Revista Música, v. 23 n. 2, dezembro de 2023, p. 277-289.
Submetido em 17/10/2023 – Aceito em 26/12/2023.
D.O.I: https://doi.org/10.11606/rm.v23i2.217203

Soundscape composition, hearing the real and surreal

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Abstract: Creative and interdisciplinary approaches to soundscape are introduced pointing out diverse compositional designs of aesthetic or scientific outcome. Different and adventurous works reveal the role of technology and its utilization either for artistic or scientific tasks. This article discusses different compositional approaches related to soundscape and its technological application. It creates an entire body of original works of specialists that connect with multiple disciples that find soundscapes as a useful tool for research like aural fauna identification. As an example, one can see collaborations between specialist biologists and artists dealing with fauna census who are technology experts. All these have led to redefining different concepts found within the discipline of composition, working with soundscape. Compositions like Verdant by David Dunn, and Shadow by Max Richter help us to define 'surreal' soundscape. These compositions combine natural sounds along with synthesized ones. On the other hand, works by Murray Schafer and Bernie Krause exemplify compositional practices while recording 'natural' soundscapes, which are described during the work. Nevertheless, we focus on the different possibilities and strategies implemented by practitioners interested in contributing to current environmental issues.

Keywords: Interdisciplinary, Soundscape, Technology.

Composición del paisaje-sonoro, escuchando lo real y surreal

Resumen: Acercamientos creativos e interdisciplinarios entorno al paisaje sonoro son presentados señalando diversos diseños compositivos con finalidades estéticas y científicas. Variado y venturosos trabajos enseñan el papel de la tecnología en su aplicación artística o científica. Este articulo discute diferentes acercamientos compositivos relacionados al paisaje sonoro y su empleo tecnológico. El cual crea un cuerpo de trabajos de especialistas que conectan con múltiples disciplinas encontrando al paisaje sonoro como herramienta de desarrollo como el reconocimiento aural de la fauna. Como ejemplo se puede observar colaboraciones que lidian con censo de la fauna entre biólogos especialistas y artistas expertos en tecnología. Todo esto ha llevado a redefinir diferentes conceptos encontrados dentro de la disciplina de la composición que trabajan con el paisaje sonoro. Composiciones como *Verdant* de David Dunn, o *Shadow* por Max Richter nos ayudan a definir "paisaje sonoro surreal". Estas composiciones combinan sonidos naturales junto con sintetizados. Por otro lado, trabajos de Murray Schafer and Bernie Krause ejemplifican practicas compositivas mientras se graban "paisajes sonoros naturales," los cuales son descritos en el trabajo. Sin embargo, nos concentramos en las diferentes posibilidades y estrategias implementadas por practicantes interesados en contribuir a diferentes desafíos medioambientales.

Palabras clave: Interdisciplina, Paisaje-Sonoro, Tecnología

Contextualizing Soundscape and its interdisciplinary practices through sound

This work shows different strategies established by soundscape practitioners and their aesthetic links with science. The soundscape is an artistic practice related to music and acoustic that has been used in other disciplines, thus, making it an interdisciplinary area related to diverse fields of ecology, fauna preservation, and speech recognition, among others (GALE ET AL, 2022; BARCLAY, 2014; TRUAX 2022). Which is enhanced by recording technology. It has facilitated to capture soundscapes with high-quality definition at diverse landscapes. Recently, soundscape has gained interest among specialists like sound artists, composers, and ecologists as well as in different areas such as environmental studies, among others (CELIS-MURILLO ET AL, 2009; BRÜGGEMANN ET AL, 2021; FARINA ET AL, 2011; KRAUSE, 2002; MARTIN, 2018). We can find creative approaches in the works of figures such as Bernie Krause, David Dunn, Tania Rubio, Barry Truax, among others. Those examples connect interdisciplinary different areas creating innovative approaches to cooperate. As an example, we can see shared efforts towards fauna census utilizing sound technology as a tool to improve non-invasive methods.

Soundscape, in its basic form, relies on recording acoustic environments; hence, it is important to differentiate strategies or methods driven by technology used during the recording. Similarly, It is necessary to make a distinction between scientific and artistic outcomes, because due technology used during the recording process will shape the actual outcome, be artistic or scientific. For example, ambisonics[1] technology has allowed us to create novel applications like a multichannel array fauna census. Author Celis-Murillo *et al* describe a quadraphonic recording method applied to the census avoiding common bias during the process of collecting data (CELIS-MURILLO ET AL, 2009).

