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To sing the body electric: instruments and effort in the performance of electronic music.

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Abstract

Visualized emotion can be transmitted through minimal physical gestures in a musical performance; this process can be described as *sentic*, a term originally coined by Manfred Clynes in the 1970s during research into the effects of space travel. The development of alternate musical instruments from the 1960s up to the present day, breaks the traditional musical paradigm of effort in performance. This development also shadows concepts of space exploration technology such as teleoperation. Musical instruments can be evaluated in terms of a new musical effort paradigm; a young generation seems content to accept that there may be no apparent correlation between input effort and sound output. This article explores what a contemporary notion of effort may be, inspired by a reading of Walt Whitman's poem "I sing the body electric".

Key Words

Effort, *sentic*, instruments, electronic music, minimal.

Introduction

The act of performing electronic music is curiously different from that of traditional acoustic music in that, often, it seems effortless. Not from the point of view of a virtuoso soloist that plays his violin, but from the fact that in electronic music the gestures of the performer, usually, do not seem commensurate to the sonic output that is being produced. This is to say that the traditional "one gesture to one acoustic event paradigm" has been broken (Wessel 2002). The generation of musicians who today is under, say, thirty years of age, is not accustomed to seeing much sweat in the performance of electronic music. It seems that the newer the technology applied to music, the less effort is apparent on the part of the

performer. This idea has been tackled by authors such as Andrew Schloss, in his discussion of contemporary technology in live performance:

It is now necessary, when using computers in live performance, to carefully consider the visual/corporeal aspects of the performance; that is, to consider the observer's view of the performer's modes of physical interactions and mappings from gesture to sound, in order to make the performance convincing and effective...(Schloss 2003)

The 'problem' for us today is that computers and microchips in games consoles will typically accept very little input in exchange for amazing cybernetic responses: a pull of the joystick and spaceships soar, a click of a button and enemies are killed, buildings explode and new leases of life are granted. Given the current use of computers for music, it could be argued that nowadays simple point and click operations in electronic music are equivalent to traditional performance techniques in acoustic music, but the panorama is far from simple. Many practitioners of electronic music engage in the research and creation of controllers that attempt to harness the new music by making use of digital technology (Paradiso 1998). They create intelligent software responses to a basic gesture set which a performer can use. The question is how basic or how complicated should this gesture set be? How much control should the performer have on the sound for a performance to be exciting? Is bodily involvement in the production of electronic music important? Is performing effort important? Do we enjoy music more if we can see the hard work of a performing musician? On the other hand, seeing as electronic devices such as USB interfaces or tablet controllers can be considered mere toys (Wessel, 2002) when compared to traditional musical instruments such as the spanish guitar, for example, is it worth expending so much effort in their adaptation for musical uses? It could be argued that modes of self expression and perception may be changing and that a generation brought up on video games is content to accept as valid, that which, from a traditional point of view, constitutes minimalist performance practices. Many audiences today seem comfortable with the record spinning of a DJ or with a laptop music performance. In fact, on this subject I would tend to think along the lines of Nichollas Collins when he writes:

Any difficulties may pass in time: since audiences stare at DJs happily enough, why not the backs of laptops? If we have faith in the eventual education of audiences, from a transitional period now, within five years a superstar laptopist may appear on Top of the Pops . (Collins, 2003)

A question of effort?

These thoughts have been a recurring theme in my mind for some time, but being a composer, I have tended to be a pragmatist. Whatever suits a particular musical performance situation, will be good for me. I have wanted for some time, to put my thoughts on the issues raised above in writing, if not in order, at least together.

