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Using Contemporary Technology in Live Performance: The Dilemma of the Performer*

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Abstract

The use of computers in live performance has resulted in a situation in which cause-and-effect has effectively disappeared, for the first time since music began. Once we started to use computers in live performance – to interpret abstract gestures and generate sound as a result – the age-old relationship between gesture and result became so blurred as to be often imperceptible. In historical terms, this problem is extremely recent, involving only the last few decades of musical practice preceded by at least thirty thousand years of music-making by conventional (acoustic) means. The aim of this paper is to show how this affects contemporary performance and the relationship between the performer and the audience.

1. Introduction

As the final speaker at the STOMPS 2002 conference, I wish to approach performance from the opposite direction. Instead of asking: "What is a *musical* performance?" I ask "What is a musical *performance*?" That is to say, I am not talking about what makes a performance musical (certainly a deep question); rather, I'm talking about what makes a performance at all. I focus here on the aesthetics of performance, not the aesthetics of music.

We have studied traditional performance practice by applying tools (computers) to aid us in the analysis of music performed by traditional means. But what happens when computers and modern technology are used in the *live performance* of music? Suddenly, we are confronted with a new problem: Can the observer/audience understand the performance from a direct, physical standpoint? And does it matter if they can or cannot?

No matter what the culture, there is a relationship between performer and audience. This relationship is based on many factors, most significantly on trust, and also on the audience *understanding* what the performer is doing on stage. Typically, the performer is doing something that the audience cannot do themselves; there are of course numerous reasons that people go to concerts, but this is one of the most important and universal reasons. We can listen to recordings, but of course it is not the same thing as going to a live concert. Ironically, with technology, some "performances" have become as dull as pressing "play" on a CD player (or the equivalent button in Pro Tools or iTunes).

1.1 My claim

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. Even though these are in many cases "extra-musical" requirements, I believe that it has become necessary to deal with them directly, because the integrity of the performance is in jeopardy.

2. Background

In the 20th century, we have seen the ideological boundaries of music and musical performance tested, beginning with atonality, serialism (of pitch first, and eventually all musical

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parameters), and continuing through various philosophical and theoretical phases. One could say this came to its logical conclusion with John Cage's 4′33″ from 1952. We have finally broken all the rules. However, the "liberation of sound" during this period was not only aesthetic, it was also technological, in the form of electroacoustic and then computer music (Varèse, 1996). By far the most important aspect of electronic music has been the potential to explore *timbre*. But, as David Zicarelli so controversially put it in his ICMC 2001 keynote address (Zicarelli, 2001), there is more to music than timbre.

We can say that computer music has finally matured enough and the machines are fast enough so that we can go beyond timbre now, and explore live performance possibilities using computers. In the early days of computer music, when it took 100× real-time to make a sound, the only kind of performance possible was a taped performance. No one is on stage, and no one needs to be. Tape music may have been boring to watch, but it was honest, with no false expectations of performance. Also, the music, by definition, was finished by the time it was performed. Some pieces performed nowadays claim to be interactive, but in reality they are simply not finished yet. So the performance involves the "baby-sitting" and "knob-twiddling" we might see on stage that is so unsatisfying to watch. At least with tape music, we can concentrate on the music; there is nothing else to worry about.

To reiterate, now that we have fast enough computers to perform live, we have new possibilities, and a new problem. From the beginning of the archeological evidence of music until now, music was played acoustically, and thus it was always physically evident *how* the sound was produced; there was a nearly one-to-one relationship between gesture and result. Now we don't have to follow the laws of physics anymore (ultimately we do, but not in terms of what the observer observes), because we have the full power of computers as interpreter and intermediary between our physical body and the sound production. Because of this, the link between gesture and result can be completely lost, if indeed there is a link at all. This means that we can go so far beyond the usual cause-and-effect relationship between performer and instrument that it seems like magic. Magic is great; too much magic is fatal.

With virtual instruments, we can theoretically recognize any gesture. We might want to know what gestures are important to recognize. What can we learn from conventional instruments? As Perry Cook points out in his new book (Cook, 2002) there are basically only three gestures or modes of interaction in all families of conventional acoustic instruments:

- blowing (voice, whistles, wind instruments etc.)
- striking, plucking etc.
- rubbing, scraping, stroking, bowing etc.

Can we go beyond these gestures with electronics? Certainly, but it takes a great deal of experimentation to discover what works when there is no underlying physicality.

If we search for evidence in the literature, we find that there are several studies that show the primacy of visual cues in a musical performance. For example, Davidson shows that observers are as skilled to perceive intended musical expression by solely watching the video as when they actually listened to performed music (Davidson, 1995).

