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# From algorithmic jukeboxes to zero-time synthesis: a potential A–Z of music in tomorrow's world (a *conference provocation*)

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**This conference talk is about change. It does not pretend to be an academic paper as such; it was offered at the 'Music without Walls? Music without Instruments?' conference as a provocative 'performance'. The following pages investigate twenty-six developments associated with music that one might discover in the not-too-distant future.**

## 1. INTRODUCTION

An increasingly interactive world. Alright, a world with increasing interactivity involving digital technology. A world in which copyright is regularly being redefined following technological developments. Idem customs (the international border one, not the day-to-day one). A world in which one socialises in digital neighbourhoods where physical space becomes decreasingly important. These are visions of Nicholas Negroponte,<sup>1</sup> one of many individuals concerned with our arriving into the future as soon as is feasible. The speed has become so great that this visionary is now seen by some to be rather, well, behind the future times as it were.

This paper is an ideas paper. Since its outline was created some fifteen months before the conference, so much has happened that a few entries had to be changed. Others are still there – their future is much more present than it was when I started. The following pages investigate twenty-six developments associated with music that one might discover in the not-too-distant future using our current alphabet.

## 2. AN A–Z

### A: Algorithmic jukebox

It has to change. It just has to! People cannot continue solely to listen to their favourite top-ten hits every other hour for a few months and then discard them. At least I hope they can't. As a matter of fact, there are recent signs that people can actually tolerate live popular music, such as performed by DJs, music that is not identical to the recording!

The concept behind the algorithmic jukebox is simply that the user(s) can choose the type of music desired and

the jukebox will play a new piece every time. You may ask, but most popular music has a text. Is one to treat that algorithmically as well? Of course lyrics will be treated similarly. Although the history of algorithmic literature may not be as dynamic as that in music, it is still more than capable of handling algorithmic love song lyrics.

Sampling techniques will permit you to have your favourite musicians' instruments and voices processed so that you feel you are not meeting new, unknown performers with each click of your wireless device.

How versatile will the system be? The more learned the user, the more detailed the opportunity. Programme an entire seductive evening before your date's mobile all-purpose utility aid triggers the doorbell to ring.

### B: Beethoven II, no

We must now slowly but surely accept the fact that immortality is dead. Long live the ephemeral. (I overstate my case.) With due respect, any attempts that Stockhausen continues to make through his 'Licht' cycle to become the last century's Wagner or even Beethoven will not succeed. Although our ability to retain information forever seems to be on the increase, our need for demigod musicians, other than our temporary pop stars, seems to be on the decrease. Therefore, talented musicians unite and enjoy music while it takes place. For the here and now is the signature of our era. It was fairly acceptable to most musicians in centuries past and still is in many cultures. There is no *volte-face* expected.

### C: Computer folk music (see also V: Virtual composition collectives and Y: Yoruban computer music)

The notion of computer folk music represents an interesting manifestation of the previous view concerning the ephemeral. More and more music-making is taking place on the Internet. This is not a trend. Similarly live laptop, that is, portable digital music is on the increase.

People need to make music. Some have been influenced negatively during the last century as the perfect recording became more perfect and the virtuoso musician continued to break virtuosity records. Therefore, fear was added to joy regarding some people's desire to

<sup>1</sup>All thoughts attributed to Negroponte can be found in his *Being Digital* (London: Hodder & Stoughton, 1995).

make music. However, just like CB radio turned shy individuals into enabled communicators, the Internet is offering opportunities for people to meet and become mates in a variety of forms, music not being the least of them. As more people are able to create music collectively within cyberspace, the notion of music of and for the people will evolve, perhaps radically. The Net will represent an important venue for the musics of the people, a.k.a. folk music. Portable digital music can similarly be made anywhere. The excitement about the development of these strands of folk music is that they will be fundamentally participated in and enjoyed by its makers. It will represent an important reaction to the commercial music consumption that dictates today's music appreciation.

#### **D: Dial-a-space**

Have you ever had the experience of performing that gig you so looked forward to and found that the performance space was, well, not quite good enough? No worry. Dial-a-space will allow you to provide the listener with an environment of any size, reverberation and geometry you choose. Many of us talk about the urgency of intimacy in our music. The Albert Hall will be able to sound like a Parisian salon with the proper setting. We've diffused sound around spaces for years, now how about a dynamic environment as part of the audio or audiovisual experience?

