Situated Trio: An Interactive Live Performance for a Hexaphonic Guitarist and Two Computer Musicians with Expressive Controllers

David Wessel
Center for New Music and Audio Technology (CNMAT), Department of Music,
Univ. of California, Berkeley
1750 Arch Street
Berkeley, CA, USA
wessel@cnmat.berkeley.edu

Matthew Wright
Center for New Music and Audio Technology (CNMAT),
Department of Music,
Univ. of California, Berkeley
1750 Arch Street,
Berkeley, CA, USA
matt@cnmat.berkeley.edu

John Schott
Composer/Guitarist
john@johnschott.com

Abstract
We describe a 15 to 20 minute interactive live performance work entitled *Situated Trio* for augmented guitar and two computer musicians with expressive controllers. This work brings into focus a number of issues concerning musically expressive control and interaction among performers.

Keywords Gestural controllers, interactive music, improvisation, guitar effects

INTRODUCTION
This paper accompanies and describes a live interactive performance by guitarist John Schott and computer musicians Matthew Wright and David Wessel, each of whom use a combination of controllers. The proposed work involves composed situations that define the modes of interaction among the musicians and the musical materials available to them. Emphasis is on musical dialog and refined control in improvisation.

Our work strives to give long-range harmonic continuity a place in improvisation. This is not simply the privileging of certain sonorities throughout the duration of the piece, but a sensitivity to pitches and combinations of pitches, and their growth over the course of a piece. Thus we have designed a range of algorithms to analyze and respond to real-time improvised musical data.

MUSICAL GOALS
Much of what passes for musical interactivity today merely involves the starting and stopping of pre-canned sounds. Hard disk playback of extended samples has replaced the tape recorder in most electroacoustic concerts, and while appropriate to risk minimization in the live performance of through composed music, the rigidity of these means of performance does little to invite a sense of musical dialog or a sense of real control intimacy.

As a trio, our goals are to generate and shape musical material on the spot, to provide situations that provoke a perceivable musical dialog, and to facilitate rapid adaptation to new musical contexts. The compositional aspect of our music involves the design of situations, situations that specify modes of interaction among the performers and the musical materials available to them – scales, harmonic fields, rhythmic structures, etc. We subscribe to the notion that we play computer-based instruments that require a practice. We believe, as with any musical instrument, that human skill is essential. A practice is not only required for the development and refinement of appropriate motor skills coupled to cognitive compositional and improvisational strategies but also for the adaptation of the computer-based instrument. Our practice, when it is successful, involves a delicate balance between the time invested in performing and time invested in instrument refinement which for the most part involves writing software.

THE NEED FOR IMPROVISATION
We believe that the discipline and practice of improvisation is essential to the evolution of live computer music, especially with respect to the use of new controllers. It is clear that—with the exception of a very few—composers have resisted writing works for new or so called "alternate" controllers. Typical reasons cited include general unavailability of such controllers; lack of high level performance skills on the controllers; general insecurity concerning the risks of live-performance electronic music; "I'm a composer not a technologist or instrument builder"; etc. Clearly there is a kind of chicken-and-egg problem here relating to the lack of repertoire for controllers. Indeed, it has been this way for quite awhile and, in fact, a number of acoustic instruments suffer from the small repertoire problem — notably the saxophone and drum-kit. Though these instruments are rarely used in the composed art music repertoire they are ubiquitous in jazz and many forms of improvised music. Jazz musicians have a long tradition of acting as instrument shapers on such instruments. Players shape their performance practice towards an indentifiable, personal sound. We feel that this personal approach to sound in the improvisational context is critical to the eventual evolution of controllers. As performers with an interest in improvised music traditions, we have committed ourselves to a performance practice and take the new controllers and the development of the software that maps them to generative algorithms into our own hands.

ENHANCED GUITAR
The enhanced guitar used by John Schott is a customized Gibson ES 135 outfitted with a piezoelectric hexaphonic pickup system from RMC

(http://www.rmcpickup.com). The six analog outputs of the pickups are fed to a guitar-adapted version of CNMAT's connectivity processor [1] that communicates with the Max/MSP environment (http://www.cycling74.com) via 100baseT Ethernet.

The guitar pickup outputs are also fed to an Axon AX100 guitar-to-MIDI converter so that the software has access to a high-level discrete-event representation of what the guitarist is playing along with the actual signal. In some of the composed situations, musical phrases from the guitar are analyzed in terms of their pitch and rhythmic content. Specific pitch and rhythmic patterns are defined to function as "triggers," and alter the state of the software.

