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An Intersection between Creative Process and Compositional Structure: Study of *a Sketch of Two*

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Abstract

This paper describes the creative process of a composition for bassoon and live electronics, which involves elements of improvisation, notated score, and an interactive music system. The creative process suggested a mix of individualist and collaborative approaches. Through discussions and tryout sessions, compositional materials were developed in conjunction with the interactive music system. Following the collaborative process, I went through an individual session where I put everything together—notating the score and developing the interactive music system. A standalone program was then created to minimize the software requirements of the computer used for the performance. The practical challenges posed by this compositional method are discussed with respect to the development of the interactive system. This study offers insight into the dynamics of composer-performer interaction, highlights strategies for system design in live electronic music, and proposes a flexible tool that can be repurposed for other improvisational settings—despite the ongoing sustainability challenges related to software maintenance.

Keywords: Interactive music system, improvisation, live electronic music, bassoon

Introduction

Most composers tend to be individualistic when composing music. This is especially true within the traditional composer-performer hierarchy, particularly in works for acoustic instruments. When engaging in collaborative projects with other artists, composers often face substantial tension between maintaining their artistic vision and accommodating the input of their often more influential collaborators (Hayden & Windsor, 2007). However, as computers became more widely integrated into musical practice, composers have become increasingly open to collaborative approaches, especially when technical expertise is required to realize artistic ideas. In such contexts, collaboration may involve not only artists and programmers but also the tools and systems themselves.

This shift opens the door to new forms of collaboration—not only among humans but also between humans and machines. Live electronic music performance, in particular, involves complex layers of interaction. Performers feed musical inputs to the system, which in turn generates responsive feedback. In performances that include improvisation, these inputs may

diverge from the notated score, producing a continuous loop of interaction between the performer and the system.

In this study, I examine one of my own compositions, *a Sketch of Two*, to explore the interplay between creative process and compositional structure within an interactive music system. This piece was created through a mix of individualist and collaborative processes, involving multiple sessions of discussion and tryouts. Each session informed the development of both the bassoon part and the interactive system, eventually shaping the final performance structure.

Although prior studies have addressed composer-performer collaboration and human-computer interaction separately, there is still a lack of focused investigation on how creative processes—particularly those that blend individual and collaborative work—influence compositional structure in interactive music systems. This paper addresses that gap by analyzing the development and performance of *a Sketch of Two* as a case study.

In the following sections, I detail the creative process behind the piece and investigate how this process informed the resulting structure of the performance. I also explore how the ideas generated through collaboration were embedded in the design of the interactive system.

A Sketch of Two: Creative Process

I divide the creative process of *a Sketch of Two* into 3 phases: *the collaborative, semi-collaborative,* and *individual*. In the *collaborative phase*, ideas are exchanged between the bassoonist and me as the composer. Here, we let the discussion shape the general idea of the composition without any prior plan. We then bring the concept to the next phase, the *semi-collaborative phase*. More detailed musical materials are developed through the tryout sessions in this phase. What makes this phase different from the previous is the in-between individual sessions, where I prepare a set of musical ideas and a small part of the interactive system to be experimented with in the tryouts. In the *individual phase*, I gather the results of the earlier stages and organise them into a performance structure. In this final phase, I notate the part and develop the interactive system concurrently before sending the final version of the score and the standalone application to the bassoonist to rehearse. Although it might be inaccurate to say that these three phases occur in discrete steps, they still provide valuable insights into the creative process of the work. It also helps me to understand how I structure the performance in conjunction with the process, which will be discussed later.

Collaborative Phase

The discussion starts with the bassoonist sharing a video (frauenfelder82, 2009) of his hometown bell in Saint Florian, Austria. He expresses his interest in the sound and rhythmic pattern of the bells. We also discussed the format of the performance and the equipment available for the performance. From there, I develop a simple granular system that can produce a cloud of sound fragments that resemble the interaction of multiple bells' overtones.

Semi-collaborative Phase

After the discussion, we set up a tryout session to experiment with different musical materials to feed the granular system. In this session, the bassoonist briefly overviews traditional and extended techniques for playing the bassoon. We observe and evaluate the interaction between the bassoon input material and the granular system output. At the end of the first tryout session, I am left with selected rhythmic motif to be used in the composition (Figure 1). This rhythmic motif particularly highlights the feature of the simple granular system, filling up the time and space

with clouds of short sounds with various pitches produced by using the flap tongue techniques on the bassoon.

