necessity of developing a sufficiently good 'ear' to imagine the sounds in one's head, trained through the study of scores with recordings, and playing through on an instrument, becomes redundant. In the studio, while creating new timbres and sonic shapes, the composer relies on turning buttons or otherwise shifting parameters and listens to the output to verify that it is satisfactory. Those who enter the studio with a fixed idea of a specific timbre and progression either grow frustrated by the difficulty of arriving at precisely that sound, or, more frequently, become entranced by another sound or sonic group that results from the studio 'play'. In both cases, the sharpening of the capacity for hearing what one sees, or conversely writing down in visual notation what one hears, becomes lost. Assuming that this capacity is related to the development of aural memory, one way of rewarding such development would be for legal bodies, of government or industry, to provide significant financial rewards to people who could successfully identify the misuse of copyrighted material in contexts other than those originally created by the composer. Another approach, though probably much more difficult to achieve, to the point of being simplistically idealistic, would be to raise the sonic awareness of the public to such an extent that film and video which used artificially created sound effects would be boycotted if those effects were found significantly inaccurate in their evocation of the original sound source. Thus, the sound of a loon in the daytime in an Arizona desert, or the sound of an oak door closing in an apartment that clearly has hollow plywood doors, would lead to a general participation in the ridicule which is currently found only in the more sophisticated electroacoustic schools.

Continuing on in the idealistic realm, it would be interesting to devise assignments in electroacoustics classes where the students were expected to express qualities such as elegance, dignity, wonderment, tenderness and delicacy. Although it might be argued that such qualities are so uncharacteristic of the present-day world that we cannot be expected to understand or recognise them, we could probably enlist the help of musicologists who have studied the music of past eras and could provide us with acoustic examples of them.

Speaking of musicologists: I look forward to the days when problems of technology fade and questions of compositional style, technique and intent become more dominant in our discourse. This seems to involve several steps. The order of these steps is not clear; probably, some of us should start with the left foot and some with the right, while a few execute cartwheels. One step is to ensure that the corpus of electroacoustics works are incorporated into the general repertoire of twentieth-century and contemporary music as presented in concerts, music analysis and history classes. Another is to design coherent and appropriate analytical tools and procedures for such music. A third step is to persuade colleagues that such tools and procedures can also be appropriate for other types of music, thereby highlighting the common elements between them (and emphasising also any particularly unique characteristics). By taking these steps, in various orders,

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we will hopefully engage others less used to listening to and thinking about electroacoustics to share in discussions that will not only draw attention to the richness of activity here but also allow us to view our own field from different perspectives. I expect that a result of many successful exchanges over several years will be the dissolution of the term 'electroacoustics' (one wall) to be replaced by other terms (hopefully more porous walls) which refer more to the aesthetics, context and functions of musics in general rather than the means by which they are assembled. In the meantime, the playfulness resulting from flying speakers and malleable instrument interfaces may spawn ever-greater degrees of imagination which will characterise musical environments, activities and products of the future.

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