Sonic Collaborations between Humans, Non-human Animals and Artificial Intelligences: Contemporary and future aesthetics in more-than-human worlds

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This article sketches a theoretical framework that allows the conceptual inclusion of non-human animals and artificial intelligences in human sonic collaborations. Post-humanist concepts that question the categorical divide between nature and culture, following Donna Haraway and Bruno Latour, converge with contemporary, non-adaptationist evolutionary aesthetics. Therefore, the anthropocentric 'othering' of non-humans gives way to a concept of a more-than-human sociality of sound. We offer some theoretical propositions for the extension of socially engaged sound practices to collaborations between humans and non-human animals and between humans and artificial intelligences, and then exemplify such multispecies sonic collaborations by analysing some existing projects from the fields of sound art and musical performance. After drawing some more general conclusions from these analyses, we hint at potential aesthetical and ethical parallels between animal and AI creative agency. Finally, we point out a few questions we see as important for future advanced settings of such collaborations, especially when it comes to assemblages of different AI technologies and to future concepts of animal–computer interaction that might enable non-human animals and artificial intelligence to cooperate creatively.

1. INTRODUCTION: THEORETICAL FRAMEWORK

Is the sociality of sound an exclusively human issue? Or do socially engaged sound practices realise themselves in more-than-human worlds? Since its introduction in 1996 in an ecophenomenological context (Abram 1996), the term 'more-than-human worlds' has emerged to denote a multidisciplinary understanding of relations and entanglements between humans and non-human actors; for example, in the context of philosophical ethics (Gruen 2009), geography (Bastian, Jones, Moore and Roe 2016), and poetology (Middelhoff and Schönbeck 2019). It suggests a critical examination of anthropocentric categories and assumptions that can fruitfully be applied to sound art and music, too.

If socially engaged art practices are defined as taking human relations and their social contexts as points of departure, such a definition seems to be inherently anthropocentric. It puts its emphasis on *human* relations and thus implicitly excludes all non-human agents. From a point of view informed by the theoretical frameworks of post-humanism (Wolfe 2010), it seems to be worthwhile to consider the possibility of more-than-human sonic collaborations. In the age of the Anthropocene, the sound aspects of non-human agents (non-human animals, plants, fungi, microbes, artificial intelligences) should matter, too. We follow Bruno Latour in his understanding of the Anthropocene as disrupting the established categories of nature and culture, the human and the non-human (Latour 2017: 118–19) while sympathising with Donna Haraway's proposal to call the recent epoch Chthulucene (Haraway 2016), avoiding any misunderstanding about the role of the Anthropos in the Anthropocene.

Our special interest is directed to the creative agency of non-human animals and artificial intelligences and their sound practices in social collaborations with humans. Thus, we deal with these two groups, leaving other non-human agents and their roles in more-than-human sonic collaborations to further research.

Social engagement, as the call for submissions puts it, 'too often presupposes or assumes non-engagement or exclusion for an identified (othered) community'. We strongly agree, because non-human animals have remained the ultimate 'others' from the point of view of human exceptionalism. This anthropocentrism is still an important part of the ontological and ethical mainstream in Western societies. On the other hand, artificial intelligences have not yet reached the stadium of agents who 'matter' to society when it comes to cognitive and ethical equality.

So, the concept of 'othering' as developed by Gayatri Spivak in the context of post-colonial theory (Ashcroft, Griffiths and Tiffin 2013: 188) is certainly a

good starting point for critically assessing sonic collaborations of diverse actors, and it has to be extended to non-human animals (section 2.1) and artificial intelligences (section 2.2). We would like to propose some theoretical propositions for this extension and to exemplify such multispecies sonic collaborations by analysing some existing projects. We try to draw some more general conclusions from these analyses, but most of all point at a few questions we see as important for future advanced settings of such collaborations (section 3).