#### **E: E-operas, e-symphonies, more interesting e-genres, not to mention e-instruments**

Face the facts. Our orchestras and opera companies are begrudgingly attempting to reinvent themselves. The race is to find the quickest means to create an e-opera and e-symphony before someone else gets there first. I leave it to you whether this is worth the collective effort. New operas and orchestral music in the latter half of the twentieth century were neither often composed relatively speaking nor generally appreciated, especially by the opera and orchestra musicians. Actually, e-sacred music is not unthinkable either.

I believe that the map of music is awaiting revision. Two powerful dinosaurs are under threat. On the one hand the art music circuit is trying desperately to keep funding for music, especially that written 120–400 years ago, at current levels. Furthermore, the commercial sector wants to make minor alterations to your taste and feed it as quickly as they can produce recordings. The Internet will change both.

In the revised map of music, nothing will be lost, although some slices of the musical pie might get slimmer as the market organically becomes more segmented. New genres will evolve, including e-genres. Equally, as the Internet moves on from a MIDI-based to an audio-based standard, new e-instruments will be designed and

shared, a very enticing prospect. Whatever happens, our instrumentarium will include new imaginative keyboards. It is not unthinkable that future instruments increasingly resemble Gameboys and the like.

#### **F: Fuzzy logic applied to a composition's development**

Why did it take so long for fuzzy logic to be discovered? It is so damned logical. As Negroponte points out, a toaster should not be able to burn toast. Our cars are getting fuzzy logic-based climate control. So how can this be used in music? We composers are becoming increasingly sophisticated in terms of our knowledge of areas outside of our *métier*. We use strategies to compose music that were unthinkable a century ago, when the application of the Fibonacci series in music was still the talk of the town. As our understandings of forms in nature, neural nets, perception and even emotion increase, our ability to translate this into formulae will grow accordingly.

Please allow me to take a stab in the dark. There must be some form of structural control of a composition to disallow us composers from writing those works which are simply too long. If fuzzy logic can keep our heating and air conditioning systems in line, it should be able to control any aspect or parameter in music. Might this not aid in our greater understanding of balance?

#### **G: Granular music's own Grammy Awards**

You may believe that the word *paradigm* is overused. I am not so certain. So much is evolving, and will continue to for the time being, that paradigmatic changes are rather inevitable.

Granular synthesis is but one of the many exciting ways to create sound digitally. People involved in granulation have been known to define sound entities, sound flows and structures as part of one holistic process. This type of thinking will continue to lead to new listening experiences. Some of these will become more universally recognised than they are currently. As these approaches and paradigms root more deeply, appreciation will likewise be increased. Or do they need to be replaced as often as our equipment? I doubt it. Therefore the notion of a Grammy (or equivalent) for a granular piece (or other new digital procedure) is anything but an odd fantasy.

#### **H: Household digital A/V installations**

Ah, how we do like to keep up with the latest technological developments. For the Apple users amongst you, how much time has been spent dreaming what OS X will mean for you. Let's skip these evolutionary steps for a moment and look a bit further ahead. Will we need dozens of machines to cater to our audio-visual desires

at home in the future? I doubt it. One central multipurpose, multiprocessing machine should take care of things throughout the home (and elsewhere) rather well. Television and radio can be requested anywhere at any time. And, as Negroponte has often pointed out, we will be able to select bits that interest us in the same fashion as we choose items in our newspapers. Physically owning recordings will become unnecessary as storage will take place at origin and the replacement for our optical cables will ensure our receiving whatever we need as quickly as technology will allow, which in any event will be faster than our perception receives it.

All that we will need, and even this is possibly superfluous, is some sort of multi-purpose triggering device, such as that mobile all-purpose utility aid mentioned above. We will be able to look at wide screens or smaller ones in the same space depending on the atmosphere we want to create. And that evergreen of ours, surround sound? Yes, it just might be a matter of a few years before we can transport ourselves into a totally different acoustic and visual environment at a touch of a button or transmission of a thought.

### **I: Internet conservatoire**

Some of us are loners. I, for one, like to socialise. This online learning business is just another form of development to ensure we never see, meet or work with people. To make matters worse, we in music sometimes enjoy the collective creation or performance of music. Who wants an Internet conservatoire?

This conservative paragraph must have had some parallels when the UK's Open University was conceived. Yet no one doubts that the increase in opportunities for individuals through this initiative is enormous. Can you learn to hold your instrument properly on the Internet? In fact you can. The Internet allows for virtual eye-to-eye tutorials.