A recent re-reading of Whitman's poem "I Sing The Body Electric" (Whitman 1855) lead me to reflect on how far electronic music making seems to be from the muscular virtuosity normally expended in the performance of nineteenth century music; One valid avenue of thought is that this is not a problem at all. I have also been wondering whether the concert hall is the right place for electroacoustic music¹; furthermore, although clubs seem to be good for electronica, as soon as things become musically interesting it is clear that they are not. What follows below is a collection of brief musings on the subject of electronic music instruments and performance, initially inspired by Whitman's poem. As an electronic composer I was taken by the images conjured in my mind by this, apparently musical, heading². Although the poem only uses the word electric in the actual title, my imagination was captured by its sensuous descriptions of the body, which transported me to a different era and motivated me to ponder on how detached from physical effort, our lives have become, and, whether effort is important at all in the performance of electronic music.

The very idea of electricity conjures both images of the nineteenth and of the twentieth century. Traditionally, electricity serves as a labour saving device. When speaking of electronic music, this is an idea, in fact almost a prejudice that comes to mind. It is music that is produced with the aid of electricity, and by extension, electronically. Musical labour is something that becomes almost anachronistic when considering the work of computer laptop artists and their type-point-and-click music; the new musicians use their game controllers, gloves, helmets and electrodes; they respond, monitor and engage with their software creations, with apparently little physical effort. These artists conjure sound from the point of a laser; they make tidal waves of acoustic force with the touch of a button, and the slide of a controller or the proximity of a sensor. No feat of musical virtuosity is beyond their software. In entering the arena of musical performance they are not limited by their manual dexterity; They are not physically limited by space as traditional musicians; Through performances of network music, much the same as in network games, laptop musicians can collaborate in realtime from diverse geographical locations, by disembodimenting the act of performance into cyberspace.

Sentic Music.

I will embark now on an apparent tangent in an examination of an extreme condition of effort: that of no effort at all. In 1970, the theory of Senticity was proposed by Manfred E. Clynes to preserve mental health during space travel (Clynes 1970). As the conquest of space began to unfold, in the 1950s, NASA (the National American Space Agency) commissioned studies in all aspects relating to life in outer space. Areas like the operation of electronic machinery in space, ergonomics of small living spaces and psychological aspects were all taken into account as part of an effort to anticipate living and working environments outside Earth's atmosphere. Given the cramped conditions of spaceships, such as in the early mercury and apollo missions, the underlying idea was to aid the astronaut in

carrying out his daily tasks within a confined space. For this purpose, body movements had to be minimized and robotics ideas applied in order to maximize the efficacy of any human movement. Using teleoperation the astronaut would also be able to control equipment at a distance, maybe to carry out repairs on the spaceship. NASA's line of research led to many interesting experiments into "projecting man's manipulative capacity into a hazardous environment" (Johnsen & Corliss, 1967). But it was with the emotional states of the astronaut that Clynes was concerned³.

In applying the theory of sentics, according to Clynes, mental health can be preserved by a daily session in which '...a person sits in a chair,... rests his arm on a finger rest placed at the level of the seat of the chair and expresses with a single transient pressure a particular quality of emotion.' (Clynes, 1970, p.38). The basic idea is that if we can attach emotion to a physical action, no matter how minimal, then by simply repeating this action when so desired, the emotion may be recalled and re-experienced. In this way, feelings of happiness and relaxation could be summoned at will, thus helping preserve mental sanity under the cramped conditions of space travel. Apparently, Clynes was able to obtain good results with patients suffering from depression and confined to a wheelchair (Clynes, 1970).

Although the sentic method of therapy may not have become widespread, it is interesting for an electronic musician; pointing and clicking with a computer mouse are actions not far removed from a sentic experience⁴. Perhaps electronic musicians could also be described as teleoperators of virtual musical instruments; so much of the time, they seem to be handling something at a distance, with no apparent correlation between input gesture and musical effect. I would suggest that metaphorically, the laptop creator could be seen as aspiring to summon his music in one click: the click of a mouse, or of a button on a USB game controller; the tapping on a digitizer tablet. This action can set in motion an algorithmic musical process, play back a sound sample, begin a recording or introduce signal processing into an audio chain. Since it often sets in motion a host of musical processes, that "transient", to use Clynes' term, click of the mouse has an emotional charge which cannot be ignored. Of course, an important flaw becomes immediately apparent if we apply the sentic concept to music. In Clynes' method, the emotional output is only verified by the person applying the transient finger pressure. In music, a sentic experience aims to unfold the emotional charge into a musical output. I believe that, although imperfect, it may be argued in any case that music already attempts to convey something which can ultimately be verified only by the composer. In this regard, sentic therapy and music have a lot in common. The output gesture of music is *meant* to be shared whilst the sentic gesture serves to trigger an emotional feedback loop for the private consumption of the person in therapy, but in both cases, though, emotional content is poured into an output gesture, which in the case of sentics happens to be minimal.

