Connectivity and Adaptability: Evaluation of Signal Flow Scenarios in Shared Outdoor Electronic Practices on Mobile Devices

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Abstract. Mobile devices and portable loudspeaker systems allow for a shift of electroacoustic sound practices to the outdoors. This paper reports findings from the ExoSound research project, which explores electronic co-musicianship in Nordic outdoor conditions. Three signal flow experiments that have been designed to enhance inter-musician and musician-environment connectedness are tested, evaluated, and discussed. In these successive experimental Scenarios, mobile devices are configured as individual instruments, as an output matrix using a WLAN, and an input-output network integrating a live microphone feed. The results point to a shift at the core of electroacoustic practices and aesthetics, from fixed pieces and instrumental agencies towards relationality and situatedness. Connectivity and adaptability emerge as concepts for the further development of approaches for networked electronic music making in the outdoors.

Keywords: Outdoor electronic music · Musicking with mobile devices · Distributed musical agencies.

1 Introduction

This coauthored article presents and discusses the concepts of connectivity and adaptability in-between musical agencies enabled during collective outdoor electronic musicking. The research creation approach has been developed within the ExoSound project. ExoSound focuses on shared and distributed musical agencies, with an aim to establish an electronic sound practice as a means for community- and place-making. ExoSound is aesthetically rooted in the traditions of electroacoustic and live-electronic music, but it enacts a transfer from sheltered studios and black boxes to the lively (and noisy) outdoors. The outdoor musicking of ExoSound deliberately brings the soundscape as well as other

features of the environment as central constituents of the sound work. At the same time, it is a collective practice based on listening and improvisation. Lastly, ExoSound creatively uses mobile networked sonic technology which gives novel socio-material arrangements. Thus, the project explores sonic and social relationality and mobility, as well as exposes the artistic practice to "all-season, all-weather, all-terrain" conditions in Scandinavian latitudes. It aims to unravel new technological constraints and possibilities for sonic practices in outdoor compared to indoor setups. This experimental approach feeds the development of theoretical concepts at the intersection of music technology, sociology, and artistic research.

ExoSound's contribution takes place within that disciplinary intersection, so rather than developing new gadgets, the focus is on relational socio-material practices. For example, by employing distributed music principles, we're not primarily interested in their *technological* novelty, but in the novel insight into the possible practices they can provide *socially* and *artistically.* What is more, as an experimental and experiential practice, we cannot predict its artistic outcomes, or the whole project's exercise would be moot. Rather, we draw on the intersectional experiences such a practice facilitates, recording and documenting its emergence.

2 Rationale and Background

The dataset and analysis presented in this paper stem from a series of field work sessions conducted in Southern Finland during the winter 2024-2025. The test sessions have been designed to explore the available technological frameworks for outdoor electronic co-musicianship, and to examine how specific technological settings affect aesthetic outcomes and social interactions within the musical practice. The technical and social implications of the practice were initially explored within a small team and selected guests. As a nascent practice, it is not quite clear yet as to what degree ExoSound will preform for an audience in the traditional sense. From the experiences so far *within* the practice, listeners are *participants* rather than *recipients*, they are part of the surrounding the sounding is situated in. Although it is essential to the practice to give access to a participative audience, the aim is to engage in co-listening, and co-sounding, quite far removed from the usual audience-performer paradigm. At the current stage of the project, our experiences seem to point to a new set of questions concerning the relations between audience/spectators and musician/performers and consequently an unease with the terminology just used. We prefer to refer to future work on that subject than making any rash claims.