The heterogeneous and diverse field of thought that is often subsumed under the label of 'post-humanism' offers a wide range of epistemic and theoretical frameworks that can be applied to the aesthetic collaborations of human and non-human agents. We focus on a few of the many interesting approaches from this area, which complement and intersect with each other. Our interpretation of the social is mainly derived from Bruno Latour's definition in the context of Actor-Network Theory (ANT): 'To be social is no longer a safe and unproblematic property, it is a movement that may fail to trace any new connection and may fail to redesign any *well-formed* assemblage' (Latour 2005: 8). The application of ANT to music history led not only to domain-specific insights but also to partial criticism as ANT being only a method of analysis rather than a theory (Piekut 2014). We take note of this criticism but do not follow Piekut in his emphasis on music. As sonic collaborations in a wider sense are our field of interest here, we complement Latour's dynamic construction of the social with Donna Haraway's figure of the cyborg (Haraway 1991) and her concept of naturecultures that declares the categorical divide between nature and culture obsolete.

To enrich the discourse on sonic collaborations between human and non-human agents, we also refer to evolutionary aesthetics. In recent years, evolutionary aesthetics have taken an interesting turn, questioning the adaptationist framework that translates every aesthetic behaviour into an underlying fitness for natural selection. Richard Prum has vocally stressed the importance of arbitrary runaway processes that are caused by sexual selection and lead to often non-adaptive aesthetic phenomena. Prum proposes an inclusive concept of biotic arts, starting from Arthur Danto's 'artworld' term: 'Perhaps the most revolutionary of this definition of art is that it means that bird songs, sexual displays, animal-pollinated flowers, fruits, and so on are *art*, too. They are *biotic* arts that have emerged within myriad *biotic artworlds*, each of them a community that fostered the co-evolution of animal aesthetic traits and preferences over time' (Prum 2018: 336). He posits what he calls 'biotic arts' and their understanding explicitly in the

context of the post-human (Prum 2018: 337). In following up on this terminological convergence of post-humanism and evolutionary theory, we hope to contribute to the discursive exchange between the relational aesthetics enabled by Haraway and Latour and the reformed, non-adaptationist evolutionary aesthetics that Prum proposes. At the same time, we would like to further a fruitful exchange between the areas of animal aesthetics and artificial creativity.

The ability to become an actor in sonic collaborations requires a certain degree of creative agency. The following section will discuss the specific prerequisites and conditions for non-human animals and artificial intelligences to participate in these collaborative settings in more detail.

2. CREATIVE AGENCY OF NON-HUMAN ACTORS IN SONIC COLLABORATIONS

2.1. Non-human animals

Considering the phenomenology of many bird songs, it may be surprising that there is a strong tradition in Western aesthetics to define music and the sonic arts as an exclusively human domain. May it suffice here to say that this discourse of anthropological difference in the arts has its counterpoint in the long-lasting concept of animal music and animal aesthetics (Ullrich 2018). The discussion as to whether non-human animals have music or not runs from Antiquity through the Middle Ages into Modernity, and we could interpret the theoretical approaches that vehemently deny animals any creative agency as attempts to affirm and fortify the ultimate 'othering' of non-humans, with all its social, societal and even ethical implications. Nevertheless, following Haraway, Latour, and Prum, we take the agency of non-human animals for granted and are more interested in the question of how sonic collaborations in more-than-human contexts are realised than in the question of whether they are possible in principle.

Starting from this point, there is an overwhelming body of examples of intraspecific and interspecific sonic collaborations that involve non-human animals, from what Prum calls 'biotic art' via the ornithological field research by composers such as Olivier Messiaen and Hollis Taylor to attempts of 'interspecies music' involving human musicians such as Paul Winter, Jim Nollman, David Rothenberg and Peter Gabriel. Especially when it comes to sonic collaborations between humans and non-human animals, the latter proponents of twentieth and twenty-first century interspecies music are deeply rooted in historical traditions of making music and exchanging sound productions by humans and non-human animals. Leaving out the vast array of highly interesting examples of sound as a shared social practice in contexts that are mainly

framed as 'musical', we focus here on some selected cases of sound art that involve the social collaboration of non-human animals with human actors. While the creative agency of non-human animals plays an important role in several works of sound art, the sonic sociality of humans and non-humans in such artworks has seldom explicitly been discussed. Animal sound production can contribute asynchronously (per pre-produced field recordings) or synchronously (involving live animals in the artwork). In some cases, non-human animals contribute their species-specific and individual sounds, while other works guide them to the use of human instruments and interfaces of sound production. Sometimes non-human animals are explicitly addressed not so much as active performers but as audience members.

