

The Ensemble as Expanded Interface Sympoetic Performance in the Brain Dead Ensemble

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Abstract

This paper reports on an interactive and interconnected music ensemble from the perspective of the interface. More specifically it aims to canvass the dynamic relationships established within the Brain Dead Ensemble. It describes how the reconfigured relationships between performers and instruments are inherent to this ensemble from a technical point of view. In addition, it aims to survey the phenomenological aspect of the relationships established between the performers of this ensemble and how these relationships suggest the possibility of an ensemble itself conceived as interface.

Keywords

Ensemble as interface
Brain Dead Ensemble
Feedback Resonating Cello
Feedback Resonating Double Bass
Threnoscope
Uncontrol



Figure 1. The Brain Dead Ensemble

Introduction

Four decades ago, Jean-Claude Risset wrote on the idea of the computer as a new paradigm of interfacing: “between different processes, material or intellectual, and also between people.” (Risset 1992,10). Since this time, significant research progress has been made in the development of technical and conceptual approaches to designing, building and framing attributes, affordances and capacities of acoustic, analogue, digital and hybrid musical interfaces. Current movements in the digital humanities suggest a turn to what is described as a *post-digital* aesthetic (Berry 2015). The postdigital in this case refers to media that do not prioritise their digital materiality or properties as something ground-breaking; the “post” in postdigital refers to the “beyond digital” rather than to the non-digital (Cramer 2015). Such interfaces combine both digital and acoustic processes as in Nicolas Collins’ *Pea Soup* (1974; revised 2001-2014), the “Trombone-propelled electronics” (Collins 1991), the Feedback Resonance Guitar (Overholt et al. 2011) the Magnetic Resonator Piano (McPherson 2010), the Feedback Lapsteel (Harriman 2015) or the Overtone fiddle (Overholt 2011). All of which achieve a rich, distinctive sonic aesthetic. This

conception of postdigital media challenges our understanding of interface as a discrete object. Moreover, it allows us to reinterpret the interface, re-conceptualise it and potentially apply it in different contexts.

In this paper we start with the notion of the interface as set of processes that establish new interactive relationships between the performers. The interface becomes a “transindividuated” process (Stiegler 2010), a process of individuation of the self through its interaction with technical objects or technical individuals (Simondon 2017) and other human individuals. The *Brain Dead Ensemble* emerged as a result of several on-going research endeavours at the University of Sussex Experimental Music Technologies Lab, with roots in live coding (Magnusson 2014), dynamical systems for interactive music (Eldridge 2008), musician-computer interaction, and general feedback instrument design (Ulfarsson 2018; Eldridge and Kiefer 2016). As part of this on-going research into digital and acoustic feedback instruments (and hybrids thereof), we consider a range of closely interrelated aesthetic, technical and phenomenological questions: *What happens when the playing of an instrument is not about the instigation of musical events, as in playing notes, but more about the shaping of an on-going, evolving, emergent sound in a self-resonating instrument? What would happen if we interconnect the sound from other actors within the functional structure of each of the instruments? How would we, as performers, perceive such delegation of agency to other performers and the functionality of their instruments?* In this paper we describe the instruments that make up the ensemble, and the specific acoustic networking which connects them. We then discuss the experience of playing in the ensemble as a form of making-with, or sympoetic performance, suggesting that this structural acoustic coupling establishes of a new type of involving, evolving musical relationship, distributing musical agencies across a meshwork of players and instruments and acoustic spaces.

