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The Performer is Us

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Interactive media present new opportunities for composers to create compositions that allow members of the public, even those without musical skill, to become performers. A categorization of different types of interactive realtime music is proposed from the perspective of the performer's role.

KEY WORDS: Computer-aided performance, interactive media, real time, algorithmic composition, interactive composition.

Among the many things that computers can help people do better is perform music. Computers, for example, can play a sequence of notes automatically and without mistakes, allowing a performer to concentrate on the expressivity in a performance — which is, after all, the aspect of performance that most requires musical intelligence and understanding. As Max Mathews, referring to his *Conductor Program*, put it (Mathews, 1993):

> The sequence of notes to be played, for example, was an area in which the computer could legitimately help a performer in making it easier to do things correctly. And this led to the concept of the "expressive sequencer," where the predetermined parts of the music were in the computer memory as a sequence of notes or chords or events, but where the performer was controlling everything about the way those notes got played, including the timing, the tempo, the dynamics, and, perhaps even more important, the shading, the attacks and decays, and the timbral qualities of the notes.

Mathews' software divides the performance of what is essentially a traditional composition into separable tasks, some of which are performed by the software, some by the performer. The underlying assumption in Mathews' statement is that the performer does not have a significant level of musical skill — or at least not the kind of musical skill that comes from hours and years of practice — but does have talent and a desire to perform. Consequently, the aspect of musical performance which is most associated

with hard-earned musical skill, namely playing the notes, is eliminated from the performer's tasks. Is this good? Yes. It allows more people to participate in musical processes at a meaningful artistic level, regardless of whether or not they have previously studied a musical instrument. Mathews, with Robert Boie, has also developed the Radio Baton, a performance device which allows a performer to move two wands, something like conductors' batons, to be used in conjunction with the *Conducting Program*. In Mathews' words (Mathews, 1993): "The Radio Baton and *Conductor Program* may create another way of experiencing music, where instead of passively sitting and listening to a compact disc, you could buy the score to a piece of music on a floppy disc and conduct your own interpretation of the music."

The *Conductor Program* is one specific example of the general concept of computer-aided performance. Computer-aided performance means that a computer adds to or extends what a performer does in performing music.

The concept of computer-aided performance is especially appropriate to a currently emerging market for interactive media. Indeed, interactive media — including floppy discs, CD-ROMS, and eventually interactive television — will in the near future provide the basic hardware platforms for computer-aided performance. Some almost-interactive musical CD-ROMS have already begun to appear. In one section of Peter Gabriel's *X Plora 1*, for example, a listener-viewer, acting as a kind of recording engineer, is invited to "perform" the faders of an onscreen mixer, thereby changing the balance between the vocals and the instruments in the band. In Todd Rundgren's *No World Order*, the performance metaphor is more vague: A listener-viewer is invited to operate onscreen controls — something like a control room device but not quite a mixer — to alter various aspects (Rundgren calls them "flavors") of the music. As Rundgren puts it in the booklet accompanying the disc, "Standard music CDs are like amusement park cars that run on tracks. *No World Order* removes the track; you can drive wherever you want in the park. You control the tempo, the mood, the mix, and the freedom with which musical events are selected. Speed up the tempo. Reverse the order. Change the mix. Overthrow conventional expectations and create something entirely new."

Although Rundgren's music is more malleable than Gabriel's relative to the performer's controls, neither composer allows the performer to do anything truly meaningful. From the composer's point of view, the problem in allowing a performer meaningful control is that the performer may ruin the music. One solution to that problem is to limit the performer's role to what is basically harmless.

Morton Subotnick, who has recently entered the interactive CD-ROM field with *All My Hummingbirds Have Alibis*, offers a different solution.

Subotnick lets the listener-performer select the ordering of sections and choose which visual elements are shown — score, visuals, or words — as the music plays. Further, with his next CD-ROM in mind, Subotnick proposes that a performer alter the structure of a composition by finding one of many parallel paths through a multi-dimensional musical (and visual) space. In his words (Subotnick, 1993):

> If the CD-ROM is truly a malleable, nonlinear medium, then one could have many versions of the same idea on a CD-ROM. Instead of writing many pieces, one could write one piece with many paths, and, as the listener-viewer feels at a particular moment in the piece, the piece could tilt in a certain direction. The piece could tilt in many ways quickly, in multiple dimensions, while the listener-viewer responds.

Mathews', Gabriel's, Rundgren's, and Subotnick's approaches to music are certainly different in many respects, but they also represent, at a very general level, a similar approach in the role a performer is allowed to play. The performer of their music — whether functioning as orchestral conductor, recording engineer, or musical guide — has little control over the substance of the composition itself. The performer, in short, performs some aspect of someone else's composition.

There are other approaches. In Laurie Spiegel's *Music Mouse* (1986), for example, a performer composes original melodies by moving a mouse within a grid defined by two onscreen graphic keyboards. At the same time, algorithmic software adds two harmonically-related voices and generates additional melodic patterns which vary with the harmonic mode, contrapuntal voicing, transpositions, and scale degrees played by the performer.