As feminist and post-colonial theory have shown, agency is often enacted by subaltern and oppressed actors. Therefore, relational aesthetics can be applied not only to social collaborations between humans and non-humans in the field, where animals are comparably free to participate in or to reject the acoustic interactions, but also to situations of captivity and restraint, where the sonic collaboration is more or less forced on the non-human participants. An aesthetic approach that is able to deal with these differences in more horizontally or more vertically structured relations should grant agency to all collaborators while at the same time having to be aware of ethical implications that come with the framing of the individual artwork. These questions are comparably unproblematic if animals are not integrated as live actors and only deliver their sounds as pre-recorded and thereby mediated material.

This is the case in Christian Boltanski's site-specific sound installation *Entendre les chiens* for the Venice Biennial of Arts 2003. Boltanski played pre-recorded dog vocalisations from hidden loudspeakers to the visitors of the art exhibition on the main island of Venice. Thus the work addressed a layer of the shared social history of dogs and humans and its disruptions in the Venice Laguna, alluding to a historical practice of capturing free-roaming dogs and shipping them to an otherwise uninhabited island nearby (Boltanski 2005). The dogs became visually and physically invisible for humans, but their sound utterings remained detectable to listeners. Boltanski, mediated by technology, brought the voices of dogs back to the human's quarters while at the same time emphasising the process of othering and exclusion of non-human animals that came with the historical practice. Dogs as the paradigmatic companion animals of humans have been often pushed to liminality and sometimes even back into 'wildness' in certain geographical and ethnographical circumstances. In this case, the sound utterings are the last trajectory that

binds the isolated dogs back to human sociality. Boltanski uses the recorded barking of dogs as a trace of the agency of these (contemporary) dogs and at the same time as a medium for their historical predecessors.

If live animals collaborate directly with humans in the context of sound art, the relations between the collaborators become more complicated, and aesthetical explorations and ethical considerations may conflict with each other. ANT has been criticised for its tendency to create a flat ontology (Born and Barry 2018: 446), allegedly making hierarchical power relations and processes of exploitation and oppression unclear instead of dismantling them. With Haraway's (1991) cyborg concept, however, differences in the ontological status of non-human actors become more apparent. *Playing to the Birds* by Annika Kahrs is a good example of these difficulties. With her 14-minute video *Playing to the Birds* from 2013, which in 2014 was further developed into a performance called *Concert for the Birds*, sound artist Annika Kahrs constructs an intertextual relation to Franz Liszt's first legend for piano ('St François d'Assise: La prédication aux oiseaux' from *Deux légendes* S. 175, composed 1863). With Liszt evoking birdsong and programmatically imagining St Francis's sermon to the birds in his composition for piano solo, Kahrs decides to let pianists interact with live birds. The caged birds of several species are grouped around the grand piano and have to listen to a live performance of Liszt's piece. The artist wants to address questions of communication by creating a non-human audience for the piano recital (Kahrs 2020). Kahrs's work seems to give a sophisticated commentary on the rich history of birdsong in human music and on the tension between birds as symbols and birds as living agents. At the same time, the aesthetics of the birds' own songs and their freedom from restriction and captivity are remarkably unimportant in this approach. So, perhaps unintentionally, the artwork illustrates (and is itself part of) the diverse and ethically problematic practice of capturing and breeding wild birds and exposing them to human music in very much human-specific environments.

