The Node Necklace: An Interrogation of Agency in Human-Non-Human Sonic Networks

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Abstract

This essay aims to explore the mobilisation of agency in three parties in the context of a sonic art installation — the Node Necklace. The Node Necklace is a generative, interactive, 8 channel audio installation built in Max MSP and Arduino. It uses methods of abstraction, pseudo-randomness and latency to effectively 'black box' interactions thus blurring the lines of agency between the participants, the system, and myself as a performer. In this essay I will use Bruno Latour's actor-network theory and Katja Kwastek's classification of actors in interactive media art: the artist, the recipient and the technical system, to posit that all three have the ability to act with agency within the Node Necklace, and within the broader scope of computational art.

Introduction

My motivation for this project is a convergence of my interest in immersive sonic media — audio spatialisation and augmented reality; and technological agency within the computational arts. In particular, I wanted to observe the boundaries of agency between artist, recipient and technological system. I believe that an interactive sonic installation was the most intuitive method of observing these boundaries whist also satiating my desire as a computational artist and musician to create a piece of sonic artwork.

I have built a system, called the 'Node Necklace' that positions recorded audio samples in a circular 2D installation space through 8 loudspeakers. The system has the ability to move these samples in two planes through simple transformations such as rotation and translation, as well as more complex random movements. The system, its recipients, and myself — the artist, all have the ability to affect and create recorded audio samples in a number of ways that I will explore later on. Two research questions that I have identified for this project are:

1. How can shared participatory experience mobilise compositional techniques in the creation of generative sound art?

2. How do generative processes effect the balance between human and technological agencies as experienced in the work?

Research

Agency

Agency in this essay is defined as the capacity, or ability, irrespective of willingness, of an actor to act in a space. Philosopher and sociologist Bruno Latour introduced the theory of the actor network in 1987, positing that human and non-human entities (actants) share the same amount of agency ("generalised symmetry") within a network (Latour, 1987). Network here has a similar meaning to assemblage: an irreducible structure built from constituent 'parts' that are decomposable (hold meaning even without the structure), yet the sum of which are more than the individual parts themselves (Deleuze and Guttari, 1988). Non-human objects for Latour can "allow, afford, encourage, permit, suggest, influence, block, render possible, and forbid" through their capacity to act in a space, as much as humans (Latour, 2007).

New Media Forms

As highlighted in many lines of new music research, musicians are becoming more and more interdisciplinary with their skillset, as musicians explore 'the digital' and what it has to offer to existing, or new musical practices, we see examples of musicianship fusing with computer science with the forming of new programming languages for artists: Chuck, Supercollider, Max MSP and PureData amongst these tools. Thor Magnusson writes: "Todays music critic [considers] the artistry and skill in the soldering of a new instrument, the programming of computers and the use of artificial intelligence". (Magnusson, 2019) The growth of work in this area has allowed new forms of interactive work benefiting from the digital and our ability to perform alongside it, manipulate it, and assign it autonomy through randomness and generativity.

Interaction in Digital Art

When considering the above interactive digital works, Katja Kwastek separates the actors within an 'aesthetic experience of interaction' into the Artist, the Recipient, and the Technical System (Kwastek, 2013).

Actors: The Artist
The role of the artist is generally to conceive of the idea and facilitate the process of creating the artwork. The artist creates what Kwastek calls the "interaction proposition" — the affordances of the artwork given to the recipient and technical system, and any processes that arise from these affordances. Note: these don't necessarily have to be known by the artist in advance. Kwastek writes that the artist should be absent from the actual interaction process,

but only as the author of the work, they can still interact as a "co-recipient, observer, mediator. or fellow player".

Actors: The Recipient

The role of the recipient is to realise the artwork through the interaction proposition. Recipients don't have to actively interact with the work, they can observe others through what the media artist Golan Levin calls "vicarious interaction". Expectation and familiarity with similar works will mould the way in which the recipient interacts.

Actors: The Technical System

The technical system is the combination of the material components of the system that support the interaction proposition. Kwastek considers these as actors in their own right, borrowing from notions of agency in non-human actants found in actor-network theory. Instead of focusing on the material affordances of the system, i.e., buttons, screens, etc., Kwastek focuses on the processuality of the system, the liveness of it and how that grants it agency. Whilst this processuality is originally programmed or created by the artist, the system does act independently of them according to Kwastek.