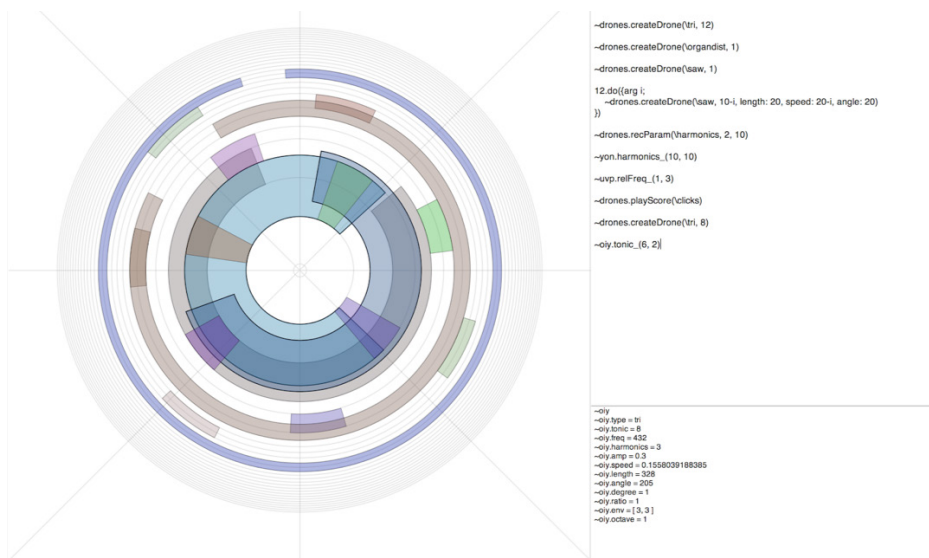


Figure 2. The Threnoscope

1.The Ensemble

Brain Dead Ensemble (Figure 1) consists of four performers whose instruments are acoustically networked: Alice Eldridge and Chris Kiefer on Feedback Resonating Cellos (FRC), Thanos Polymeneas Lontiris on Feedback Resonating Double Bass (FRDB) and Thor Magnusson live coding the Threnoscope.

2.The Instruments

The Threnoscope

The Threnoscope (Magnusson 2013) is a live coding environment developed by Thor Magnusson. The instrument produces rich spectral sounds that are sculpted in real-time, and output through an intricate multi-channel panning system. The Threnoscope's interface includes an absorbing graphic visualisation of the sonified and spatialised spectra. The graphic visualisation contains output "channels" (lines crossing the screen) and the "notes" move around the space by entering or appearing on a speaker channel. Harmonics of the fundamental frequencies are represented as circles, where the innermost circle represents the fundamental frequency (for example A at

55Hz). The notes or drones can be filtered, and this is represented by the thickness of the note (how many harmonics it crosses). Following a live coding fashion, the code, together with the graphic visualisation, is typically projected on a wall or a projection screen at the back of the stage (Figure 2).

The Feedback Resonating Instruments

The FRC (Eldridge and Kiefer 2016; Eldridge and Kiefer 2017) and the FRDB (Figure 3) are hybrid instruments custom-made by their performers. They are designed and developed in an on-going collaboration with instrument designer Halldór Úlfarsson, creator of the halldorophone,¹ a cello-like feedback resonating instrument. The principle behind both FRC and FRDB instruments is the same: electromagnetic pickups are placed under each string of the instrument. The signals from the strings are processed (in varying ways for each instrument) and fed back to the body of the instrument (Figure 4). This is possible through tactile transducers that are clamped onto the instrument, and by speakers that are mounted into the instrument body. The pick-up signals are mixed and sent to the transducers; energy from

¹ <http://www.halldorulfarsson.info/halldorophone5/index.html>



Figure 3. Two feedback resonating cellos and the feedback resonating double bass

the transducers vibrates the instrument's body causing the strings to resonate and creating a signal in the pickups, so forming a feedback loop. This feedback loop is highly nonlinear, as energy is transformed through several media (acoustic, electric, digital), and it is forced, by intentional design, to follow indirect and *difficult* paths. This systemic nonlinearity radically transforms both the sound world and interactive model of the instrument, relative to their classical parents. Acoustically the feedback pushes the instrument into overdrive, creating a sonic complexity far from the familiar tones of acoustic strings; physically the instruments are no longer controllable in a linear way, rather the players now negotiate with an already-vibrating body: the strings no longer function as a means to inject energy into the system, but act as lively, resonating controllers by which the feedback running through the instrument can be shaped. These feedback instruments are good examples of postdigital instruments as they rely equally on analogue, digital and physical processes.

Each instrument uses different approaches to process the sound from the strings, one FRC uses purely analogue process controlled by foot-pedals, while the other FRC processes the signals digitally using SuperCollider via a control surface mounted onto the instrument. In the case of the FRDB the signal is amplified—and minimally processed—using SuperCollider² integrated in the Bela³ platform (McPherson 2017).