No one believes that an entire musical education can be taught by way of packaged music modules offered online. Many of us, however, underestimate what can be done at a distance. The efficiency gained by placing all elements online serving the student and lecturer alike is potentially significant. Time will tell whether one needs to be physically seated in a single space to make instrumental music collectively. As with everything in education, not to mention the arts, it is simply a question of finding a balance. The time lost by staff and pupil alike doing things one already knows or following a collective pathway is a shame and can be improved through online learning. Slower students will equally profit by the Internet conservatoire of the future as those repetitive tasks of learning where most deficiencies can be found are the easiest to implement.

By the way, if more and more music is going to be made on the Internet, it seems appropriate that one considers it to be amongst of the best places to learn about it as well.

### **J: Jazz online accompaniment (see also X: XL, L, M, S – virtuosity levels of different versions of the same piece of music)**

How many of you remember those 'music minus one' recordings of old which allowed you to play the solo with a professional ensemble? What is being proposed here is not dissimilar, the difference being that the music is improvised as is the accompaniment. This idea is absolutely not my own. Research, for example at Carnegie Mellon University, has been dealing with this approach for jazz students for years. The future ambition here is that (i) one need not purchase an expensive system as relevant programmes and sounds will be situated at origin, (ii) it will cater to any style, and (iii) it will cater to any level. The next step is the forming of online ensembles. The protocol defining when solos and accompaniment take place is agreed by the participants and/or the system. The notion of the pick-up gig will take on a new form.

### **K: Kindergarten, electroacoustic composition in**

When I was a young child, I was treated to the opportunity to play objects from daily life within a musical context at a nursery school. Thus sonic art became as much part of my sound universe as any other form of music. It is a shame that only a select few were treated to this during that time. Today, young children can choose between Playstations and CD-ROMs, many of which are filled with electroacoustic sound material. And then there are all of those new digital audio products available for the young.

If we then evaluate the proportion of music they hear that involves sound in whatever form, the introduction of electroacoustic creation in kindergarten should perhaps become as common as group singing. Any child can do what I did with the glasses, rocks and other objects. Children all play computer games at their own level. All that is needed is an appropriate interface to assist in their being able to create a piece no matter how basic. The sense of discovery that will accompany such experiences will influence the child positively in two senses. She or he will look forward to continuing creative work as there was no threshold to start; this in turn will increase electroacoustic music appreciation. The early introduction of creative processes to children is equally a great aid in terms of their discipline, logic and communication skills.

### **L: Length-variable works of music**

Having already complained that a great deal of contemporary music (not to mention other art forms as well) is too long, we now move on to something much more dynamic. One of the key areas of investigation that I have been involved with is the notion of the 'flexible

composition'. In my case, flexibility involves with whom one works and for whom a piece is being performed.

Length-variable works of music are adjustable according to circumstance. Classic FM and equivalent broadcasters abroad will love this as they will ask for 3'37"-lasting works from everyone. That silliness aside, I can well imagine a Scelsi or Feldman meditative work being shortened for certain circumstances even if they didn't. Don't forget, performers of ragas have known how to shorten or lengthen a work *ad libitum* given circumstances in which a performance takes place.

This composition tool will allow us hungry composers to be able to reply to a festival director or concert promoter that our work is exactly as long as they need. Putting a different spin on this, perhaps our works require full length and concertante versions or whatever our own equivalents might be. Algorithms will be evolved which can ensure that the key characteristics of a piece are in no way diminished in either an epoch or reader's digest form.

#### **M: Music**

This was in question . . . Suffice to say that no matter how hard we try to redefine or even destroy our art or our environment, music will survive us whether we define it as organised sound or anything else.

#### **N: Neighbourhood interactive sound installations**

Similar to the concept of dial-a-space, the notions of the flexible, portable concert hall, sonic playground and other day-to-day venues are inevitable. Modular, that is, multipurpose public-access architecture is due to increase allowing people to choose what they want to do within their communal spaces.

Parallel to this, the success of public art will continue. Public artists will increasingly call upon sound as part of the interdisciplinary, multi-sensual experience. Everyone knows how well appreciated sound installations can be. In fact, many very innovative sound installations are infinitely more accessible than most contemporary music. With the continual lowering of prices accompanying the increase of sophistication of our sound equipment, it is perfectly feasible for neighbourhoods to get together and create dynamic sound installations that evolve with time or are regularly altered.

Wouldn't it be nice if music, or the arts in general, could bind communities in the future? It wouldn't be the first time. Education has an opportunity here to act as enabler for these types of communal activity.