Interactivity

Kwastek associates Salen and Zimmerman's game design 'Rules of Play' framework with installations when referring the interaction proposition. Constitutive rules are the structural rules of the system - they are normally logically or mathematically expressed. Within installations they may not be discernible from the play, or from the operational rules. Kwastek writes: "algorithms on which artistic interaction propositions are based can be seen as constitutive rules". Operational rules on the other hand, are seen as the 'rules of the game' in that they are the guidelines given explicitly — though it is the norm in interactive media art that they are not communicated but instead may be outlined to the recipient. The relationship between openness and control structured by these two types of rules makes way for various modes of experience that Kwastek refers to as the phenomenology of interaction.

The recipient's realisation of the interaction proposition starts with 'experimental exploration' which is a period in which they try to understand the constitutive rules, and any possible actions they can make within it. New media artist Ken Feingold writes about his installation "Surprising Spiral, 1991": "Interactivity is, in many ways, about affirmation of the human action by a non-human object, a narcissistic "it sees me." But beyond that, there is the desire for control, for mastery over the nonhuman entity", (Feingold, 1995). Within certain installation case studies, Kwastek writes that it has been shown that recipients repeat actions they know have an affect, first with questioning, and then with a commanding tone — of course, with the second having a different outcome, shaping the recipients knowledge of the system (Kreuger, 1991). These interactions transform into something that you could class as

an 'expressive act' or creativity. The recipient believes that they have the "ability to change the outcome of the work through their agency" - Kwastek refers to this as constructive comprehension.

Practice

The Artist

I am present at the side of the installation, and through the creation of an 8 track 'loop station' within the Max patch, have the ability to record audio samples directly into the system. I do so with a guitar that is being passed through a reverb plugin in the system. I'm interested in extracting unusual sounds, especially sounds that are not associated with the guitar and are achieved by using extended techniques such as scraping the strings, amplifying potentiometer crackling, and using percussive blows against the body to actuate the strings.
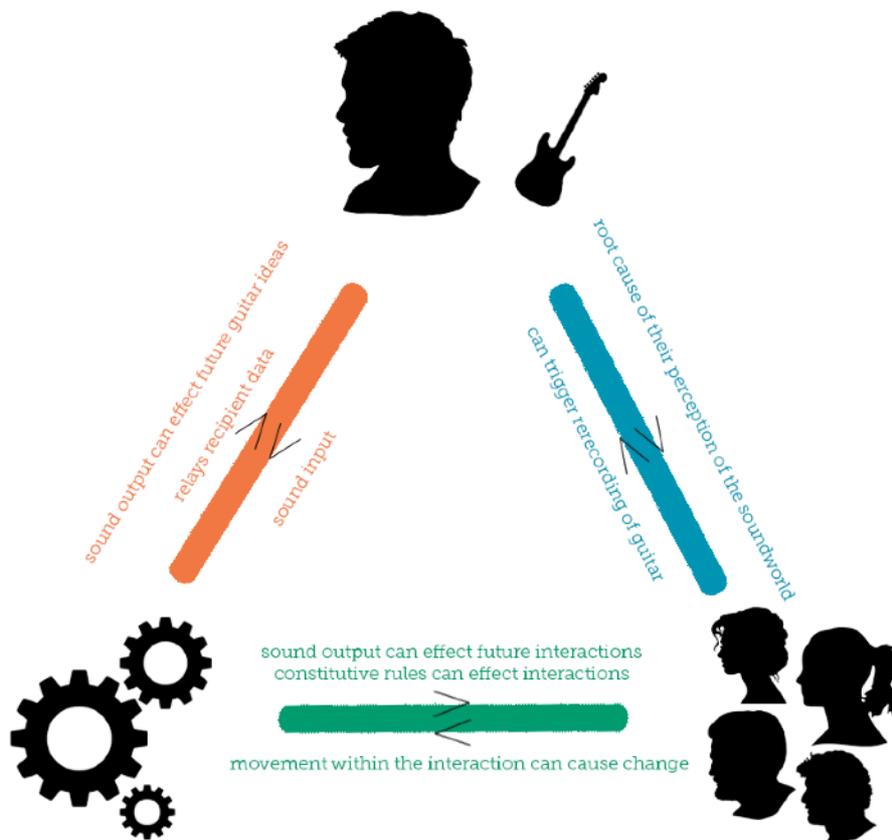

