Playing with fire: an unexpected collaboration

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Working with dancers to generate musical material has been the interest of many composers since such technologies became available. My work focuses on a particular kind of dance – a fire dancer – to generate sonic material. Working with a fire dancer in a collaborative environment creates a unique set of difficulties with rewarding outcomes.

1. INTRODUCTION

Like many electronic composers, I have a particular interest in working with non-traditional instruments as sound sources, including non-musical devices. Working with a non-musical device for sonic material occasionally requires a performer who may be an expert on the 'instrument', but lacks musical training. This unique type of collaborative environment carries obvious disadvantages as well as several refreshing advantages if the composer is open to them.

On 21 February 2004 I premiered a work entitled *Firewire* for signal processing and live fire dancer at the second annual Spark Festival of Electronic Music and Art at the University of Minnesota. Performed outdoors, the work uses wireless lapel microphones to capture the audio generated by the spinning fire and allows processing of it in Max/MSP. My collaborator, a professional fire dancer with no musical experience, performed expertly while negotiating the microphones.

This experience was decidedly different from working with a more traditional dancer, as fire dancers are typically untrained in the classical dance forms, and are not well versed in rhythmic counting systems usually employed by a choreographer. Consideration also needs to be given to venue when working with items not typically regarded as instruments, especially fire, due to the obvious limitations of programming such a work. It was a primary goal of our work to reinforce the visual aspect of the work with the aural: to have the motions of the dancer synthesise the audio. The collaboration was significant in that it brought together two artists on the fringe of their fields: fire dancing and electronic signal processing music.

2. HISTORY OF FIRE DANCING

Firewire calls for a specific type of fire dancing called *fire poi.* Poi dancers use two cords (typically chain or metal wire) attached to their hands, with a ball on the end. The wire is approximately one and a half feet long, depending on the performer. In the case of *fire poi*, the ball on the end is called the 'wick' and is made of Kevlar, denim or various other materials. The 'wick' is soaked in a flammable liquid (typically paraffin) and ignited. The result is a ball of fire that can be spun very fast in many different gestures by the dancer. When spinning, the fire 'tail' can be as long as three feet (Home of Poi [various authors] 2004).

Poi dancing can be traced back centuries to New Zealand as a way for warriors to keep their arms in shape during times of peace. Maori women later adopted the skill, turning it into a form of dance. These dances did not involve fire, but simply a ball on a type of chain ('poi' is the Maori word for 'ball'). In relatively recent times, dancers have begun igniting the ball, thus indoctrinating *fire poi* (*ibid.*). In modern culture, fire dancers can be found around the world as part of circus acts, popular music festivals, and their own frequent gatherings.

When first exposed to a fire dancer of this type, I was visually mesmerised and aurally curious. The sound of the fire spinning can only be described as intense. Once I tried spinning them myself, I realised how much *more* intense the sound was from the dancer's perspective. My goal was to capture this sound, as the dancer hears it, and use it as source material in a real-time audio signal-processing piece. This is not unlike Xenakis' *Concrete PH*, in which fire-related sounds (burning sounds, specifically) are used as source material for a tape work. In *Firewire*, I wanted to extend this concept into a real-time processing work.

When I began working with a fire dancer on this project, three central concerns arose immediately: (i) How can I get a microphone on something moving so fast, and will my microphones go up in flames? (ii) What can I do with the sound, and how will I teach the dancer to react to it? and (iii) Can I legally do this in a concert?

3. WORKING WITH FIRE

For *Firewire* I collaborated with fire dancer Cori Lee Stahlacker. I first met with her to discuss the logistics

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of doing this piece, and to address the three questions above. After experimenting with various microphone placement strategies, we found the most successful to be wireless lapel microphones on each shoulder, pointing outward. The obvious drawback to wireless microphones is the radio unit, which would need to stay attached to the dancer through her various contortions. This is more of a drawback than on a typical hands-free dancer because of the rapid arm movement of a fire dancer, and the risk of the radio unit restricting motions. Although this was awkward for the dancer, she was able to adjust to the wireless system with practice. All wires ran under her clothes, as did the radio units, which were securely fastened to her with duct tape. The placement of the microphones on the shoulders was another compromise that was essential to minimising costume restriction; the wires connecting the microphone to the radio unit are otherwise cumbersome. A better sound was received from the microphones being attached to the dancer's wrists, but this proved to make certain gestures impossible (and dangerous) for the dancer.