#### **O: Osteopathic sound massage**

*Gebrauchsmusik* is in need of finding new forms. If you are no longer *au fait* with Hindemith, what we are talking about here is music for use. Those of us who somehow missed the New Age are still aware of music's

potential role in meditation. What is proposed here is a sound-based therapy to assist in righting what's wrong with you. Not only is this paper insisting that the music market be recreated, it is also interested in alternative pharmaceuticals. Therefore, as sustainable energy opportunities are finally allowed to develop – think of all that wasted wind – sustainable holistic medical applications will equally be found. Homeopathy and the like may never replace traditional medicine. Still, these fields will surely increase in importance as human beings realise that we are only part of nature and need to look to it for our own healing. Sound, being part of nature, will play a role in healing.

#### **P: Popular electroacoustic music**

Oops, I'm more than a bit on the late side with this one. Let's say, not new, just more. Electroacoustique (without the accent) and electronica are currently two trendy words in popular music and, let's face the fact, popular electroacoustic music has been in existence since the era of Hendrix, Pink Floyd and Soft Machine, just to name a few. As relevant technologies continue to develop, the growth of popular forms of the music of sound will follow a dynamic path.

#### **Q: Qualifications in computer game ingenuity**

The computer game market is larger than the film market. Computer games represent a part of daily life for the majority of youths in the developed world if not practically everywhere. Besides the entertaining and relaxing (if that's the proper word) aspects of computer games, there are also developmental aspects. I therefore suggest that we can expect the offering of qualifications to become a standard for practice similar to those of swimming diplomas, perhaps leading to equivalents of O and A levels. Similarly, new forms of education will be devised whereby computer games skills are integrated into learning curricula to make learning more enjoyable. For those from outside Britain, suffice to say that there are already more than one bachelors and masters programmes in computer games design on offer.

#### **R: Record and play back the world**

From sound effects to any sound. From phonography to digital griots. From Napster or tomorrow's equivalent thereof to a similar means to record and access any sound from any place. Children's books, like the French story of Mr Tubs, tell the tale of our being able to play the world. The postmodern era has seen the notion of collage applied to many aspects of life. For example, the notion of treating Italian pasta to a serious dose of jalapeño peppers not to mention lemon grass and a dash of caviar is no longer ridiculed.

Soundscape composition, whether local or transcontextual, is based on the treatment of one or more environments. It allows you to play the world. For those who want art to deal with life, one means is through making music with our globe's treasure of sound. It is already being done, but there is room for more as there is always something for the listener to hold on to.

### S: Sonic puzzles

Computer games are still visual-driven. I do not believe that this will be the only *modus operandi* in the future. One can imagine sonic puzzles for recreational use. I don't believe I've ever known a name for those rectangular games where  $n-1$  plastic pieces get moved around a grid of size  $n$  until you find the puzzle's image. A sonic equivalent would be easy to create and would be at least as entertaining or challenging as a visual puzzle. But that is only one type of game that could be sound-driven. Further suggestions are welcome.

### T: Twenty-four hour electroacoustic broadcasting

The number of radio, television and web broadcasts we can receive is on the increase. I know, before you scream at me, that we are talking about quantity here, not diversity or quality.

With the continued development of affordable technologies, market segmentation will increase, offering the opposite of the broad wash of most television stations or the audience numbers-based policies of radio stations. These (lower-budget) focused broadcasters will cater to finely defined communities. If we take current electroacoustic art music terminology into account, perhaps three radio stations can be expected: Acousmatic FM, Algorithmic FM and Interactive FM. A Venn diagram of the playlists of these stations would indeed demonstrate an overlap. When the overlap increases, new segmentation will be discovered and offered. As our spokesperson of the day, Negroponte, points out, in the post-information age we often have an audience the size of one. That is an end point. Between the rather generalist broadcast system today and radio stations for one, which again will allow you to call up any piece at any time, there are many points in the middle, some of which are already evolving on the Internet.

### U: Ultrasonic art

I am sorry that there has to be an entry like this one. You see, I don't really know what I'm talking about here. Still, there will be an application found for ultrasonic art.<sup>2</sup> And please don't come back to me with the

<sup>2</sup>As expected, two people grabbed me after delivering the paper mentioning high-frequency work employing difference tones by Shigato Wada at the University of East Anglia as well as Joe Pompei's 'Audio Spotlight' (MIT Media Lab). There could no doubt be several other 'already achieved' examples added here and under many of the other twenty-five entries.

notion of making electroacoustic music for dogs and other animals. I already know we can expect that.