Fig. 1 Interactions within the Node Necklace

The Technical System

The system is built in MaxMSP, a visual programming language. The language allows you to build software systems that engage with sensors, such as distance sensors and other various hardwares. I built 8 wireless ultrasound sensors that all communicate to a master receiver plugged into my laptop running the MaxMSP patch. I then wrote a parsing patch that sorts the data being received by the master receiver into 8 nodes, and built a visualiser so that I can easily see positions of recipients within the Node Necklace. The sensors are placed at the front of each of the 8 speakers so as to sense recipient proximity. The system performs without artist or recipient, enforcing its own agency by perpetually attempting to create and manipulate sound to form what I will refer to in this paper as the "soundscape". It creates and manipulates these sounds without real-time instruction from its creator (myself) as it uses pseudo-randomness to 'decide' when to take action or perform an event.

Fig. 2 Making of the sensors
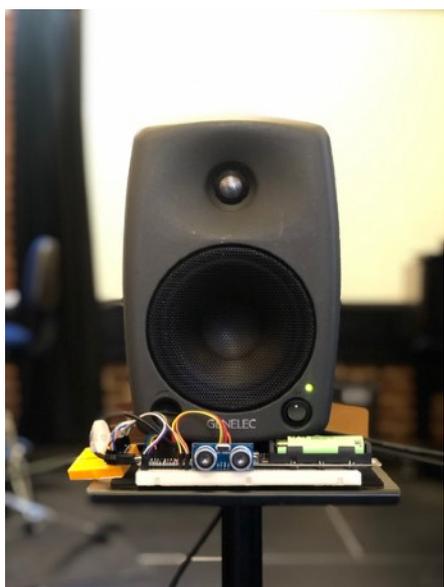

Fig. 3 Sensors completed

Fig. 4 A Node

Fig. 5 The Necklace

Sounds coming into the system are passed into a Max external created by the Institute for Computer Music and Sound Technology at Zurich University of the Arts called "Ambisonics", which place them within a plane that is identical to the installation space. Movement of the samples within the plane corresponds with increasing and decreasing volume levels of the sample based on how close they are to the 8 speakers around the edge. This direct mapping leads to an extremely immersive experience when moving the sounds by yourself. When the movement control is given to the system, the movements become more of a real time choreography of sound, in which the recipient and artist are equally actors.

The Patch

Sensor visualisation

Pitch shift amount

Loop station

Automatic / manual movement control

Visualisation of sample movements

Sonogram of output

8 ch. level meters

The Recipient

The recipients of the installation also have the ability to have an effect on the sculpting of the soundscape. The system contains 8 sensors engineered by myself to detect movement within the circular speaker array. This data might be / is / sometimes fed into the systems' creation and manipulations of the sound. This leads to an embodied experience of the system by the recipient. They are able to turn on and off the rotation of the aforementioned guitar samples around the plane, increase and decrease the pitch of these samples, and reverse their playback, all through their positioning within the necklace. These positions act like triggers for the system, and although these rules are not explicit, they will arise out of interaction and exploration of the system. The recipient can also have an effect on the artist - certain positions within the necklace will trigger the record button on the looper, forcing a rerecording of a sample.
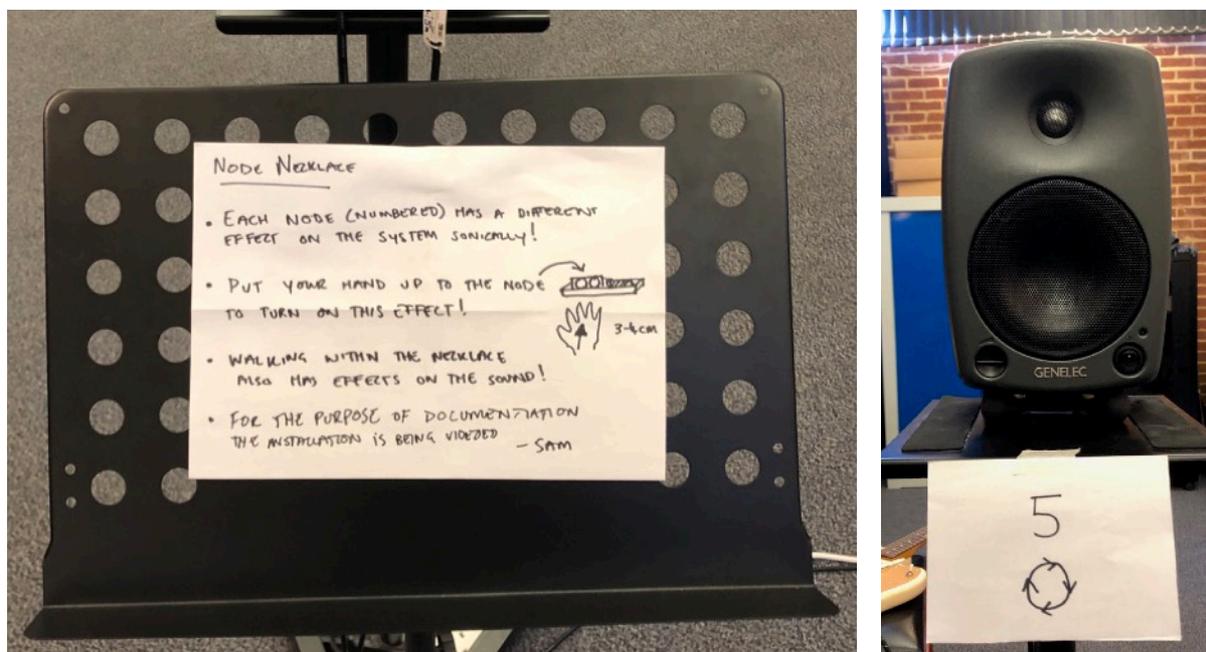