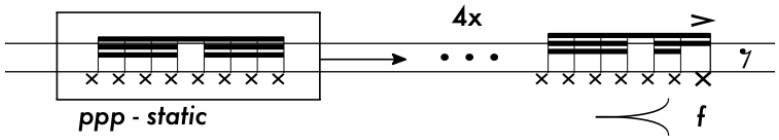


Figure 1. Selected rhythmic motif

While waiting for the next tryout session, I do an individual session to develop the system further and develop the sound transformation idea. The idea was also partly derived from the Saint Florian bell video, which will be discussed further in the next section. I chose two sound transformation methods: adaptive ring modulation and multiphonics. The ring modulator can adapt to the input signal envelope. Therefore, various timbres will occur depending on the bassoon's input intensity. The other method is to find multiphonics sounds on the bassoon that can be interpolated seamlessly from normal sound. A bassoon's multiphonics produces two types of resulting chords: *consonant chords* and *beating chords* (Ross, n.d.). The *consonant chord* has strong bell tones that are inharmonic to the fundamental. On the other hand, *beating chords* occur when the tones produced by the multiphonics are concentrated in a cluster—these competing frequencies create a beating-like sound.

In the second tryout session, we explored various multiphonics fingerings suggested on Ross' website. We evaluated how they sound when fed into the granular system and the new adaptive ring modulator. The transformation from normal sound to multiphonics and back is also discussed. The essential criterion of the transformative motif is that one of the tones produced by the *consonant chord* multiphonics should be audible enough and smoothly transition into an ordinary tone or vice versa (Figure 2). We also experimented with transforming double tonguing into a *beating chord* multiphonics. It is, however, rather tricky to make a smooth transition from double tonguing to the beating chord, and we have to play around with the dynamics to blur out the rough transition.

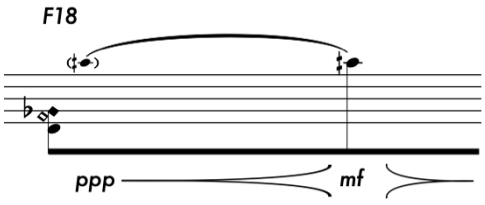


Figure 2. Transformative Multiphonics

Individual Phase

In this phase, I gather all the materials developed throughout the previous stages and structure them into a performance plan. Almost every creative decision in this phase is made alone, without the performer's intervention. The performance is structured into three major uninterrupted sections: *semi-improvisation*, *fixed score*, and *free improvisation*.

The performance starts with a *semi-improvisation* section where the rhythmic parts are determined but not the exact pitch. The performer's intuition drives the pitch's decision, although

the approximate register is still notated. The overall nuance of this section sounds like a cloud of short, rhythmical patterns produced by the flap tongue technique and the granular system.

It then slowly progresses into the *fixed score* section, where the notes and patterns are fairly notated. In this section, transformative patterns are also introduced and juxtaposed with the rhythmical patterns from the previous section. The adaptive ring modulator is also utilised to complement the multiphonics transformation. The granular system is still used during this section, producing a slower rate and longer grains, which simulate a cloud of bell tones.

When transitioning to the *free improvisation* section, some note fragments from the previous parts are listed to be played in order first and then in random order. The decision should be made by listening to the computer on the fly. Here, the performer is free to add new musical ideas while interacting with the sound produced by the computer. The performance ends with a transformation from double-tongued multiphonics to *beating chord* multiphonics. Integrating improvisation can be seen as a part of the collaborative process between the human performer and the computer during the performance (Rowe, 1999).

The Intersection between the Creative Process and the Compositional Structure

Figure 3 suggests that the creative process and the performance structure intersect with each other. It depicts the interaction between the composer and performer during the creative process (left) and between the performer and computer during the performance (right). The green, yellow, and red areas indicate the *collaborative, semi-collaborative*, and *individual* phases. Unlike the creative process on the left, the performance structure on the right starts with yellow and ends with green. Structuring the performance this way signifies the loop back into the collaborative realm, metaphorically creating a continuous 'sketch' of processes and musical ideas.