Céleste Boursier-Mourgenot's installation *From Hear to Ear*, realised for the first time in 1999 and re-enacted several times since, is in some aspects comparable to Kahrs's approach. Both of the two bring birds into the indoor exhibition space, and both make use of human musical instruments. Nevertheless, there are important differences between both works, too. The zebra finches that contribute to *From Hear to Ear* are not confined to small cages but roam freely in the exhibition space. They decide whether they touch the electric guitars, which Boursier-Mourgenot has mounted, and so create sounds that

acoustically interact with their own vocalisations. The social and aesthetical relation between the birds and the human artist fluctuates between horizontal and vertical vectors, the overall framing of the artwork being typically human (and the zebra finch being a typically 'animal model' in biological laboratories) but leaving a lot of concrete autonomy and behavioural flexibility to the birds inside the installation. An analogous ambiguity as to the power relations in this social interaction lies in the aesthetic premises and outcomes of the joint collaboration. The audience can never be sure whether the birds are interested in and sonically interact with the guitar sounds they trigger or if the sound combinations are generated by chance processes.

While not referring to sound art in particular, artist Lisa Jevbratt's *Artistic Interspecies Collaboration Field Guide* tackles some of the problems that have become visible in Kahrs's and Boursier-Mourgenot's approaches. The copyright notice gives Jevbratt's canine companion Rosebud as co-author of the *Field Guide*, enhancing the practical function of the guide with a self-referential level that makes the flyer itself a collaborative artwork (Jevbratt and Rosebud 2009). Jevbratt and Rosebud's experiences of shared artistic collaboration are important sources for the guide. The text makes a strong case for the empathic and respectful approach of the human collaborators: 'Put yourself in the collaborators position. At times, become animal … Show affinity and respect towards your collaborator.' Clearly, the balance between aesthetic collaboration and ethical responsibility towards other species is here notably different from the previously discussed works. This also affects the realm of sound. The field guide hints at the different frequency ranges when it comes to the hearing ability of several species and points out that echolocation of cetaceans and bats lies beyond the human senses but could be interesting for artistic collaboration in principle.

2.2. Artificial intelligences

As explained previously, there can no longer be doubt in the creative capacity of non-human animals. Dennett furthermore emphasises the inherent creative potential of evolution as a biological or universal process itself (Dennett 1995: 223). At the same time, however, the ability of artificial intelligences to act autonomously creative is often questioned. Margret Boden (1991) argues for their theoretical possibility of becoming 'really' creative as there is no magic involved in the function of the (human) brain and it can thus be computationally modelled. Even if this affirms the basic technical prerequisites for a speculative future, it still contains the clear objective of

simulating human creativity. Instead, we should look for ways to enable genuine contributions of artificial intelligences in collaborative creative processes and ask for their requirements, conditions and consequences. Some approaches in this direction can already be seen in current projects and developments.

Although the creative process in current software approaches is very individually adapted to the respective projects, a distinction can be made by the level of autonomy in the evaluation of generated artefacts and the ability to make aesthetic decisions. Often, these concepts are framed by human measures and 'the emergent artificial aesthetics themselves seem alien and unrelated to human notions of beauty' (Galanter 2012: 286). Creative autonomy in AI agents is described and evaluated there from the anthropocentric perspective of human value systems for adaptive creativity (Bown 2012). While such notions of devaluation give clear evidence for aesthetic efficacy in creative AIs, test scenarios such as the 'Turing Test' seem very inappropriate for the evaluation and in particular appreciation of computer-generated artefacts. In his famous 'Imitation Game', Turing (1950: 433) proposed a test scenario in which a human interrogator is challenged to identify the human from the machine in a virtual chat conversation. The notion of gaming combined with the aim of distinction in this approach might thus actually even enforce exclusion from 'serious' artistic practices and perception (Colton, Cook, Hepworth and Pease 2014).

Boden's model of creativity (1991) suggests value besides novelty as a key criterion of generated artefacts to count as creative. But how can a genuine value system beyond human evaluation criteria emerge for artificial intelligences? The evolutionary origins of music point to various functional relationships and associated evolutionary advantages (Dissanayake 2008). Apart from this neo-Darwinian question for the origins of aesthetic preferences in survival values, mate choice proves to be an even stronger factor in aesthetic evolution in the biological world (Prum 2018). For artificial intelligences, then, we have to look thoroughly for mechanisms of reproduction and their potential role in the emergence of machine beauty.