Electronic music and sound art have embraced the outdoors in various ways, with lines of work in sound installations [2, 4], field recording [8, 20], and acoustic ecology [14, 18] and the open air "free parties" rave scene [17]. Anna Xambo has explored sonorous sensing and sonification of forest data in relation to climate change [21]. Mobile music creation with an environmental emphasis has been explored, for example, by Martin Parker in his piece "unsettled and oversensitive",

where sensor data from walking is mapped to the piece's sonic evolution [12]. The ExoSound project participates in an "environmental turn", where the arts increasingly turn towards environmental relationality, focusing in particular on the "live electronic" and shared dimensions of electroacoustically oriented outdoor sound work. The theoretical framework upholding this research envisions both music and technology as essentially social processes. In "Human Machines Reconfigurations", Lucy Suchman [16] describes machines, and thus technologies, as socio-material arrangements, to stress the performative, contingent, and enacted nature of all machines, opening a path to conceptualise technologies as something never only material. One aspect of socio-materiality at the core of our take on the concept is that technology itself is social in essence - the use gives life to the machine — a machine that is itself as an assemblage of acts of invention, practices, material negotiation and eco-politics. In parallel to a socio-material approach concerning audio technologies, our theoretical framework views music as an essentially social process as well. Christopher Small's "musicking" [15] frames music as a set of relationships where the meaning arises not only from the sounds themselves but from the people taking part in a sonic form of human social behaviour. Recontextualising Small's musicking to the electroacoustic context, where the demarcation of music and non-music has become somewhat irrelevant, we have adopted the more generic expression of "sounding" as a marker of our activities. Furthermore, emphasising the social and shared aspects of the practice, "co-sounding" appears to be an adequate and emerging term [3]. A third theoretical rooting of our approach is in the notion of relationality, which views the world through the lens of relationships and connections. Instead of viewing entities as isolated and independent, relationality focuses on the dynamic interactions and interdependencies among them. Baptiste Morizot [11] frames the current eco-crisis as a crisis of sensibility, with immediate aesthetic repercussions that drive our research project. In order to get out of the dead end, our ways of being and working need to integrate the embedded relationality of its technological objects.

The outdoors, with their multidimensional and multimodal liveliness, challenge us electronic musicians to relate in a novel manner. It would not make sense to look for sweet spots, ideal frequency response curves, or non-disturbed listening outlining "sonorous objects" as isolated, objective entities. In this paper, we discuss the strategies we developed to overcome the "individual instrumentalist" or "electronic music producer" paradigms when playing outdoors, on the basis of a series of systematic experiments by embracing the affordances of a situated practice with its human and non-human actants. Electronic music instrument design allows for distributed and networked signal flows, and is thus not limited to single-direction gesture-to-sound relations, technical affordances we hypothesise to be fruitful in our attempt to overcome the studio paradigm. Relevant prior work has been carried out in the domain of distributed instrument design and practice. As a short overview, Golvet et al. [6] have conceived "Simone, a collective instrument with distributed musical interactions", which uses a local network to share information between agents. Each participant's audio mosaic-

ing sound synthesis is controlled via network arrangements with shared data: clock, sound files or audio analysis data. In a similar vein, the "Powerbooks Unplugged" ensemble distributes code via wireless network among performers to be freely copied and modified. Code as sound source can be played in anyone's built-in laptop's speakers allowing for decentralized sound production [13]. Lähdeoja and Montes de Oca [9] have discussed the intertwining of musical agencies, ownerships and identities within a duo DJ practice where the DJ's sample each other in live performance. The research presented in this paper builds on these contributions and transfers the exploration of distributed frameworks for music-making to mobile devices.

3 Research Design

This article stems from a series of mobile musicking experiments run by the research team of three to four persons (depending on the occasion), each time in different outdoor locations. The project's ecologically-oriented research design which encourages upcycled, low-footprint solutions led to the adoption of a fairly generic technological framework comprising portable devices (Android and iOS) and bluetooth speakers. Initially, a number of free exploratory sessions were run with the aim to sensitise the team to outdoor sound practices and to instigate group dynamics and shared aesthetic grounding. Then, the three experiments which form the main corpus of this article were designed to test specific Scenarios built around the constraints and possibilities of signal routing between portable wireless devices. These experiments are referred to hereunder as Scenarios 1-3.