3. Examples

We can call these new computer-based systems "intelligent musical instruments," in which there is embedded intelligence between the sensor and the sound-generator, so that arbitrarily complex decisions can be made on the basis of the composer's or performer's design. The possibilities are endless and exhilarating, but also problematic. Nearly ten years ago, David Jaffe and I wrote an article called *Intelligent Musical Instruments: The Future of Musical Performance or the Demise of the Performer?* (Schloss & Jaffe, 1993) in which we discussed many of these issues for the first time. Now, ten years later, there is an international community working in these areas, and a thriving conference: New Interfaces for Musical Expression (NIME), already in its third year (NIME, 2001, 2002, 2003). Intelligent musical instruments, in the extreme, can "play themselves." Do we really want them to do that? Perhaps in certain contexts, like in installations or toys, but probably not in concert situations (Cook, 2001).

Visible *effort* is something that often enhances a performance; one could say that it demonstrates being committed to what one is doing. For example, the singing voice is the most invisible acoustic instrument (being internal to the body), but even for this invisible instrument, emotions, affect and effort are visible via facial expressions and/or the body. For other instruments, this can be somewhat false (as in the grimacing rock guitarist), or very real, as in the bulging veins in the neck of the trumpeter blasting a high C, or the sweat-drenched body of an African drummer. It is likely that the appeal of effort in performance led to the ubiquitous attraction of distortion in electric guitars. With electronics, of course, the energy comes from afar (the power plant), and loudness is practically orthogonal to effort. The electric guitar survives this problem because it is still a physical instrument, so the observer can extrapolate the effort without a lapse of belief. However, the computer musician has a definite problem – where is the effort?

3.1 The Flying Karamozov Brothers

My first example is an extremely successful New Vaudeville ensemble called The Flying Karamozov Brothers. This ensemble has performed internationally for nearly thirty years. They began as a juggling troupe, and expanded their repertoire over the years. Their case is very instructive, because they begin with the absolute cause-and-effect of juggling on stage; if someone makes a mistake, the result is a club on the floor and the audience has no doubts as to what happened. Over time, they developed some very interesting and compelling routines that began to merge juggling with

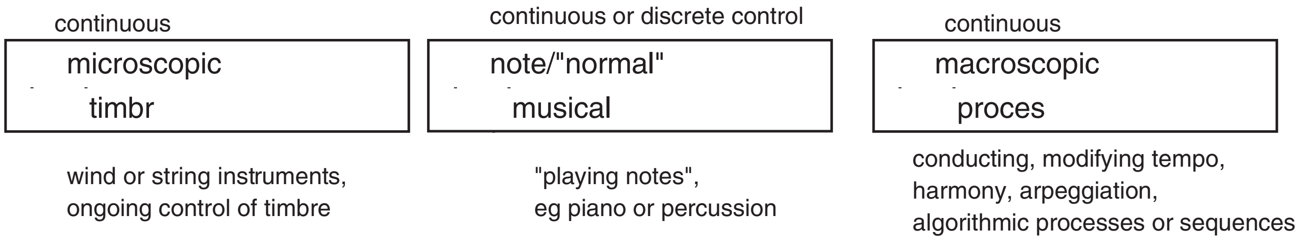

Fig. 1. Levels of gestural control of music.

music. In their initial attempts, they were able to create a form of "direct visualization" of music and rhythm: there was a one-to-one mapping from the juggling moves to the sound produced. This was done by wearing special gloves that made each catch deliberately audible to the audience, and inventing special juggling patterns that generated complex rhythms. It was an added value to an already virtuosic physical display.

From there, they became more adventurous, adding complicated MIDI hardware to their set-up, and finally using ultra-sonic sensors designed at the MIT Media Laboratory. Sadly, the more sophisticated their apparatus got, the harder it was for the audience to appreciate their virtuosity. It was simply lost on the viewers, who could not perceive what the FKBs were physically doing versus what was being generated by the computer. In fact, I noticed that the audience, confused, thought they were juggling to a tape! What a waste of hundreds of hours of practice. Eventually, the troupe resorted to long verbal explanations of what they were doing, but these became somewhat tedious. To this day, they are still grappling with the problem. Their problem is no different from the computer music performer, but it is crystal clear because it is in a physical context, in the midst of physical rigor.

3.2 The performance of "The Seven Wonders of the Ancient World"

Composer David Jaffe and I have collaborated for over a decade in performances that utilize the Radio Drum. The Radio Drum is an interface that is sensitive to location in three dimensions, while maintaining a high degree of temporal accuracy. When combined with MAX (or another similar real-time processing system), the composer can make "virtual" configurations of the drum, so that a particular event or combination of events can have practically any musical result (Mathews & Schloss, 1989; Schloss, 1990; Puckette, 1990; Schloss & Driessen, 2001; Mathews, 1988).