Furthermore, referring to the concept of cultural evolution (Dawkins 1978), such benefits can also apply to the cultural artefacts themselves and co-evolve in virtual hybrid societies. A promising approach towards the collaborative emergence of a sound language between human and artificial agents is realised in Romero, Machado and Santos' 'Hybrid Society' project (Romero, Machado and Santos 2009). This is based on the roles of creator and critic, which in typical systems of interactive

evolutionary art are firmly assigned to machines or humans. Here, a community is created in which all participants – human and artificial – can play both roles. A shared aesthetic value system emerges through bets placed by critics on created artefacts that also appear attractive to other members of the society and both critics and creators being rewarded for successful bets. A relation matrix, specific affinities between creators, their products and critics become apparent, thus even creating subcultures within the hybrid society. The possibility of mutual influence in this heterogeneous network of interactions in a cultural ecosystem contains encouraging components to address potential driving forces for AIs to become sonically creative and thus even contribute to the development of new styles.

Against this, approaches where 'high-level aesthetic decisions are made by humans, while non-human agency is understood as an extension of human intentionality' (Gioti 2020: 31) should be overcome in order to let artificial intelligences become equal participants in sonic collaborations. Donna Haraway's figure of the cyborg (Haraway 1991) seems to be a helpful concept to reflect upon settings of co-creativity with blurred borders between biological and cybernetic worlds. These musical cyborgs can enfold in various configurations and create a contact space for joint creative action. Bespoke intelligent interfaces are needed to allow such artistic dialogues to emerge.

Rebecca Fiebrink's software 'Wekinator' and its underlying concept of 'Machine Learning as Meta-Instruments' (Fiebrink 2017: 137) offer an auspicious approach for this and allow a seemingly simple linking of input devices and software instruments. From a purely technical point of view, this mapping of parameter spaces does not appear to provide any independent creative agency for the AI involved, as all sonic changes seem to be controlled by the human performers. A closer look at the sonic interaction that unfolds in this setting, however, reveals a much higher degree of leeway for joint sonic design by performers and AI algorithms alike that goes far beyond notions of control and reproduction of learned gestures.

Performer and instrument builder Laetitia Sonami, known to be using machine learning in performances most extensively, regards the unpredictability of her instrument as a remarkable feature of the AI's agency in this cyborgian performance setup that 'does have agency and identity' (Fiebrink and Sonami 2020: 239). It challenges her to listen actively to the sound proposals of her artificial performance partner, continuing the explorative dialogue between them while performing together. She argues against transhumanistic desires to 'dominate an unknown' – the sonic presence of the technological other – through 'control and power' (Sonami 2014), and appreciates the

often-surprising contributions of the artificial performance partner.

With her live coding system 'flock', the British sound artist Shelly Knotts (2016) creates a playful concept for the interaction of human performers and an artificial population according to the mechanisms of politics. By either trying to match the expectations of artificial agents with voting rights or convincing the AI society to 'flock with their musical proposals' and vote for them, each performer can gain less or more volume within the audio mix according to the AI elections. Even if the AI participants in this performance are not themselves involved in the production of the individual sounds, their influence on the overall sonic result is quite significant. However, the question remains open as to how the sonic preferences of the AI agents are established. A combination with suggestions from Romero et al.'s 'Hybrid Society' could also help to achieve more autonomy in this aspect situated ahead of the performance itself.

The human–machine collaborative improvisation system Odessa (Linson, Dobbyn, Lewis and Laney 2015) follows Brooks's (1991) subsumption architecture, a 'minimal cognition' bottom-up approach to design robots, enabling them 'to respond quickly and appropriately to changes in an unpredictable world' (Eldridge and Bown 2018: 230). The underlying three modes of behaviour, 'Play', 'Adapt' and 'Diverge', which influence each other, form a system for autonomous interaction with human improvisational partners 'that suggests intentionality' (Linson et al. 2015: 101) without any evolutionary or learning mechanisms. Referring to the concept of free improvisation as collaborative real-time performance without any hierarchy between participants, Odessa successfully – within limitations such as no musical memory – tries to reach the same degree of agency. With future extensions, this promising concept might also guide us towards diverse assemblages of simple technological modules converging to a complex artificial intelligence.