The methodological rooting of the study lies in research-creation, understood as an approach combining artistic work and academic research into iterated cycles of enquiry where the art and research component feed into each other [10]. The research framework is transdisciplinary, weaving together musical, technological, sociological as well as environmental and philosophical threads. The principles of the autoethnographic research are also adopted: intragroup introspection on the emotions, bodily sensations, and intuitions experienced during the field work sessions [1]. Auto-ethnographic writing extended the deep interpretation of the co-sounding experience [5]. The experimental Scenarios investigate the possibilities of a given technological framework to create affordances towards enhanced musical interaction between participants and to increase relationality with the place, its non-human and material constituents as well as its socio-cultural history and present-day characteristics. The qualities sought are evanescent, non-quantifiable and affective, such as listening (to each other, to the environment), aesthetic impression, changes in the felt sense of place and the social group - essential constituents of an aesthetic experience. The research interest lies in the examination of how specific technological configurations may give rise, or produce variation, in these qualities.

The three studied Scenarios involved planning and configuring a signal routing on the mobile devices, moving on-site to conduct the sonic experiment, documenting the experiment in audio and video, and finally evaluating the experiment

with a written observation diary by each participant. In addition, the video material was reviewed and the outcome discussed within the team. The observation diary comported the following elements:

- A general description with the date and day of the week, time of the day, duration of the performance, weather conditions, number and description of participants. Also, a description of the place with environmental features and materialities, historical and cultural identities, personal attachments, memories, and the sense of place.
- Description of the artistic, social and technical interaction during the performance comprising the dynamics of the interaction: high, low, alternate, phases in the dynamics, and Scenarios of "social coupling": individual, dyads/triads and whole group interaction phases.
- A personal reflection after the performance: How did I feel about myself during the experiment/performance? How did I feel about others in the group? How did I interact with the instruments? How did I feel about them? How did I relate with and feel about the place? How did I interact with the sounds in (of) the place?

4 The Experiments

The tests were conducted using Samsung Android and Apple iOS mobile devices and the related extensive audio app resources. The output stage consists of portable bluetooth speakers, including B&O A1, Minirig, JBL Clip 3 and custom made units. There are a dazzling amount of mobile device applications available from independent developers. The research team has tested a fair amount of them, but cannot give a comprehensive overview of the wide offer. Giving priority to apps geared towards more experimental or electroacoustic approaches, each team member makes their own choices, (e.g., "Animoog Z" synthesizer, "Flip" sampler, "Caustic" rack-mount synthesizer/sampler, "Model 15" modular synthesizer port for iOS, "Borderlands" and "SpaceCraft" granular synthesis samplers). Cross-app mixdown within one device can be done with the AUM Audio mixer app, and for networked audio signal flows between devices, the team agreed on a common framework using the SonoBus app.

4.1 Scenario 1: discrete configuration of iPad and loudspeaker

Scenario 1 was tested in a suburban Southern Finnish setting, on a mild winter day, with some car traffic nearby. In Scenario 1, the loudspeakers were directly linked via Bluetooth or cables to their respective mobile devices, namely 3 tablets (see figure 1). The loudspeakers were battery-powered, small, portable Bluetooth loudspeakers.

This Scenario is essentially an ensemble of instrumentalists, where each participant's speaker amplifies their own mobile device instrument. However, the technological framework allows for multiple mobile device-plus-speaker instances

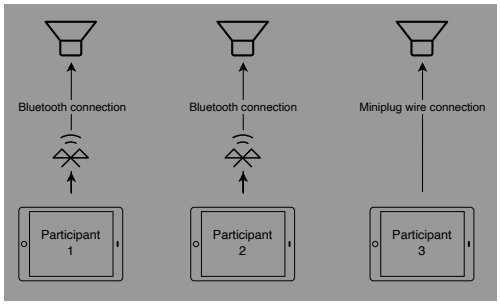

Fig. 1. Signal flow chart of Scenario 1.

