The Bucket System - a computer mediated signaling system for group improvisation

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ABSTRACT

The Bucket System is a new system for computer-mediated ensemble improvisation, designed by improvisers for improvisers. Coming from a tradition of structured free ensemble improvisation practices (comprovisation), influenced by post-WW2 experimental music practices, it is a signaling system implemented with a set of McMillen QuNeo controllers as input and output interfaces, powered by custom software. It allows for a new kind of on-stage compositional/improvisation interaction.

Author Keywords

collaborative interfaces, group improvisation, systemic improvisation, open work, experimental music, live score, generative score

ACM Classification

H.5.3 [Group and Organization Interfaces] Collaborative computing H.5.5 [Sound and Music Computing] Systems

1. INTRODUCTION

In what we call *systemic improvisation*, musicians are active parts of a system, with given rules for interaction. In such works, there is no pre-determined time-line or given musical material. Form and content emerge from systemic interactions between musicians. The Bucket System is the latest in a series of such works, and it is our first that does not deal with sound, but only with interactions.

With democratic interaction as its point of departure, each participant may contribute to the sequence and combinations of instructions, and all musicians share the same information about the current configuration, and lack of information about what will come. The system itself does not contain any information regarding musical content but only basic instructions about who is or is not playing, and a set of pre-agreed interpretations for the given signals.

Our design choice has been to make a simple yet flexible system, to minimize the need for extensive training. With minimal cognitive and perceptive load on musicians, they can concentrate on the music. So far, it has worked very well, and it there is potential in the concept. The system will be significantly extended in the near future, and the plans for this are sketched in this paper.

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The Bucket System has been used in a series of concerts in Sweden, with a number of different professional improvisers including ourselves. The attached **video example** shows the system in action, from the live premiere.

2. BACKGROUND

The Bucket System comes out of a tradition of structured free ensemble improvisation practices, a.k.a comprovisation [8], and from the post World War II experimental music practices, such as the works of Earl Brown. He posed himself the question: How can I make music that at the same time preserve an identity and is variable? One answer to this was the open score, or open work, such as Stockhausen's *Plus-Minus*, Cage's *Imaginary Landscape* series and *Number Pieces*, Feldman's *Intersection 3*, Cardew's *Treatise* and *The Great Learning*. Another answer is rule-based or structured improvisation, such as developed by Eddie Prévost of AMM, Butch Morris ("conduction"), Anthony Braxton, John Zorn and many others. Also important were experiences from our own previous systemic improvisation pieces, human- or computer-mediated (e.g., GR's *I Norton*, PD's *Dynamic Triads* and *Gestural Dialogue*).

These theoretical ideas stems from complex systems and networks research [6] applied to music making [1], but most previous systems are directed towards novices or the general audience to encourage participation [2, 10, 9], while ours is designed for expert musicians. A notable exception is the technically mediated work by the League of Automated Composers in the 70's and The Hub from the 80's and onwards [4]. The idea of computer-based visual information to musicians is not new [5, 3]. Most of the previously mentioned systems deal with score or sound generation, while our system deals with the abstract roles and interactions between musicians, regardless of instrument. Maybe most similar to our approach is [7], providing a mechanism to distribute timing instructions and frequency ranges to a networked laptop ensemble. One of us (PAN) has performed in this system.

3. IMPLEMENTATION

The Bucket System is a signaling system where a group of musicians can, while playing, define desired configurations of musicians and behaviors, and place those instructions in a virtual bucket. At certain times, outside of the musicians control, a new configuration is picked at random from the bucket, and kept active for a certain amount of time. Musicians can also directly enforce a certain configuration. All musicians use a similar interface.

The shared comprovisation task and the element of indeterminacy make the musicians stay on the tip of their toes, so to speak. All musicians have equal quasi-control of the form and shape of the piece, which also encourages them to be very active in relation to their role in the ensemble.

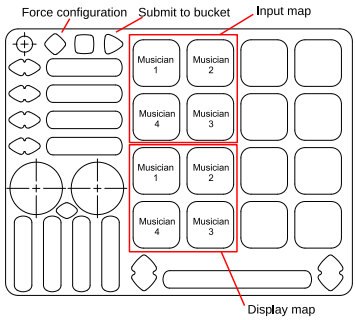

Figure 1: The QuNeo interface. The Input Map is used to enter desired configurations, and the Display Map shows the current active configuration.

The current implementation is designed to generic, and to fit different contexts. Overall group behavior can be changed either by giving different instructions to the musicians (e.g., "you are only allowed to force a configuration twice per piece"), or by changing the settings, (e.g., the pick method). It can also be used without active contributions from one or more of the musicians. It can and has been used as a conduction system. However, its use as collaborative tool without a conductor remains the primary intent.

The software part is a Pure Data patch connected to four QuNeo controllers (primarily 16 pressure sensor pads with internal LEDs), one per musician. The interface is divided into a display area and an input area (see Fig. 1). Each is conceived of as a geographical map of the four musicians.

In the following, a set of four pad/musician states is called a *configuration*. An *interpretation* is a set of rules assigning meaning to the pad states. We use a set of different minimal signals of blinking lights to make it manageable for the participants. Through different types of pad presses (short, long, double), a desired configuration can be entered (unlit, slow/fast blink, steady light). The configuration can be edited until it is right, and is then either submitted to the bucket, or directly activated (enforced). The actual bucket is an internally stored list, which can, depending on configuration, be regarded as a queue (first in, first out), a stack (first in, last out) or an urn (random pick). When a configuration is submitted, it is assigned a random duration and placed in the end of the list. Parameters for the random distribution of durations for the configurations (min, max, distribution type), and how they are picked from the bucket (first, random, last) can be set before a performance. In this way, different macro-characteristics can be catalyzed.

The signals from the system are abstract, with three different lit states. We have tried different types of pre-agreed interpretations, based only on the state of your own pad (Table 1) or depending also the number of pads showing the same state as yours (not shown).

4. DISCUSSION

The current version, although limited, has received a very positive response from musicians participating in concerts. A longer paper is in preparation with a more thorough evaluation, based on video analysis and actions logs. Preliminary observations show that it is perceived as very different from normal playing, requiring split attention and dual roles for musicians. The pre-agreed interpretations are crucial, filling the system with musical meaning, and the simpler interpretations worked better than the complex ones. Still, thorough rehearsals are required. Expert musicians in the audience responded that the music emerging from the Bucket System was very different from and more interesting than free improvisation from the same players (as performed in the same concert).

Metaphor	
Fast	*Busy*
Slow	*Simple*
Steady	*Extended*

Behavioral	
Fast	*Solo*
Slow	*Interact*
Steady	*Vacillate*

Simple Hierarchy	
Fast	*Lead*
Slow	*Support*
Steady	*Background*

Hierarchy with Opposition	
Fast	*Lead*
Slow	*Support*
Steady	*Opposition*

Table 1: The four basic signal state interpretations used when improvising with the Bucket System.

5. IMPROVEMENTS AND CONCLUSIONS

The current system is a minimal implementation, and we plan to extend the number of participants (up to 8) and the range of possible signals, potentially also recordable light sequences, with gestural content and rhythmic information. Also, bucket pick methods and underlying duration assignments may be subject to larger user control. Visual timing feedback and previews could allow for prepared transitions (as argued in [3]).

We have presented our experiments with a collaborative interface for structured improvisation. Although preliminary, the musical results have been very rewarding. The system is abstract, devoid of musical content, and can be used with any group of musicians. Made for expert improvisers, it provides a rich framework for interaction. It is visually non-intrusive, and quite simple. With the experiences so far, we look forward to develop and try the next iteration of the system.

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