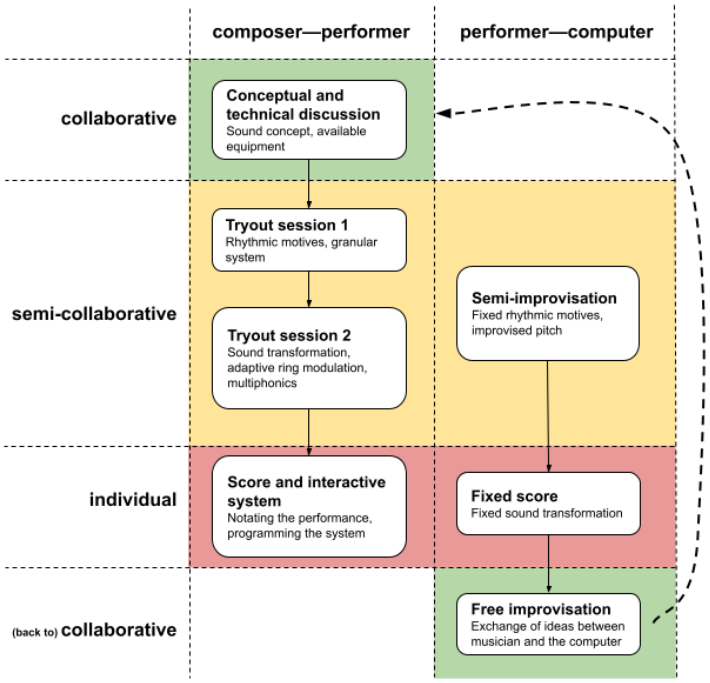


Figure 3. Intersection diagram between composer, performer, and computer in the creative process (left, composer-performer) and the performance (right, performer-computer)

The video of the Saint Florian bell discussed in the very first stage of the creative process also partly contributed to the structure of the performance. The sound of the bells that we hear in the video starts with a clear separation between each bell sound. The time interval between each sound is relatively sparse; hence, we can still perceive the rhythm. The sound becomes denser towards the end because more bells are sounding together. Because of the thick texture, we can hardly perceive the attack of the individual bell, only the tones. Rather than rhythmical, the sound becomes more textural. The overall analysis of the video suggests that sound transformations occur at a macro-level structure (Figure 4). This changing character is deeply embedded into the composition structure, both in the macro- and micro-level structure, primarily through the previously discussed transformative multiphonics and adaptive ring modulation. The interactive system embodies this transformation by gradually shifting processing behaviors—such as ring modulation intensities or granular densities—in response to time and performance gestures. This reflects the macro-level sonic change found in the bell video, embedding environmental transformation as structural logic.

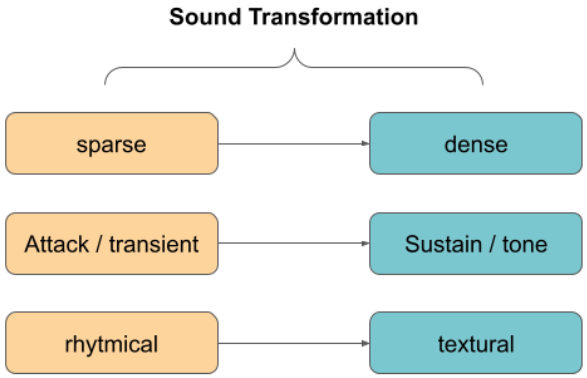


Figure 4. Sound transformation in the Saint Florian bell video

Developing the Interactive System

Unlike most live electronic pieces, which commonly require the musician or a second performer to operate the live electronic system, the interactive system of *a Sketch of Two* only requires the musician to specify the duration and press the start button. Based on the predetermined compositional structure, the module parameters' changes will happen automatically over time. This automated timeline progression feature was programmed to be in relative terms, meaning every temporal change is timed on a specified ratio to the whole performance. It implies that the performance structure is embedded into the system, not relying on a performer reading the score and changing its parameters. Hence, the interactive system is not only a tool or instrument to perform the piece but also a score in itself and a performing partner or collaborator. This means that every performance results in subtle structural and sonic differences. The interactive system affects not only the sound processing but also shapes the phrasing and timing decisions of the performer in real time.

To ease the preparation for the rehearsal and the performance, I developed a standalone application of the interactive system (which is programmed using a visual programming language called Max) so that the performer is not required to have Max installed on their computer. Figure 5 shows the user interface of the standalone application.