to be operated by one person. Using generative sonic tools, loops, synthesizer pads or granular methods one is not tied to real-time control of the software instrument. Instead, one can set a "sonic state" on one device and leave it run, while working simultaneously on another device. Furthermore, the spatial arrangement is flexible, as it allows for the possibility to be stationary, move with the "personal mobile sound system", or leave a Bluetooth speaker to a particular spot and take some distance to the sound source. These configurations open a wide range of possibilities of interaction with the environment. For example, during the session one may place a specific sound next to a feature in the environment (e.g. a natural sound source, a plant, a rock, or an object), choose to relate to other players via movement, or engage in relating with the larger landscape features (horizon, architecture, forest, lake, sky. . .). However, here the Bluetooth range problems arise, and audio dropouts occur already at distances between two to four meters, depending on specific devices and regardless of the fabricants' overpositive sales statements. The currently widespread version of Bluetooth 5.3 (and prior versions) on mobile devices is restricted to one-to-one audio configurations between phones/pads and speakers due to operating systems capabilities. Figure 3 provides a photo document from Scenario 1. Video documentation of Scenario 1 can be accessed here: https:vimeo.com/1059719241/f88c3249b7

Evaluation of Scenario 1: Each Scenario was evaluated on the basis of the video documentation and the participants' observation diaries.[3] For Scenario 1, the first observation is the tendency of the participants to "bubble up", to close down on their own agencies. This is a classic issue in musical improvisation, here resurfacing in the particular context of the outdoor situation and mobile device co-sounding. Large parts of the observations point to difficulties of achieving balanced listening between one's own and the other participants' sounds, and finding strategies to remediate the situation. One participant reports: "I first focus my attention on my own sounds, but as soon as I hear something is going

[3] In the evaluations, text passages in quotes are drawn from the observation diaries.

on with my instrument I try to also listen to the others. I needed to approach them in order to hear them better. I have hung my speaker in my jacket, my fingers are already cold but I keep trying to find a sound that suits the other's sounds. Also I pay attention to the amplitude I am playing, I want to listen to myself but also the others." Another participant writes: "I didn't feel that I overpowered the others, but to hear them better I lowered my volume. Yet, I felt a bit caught in my own bubble."

The use of personal mobile device-plus-speaker configurations in outdoor conditions creates challenges for aural monitoring. The sounds get dispersed in non-enclosed spaces. Environmental sounds are omnipresent. The weak acoustic projection of the modest speaker systems make it difficult to discern individual signals. The experience of listening becomes unclear, centered on one's own sound. A possible solution emerges from movement. Moving towards the others, or leaving the speaker on a spot are means to break the bubble. "There were some very musical moments, often linked to a change in spatial position, be it that I got closer to one of the others or them to me." The multiplicity and novelty (in terms of hours of practice) of the apps demand tedious touch control and inter-app navigation, contributing to the emergence of non-communicative bodily postures that are salient in the video documentation. To alleviate the self-focus, the use of sound apps that utilise the mobile devices' touch screen in a way that encourages the performer to play without requiring attentive gaze was explored. For example, the "Hexaglyphics" noise generator app interface does not require precise pointing on any virtual screen "objects" or "dials", rather tactile-auditive exploration of the 2D screen space. Relating to the outdoor location and its multimodal presence while struggling with hearing each other added another layer of challenge. A diary entry states: "The on-location sounds almost disappeared when playing. Is there genuine sonic relationality happening?" The most salient sounds present in the environment are perceptible such as "some bird sounds, a car passing nearby and the road noise far away". At times, there is a perceptual merging of loudspeaker output and the soundscape: "I heard the sound of some other birds, I wasn't sure where they came from but then I noticed they come from another player's speakers. I added to that layer some water sound to shift from the electronics soundscape to a more 'real' nature soundscape."

Listening back to the Scenario 1 recordings was a surprise to the group, as despite the memory of a challenging session, there was a sense of having achieved musical balance despite the bubbles. While Scenario 1 constitutes a meaningful and easy entry point to taking electronic sound practices outdoors, its configuration transfers a traditional "indoors" instrumental setting to a radically different environment, and fails to embrace the relational potential of the outdoor co-sounding setting.