In a performance of his *Sound Effects Improvisation* at the Perth Institute of Contemporary Art in 1993, Warren Burt used Donald Buchla's Lightning, a hand-held spatial controller, to control various aspects of the music by moving his hands in the air. In Burt's words (Burt, 1993):

> I know the range of pitches that I want, but I actually don't care which one of those pitches is happening . . . A few small changes in range settings and I can generate a lot of music. If I were using a sequencer, I'd have to specify a lot of detail which in this particular piece is actually superfluous because really what I'm looking for is a statistical character to the music. I'm trying to generate controllable clouds of sound. So I feel relief at not having to specify the detail.

In both Spiegel's and Burt's approaches, and in other realtime algorithmic approaches to composition, the performer is like a pilot flying an instrument-airplane through a sound-space. The instrument, further, contains software that extends and expands what the performer does — which is similar to what actual airplane pilots call a "fly-by-wire" system, where

the pilot communicates an intention to a computer and the computer flies the airplane. Iannis Xenakis puts it well (Xenakis, 1971):

> With the aid of electronic computers the composer becomes a sort of pilot: he presses the buttons, introduces coordinates, and supervises the controls of a cosmic vessel sailing in the space of sound, across sonic constellations and galaxies that he could formerly glimpse only as a distant dream. Now he can explore them all at his ease, seated in an armchair.

Xenakis is describing a non-realtime system and, consequently, he refers to a composer instead of a performer-composer. At the same time, the distinction between composer and performer-composer presents an interesting question: If the performer is composing, what does the composer do?

First, the composer designs the specific modes of operation of the instrument, which include control and compositional algorithms and, as in a real fly-by-wire system, may include context sensitivity. As Laurie Spiegel adds, referring to *Music Mouse* (Spiegel, 1986): "The software interprets the player's actions and outputs music which can be thought of and experienced as a transformation of the player's movement. The actual music produced will vary with an action's context, history, and position in what can be thought of as a multidimensional musical space." Context sensitivity, further, can be extended to disaster prevention. Again, Spiegel (Spiegel, 1986):

> In writing *Music Mouse*, I tried to use software to minimize violations of musicality while allowing maximal variety of output. This means including constraints, logical tests, filtration, and transformation, a loosely enforced bias toward continuity in all dimensions, and very careful specification of non-user-settable constants for harmony control.

Second, the composer also designs the space through which the performer moves. The space includes the sounds. It also includes the rules which determine how the sounds react to the performer's movements. In *Music Mouse*, for example, the sounds — melodies and ornamentation — follow in the performer's wake, like the tail trailing a comet. In *Sound Effects Improvisation*, the performer's movements project a changing force field, causing the sounds to realign and regroup in various designs and distributions.

In realtime algorithmic composing, the musical results — whether individual notes and melodies or clouds of sound — that follow from a performer's actions are generally predictable, leaving the performer in complete control. The musical space through which the performer "flies" may, however, also contain unexpected events in reaction to which the performer may need to maneuver. George Lewis, for example, in reference to his composition *Voyager* (1987), puts it simply (Lewis, 1993):

If everything is going along with the performer all the time, it can get boring, because the performer is then completely responsible for everything that's happening. So I try to get the computer to do its own thing as well as follow a performer. And as soon as the computer generates something independent, a performer can react to that and go with it.

In 1981, I coined the term "interactive composing" to describe a performance process wherein a performer shares control of the music by interacting with an instrument that itself generates new material. I pointed out that the compositional algorithm in my composition *Solo* (1978) seemed to make musical decisions independent of my actions as a performer, that I had to react to it at the same time that it reacted to my gestures, and that the term "interactive composing" meant that the composition took its form in each performance as the result of a mutually influential process between myself and the instrument I was playing.

In summary, there are three basic models for computer-aided performance, each of which puts the performer in a different role: (1) a performer is a performer who performs some aspect of someone else's composition, (2) a performer is a composer who composes by controlling an algorithm in real time, and (3) a performer is an improviser who improvises by controlling an algorithm in real time while reacting to new information generated by the instrument. In the general development of electronic music during the past forty years, these models have each had different histories and myriad specific realizations by many composers.

At this time, however, with interactive media fast becoming a normal part of our culture, these computer-aided performance models may be seen in a new light. From the composer's point of view, at the same time that computer-aided performance provides opportunities for new ways to address the public, it challenges traditional notions as to the skills required for performance. It also challenges the very basis of what we think of as a musical composition. If a performer is to be creative and if the performer's role is to be rewarding, the performer must be left free to make musical decisions; and to the extent that the performer makes musical decisions, the composer perforce becomes less responsible for the music. Indeed, the composer's merit can be measured not in the specific music produced but rather in the extent to which the performer's role is satisfying. The composer's role changes from making a musical composition to creating an environment, a system, specifically to allow performers without skill to participate in a rewarding way in a musical process.

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