To illustrate the idea of sentic music perhaps it is useful to look at an example from the repertoire. In 4'33", John Cage instructs the performer to simply be at the piano

for four minutes and thirty three seconds precisely timed. Could this could be considered as the ultimate expression of sentic music. The performer merely becomes present, with his musical intent for 4'33", this alone, it could be argued, constitutes an interesting musical act . How minimal is minimal?

Following the logic of the question above, but not as an answer, I present here a thought exercise: a suite of sentic music for seated performer:

Sentic Music for Seated Performer (to be performed without a break):

1. Eyelid Music:
Sit on a chair and face the audience. Close your eyes very gradually once. As your eyelids meet, intend something very passionately. Remain as expressionless as possible.
2. Index Finger Music:
remain on the chair. Place your left hand on your knee. Lift your index finger gradually to the point of its maximum extension. At this point intend something very passionately. Bring it slowly down.
3. Foot-tapping music:
remain on the chair. Tap the floor very softly with your right foot. When the tap occurs, intend something very passionately. When you finish, stay still until the audience reacts.

In an article about Input devices for musical expression, evaluated from the point of view of Human-Computer Interaction, Wanderly and Orio attempt to test basic musical tasks and they ask a key question as the starting point for evaluating the musicality of various input devices :“Is pointing alone an interesting musical task?”(Wanderley and Orio 2002). I would suggest that a sentic approach makes any task potentially musically interesting. Musical actions, arguably imperfectly, exist in order to convey intentionality, therefore Intention is the minimal condition⁵.

The sentic approach may serve to alert us to the fact that the performance or realization of electronic music should not simply be restricted to ‘transforming, analysing, synthesizing and memorizing the performers’ gestures or streams’ (Schnell and Battier, 2002), or in ‘flying about in a space of musical processes’ (Wessel 2002), but in considering emotional input and musical intention. Shouldn’t we be a bit more concerned with the aesthetics and intentionality of electronic music rather than the with the myriad technical problems that it carries as necessary baggage?

Electronic Music Instruments and effort.

Once we accept that there may be a sentic approach to music, manifested in electronic music, it is for us to decide how we will embody our visualizations of emotion. Clynes’ transient finger pressure seems arbitrary if convenient enough for

a space traveller. But even a cursory look at electronic music's instruments will seem even more arbitrary. Wanderley and Orió in the paper mentioned earlier on borrowing tools from Human-Computer Interaction, already identify the trends of new musical input devices as those that are created to fit a given motor ability or those which use non traditional (in a musical sense) gestures (Wanderley and Orió 2002). In keeping with the sentic idea that any gesture, no matter how minimal, can be musically valid, It seems obvious to me that, any input device can be a musical instrument. For this reason I would consider any sound producing devices as musical instruments even if, primarily, they are generic computer interfaces⁶ which *produce sound* by triggering computer software. Furthermore, given that many of the electronic instruments used are borrowed from general computing uses, the way they should produce sound does not seem immediately apparent, which can be very confusing for an audience. How should a USB game controller sound? Or a data glove? Does it also matter if the objects that we designate as instruments do not look like they could even possibly correlate with their assigned sonic output?