4.2 Scenario 2: output mix matrix

Scenario 2 was tested on a winter evening on a sauna terrace by a frozen lake, in a sub-zero temperature. In Scenario 2, the loudspeakers and devices were the same

Fig. 2. Scenario 1 in action. Three participants playing each on their own pad and Bluetooth speaker combination.

as for Scenario 1, but with a fourth iPad configured for a participant who could not make it. The devices were networked via the SonoBus software, which allows digital audio devices to stream audio peer-to-peer (P2P) via a wireless local area network (WLAN). The participants' mobile devices were thus able to send and receive audio from each other, and each participant could mix the incoming signals to their dedicated Bluetooth speaker (see Figure 3). This Scenario studied the possibility of networked audio outputs enabling a spatial distribution of sounds. A WLAN provided by a portable, battery-powered router was adopted, as it offers better transmission stability than internet provided by cellular networks. Latency is a shifting variable, depending on the amount of connections, network traffic, and the distances to the router. To provide a figure, the measured latency at one specific occasion for the WLAN has been circa 500 ms. While such levels of latency are somewhat manageable in a live setting without the need of syncing short-enveloped sounds (i.e. playing synchronised rhythms, which has not been the project's aesthetic scope at least for the moment), the delay can be perceived as a spatial effect, a single sound being reproduced in various speakers and spatial locations with small delays, analogous to the decorrelation of waveforms used by Horacio Vaggione [19]. The SonoBus app allows for independent control of networked send and received signals. While testing and playing we noticed that this independent output volume control opens the possibilities to a live sound diffusion performance in line with the loudspeaker orchestra tradition [7]. Figure 5 is a photo shot from Scenario 2. Video documentation of Scenario 2 can be accessed here: https:vimeo.com/1059723933/45de099ae6

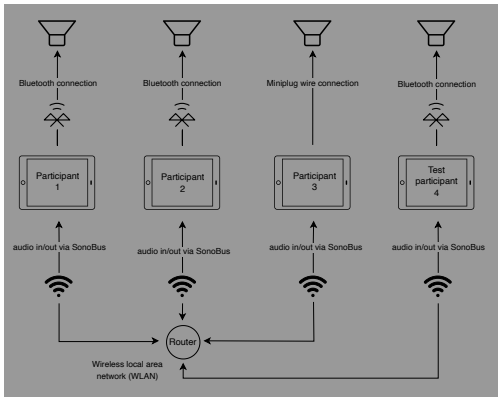

Fig. 3. Signal flow chart of Scenario 2.

Evaluation of Scenario 2: The Scenario 2's evaluation brings forth the enlarged agency of each participant. From playing a single sound source, one moves to mixing four signals into one output, and listening to the others sound the same. The configuration "created a mesh of possibilities", where one participant "barely knew what sounds came from whom." Thus, an interpersonal layer emerges between the players. A single participant is no longer just working on their own sounds and expression, the work evolves to include attentiveness to other players' sounds and the possibility to step back from a direct sonic engagement to a position of electroacoustic sound diffusion. Instead of Scenario 1's sound bubbles, there is the possibility to circulate, borrow, and spatialise sounds that become a commons. In this configuration, listening was found to be activated, and in outdoor conditions the listening automatically also involves the sounds from the environment, producing a standpoint of enhanced relationality within the practice. The complexity of the situation is underlined by a participant: "for most of the rest of the session my attention switches from trying to play the ipad, listening to the others, listening to the system (technical listening), listening to the soundscape of the place and feeling a bit cold."

4.3 Scenario 3: networked input-output

Scenario 3 took place in central Helsinki, on a sunny winter afternoon. The third Scenario expanded the mix matrix of Scenario 2 to include a live microphone feed. With the same number of loudspeakers and devices as above, Scenario 3 introduced an additional laptop with an omnidirectional microphone picking up the environmental audio, fed into the SonoBus signal network to be picked up by each of the players as source material (see Figure 5). For this experiment, it was decided that each player uses a short recording of the mic signal as seed material for further processing. Latency was clearly audible, but perceived as an aesthetic element: "what was interesting though, is how the sounds that I made

Fig. 4. Mixing signals via a wireless battery-powered router in wintery co-sounding by a frozen lake.

and the others received, sounded entirely different in his setup, exaggerated by a considerable delay at points." The decorrelated signals create a sense of spatiality that "fits especially well to this landscape". On the other hand, the achievement of synchronised percussive sounds might be difficult, or require a distributed clock signal. Signal cuts and dropouts appeared at longer distances to the Wi-Fi router, limiting the area of exploration by the participants. Another pragmatic note was made on the configuration with a mobile router run by a computer being more complex and requiring more setup time, which happened indoors to avoid getting freezing cold even before playing. Also, the cold weather conditions were noted to limit the capacity to concentrate. Co-sounding in the wintery Nordic outdoors creates a mental and physical challenge that the group must be motivated enough to endure.