3. Understanding Feedback Musicianship

Whereas playing a traditional string instrument involves the performer inputting energy to excite the strings with their bowing arm or pizz finger, playing these self-resonating feedback instruments is more a dynamic negotiation with a self-resonating system. Due to the complex, hybrid feedback pathways the instruments can react in a highly nonlinear manner to any vibration (sound or movement) that can potentially stimulate and excite their strings. In this sense they are uncontrollable, under the traditional instrument interaction paradigm; a differ-

² <https://supercollider.github.io/>

³ <https://bela.io/>

ent form of dialogue is established. Chadabe (2005) extended Xenakis' metaphor of composer navigating seas of sounds and described real-time interactive music as a process similar to that navigating a stormy sea, having to manage a sailing boat, taking into account the waves that thrash its hull, and the wind gusts that pull its sails. The additional feedback loops in these hybrid instruments makes navigating a route through an unfolding performance a very intuitive journey. They require adaptability and agility as all instruments, but their intrinsic non-linearities demand a non-conceptual, pre-conscious, almost meditative approach from their performer: music unfolds only in the absence of expectation, through a very subtle listening and nuanced embodied response.

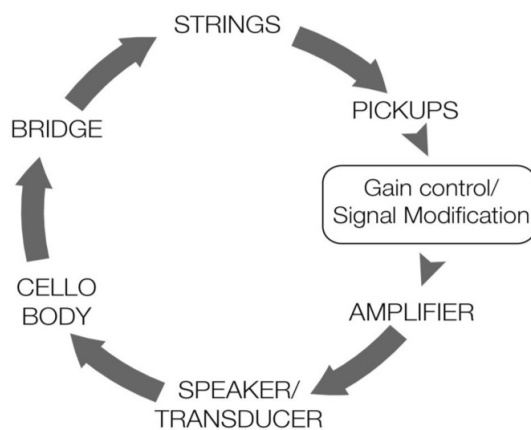


Figure 4. Schematic of the feedback instruments

Jon Drummond describes in detail the different types of interactive music systems and the relationship established between the interface and the performer (Drummond 2009). In these new systems, an increased level of musical knowledge is embedded in the body of the instrument itself, giving it an agency that becomes partly that of the instrument designer/maker and partly that of the performer. The instrument with its emergent properties and unpredictable behaviour challenges the performer in how to respond to it. From an enactivist perspective, the instrument can be seen as a realisational interface, (Armstrong 2006) and the performance becomes an emergent conversation between player, instrument and ensemble.

4. Acoustic Networking in the Brain Dead Ensemble

During performance, the behaviour of the self-resonating feedback instruments is periodically influenced by audio signals sent from the Threnoscope. The Threnoscope operates through the string instruments using its intricate panning system, exploring and exploiting them as resonating and reactive loudspeakers. Hence, in Brain Dead Ensemble performance the musical interface ceases to be merely the Threnoscope, the FRCs or the FRDB, rather the whole ensemble should be considered as musical interface, an extended and resonating multi-player performance system.

Regardless of the differences in how instruments manage their signal paths or whether they are built on analogue or digital processes, the three feedback resonating instruments used in the Brain Dead Ensemble have a basic common feature: they all receive external audio input from the Threnoscope, which can be then played back through the speakers and the transducers that are attached to their bodies (Figure 5). The acoustic properties of the string instruments shape this external signal. In addition, the sound of the Threnoscope excites the instruments' strings and makes them resonate. The combination of the Threnoscope sound together with the feedback properties of the string instruments afford even greater variety of sonic textures. The degree of influence from the Threnoscope is variable, and unpredictable to the receiving player; it may create interplay between the two instruments, but it may also override and saturate the feedback loop of the receiving instrument, making it temporarily insensitive or unplayable. At the same time any player can reduce the gain on the input from the Threnoscope, silencing this player's actions. This *acoustic networking* creates a fresh form of chamber music, where instruments can be "played" by other members of the ensemble, substantially reifying the musical influence implicit in traditional ensembles. The sound of a voice or of an acoustic instrument being processed and manipulated by an analogue or digital interface is nothing new. However, having an external sound being shaped by the internal acoustic properties of an acoustic instrument,