I would say that this inherent arbitrariness of general purpose computing devices used as musical instruments tends to subvert any apparent correlation between effort and sonic output, and this is why it is so confusing for an audience, raised on mainly 19c instruments. I would also suggest that part of the thrill of the performance of music traditionally lies in appreciating the dexterity and effort of the player; for this, there must be some visual logic to the act of sound production, but when considering present day electronic music this need not be the case.

Since the advent and popularity of the Nintendo™ computer games system in the early 1980s, so many new ways of human computer interaction have sprung forth, that a generation brought up on a diet of videogames is, in my opinion, ready to accept the rupture of what we could call the *efforted*-input paradigm.

Let us consider for a moment, from the point of view of effort what may constitute a conceptual framework for new musical instruments. A cursory exploration of recent musical history and the search for expressive electronic devices can show us how there has always been a tendency to preserve the *efforted*-input paradigm. I would argue that this is the case mainly in the pre-digital synthesis era, and that later on, this paradigm is broken.

Many authors have surveyed the new musical instruments that have been developed since the early part of the twentieth century (Roads 1996; Chadabe, 1997; Paradiso 1997). From Elisha Grey's Musical Telegraph of 1876 and William Duddel's Singing Arc of 1899 to the Mattel Power Glove™, electronic musicians have been trying to harness the shaping and production of new sounds and in doing so have been obliged to reconsider the role of physical effort in the production of electronic sound.

As implied at the beginning of this section, two distinct stages can be appreciated in the development of these musical instruments. The first stage is characterized by

instruments that must be practiced and mastered in a traditional way, for example, the Theremin. In order to play a Theremin correctly, the performer must practice in much the same way as any traditional instrument. It requires knowledge of scales and to have a developed sense of intonation. The discrete pitches are produced by the approximation of the right hand to the antenna, but with an inevitable non-discrete glide through the pitches, which depends on the hand's proximity to the antenna. The slightest difference in distance from this antenna will result in 'wrong' notes being heard⁷. A similar approach is required by the Ondes Martenot, although in this case with a piano-like keyboard guide. These and other earlier instruments, call for "virtuoso performers who practice and become adept at the details of manipulating subtle nuances of sound from a particular instrument" (Paradiso, 1998).

The second stage is characterized by the advent of the microprocessor, or let's say the increasing accessibility of the microprocessor. This allows instrument designers to place the bulk of the sound producing mastery onto the computer: "to map basic gesture into complex sound generation, allowing even non-musicians to conduct, initiate and to some extent control a dense musical stream" (Paradiso, 1998). In this second stage, instruments such as the Buchla Lightning, a couple of batons that transmit information on their spatial location to a specialized receiver, are used to generate data from a minimal and perhaps only potential, musical gesture. It is worth noting here that the development of these instruments shadows the development of video-game controllers in general computing⁸.

Today, these two stages briefly described above overlap, as composers and performers have preferences for one approach over the other. The coexistence of these approaches has also led to the notion of "composed instruments" (Schnell and Battier, 2002). The computer is capable of artificial intelligence and therefore can become an active participant in both the composition and the performance process. This idea is new, as the traditional conception of a musical instrument does not even envisage the instrument itself becoming an autonomous participant in the making of music. Again, to draw a parallel with video gaming, never before was the toy itself a playmate capable of making its own choices during the game.

Conclusion.

The idea that visualized emotion can be transmitted through minimal physical gestures in performance is important in understanding our fascination with alternate controllers in electronic music; In some ways it may also serve to justify it. There is a case for thinking of musical alternate controllers as "sentic" instruments (Clynes, 1995), and it is not surprising that the development of human-computer interfaces has been shadowed by that of musical controllers. It is interesting to note how these controllers echo the teleoperation paradigms of space exploration technology.