The Scenario 3's configuration aimed to introduce a second layer of relationality to the previous Scenario, with the direct involvement of the local soundscape into the practice. The environment thus became constituent of the sonic material itself. Given that each player started out with a similar base material, and that each player's sound could be diffused via any speaker, this Scenario also gained in sonic homogeneity at the same time as in perceptual complexity.

Evaluation of Scenario 3: The observation diary entries concerning Scenario 3 point to a radical shift in how the practice was perceived. One participant noted: "getting into it as usual – and then something lively, uncontrolled starts to happen", and another wrote: "an incredible amount of sounds was sent around. No idea who sent what to whom, to be honest, but all sorts of textures, swoops

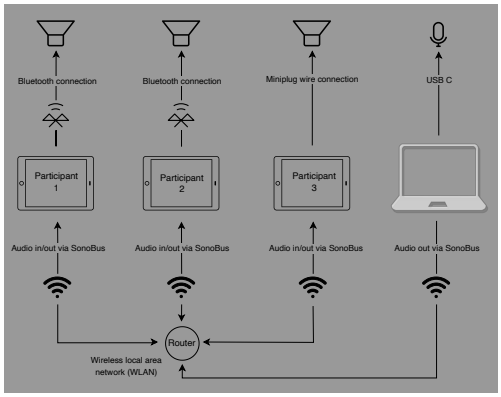

Fig. 5. signal flow chart of Scenario 3

and dynamics ensued. Due to some glitches (I presume) that led to intermittent signal interruptions, even rhythmical elements featured in many places — a very satisfying and engaging experience. There was an interesting phase of feedbacking though the many possible open chains, which at one point or two became slightly nerve-wracking, but not un-musical."

The combination of a live microphone feed as shared source material with the mix matrix brought a sense of loss of individual sound signature and recognisability. In a radical manner, there was also a loss of understanding what one's sound is, loss of ownership, as expressed in one diary entry: "the feeling is that I don't know what's "my" sound or agency, it circulates. Not much control, but the ensemble morphs and lives. Very enjoyable." A feedback element was present, without a clearly detectable source (despite the participants' non-negligible sound engineering experience), provoking a sense of loss of control: "feedback, strange sound behaviour, out of control – but still manageable, not getting too loud." A sense of surprised excitement emerges from the diary entries. Some participants noted the wish to involve fader-like physical volume controllers to the set, for controlling gains fast and precisely. Interestingly, within Scenario 3, the sound work starts to merge with the environment. At 2'30 of the video Scenario 3 footage (see link below), a construction site truck unloads wood and the related sounds become a musical agent, fitting rather seamlessly into the mix. Video documentation of Scenario 3 can be accessed here: https:vimeo.com/1059730907/2e1a2b151f?ts=0&share=copy

5 Findings and Discussion

Through the three experimental Scenarios reported above, the relational qualities of outdoor co-sounding practice were found to develop between the participants as well as towards the environment. With this process, the aesthetic