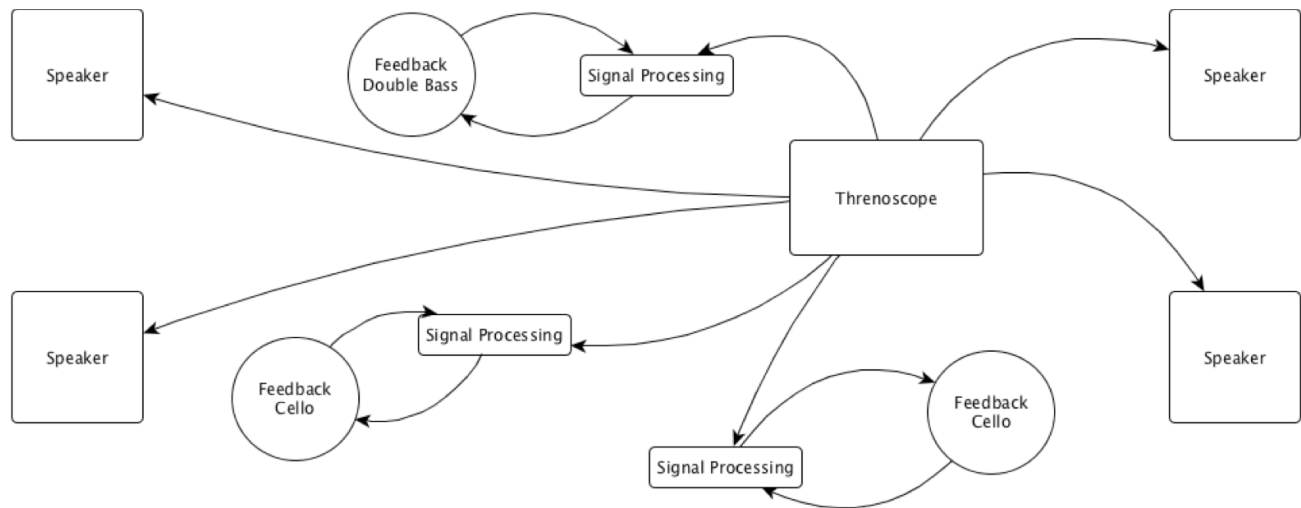


Figure 5. Audio pathways between instruments

while an actual performer is also performing that acoustic instrument, is quite unique. This process borrows the afore-mentioned postdigital capacities of the instrument (i.e. the hybrid analogue-physical-digital qualities of it) and it applies it on the entire ensemble. The ensemble's way of operating is shaped by interconnected yet often undifferentiable analogue, digital and physical processes. To extend the Xenakis/ Chadabe sailing metaphor further: we are no longer simply navigating stormy seas, but actively perturbing them in performance time, these perturbations being a defining language of the ensemble. The Threnoscope audio signal entering the feedback resonating instrument is an additional variable to the whole performance equation that at once distributes, and dissipates, musical agency across the assembled interface.

5. Brain Dead Ensemble as a sympoietic interface

The evolution of digital music interfaces has been as much about conceptual framing of musical attributes, affordances and capacities as their technical implementation and musical exploration. Early metaphors played on extant chamber models (Winkler 2001) and later forms of dialogue, conversation (Paine 2002)

and mutual influence (Bongers 2006). The traditional roles of instrument maker, composer and performer have been deconstructed and reconstructed (Schnell and Battier, 2002; Magnusson, 2009), and the inter-agency of performer and machine reconceptualised in terms of 'losing control to gain influence' and meta-control (Campo 2014).

Brain Dead Ensemble is an expansion of the performer's nervous system into a postdigital music system. The entire performance ecosystem (Waters 2007), has expanded to comprise equally code, bytes, metallic strings, analogue transducers and pieces of wood as much as the performers' proprioceptive biases, autonomic nervous system, musical impulses and muscular digits. The whole ensemble with its wired members suggests an interface that links interfaces, a multi-instrument. Moreover, in this ensemble-interface, a system that assembles—in a form of a network—other interfaces, the performers operate as much as observers as instigators.

Dunbar-Hester's description of cybernetic processes in music goes some way to describe the real-time composition and performance processes that govern the Brain Dead Ensemble, which can be understood:

as enrolling the performers, the instruments, and the audience into a “system” of experience that is distinct, and experienced as subjectively unique, and yet is part of an ongoing process. (Dunbar-Hester 2010, p. 125, emphasis in the original)

But the acoustic couplings of feedback instruments, which characterise the Brain Dead Ensemble, suggest a new form of music-making, a “music-making-with”, or *sympoietic performance*. Musical agency is not only distributed over a hybrid assemblage, but is fundamentally defined in relation to the co-assembled agents. Haraway (2017) adopts the term *sympoiesis* (Dempster 2000) to elucidate the deeply interpenetrative on-going relationships between biological systems. *Sympoiesis* is a word proper to complex, dynamic, responsive, situated historical systems, and is as useful in conceiving of dynamic musical relations as the biological assemblages of Haraway’s concern: “critters do not precede their relatings” and nor do performers, “they make each other through semiotic material involution, out of the beings of previous such entanglements” (Haraway 2017, 60).