MUSICAL MATERIALS

A large suite of guitar effects has been implemented in the Max/MSP environment, including non-linear distortion, spatialization, convolution-based cross-synthesis, capture and looping processes, and guitar-controlled granular synthesis among others.

Wright controls granular , sample-based, sinusoidal model, and resonance model synthesis via his Wacom tablet controller [5, 6]. Wessel uses both asynchronous and pitch-synchronous granular synthesis techniques, controlling them with the Buchla Thunder (http://www.buchla.com). In addition, variants of the CNMAT rhythm engine [2] are used for rhythmic structures.

MODES OF INTERACTION AMONG THE PERFORMERS

Both Wessel's and Wright's computers "listen" to the guitarist's output. Wright uses the *Catch and Throw* paradigm, recording material from Schott and, after transformation, reinjecting it into the performance. Wessel uses tone profile theory [3] to determine the harmonic territory where Schott is operating; this in turn informs his generative algorithms about pitch material. Computers mutually inform each other via Open Sound Control [4]. (http://www.cnmat.berkeley.edu/OSC)

PREPARING FOR IMPROVISATION IS A COMPOSITIONAL ACTIVITY

Our computer instruments are limited in many respects. For example, we use some prerecorded samples, and although we can select, layer, and transform them, their character has a large impact on the timbral possibilities available in an improvisatory context. Similarly, both the tablet and the Buchla Thunder interfaces associate particular pitches with different areas of the control surface; while improvising we are limited to the pitches that are available on our interface.

Our design of instruments for improvisation requires making these kinds of selections; we see this as a compositional activity. As composers we decide in advance what materials will be available in our interfaces; as improvisers we operate freely within those limits.

One example is a program we call "The Great 48." This name comes from the 48 discrete pitches available on a guitar with standard tuning; our patch uses a form of live sampling so that each buffer always contains the most-recently-played note of the given pitch.

How, then, do we play the samples? It would be easy, for example, to use a MIDI keyboard in the standard manner; this would encourage musical gestures that are in some sense keyboard-oriented. Instead, Schott composed a melody that uses all 48 pitches and has other properties. We placed a copy of the notation for this melody onto the tablet surface and wrote software that plays each note when the pen touches it.

This melody does not need to be played as such by Wright; in fact, in improvisation he never plays the entire melody straight through from beginning to end. Since the melody includes all 48 pitches, it would be possible to play any melody (within the range of the guitar) by picking out the individual notes from wherever they lie in "The Great 48 Melody." At the same time, this interface makes it very easy to play fragments of the melody, and that is how it is typically used.

CONCLUSIONS

Performing with computer music instruments, like the performance practice associated with any expressive musical instrument, requires a practice. This practice is honed over time and in a variety of contexts, and simultaneously develops human skill and adapts the computer instrumentation.

ACKNOWLEDGMENTS

Special thanks to Rimas Avizienis, Adrian Freed, and Takahiko Suzuki for their work on the connectivity processor and to Gibson Guitar, DIMI, and the France Berkeley Fund for their generous support.

REFERENCES

[1] Avizienis, R., Freed, A., Suzuki, T. and Wessel, D., Scalable Connectivity Processor for Computer Music Performance Systems. in *International Computer Music Conference*, (Berlin, Germany, 2000), ICMC, 523-526.

[2] Iyer, V., Bilmes, J., Wessel, D. and Wright, M., A Novel Representation for Rhythmic Structure. in *Proceedings of the 23rd International Computer Music Conference*, (Thessaloniki, Hellas, 1997), International Computer Music Association, 97-100.

[3] Krumhansl, C. L. *Cognitive Foundations of Musical Pitch*. Oxford University Press, Oxford, 1990.

[4] Wright, M. and Freed, A., Open Sound Control: A New Protocol for Communicating with Sound Synthesizers. in *International Computer Music Conference*, (Thessaloniki, Hellas, 1997), International Computer Music Association, 101-104.

[5] Wright, M., Freed, A., Lee, A., Madden, T. and Momeni, A., Managing Complexity with Explicit Mapping of Gestures to Sound Control with OSC. in *International Computer Music Conference*, (Habana, Cuba, 2001), 314-317.

[6] Wright, M., Wessel, D. and Freed, A., New Musical Control Structures from Standard Gestural Controllers. in *International Computer Music Conference*, (Thessaloniki, Hellas, 1997), ICMA.