Although AI has not yet reached this ontological status, Inayatullah argues for the potential of AIs (or in the embodied appearance as robots) to become alive (Inayatullah 2001: 95). The general question for moral agency of machines, however, remains unanswered because of the 'ambiguous, indeterminate and rather noisy concept' (Gunkel 2012) behind it. Theoretical concepts of critically decentring agency within a network of actors such as F. Allan Hanson's 'extended agency theory' (Hanson 2009: 92), on the other hand, fit very well into Latour's collaboration theory. Hanson refers to 'joint responsibility' (Hanson 2009: 97) to describe the shared authorship through the divergence, growing over runtime, between an originally human–computer

programme and its resulting artefacts. While it is a common reflex to blame computers for problems or errors, they are usually not credited with the authorship of positively perceived results. Philip Galanter therefore demands ethical treatment for Artificial Intelligence entities creating art 'when credit is due' and regards this as a first step towards machine patiency with potential moral implications (Galanter 2020: 26). Thus, this approach of 'radical immanence, relational ontology, and affirmative ethics' fits seamlessly into the concept of critical post-humanities (Braidotti 2016: 383).

We imagine that the way animal aesthetics is established and appreciated – and the rich discourse of animal ethics and animal citizenship of the last decades – could inspire the analogous process in AI aesthetics yet to be developed. We only briefly hint at the fact that theoretical sketches of AI ethics and AI citizenship already relate to the parallel and more established discourses on non-human animals. Obviously, the technical advances of artificial intelligences are difficult to predict, in terms of both time and direction – most past forecasts have been tempered by reality. Nevertheless, ways should be established here to enable these actors to gain more agency and abilities to collaborate as equal artistic partners.

3. CONCLUSION

This article aims to be a starting point for an increasingly interdisciplinary assessment of more-than-human actors in socially engaged sound practices. Latour emphasises the necessity of understanding the social as beyond the solely human: 'Because of this constant shrinking of meaning (social contract, social question, social workers), we tend to limit the social to humans and modern societies, forgetting that the domain of the social is much more extensive than that' (Latour 2005: 6). Prum's concept of biotic art (e.g., bird song, whale song) establishes the aesthetic agency of non-human animals as an evolutionary distributed trait in a post-human conceptual framework that cannot be neglected.

We have left out most questions of authorship and legal copyrights. To address briefly one aspect of future complications that can be expected in this area: similarly, as for animals acting collectively as a swarm, where the jointly created outcome is more than the sum of individual contributions, questions of equal crediting will probably also arise for AI algorithms working together. Do all systems running on a physical computer form a common identity or are they different entities, each of which might be entitled to individual aesthetical (and maybe even ethical) treatment in the future?

For the development towards general AIs that necessarily include artificial creativity, the currently predominant focus on deep learning alone does not seem to be sufficient, but rather an important component of a technological assemblage of differently oriented systems. Can concepts from biological evolutionary aesthetics inform common procedures of evolutionary algorithms and even lead to symbiotic forms of collaboration between human and non-human actors? We think that concepts of pluralistic co-evolutionary principles as presented by Prum (2013, 2018) and Rothenberg (2011) can enrich the development of evolutionary algorithms and contribute to more diverse and more complex social interactions, maybe even bringing together animal and AI creativity. The academic field of animal–computer interaction has been growing in recent years, as the establishment of the annual International Conference on Animal–Computer Interaction (ACI) shows. The general aspects of non-speciesist, animal-centred ethics in relation to ACI have been tackled by Clara Mancini (2011, 2017). In addition, ACI has already produced initial developments in sonic interaction design (Gupfinger and Kaltenbrunner 2019). A critical assessment of ethical challenges as well as aesthetical potentials of artistically driven ACI could (and from our point of view should) be a next step in these developments. Rosi Braidotti's proposal of developing Haraway's concept of naturecultures into what Braidotti calls medianaturecultures (Braidotti 2016: 383) could be a good starting point for such a critical and transdisciplinary discourse. We expect that this widened perspective in the future will also facilitate collaborations between non-human animals and artificial intelligences, and that new kinds of interfaces will emerge for this purpose.

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