6.The Sound of the Ensemble

The acoustic result of these feedback processes is characterised by a variety of sonic colours including airy microtonal micro-melodies, serene yet colourful drones, complex spectral gestures, and vast explosions surfacing gradually or unpredictably into screams. An audience member at our inaugural performance provided a fitting description: “the Brain Dead Ensemble sounds like the sonic encounter of Gérard Grisey with Sunn O)))”. The structural and systemic distribution of musical agency plays out in the sonic experience. Numerous audience members have mentioned that they were not able to tell which instrument produced what sound. Similarly, as a performer it is often hard to pin-point not only the source of a sound on stage, but even the origins of a vibration in one’s own instrument: it is often hard to tell whether the sound produced by a feedback instrument is a result of your own actions,

whether it is a sound caused by the inherent feedback properties of the instrument—the instrument reacting to the environment— or if it is a sound generated by the Threnoscope sounding through that instrument. This is the result of the integration of the ensemble’s parts into a whole. Just as a piano à *quatre mains* or a txalaparta are physical musical interfaces which afford multiple simultaneous players, through acoustic coupling the Brain Dead Ensemble create a distributed, yet integrated multi-player musical interface.

7.Live Coding the Ensemble

For the live coder performing on the Threnoscope, the options are to send signals out to the quadrophonic speaker system in the room or to the transducers and speakers in the feedback instruments. The live coder can therefore interfere or co-play the string instruments by sending signals into their feedback chain, (re) defining the acoustic properties of the instruments themselves. From the perspective of the live coder this is an unusual experience, as the output channel is “going through” a complex instrument, played by a human. By sending a signal to the string instruments, the live coder conditions them, listens to and observes the way the sound is changing equally the instrument and its performer’s behaviour, so there is an “interface” at various levels human-machine, human-other-human’s-instrument, other-human-instrument, human-human interaction, and so on. As a cybernetic system of sound and human behaviour, the ensemble is multiparametric, complex and difficult to analyse. Features emerge and disappear constantly, and language struggles with the analysis of the proceedings. Whilst the live coder is able to change the functions of the string instruments, the instrumentalists can of course reject that signal, by simply lowering the incoming signal from the Threnoscope. As such, the ensemble is a decentralised system of actors that are manifest in the human intentionality of the performers, instrumental behaviour as a result of design, behaviour of the particular room and PA system, and the audience.

8.Challenges

Playing in the Brain Dead Ensemble can be very challenging due to the very unpredictable and nonlinear nature of the instruments and the connections between them. Some of these challenges might be intriguing, inspiring and stimulating -- such as the aforementioned situation when the performer does not really know whether the sound produced by their instrument is caused by them, yet they have to react musically to it. The control has been distributed amongst actors that include people, instruments, stage technics, room acoustics and the audience. Alberto De Campo writes about this as losing control, but gaining influence. (De Campo 2014). In other cases the challenges can be somewhat more pragmatic, for example the ensemble cannot use stage monitors to listen to their sound because this might oversaturate the instruments, causing them to become unresponsive. A further challenge - and joy - is the near impossibility of making detailed compositional plans in advance, or trying to repeat collective musical moments due to the nonlinear nature of both the instruments and the ensemble. Other inspiring challenges include the way string players have to 'surf' the Threnoscope sounds as they take over their instrument and how they gear their own instrument to engage with it: the challenge of governing a smaller feedback system while being part of a much bigger feedback system.

Conclusions

This paper introduced the notion of ensemble as multi-surface interface. Such a definition of an interface will encompass the notion of the ensemble as a fluid assemblage of dynamic instruments, human-object relations and interpersonal relations. This was illustrated with the case of the Brain Dead Ensemble, an acoustically networked feedback ensemble/ assemblage in which the structural acoustic feedback pathways within and between "open" instruments create a fundamentally distributed musical agency, which we might describe as sympoietic performance. We approach performance from a postdigital perspective, canvassing the dynamic relationships between performers and instruments. A new approach to ensemble performance is sketched, based on digital, electronic and acoustic networking of intrinsically uncontrollable feedback instruments. In this type of performance, there are no defined individual states or intentions that serve as a familiar platform to refer to, but instead the performance becomes one of search, exploration, interplay, challenging, teasing, supporting, testing, excelling and breaking *in relation to each other*.

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