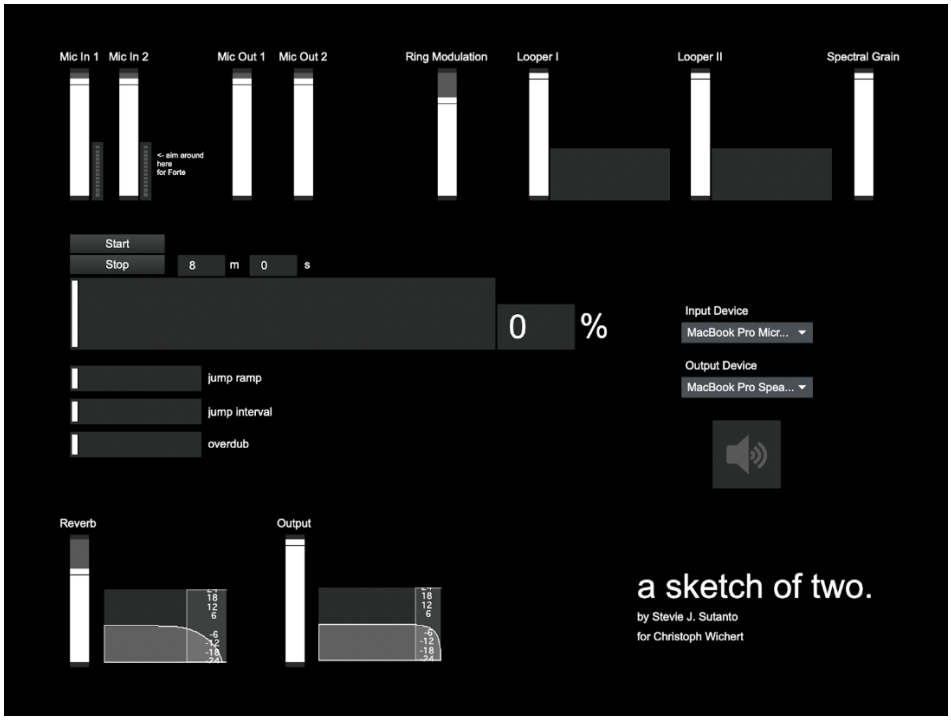


Figure 5. The user interface of the interactive system

Besides the previously mentioned modules, some other features are also implemented and play an essential role in facilitating the collaborative concept of the composition. To begin, the performer can decide the desired performance duration by inputting the time into the minutes and seconds boxes; for *a Sketch of Two*, the recommended duration is 8 minutes. This feature is helpful for rehearsal purposes and allows extended performance duration for particular occasions. Another feature is the progress bar and the percentage, which gives a visual cue of where he is in the score within the performance. In addition, the performer can adjust volume controls for each module to control the sound balance for different venues and gear. It is also handy when the composer or sound engineer is unavailable during the rehearsal.

Conclusions and Future Direction

This piece's study suggests possible relations between the creative process and the resulting compositional structure, reflecting the interaction between the composer and the performer during the discussions and the tryouts. Similar interactions also occur between the performer and the computer during the performance. The mix of individualist and collaborative approaches comprises a large portion of the process in the creation and during the performance, which plays a vital role in creating this piece.

Although the standalone app did ease the performance preparation, it is worth mentioning that a standalone app needs to be maintained to keep up with the computer operating system updates. For example, if the standalone app is built on an Intel-based Mac computer, it might not run properly on machines with the new Apple Silicon chip. Therefore, the composer/programmer would have to rebuild the program with that newer machine, or at least conduct a thorough test to determine whether or not the old app is compatible with the newer operating system and chip. This ongoing maintenance is not practical in artistic practice since it requires constant update support, like in a software company, as long as technology keeps developing. It still does not fully solve the issue of live electronic music sustainability (Bernardini & Vidolin, 2005).

Despite the issue, this system offers some advantages. The app provides volume controls over all of the modules, which is helpful to get an ideal sound balance through different venues and sound systems. The automated timeline progression, programmed in relative terms, allows the performance duration to be extendable for particular occasions. Most importantly, it can be used entirely for other improvisational performances with other musical/non-musical instruments, even though it was specifically designed to interact with what is written in the score of *a Sketch of Two*.

Acknowledgement

I would like to thank Christoph K. Wichert for commissioning *a Sketch of Two* and performing it wonderfully, and for the time spent trying out multiple iterations of the system, as well as discussing various bassoon techniques.

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