Before the widespread use of computers, electronic musical instruments could be seen as augmentations or extensions of a person's existing musical techniques as seen in the performance of an instrument like the theremin or the ondes martenot. With the advent of the computer, anything that exists can be turned into a musical instrument, because the burden of 'instrumentality' can be given to the microprocessor, This is to say that as well as how the sound is produced, the gestures that will produce sound can be designated arbitrarily by the composer/instrument designer. This designation can redefine dramatically how effort is to be expended in the production of sound, in fact, it can obviate it altogether; the performer becomes a musical teleoperator. Another idea, of interest to me, is that enhancement of a musician's physical ability by electronic means brings to mind the concept of cyborg (Grey, 1995); a musical cyborg. The composer/performer is *enhanced* by the use of technology. When looking at examples of 'wearable' musical instruments, as those used by Gordon Mumma in 1971 for dancers to control and produce electronic sounds or Laurie Anderson turning her suit into a percussive instrument (Paradiso 1989), we are reminded more of NASA promoted research than of the old fashioned workshop of a luthiere. Perhaps the term "Digital Luthierie" (Jordà, 2005) should become widespread, to embrace both the activities of software and instrument design in computer music

I would also suggest that it is not a coincidence that the exploration of space, having produced technology that extends man's abilities and consequently his 'gesture set', has indirectly also spawned musical instruments that would seem more at home inside the space shuttle. This may not be a mere coincidence, in fact, maybe electronic music has shadowed the development of space exploration since the 1950s as a kind of artistic alter ego.

The widespread use of computers and computer interfaces sets the scene for a new way of appreciating performance skills. Whether effort is apparent or not, could be important to different people according to where they stand on the digital divide. Those who have been brought up with personal computers and video-games could be more open towards *effortless* performances; People of an older generation, may tend to require an old-school paradigm of performing virtuosity, where perceived effort and dexterity on behalf of the performer are paramount to the enjoyment of music. What is certain is that our appreciation of performing skills has widened to accept all kinds of live music making as valid. To paraphrase Collins, today we may be quite content to stare at the back of a laptop (Collins 2003), or to stare at musicians who are staring at laptop screens. If the music captures our imagination, it doesn't really matter whether the laptop musician is sweating.

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Notes

¹ I am inclined to think that computer music lends itself more naturally to being listened to in a manner analogous to the way in which one views a work of visual art, thus obviating the need for a traditional performance. That the ‘honesty of tape music’ (Schloss, 2003) should be revisited (even if not exclusively) and not simply as an element for an installation, but as the object itself of auditory contemplation, in an acousmatic sense. It is not that I am ignoring the existence of the installation genre itself, but that I believe that many works from the acousmatic music repertoire of the last few decades would be more at home in endless loops as part of sound installations in art galleries, as they could be, in fact, far more sonically interesting than most sound installations. Rather than attending concert hall performances of electroacoustic music and certain genres of electronica, perhaps we should be listening to the same pieces in art galleries, where listeners may wander, ponder and contemplate in silence, as invisible sound constructs traverse the space around us.

² Including, but not limited to, cyborgs in Ridley Scott’s film *Bladerunner*(1982).

³ It is interesting to note here that as well as being a scientist, Clynes was also a concert pianist.

⁴ It would be interesting to find out whether Clynes was influential on the actual development of the computer mouse, after all, he was working in California in the 1960s and 1970s and it was during this time that the paradigm of a windows system with pointing and clicking and the use of a mouse was applied and further developed at the Xerox Palo Alto Research Center, in fact, the mouse itself was developed at the Stanford Research Institute in 1965, making California into a sort of sentic hub !

⁵ In the case of Cage’s music, this intention exists also in the listener. Although arguably it would suffice if intent resides only in the composer’s mind.

⁶ Because the fact that they may be used for music, makes them pregnant with the intentionality of music and therefore musical.

⁷ Although in fact, on the Theremin, intonation problems can be corrected ‘on the fly’ and potentially passed off as a portamento effect.

⁸ This makes sense, as the gaming industry is much more powerful than the electronic music community and therefore have more resources to develop new computer interface. Music software programmers can then utilize these controllers by writing plug-ins that can read USB ports and map the data received in a musically useful manner.

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