

generative open graphic score #1

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1. PROGRAM NOTES

generative open graphic score #1 is a work that uses the software program Touchdesigner to design and build generative processes that create an open graphic score/notation. In performance the digital score produces a plethora of graphic symbols—from simple ink blot-esque dots and abstract globular shapes to complex webs of broken grid patterns interacting with sharp and angular geometric shapes.

The electroacoustic aspects of this work utilize mixer feedback. Mixer feedback is created when the inputs of the mixer are routed back into its outputs to create a (feedback) loop. Manipulating the mixer's, faders, dials, and buttons creates unpredictable electronic sounds ranging from simple and harmonious to chaotic and noisy. The setup for *generative open graphic score #1* consists of an instrumentalist patched into a mixer with feedback loops being played by another performer. In this novel electroacoustic setup, the sounds, and timbres of the two instruments can clash and contrast or synthesize and melt together. In performance, the instrument patched into the mixer transmutes into a noise-laden super-instrument that in turn can mutate the behavior of the electronic sounds together with the mixer performer. I have dubbed this live electroacoustic system/process as “Instrumentalist and Mixer Feedback Transmutation” (IMFT).



Fig. 1. First recorded performance of *generative open graphic score #1*

2. PROJECT DESCRIPTION

Mixer feedback (a.k.a no-input mixer) is a unique electronic instrument that has seen a renaissance in the 21st century [1] [2] [3] [4]. Mixer feedback refers to

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the technique of feeding outputs of a mixer back into its inputs to create feedback loops. This type of misuse of technology has a long history and has been referred to as “creative abuse” [5] [6] and “hardware hacking” [7], among other things. The core technique involves amplifying latent noise in the mixer to create feedback loops that can be manipulated via the mixer’s faders, buttons, and dials. Control of the mixer feedback is generally perceived as chaotic and unpredictable, especially as the number of feedback loops increases. Its varied sound possibilities, tactile controls, and accessibility has allowed artists to use mixer feedback across a wide array of music genres [4]. Lately, my research has been exploring patching amplified/electronic instruments into a mixer with feedback loops. I refer to this practice as “Instrumentalist and Mixer Feedback Transmutation” (IMFT) (formally dubbed the NIMB+).

This practice-based research builds from existing work on performer/composer’s relationships when performing with feedback systems much of which has been discussed at previous NIME conferences [9] [10] [12] [13] [14] [15] [16]. The IMFT system is distinct in that it allows for a collaborative performance instrument. Typically, mixer feedback performers play similar roles to other instrumentalists in an improvisatory collaborative setting: either complementing with or contrasting other musicians, reacting in real time, and operating in parallel with the contributed sounds. The IMFT system, by contrast, allows for other instrumentalists to directly influence and interact the output of the mixer feedback, creating a combined output that is shaped by both the mixer operator and the instrumentalist acting as a sonic input for the mixer. The instrumentalist thus opens the mixing board’s closed feedback system to external input and creates the possibility for more adaptivity and human machine interaction [9]. Here, adaptivity works twofold: it refers to how the output can change because of the interaction between instrumentalist and mixer as well as the self-adaptivity of the mixer due to its positive feedback loops. While human machine interaction is possible with the mixer alone, the IMFT setup allows both the mixer performer and the instrumentalist to interact with the feedback.

Although it is possible to cooperate and work together in the IMFT system, it is also possible to work against and be “in battle” with one another [11]. Novak cites this as a key difference between the way many noise artists work with feedback—particularly those in Japan—compared to Western composers, stating that “its (feedback’s) modes and techniques are abstracted beyond self-expression beyond even the flexible constructs of improvisation and experimental sound. Noise is more than merely indeterminate: it is out-of-control” [11]. This noise music centred aesthetic goes beyond ideas of controlling feedback [12] [13] [14] and aligns itself with the negotiation of autonomous chaotic feedback systems [9] [10] [15] [16].

What is Instrumentalist and Mixer Feedback Transmutation?

The IMFT system is unique in that it cannot only morph the acoustic input, but the acoustic instrument can also influence and augment the feedback created by the mixer which can influence the mixer performer and be further mutated [1]. When discussing the different types of human-machine interaction possibilities with feedback systems, Sanfilippo and Valle inadvertently describes how the performers interact in the IMFT setup: “The performer can trigger the system (acting like trigger); contribute to perturbing the environment by producing or modifying sounds...in order to vary system parameters (as in the control signal flow) or to make the system change its state (like the meta flow). As the performer is theoretically a black box, the analytical treatment of his or her behaviour, with respect to the other components of the feedback configuration, may be very complex and lead to ambiguous findings” [9].

Instrumentalist Mixer Feedback Transmutation Setup & Sound

At minimum, the IMFT setup is most effective in duo situations involving one instrumentalist and one mixer player. In performance, the instrument’s input needs to be first in the signal chain on its own channel strip (before any feedback loops) and their signal needs to be quite strong to influence and interact with the mixer feedback. Users can then set up feedback loops in the remaining channel strips. As with no-input mixing, the more feedback loops that are used, the more complex and difficult it becomes to control the IMFT system. The hybridization of human and machine creates spectral fusion between the instrument and the mixer feedback. Spectral fusion “considers the quality of sound of a number of integrated components into a single sonic entity and attributed to a single real or imagined source” [20]. The IMFT system mirrors the multitude of sound worlds possible on the no-input mixer, from simple and monophonic to chaotic, layered, and noisy. The IMFT system has produced interesting results with instrumentalists such as distortion, saturation, harmonisation/pitch shifting, interactive musical loops, multi-voiced textures and more. The core sounds of the IMFT system involve heavy distortion and feedback.