Initially, a reasonable consideration was to incorporate body sensor devices and/or video tracking, although this was quickly abandoned. Video tracking was not tenable because the performance was happening in the evening and outdoors, which has unreliable lighting. Body sensors led to even more wires, and would not be a reasonable consideration around the hands or arms of the performer because of the heat generated by the poi.

Once a reasonable solution was agreed upon, we began experimenting with processing the source material generated by the dancer. In Todd Winkler's article, *Making motion musical: gesture mapping for interactive computer music*, he calls for an inclusion of experimentation as relating to unique peculiarities of each dancer:

> Traditional orchestration, as well as studies in sound synthesis, begin by examining the physical properties of instruments and their methods for producing sound. Physical constraints produce unique timbre characteristics, and suggest musical material that will be idiomatic or appropriate for a particular instrumental playing technique. (Winkler 1995: 2)

Result: the moves a fire dancer uses create different sonic material due to the speed of the spinning fire. It was my intention to capitalise on this, while still giving the dancer the freedom to improvise. Additional uniqueness relating to both form and duration were supplied by the fire. Once lit, the poi are at maximum inflammation (greater amplitude, figure 1) and slowly burn away (lesser amplitude, figure 4), thus creating a global decrescendo for the duration of the piece. Similarly, poi typically burn for approximately four minutes before the flame expires.



Figure 1. Initially, the fire poi burn strong, producing a frequency-rich and amplitude-intensive sound.

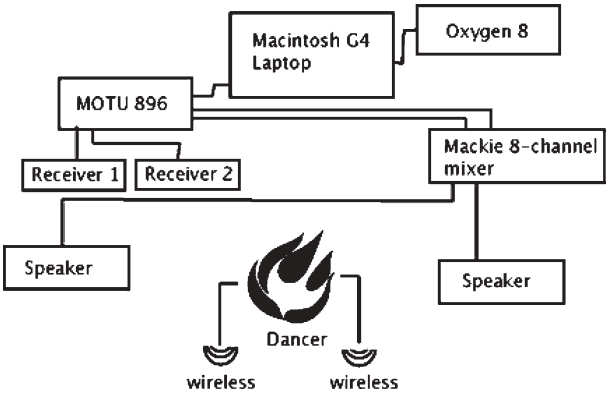


Figure 2. Set-up for *Firewire*.

4. COMPROMISED PARAMETERS

Our solution to the inherent problems of the piece was to incorporate a second live performer for the computer effects (figure 2). This performer would be running a Max/MSP patch (figure 3) via an M-Audio Oxygen 8 keyboard on stage, positioned near the dancer. The keyboard was used to control volume, amount and frequency of effect, as well as sampling functions.

Notable effects included:

(1) *Filter sweeps.* Because the sound produced by the fire is essentially pulsing white noise through its own low-pass filter (the amount of which is dependent on the speed of the rotation of the fire poi), filtering effects can be very useful. In Max/MSP I had random filter sweeps for each hand set-up to trigger when cued by the Oxygen 8. I also had individual slowly evolving filter sets independently controlled for certain gestures throughout the piece.

(2) *Quick multi-tap delay.* The spinning of the fire poi can be entirely sporadic, or rhythmically precise.

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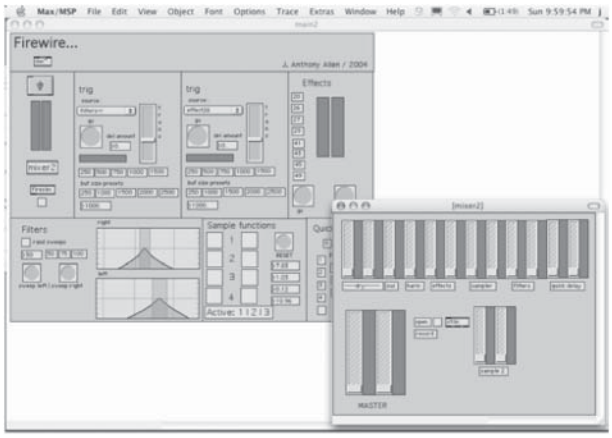


Figure 3. Screenshot of Max/MSP patch: the patch incorporates two primary windows, a global effect window and a mixer window showing the Oxygen 8 controls.