experience gained in meaningfulness and interest. Regarding the technological framework, two key notions emerged as useful feature descriptors for mobile device music network design, namely connectivity and adaptability. We found these parameters to be useful abstractions for further development work. 1) *Connectivity* points to creating linkages between "individual" devices, with a vector of growing entanglement and complexity from Scenario 1 towards Scenario 3. Connectivity affects the participants' agencies, the types of actions that can be carried out within the practice. In more traditional musical practices with an "individual/instrumental" approach, one connects to other musicians' materials through interpretation (by listening and musically responding), whereas within framework with enhanced connectivity, one can concretely circulate the sonic materials via networked devices amongst participants: rather than interpret another participant's contribution one can edit it. Adding the microphone feed connects the practice materially (or energetically, to be precise) to the environment. Along with growing connectivity, the control and ownership over one's sonic agency become more porous, leading to various degrees of merged sonic identities and agencies. 2) *Adaptability* refers to the scope of input-output capacities of the framework. In Scenario 1 interaction with the environment happens through a co-presence of the real environmental sounds and the electronic sounds played with devices. In Scenario 3 the omnidirectional mic which takes in environmental sounds allows for more adaptability of the networked architecture of devices - capacity to incorporate environmental sounds into the electronic sonic palette. Further avenues of enhanced adaptability can be imagined, such as using pre-recorded samples or soundscapes, different types of microphones (hydrophones, contact mics, geophones), internet audio feeds for input and output, radio transmission etc. On a more theoretical level, the findings arising from the electronic musicians' passage to the outdoors point to a profound shift affecting the very core of the artform. Traditional instruments have been used outdoors ever since their inception (folk musicians have been out in the rain forever). Our "instruments, have a different history: The apps we use have initially been developed to be a "studio on the go", inheriting the interface logic of studio equipment like faders, radial dials, switches, patch cables, and keyboards — all paradigms in turn inherited from three dimensional tactile analog equipment with its design origin going back to the 1950 or beyond, now represented on a two dimensional touch screen of a tablet.

Transporting these production settings from the "controlled" and ordered condition of the studio to the outdoors exposes both the digital processing- and the screen- paradigm's materiality as bubble-makers, as social isolators. The classical material and spatial regime of the studio is a well-known and predictable given, and, especially in the contrast with the outdoors, could be called sterile. It shapes the social roles of the musicians as (in a studio we become "producers", typically as single-authors). The outdoor materiality, in contrast, introduces new and quite unknown, spontaneous and elemental actants that force us to acknowledge, adapt, and relate to them. We can't simply just adjust the air conditioning if we get cold on a location, an unexpected car approaching

is a material intrusion, cold feet become a performance defining parameter, the hush of wind distorts the “clarity” of the played and the recorded sound.

As we engage into the interaction with the outdoor actants, we can use or enact their "native" outdoor nature in our tools, sounds, and bodily movements as we make music. The unknown and unpredictable nature of these actants, their otherness, invite us to step out of the comfort zone (zone of control we are accustomed to) and explore frameworks where traditional roles and expectations of musicianship may lose their relevance. Authorship and control are exchanged to modes of merging and blending, the notion of a musical “piece” dissolves and makes place to experiential flow of being in a specific place with one’s senses open to the environment (be it rather cold and harsh) and the other participants. In this framework musicians become more investigators than producers, listeners than performers, and are more free and motivated to act together than alone. This shift constitutes the direction and motivation for our future developmental work with the technological framework.

6 Conclusions and Future Work

In this paper, we have presented three experimental Scenarios of shared outdoor electronic music making - or co-sounding - exploring the perspective of relationality. The outdoor environment is radically different from the native spaces and social contexts of electroacoustic music, calling for portable and mobile sound tools which come with their restrictions. The outdoors also challenge habitual modes of listening, responding and sound shaping agencies, giving rise to aesthetics of participating in a living, merged body of sound. Also, the habitual music technological theoretical framework is called into question, as the change of environment contests the objecthood of devices, sounds and agents, and brings forth the need to think in terms of relations, which may be abstracted as vectors of connectivity and adaptability. While the scope of future work presenting itself to us is vast, some immediate next steps may be outlined. Enhancing connectivity involves introducing individual microphones to each participant to transform the player into acoustic probes who can sample and modify the sounds of their environment. Due to mobile device restrictions, these microphones need to run on independent mobile devices and linked into the signal network via internet and the SonoBus app (or similar audio over internet framework). Also, the emerging Bluetooth 5.4. Auracast functionality could offer a way to create a signal network where each participant could access all of the Bluetooth speakers and work on spatial signal diffusion. Finally, as a step towards further adaptability, the perspective of walking as we play emerged as a thrilling perspective to connect with the environment in a more dynamic manner.

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