

Computer-Mediated Improvisation

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Introduction and Overview

In this dissertation, I explore a wide range of concerns surrounding the concept and practice of computer-mediated improvisation. More specifically, I consider what is enabled or made available by the use of computation and related technologies in the context of music/sound improvisation. How do computation and the use of interactive performance systems impact and influence the nature of improvisation, for both the improviser and the audience? I discuss broad topics, such as the diversity of ideas regarding what defines or characterizes improvisation, and address specific aesthetic and technical aspects of my own research and improvisational practice. A variety of design strategies and technical implementations pertinent to computer-mediated improvisation are offered, and specific improvisational pieces/systems are presented.

Chapter one surveys a range of definitions and descriptions of improvisation, and examines the many biases and preconceived notions surrounding both the concept and practice of this diverse art form. I suggest approaching improvisation as a complex, multidimensional continuum, rather than reducing it to an either/or dualism. I attempt to place non-idiomatic improvisation in the larger context of the music/sound universe that was expanding during the course of the twentieth century. The chapter closes with a discussion of possible common features that extend across various forms of improvisation, and what is implied by these significant features.

In the second chapter, I address the topic of computer-mediated improvisation. This discussion is focused on the question of what computation brings to the practice of improvisation, and how mediated systems impact the role of the composer/system designer, performer/improviser, and listening audience. Multiple interaction models are presented, and the implications inherent in these models are examined. I propose a hybrid model, related to the idea of the composed instrument. This hybrid design incorporates aspects of both the extended instrument and virtual performer models, resulting in an interactive system/instrument that is playable, yet unpredictable.

Specific design strategies and techniques applicable to computer-mediated improvisational performance systems are the subject of chapter three. Topics include a brief survey of potential computational functions, an overview of important design concerns, and a detailed examination of real-time audio stream analysis techniques. Much of my work involves designing and improvising with computer-based performance systems that analyze the audio stream as it is performed, and use this analysis data to steer the behavior of

interactive processing algorithms. I develop the concept of a hybrid system that utilizes gestural control, algorithmic and generative data, machine musicianship/listening strategies, and audio analysis techniques to control and influence real-time sound transformations.

In chapters four and five, I document and discuss conceptual, aesthetic, and technical concerns encountered in the design, realization, and performance of several of my improvisational pieces. Chapter four examines two specific pieces/instruments: *Three Meditations* for prepared piano and computer, and *Eighth Nerve* for prepared hybrid electric guitar and computer. Chapter five traces the ongoing development of my improvisational performance project referred to as the *Sonic Improvisation Series*. This improvisational sound environment is not designed around any particular instrument. Instead, it is designed to create and explore complex and pliable sound spaces that can be approached with any sound source, and can fit into a wide range of performance settings. I discuss several of my performances, including specific discoveries and challenges they provided. Chapter five closes with a description of my most recent developments regarding this complex improvisational performance system.

Rather than attempting to draw definitive conclusions regarding topics as broad and irreducible as improvisation or computer-mediated performance, in chapter six I summarize and reflect upon the various concepts that have been discussed throughout the text. I close chapter six, and this dissertation with a personal contemplation and speculation regarding the broader implications surrounding the experience and practice of listening.