Fig. 6 Operational Rules

Evaluation

Participatory Experience

What I found occurring in the installation mirrored Kwastek's view of the phenomenology of interaction in recipients. Recipients would begin in an experimental phase, cautiously interacting with the system at first, before moving towards more constructive comprehension, and creative expression. Recipients would repeat actions and movements expecting them to have the same sonic outcome. Their exercise of agency combined with the agency of the

system and my own resulted in a sound world that was inextricably authored by all three actors. Due to the mappings to compositional techniques made by myself in the system (which were randomised as to remove myself from their real-time interactions) participatory experience and interaction by myself, the recipient, and the system led to the warping of the sound world through musical technique such as pitch, tempo and timbre to create a gestalt inherently unique, and individualised to the 'performance' in the moment.

Generative Processes and Agency

Examples of generative processes in the work include the effect on pitch, movement and playback speed of the samples. Though not generative processes in and of themselves, when linked to the interaction from recipient and artist, these processes become probabilistic, and rely on the consent from other actors which may or may not be existent. Another process that can be considered generative is my own continued playing of guitar into the system. As it relies on a chance positioning from the recipient within the necklace, it might never happen, yet might also happen twice a minute. Due to these processes' reliance on chance agreements to be carried out, the 'soundworld' heard is an amalgamation of the possibilities that "survived the process of agreement of three parties". The effect this has on the balance of agency within the network is twofold.

- Firstly, generative processes clearly have the ability to cause change in the actions carried out by actors through the nature of their obscure origins. Hence they exercise technological agency.
- Secondly, the mastering of the constitutive and operational rules in a certain way can lead to the feeling of cybernetic embodiment of the technical system by the human actors in the network. This makes them feel more empowered by the installation, and leads towards a 33% / 33% / 33% agency.

Issues

The installation didn't run without its faults. As is normally the case with ultrasound sensors, they were temperamental in their measurements. This did not aid the recipient in fully understanding (and therefore interacting with) their potential relationship with the interaction proposition. In the future perhaps using a ceiling mounted Kinect for 2D plane movement recognition would be more effective as it would also afford the system accurate data on the amount of recipients, which could further add to generative processes. However, there is something to be said for the nodal layout of the sensors that correspond with the 8 speakers in the necklace, with one recipient remarking that they looked like eyes, and helped with humanising the relationship between them and the technical system.

Conclusion

Overall, I believe that the Node Necklace was an engaging and insightful installation, both phenomenologically and epistemologically. It provided a computational arts context for arguments for non-human agency as posited by Bruno Latour's actor-network theory, and explores these arguments by considering the artist, recipient and technical system within the installation. I believe that the software is a good framework for creating future installations that benefit from a tri-party interaction proposition. In the future, I would like to explore the use of machine learning to reinforce the agency of the technical system into making more 'human like' decisions, but also explore ways in which I could force human actors within the network into making more 'mechanical' decisions. I would do this in order to study the effects this has on the resulting 'soundword', and what these effects say about the way we interact with creative computational systems.

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