Conclusions

This practice-based research explores the IMFT system as a creative and accessible opportunity to create collaborative live electronic music. Working with chaotic feedback systems like the IMFT can utilise an “out-of-control” performance practice and aesthetic attitude commonly found in noise music. This can be pushed further in the IMFT system by adding more feedback loops to create an increasingly chaotic and unpredictable system. It is useful for artists and performers to engage in these alternative types of performance practices to discover new and stimulating creative possibilities. The relationships created between the human performers and the mixer are interactive, complex, and chaotic.

The relative simplicity and accessibility in creating these complex and unpredictable musical interactions with the IMFT setup make for an exciting number of possibilities for future exploration. Further performances are needed to develop and document the interactions and dynamics between performers within the system more holistically. The relatively simple routing also makes the IMFT system an ideal candidate for telematic performances. Finally, new instruments, in various combinations, have the potential to react to the IMFT system in original and interesting ways. Beyond instruments, the IMFT could work with any number of sound inputs.

3. PERFORMANCE NOTES

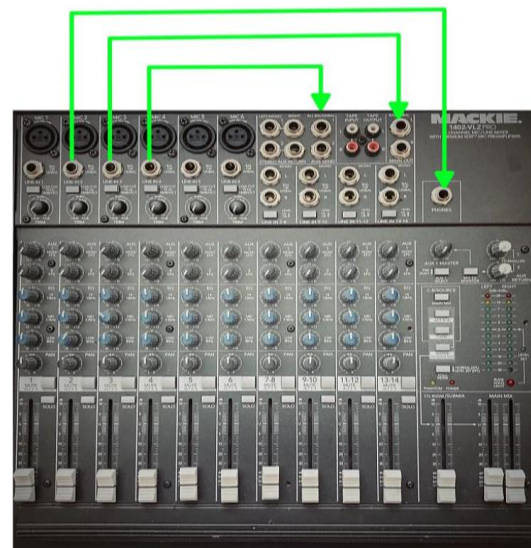
***A video recording of *generative open graphic score #1* will be used for the 2024 NIME performance as the authors/artists are unable to attend NIME in person. I believe Tivoli Vredenburg to be the ideal venue.

Electronic Equipment

- 1 DPA or similar cardioid condenser
- 1 audio interface
- 2 loudspeakers
- 1 computer
- 1 screen and projector (if possible)

To perform *generative open graphic score #1*, the mixer needs to be set up with a minimum of three feedback loops. This is achieved by routing a mixer's inputs back into its outputs (see example below).

However, the feedback loops are set up, the acoustic instrument microphone(s) should be on channel 1 (and proceeding channels as applicable) before the feedback loops in the signal chain.



Feedback Loops Example

- 1) Channel 2 In — Phones Out
- 2) Channel 3 In — Main Out
- 3) Channel 4 In — Aux. Send

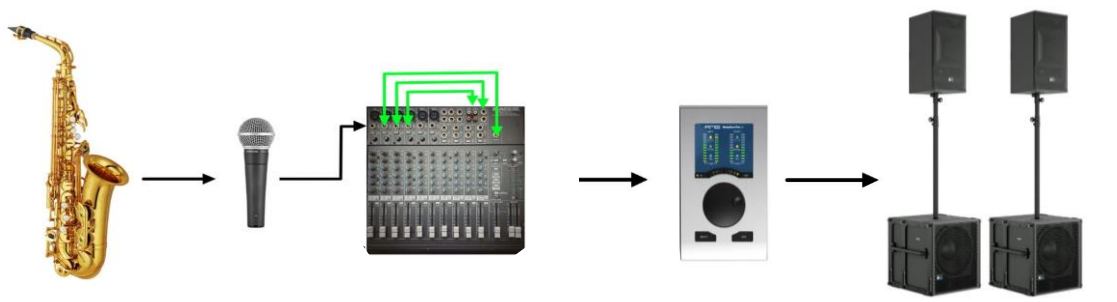
Mixing Performance Instructions

Manipulate the faders, gain knobs, EQ knobs, AUX knobs, and filters to change the sound of the electronics and the acoustic instrument over the course of the performance. Set the acoustic instrument's level and manipulate only the feedback loop channel strips during performance.

****When performing with mixer feedback it is always best practice to run the output from the mixer through an audio interface to limit the volume before sending it to loudspeakers.

Signal Flow Example

instrument – (plays into) – microphone – (amplifies signal) – mixer (into channel 1) – audio interface – (set volume on interface) – play through two loudspeakers



4. MEDIA LINK(S)

- Video: <https://www.youtube.com/watch?v=gavAyjdJRzY>
- Video: <https://www.youtube.com/watch?v=G7ZFPI3YJm8>

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ETHICAL STANDARDS

The participant study has been approved by the Office of the Vice-President, Research and Innovation, University of Toronto, RIS Human Protocol Number 40523.

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