### V: Virtual composition collectives

Whether it's folk music that these collectives are making or will make or music of the folk is not the issue here. It is quite possible that in the not-too-distant future virtual collective music-making will stand alongside traditional forms in terms of popularity. The types of composition made will represent the entire gamut of musical genres; still, it will often involve collective devising and improvisation. New genres will be created that might not have come into being in traditional contexts. The Internet conservatoire will be but one training ground for virtual composition collectives. And don't forget that with time we will be able to see everyone playing during our e-music-making if we so choose.

You name the type of music and it will be performed on the Net. In devised contexts it will usually allow you to join in. It represents the ultimate music chat line.

### W: WYSIWYG composition methods

It is perhaps a bit of a hobbyhorse in this discussion, but the fact that children are so attached to computer games is relevant once more. The algorithmic composition driven by those playing a computer game is no shock to anyone anymore. To a large extent what you see is what you get in these environments. However, the sound is following the image here.

What is being suggested is the notion of novel, user-friendly graphic interfaces which are directly linked to sound for application in creative musical contexts. Again, the idea is not new. However, there seems to be little cohesion in what is being developed. Clearly, a good part of WYS concerns our ability to analyse organised sound according to a visual representation. The more we are able to identify musical architecture in this way, the better we will be able to create coherent and useful means for people to compose within a relevant WYSIWYG framework. Alongside traditional notations, tomorrow's virtual composition collective will be able to use such tools as a means to participate in their communal activity.

### X: XL, L, M, S – virtuosity levels of different versions of the same piece of music (see also L: Length-variable works of music)

The proposed notion of a composition being performable at various levels shouldn't seem so strange. It is anything but new. If you are not convinced, think of the development of jazz performers from their first solo to the most memorable gig in their career. They could be playing 'My Funny Valentine' during both occasions, but their level of expertise will have evolved.

Such flexibility has always been available within the framework of arranged or improvised music. The suggestion here is that composers will develop the means to be able to create several versions of the same piece for use by players of varying abilities. In works that are not totally prescribed, some of the decision-making can take place by the performers. That is, the virtuosity levels are not explicit in the notation. For those of you who cannot yet totally let go, here's the opportunity to keep your publishers from twiddling their thumbs. No, I do not want to hear any remarks about those poor souls no longer being necessary. Why not consider publishing a number of scores of the same dynamic piece in small, medium, large and extra-large versions on the virtuosity scale?

### **Y: Yoruban computer music**

At last a chance to be conservative. I mean, to be able to conserve. This entry concerns cultural identification and diversity within digital culture.

Digital music enables and can expect different 'regional' schools to live and thrive. Although no one is calling for the overthrow of acoustic musical instruments, digital instruments based on acoustic ones or yet to be created will play an important role in music-making. The question is, can cultural identity then continue to survive in our art form? We have seen the disappearance of folk music in many societies in the last century. Without predicting a revival of the tunes in Cecil Sharp's collection, it is clear that part of tomorrow's evolution will continue to concern the retention or disappearance of languages, cultural traditions and habits as well as types of music. Many battles will be

lost. Some will be won. Digital technological applications in artistic creation will not get in the way of and may end up supporting the cause for cultural diversity. This is especially true when people of a specific cultural background or interest, e.g. Yoruban, can create music together, with or without e-instruments, even whilst being spread out around the globe.

### **Z: Zero-time synthesis**

I wonder how many definitions there are currently of the term 'real time' in music? When I studied computer music, 'real time' meant that the length of computation time did not exceed that of the piece you were trying to generate. Rare then, common today. In some cases sound becomes audible as soon as it is triggered in performance or virtually. To eradicate the ambiguity in terminology, I suggest that the immediate creation of sound be given the name zero-time synthesis.

How about this? As artificial intelligence or whatever it's called tomorrow continues to develop, we might be able to go, as Dr. Seuss once wrote, 'on beyond zebra'. What is quicker than zero-time synthesis, negative-time synthesis or perhaps simply avant-garde?

### **3. CAN'T CONCLUDE YET**

How can one present a conclusion for things that have mainly not yet happened? The moral to the story is, musically there is very much up for grabs in the near future. Music can take place at any site including virtual ones with any instrument including many still to be developed or none at all. Let's all hope that musical diversity benefits from all of these changes and that technology assists in enabling this musical diversity.