To take a step back, let us summarize the possible interaction schemes into three categories: the *timbral* (microscopic) level, *note* (middle) level and *formal* (macroscopic or process) level (see Fig. 1). We will discuss these levels as they relate to performance. Since the Radio Drum is three-dimensional, it can be used to trigger events without actually striking the surface. This makes it much more than a drum; either continuous or discrete gestures can happen above the surface, without hitting anything. It is still important to be able to "hit" the drum, for several reasons: the naturalness of this gesture, temporal accuracy, and for the sake of the observer (a satisfying direct physical action that looks as it sounds). To sense a hit, one searches for a change of direction of the stick, which means that there is no impact required. This is a substantial advantage in that there is no physical "thud" that confounds our perception of the triggered electronic result. In this case, the physical "thud" would be counterproductive – it negates the strong (albeit virtual) connection between gesture and result.

Here I refer to our work in realizing *The Seven Wonders of the Ancient World* (Jaffe, 1995; Jaffe & Schloss, 1994), a seven-movement seventy-minute piano concerto by David A. Jaffe, performed by Schloss as soloist. It is the premiere work for a new hybrid acoustic instrument, the "Radio-Drum-driven Disklavier," which allows the gestural vocabulary of a percussionist to speak with the voice of an acoustic grand piano. This hybridization is made possible by using the Radio Drum to control a Yamaha Disklavier grand piano, linked by a computer to create the effect of "telepresence." The premiere performance was January 20, 1998 by the San Francisco Contemporary Music Players.

Later we created a piano solo version called *Suite from the Seven Wonders*, which is a set of structured improvisations or "interactive cadenzas" taken from the larger work. In creating the interaction between the percussionist playing the Radio Drum and the resulting patterns played on the piano, we were thrilled with the possibilities and musical surprises that resulted from the cross-modalities. We also quickly became aware of the danger of mappings that were so complex as to lose the audience. We decided to plan the progression of the cadenzas partly based on the amount of perceptible cause-and-effect in each section. Such an "extra-musical" component as a basis for decisions of form, at first unwelcome, became valuable.

For example, in the first section, we deliberately begin the Suite with single notes triggered on the piano in a simple one-to-one relationship between event and result. This establishes that I am directly playing the piano, that I command the instrument, that the performer is in charge. We then introduce octaves, which are a natural amplification of the initial patterns. Then we add chords, and finally we go into a "continuous mode" in which the player is triggering hundreds of notes without touching anything. But by this time, the observer has internalized many rules – the z axis mapped to loudness, the x axis mapped to pitch, etc., so the leap of faith is not too large to follow.

We develop the interaction in this way, helping the observer to absorb the internal language of the performance, because the more the instrument (or the entire apparatus) does as opposed to the player himself, the more difficult it is to understand what the player is doing (Jaffe & Schloss, 1994, 1991).

4. Conclusions

1. Cause-and-effect is important, at least for the observer/audience in a live concert venue.
2. Corollary: Magic in a performance is good. *Too much magic* is fatal! (Boring).
3. A visual component is essential to the audience, such that there is a visual display of input parameters/gestures. The gestural aspect of the sound becomes easier to experience.
4. Subtlety is important. Huge gestures are easily visible from far away, which is nice, but they are cartoon-movements compared to playing a musical instrument.
5. Effort is important. In this regard, we are handicapped in computer music performance.
6. Improvisation on stage is good, but "baby-sitting" the apparatus on stage is not improvisation, it is editing. It is probably more appropriate to do this either in the studio before the concert, or if at the concert, then at the console in the middle or back of the concert hall.
7. People who perform should be performers. A computer music concert is not an excuse/opportunity for a computer programmer to finally be on stage. Does his/her presence enhance the performance or hinder it?

These questions have also entered popular music recently, in the *techno/house/DJ/urban electronic music* scene. It may be that the young computer musicians, doing their "laptop techno," will soon need to think about these seven issues. So far, they have not worried about it much. They have been content to sit on stage gazing at their computer screen and moving their mouse; they could easily be, as David Zicarelli says "doing their taxes" – it looks the same from the audience standpoint. Is *this* a performance? My belief is that eventually their audience will become bored and they will need to read this paper.

We have a long way to go. Just as in the technological gold rush of the late 1990s there was astronomical inflation of the P/E ratio (price to earnings ratio), there is now in technological music, an absurdly high H/A (hype to art) ratio. Evidence is the large number of pathetic performances one sees of late, with tantalizing program notes and disappointing results on stage. Hopefully this will change as we deal with these issues over time.

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