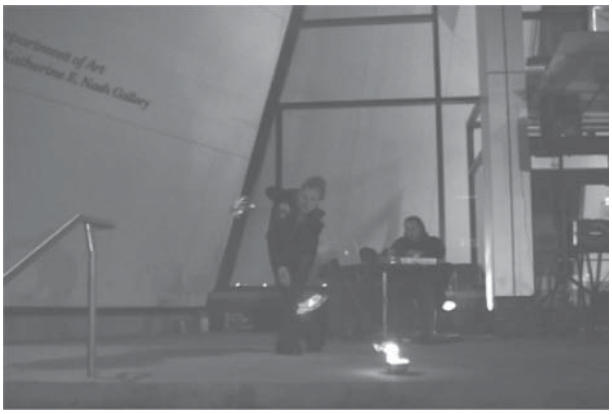


Figure 4. Near the end of the piece, the poi begin to burn out, producing a thin sound difficult for signal processing.

In cases when the dancer is maintaining a steady pulse, it is possible to enhance the pulse with a few short multi-tap delays. This effect will simulate an electronic beat in combination with the filtering effects.

(3) *Granular sampling.* A fire dancer can move in and out of thick texture with a sudden change in the wind. To curb this, a granular sampler was incorporated that would hold several brief sections in buffers. These sections looped and afforded the ability to maintain a thick texture when needed. These samples were particularly useful when approaching the end of the piece and the flame had diminished.

No significant panning effects were used because each *poi* was hard panned right-left. Because each *poi* goes over each shoulder at various times, the audio component would not have been as effective if the direct correlation was not seen between the hard panning of the hands and the dancer's gestures.

The dancer also developed compromises. In lieu of the usual paraffin to fuel the poi, a paraffin and lighter fluid mixture was devised that kept the flame at a higher intensity for a longer period of time (about five and a half minutes). Additionally, the dancer restricted herself to gestures reflective of the intensity of the flames: faster, more intense motions prevail at the beginning of the piece, while more ambient gestures proclaim the exit of the work.

5. PERFORMANCE RESULTS

Through visual and aural cues, both performers improvised while responding to each other. Although the fire dancer could not see the computer performer, both were able to react to each other substantially. The computer performer is easily able to watch the fire dancer while playing the Oxygen 8. This results in an emphasis of gesture: when the fire dancer makes certain gestures, the computer performer can emphasise the gesture by boosting the effect or volume of the effect. Similarly, the computer performer can bring up effects that suggest and reinforce certain gestural patters, which the dancer can respond to. An example of this would be an occasion when the dancer performs a larger gesture and the computer performer samples it and allows the gesture to linger after the dancer has finished the gesture. Upon hearing that the gesture has been sampled, the dancer will react appropriately: keeping similar gestures and intensity levels at the same amount as the computer effect.

It was important for us to keep the computer processing in tandem with the fire dancing. The work should reinforce the striking visual parameters of the fire dancer. As Bahn, Hahn and Trueman observe:

> In our pieces for interactive dance the sensual parameters of sound and vision become fused. While historically (Western art) music has accompanied dance, or the dancer has been bound to the strictures of music, interactive performance environments enable the dancer to simultaneously articulate sound and gesture. (Bahn, Hahn and Trueman 2001: 48)

This philosophy results in a visually intense work with corresponding auditory representation. Both the interaction between the two performers and the gesture-motion correlation of the fire dancer was of primary concern during the performance of *Firewire*.

The dancer found this to be 'a work with unique challenges, both very exciting and rewarding'. Since music is already a part of fire dancing (they usually perform to electronica), Ms Stahlacker was also very proud of the project because other fire dancers had considered the possibility of amplifying the fire, but as far as she knew it had never been done, and certainly not to the extent of making the fire sounds the entirety of the music. She also notes the convergence of two

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fringe art forms: her type of dance is not typically considered 'classical', nor is my form of music. Although the original idea for the work was largely mine, she felt in control of the sounds when dancing and in the overall collaborative process.

6. FUTURE WORK

Through rehearsals, the two performers developed a dialogue of correspondence between gesture and effect. I intend to continue this work and further explore more practical ways of working with dancers of this type. I have already been asked by the group of which my dancer was a member to write a 'fire quartet' incorporating two fire (poi) dancers, a fire baton twirler (a smaller flame but faster spinning, hence a higher pitch), and a fire blower (a deep bass sound). In the future works, sound and gesture will continue to be the focus. Incorporating more 'extreme' visual components, such as a fire blower, will also allow me to extend the palette of sonic material while reinforcing the correlation between music and dance.

The performers for the 21 February 2004 concert were: Cori Lee Stahlacker, fire dancer; J. Anthony Allen, computer processing. Video of the complete performance can be viewed at: http://www.janthonyallen.com

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