More-than-Machine Listening

Sound, Data, and Molluscs

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ABSTRACT

My research critiques the anthropocentric foundations of machine listening while exploring its capacity for involving more-than-human sound-worlds in music and sonic arts practice. Applying insights from the philosophy of animality and sonic fiction into interactive music composition, this paper examines conceptual and pragmatic considerations for designing (anim)algorithms. These algorithms simulate the auditory experiences of non-human entities, creating pluriversal interfaces that merge human and non-human listening. Through a case study based on Italo Calvino's 'The Spiral' and inspired by Vilém Flusser's speculative malacology, a machine listening system is developed to emulate molluscan auditory mechanisms. This research reconfigures the design of machine listening, promoting a multisensory, more-than-human auditory experience.

CCS CONCEPTS

• Applied computing~Arts and humanities~Performing arts

KEYWORDS

machine listening, interactive music composition, sonic fiction more-than-human

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1 Listening with (Anim)Algorithms

In addressing the limitations of anthropocentric paradigms in machine listening, I propose to recognize its entanglement with the 'anthropological machine', a concept drawn from G. Agamben's philosophical framework to describe the production of 'the human' through the negation of the animal – another category simultaneously produced [1]. This observation becomes apparent when one questions the kind of 'listening' simulated by such technologies and realizes how these technologies are evolving according to an anthropocentric and *auraltypical* definition of what might be possible [2, 3]. Researching on ways of decoupling the anthropological and the listening machines, I think with the notions of 'unbecoming human', or 'becoming-animal' [4], in the way I design interactive music systems in my artistic practice.

Deleuze and Guattari's parable of the wasp and the orchid serves as a profound metaphor for this process [5]. They are fascinated by the symbiotic relation shared by the two species, where the orchid, in synchrony with the reproductive cycles of the wasps, forms a flower that imitates the female wasp's shape, colour, height of attendance, and smell, attracting the male wasp more than the real female so that the wasps are deceived into transferring the orchid's pollen [6]. Instead of viewing this process as consisting of distinct entities (species, individuals, organs), they think of it as a 'block of becoming' where heterogeneous entities live through entangled, interdepended flows. In this case, this entanglement is activated by the 'simulation' of the wasp formed on the orchid, which manages to 'hack' the perceptual-operational worlds of the two species into a common point of contact.

How could machine listening be designed to enable such a 'block of becoming'? In practical terms, this means developing machine listening algorithms that do not merely mimic human auditory perception but instead embody the sensory experiences of non-human entities. For instance, (anim)algorithms could be designed to process sound in ways that simulate how a bat uses echolocation or how an elephant listens to seismic vibrations with their feet. Interacting with such systems would act as the 'image' of the wasp forming on the orchid, a pluriversal interface where human and non-human auditory experiences converge into new ways of listening with more-than-human worlds.

2 Speculative (Malaco)Logic

The fictional character Qfwfq from Italo Calvino's short stories collection, Cosmicomics, was the model for a music composition for which I designed such a system.1 In one of the stories, The Spiral, the shapeshifting Qfwfq recounts their life as a mollusc [7]. Deciding to compose a piece for piano and live-electronics based on this story, I became intrigued to learn about the hearing of molluscs and design the machine listening algorithm around it.

Even though it does not deal with molluscan hearing, I derived a way of thinking about this task from Vilém Flusser's Vampyroteuthis Infernalis [8] – a philosophical work that could be characterized as speculative malacology2. In his attempt to write a scientifically exact and fantastical fable about the vampire

[1] A recording of the piece can be found here: https://soundcloud.com/kostako-dam/spiral_cosmicomics_new_lights_23

[2] Malacology is the name of the scientific study of the phylum Mollusca.

squid (vampyroteuthis infernalis), Flusser's molluscan dialectics proceed through a kind of speculative (malaco)logic which he explains in a letter to Milton Vargas:

> So there we have two "dialectical" terms occupied by biological research: that of "homology" and that of "analogy". "Homology" refers to the genotype: birds' wings are homologue to our arms. "Analogy" refers to the phenotype: the wings of birds are analogue with the wings of bats. And this is an epistemological problem of first order: if the octopus brain is "analogue" with ours and "homologue" with, let's say, our medulla, then how do octopi "think"? [8, p. 134]

Oscillating between the interspecies repetitions (homologies and analogies) of humans and molluscs, Flusser manages to creatively amplify the differences arriving at an (im)possible description of a vampyroteuthian life. In a similar manner, one could reroute the homologies and analogies between the hearing of molluscs and humans to imagine new ways of listening.

2.1 Mantle

According to Flusser, the versatility of the molluscan 'mantle is the foundation for the comprehension of molluscan existence' [8, p. 32]. Covering most of the body's surface, it 'secretes a spiral shell' and it forms the molluscan foot and tentacles that allows for the mobility and the soft powers of the creature [Ibid.]. It is also responsible for the complex color modulations patterns that Flusser understands as an analogy for human acoustic communication [Ibid., p. 86]. However, the mantle is itself covered by 'cilia' and 'superficial receptor systems that, on the basis of analogy, might be involved in hearing' [8, p. 34; 9, p. 144-5]. Thus, a molluscan listening model might be approach through tentacular thinking - a way of thinking-feeling which crosses the boundaries between fact/fiction (SF), material/semiotic worlds, digital/biological networks, human/non-human earthly creatures [11]. It is a pluriversal way of listening for the time 'when humanity will extend its mantle over everything that breathes' [Bentham J. cited in 4, p. 187], so long as at the same time it dismantles itself.

2.2 Statoliths

Contained in the mantle, there is a statocyst-statolith system of orientation - an analogous apparatus to the otoliths found in vertebrates [10, p. 144-5] – which also enables molluscan to perceive sound vibrations [13, p. 14-5]. The data produced through lab experimentation describing the hearing of the bivalve mollusc, Magallana Gigas [13], was used to design the machine listening component of The Spiral through digital filters that emulate the spectrum of intensity and the delay of the oyster's response to acoustic frequencies. Additionally, a geophone was used on the piano to capture the 'extremely' low frequencies that affect the molluscan body.

However, thinking along with sonic fiction, the statolith-otolith analogy might have more profound potential. Extrapolating from the work of Kodwo Eshun and the Otolith Group, Holger Schulze writes that:

> With these tiny stones, [the otoliths,] one performs a sense of orientation, of space- and time-based estimation of velocity and gravity in relation to listening, to one's body, to one's individual state of anatomy, physiology and corporeal sensibility. […] A group of otoliths therefore is physical matter that allows us to integrate dynamic movements sensibly in our actions and our lives. Precisely from your individual group of otoliths your orientation in space and time emerges: you are situated and you sense yourself as incorporated in the movements of these incredibly tiny stones. Your sensibility is, partially at least, embodied in these crystals [12, p. 15-8].

Following Flusser's speculative (malaco)logic, methods of machine listening situated in the molluscan statoliths could not have been accessed solely from sonic data extracted in lab conditions, but would need to re-orient the listener's sense of space and time, away from an anthropocentric subject and notion of data, designing a 'new softness' [14] for a body in its becoming-animal.

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