Soundscape as an interdisciplinar research field has been closely related to technological developments in audio recording. Recording actual events leads to a unique perception of temporal perception of reality. One example of this transformed temporal reality is found in Jack Loeffler's recordings of Mexican wolves in the Sonoran Desert. "These sounds are not only a commemoration of lost animal species, but also an act of conservationist advocacy for

[1] Ambisonics is a technology developed to capture and decode sound recording fields in 360º sphere by combining four microphones distributed in the angle differential of tangents and cosines. This allows recording sound-spatial trajectories for later reproduction. The patterns in the recordings are decoded as first order, second order, or third order, etc. (MALHAM ET AL, 1995; LIU ET AL, 2021)

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species that may be vanishing and under imminent threat of extinction" (INGRAM, 2006, p.124). One perspective of conservation is that sound can be heard, even though the actual wolf is not at the same place or time when heard back. However, it is possible to bring it back to life aurally. Together, artists and scientists have developed alternatives to less invasive and accurate methods to obtain data. In particular, different composers, sound artists, and researchers gained the possibility to be innovative during the different stages of research. As we will discuss later, customized technology has been developed according to the particular interest of research.

Two different approaches to soundscape composition

> Soundscape composition over the past decades has established itself as a popular compositional practice among acousmatic composers utilising compositional techniques that go beyond phonographic representation of acoustic environments (Martin, 2018, p.20).

Two approaches related to soundscape composition are described in this section. The first is the most common: to obtain clean and transparent recordings of the acoustic environment. In general, the goal is to record the different acoustic events that might occur at a particular location at a particular time. To make a clear distinction, we will refer to this practice as '*natural soundscapes'* later in this work. Different composers and sound artists like Bernie Krause and his work *The Great Animal Orchestra* (2016)*;* or Murray Schafer's work *Soundscapes of Canada* (1974) exemplify this compositional approach to 'natural soundscape' exemplifying this compositional approach.

The second compositional approach combines recorded soundscape along with synthesized sounds that do not belong to the original recorded environment. We will refer to this soundscape compositional practice as '*surreal soundscape*'. Although it does not exclusive means to combine the original soundscape with synthesized sounds, it could include a live musical performance in the particular landscape obtaining reactions from the creatures that live there. It combines either synthesized or live performance with natural sounds from the landscapes. The performative act of producing sound aims to interact with the acoustic environment and its nonhuman species. It is because of that that we do not name it as a mixed soundscape related to mixed or tape music practices. Pieces like *Verdant* by David Dunn, or *Shadow* by Max Richter exemplify it. *Verdant* and *Shadow* are a mixture of recorded soundscapes with synthesized sounds.

The first compositional approach to be described is '*natural soundscape*', which focus on obtaining acoustic recordings in a particular time and place, for later to be heard after an edition process like mastering. Different experts have created a body of work and methodology around it. One earlier example is the World Soundscape Project (WSP), which was created by Murray Schafer and his colleagues as a research project at Simon Fraser University (MARTIN, 2018, p.20). Since then, this approach, natural soundscape has gained popularity and has found innovative collaborations between artists and scientists. Murray Schafer's book, *The Soundscape: Our Sonic Environment and the Tuning of the World* proposes a taxonomy that guides an interdisciplinary approach to listening to everyday life sounds. The goal is to focus our intention on the nature of the sounds being recorded in their surrounding context.

The second approach to be described is '*surreal soundscape*'. It involves different interests shown in the previous soundscape compositional approach, but frees itself from barred concepts like accuracy, preservation, interdisciplinarity, and so on, which are found in the previous approach described. "A key element in this inversion is that we listen to the soundscape with the same focus that has traditionally been applied to music, at least before it became an environmental accompaniment" (TRUAX, 2022, p.282). The aim of '*surreal soundscape*' is to obtain aesthetic listening experiences that use a soundscape as sound material combined with other sound materials that do not belong to the original soundscape recording. As previously introduced, Dunn's and Richter's compositions combine soundscape with synthesized sounds. Finally, some of Dunn's work demonstrates a subtle but complex interspecies communication through sound. Dunn's experience is described in his article *Music, Language and Environment:*

> Over the course of 3 or 4 days, an event occurred that was quite unexpected-at least on my part. The trumpet players were perched very far apart from each other, playing and hearing these reverberant structures within this immense open space. Three ravens flew over. We hadn't seen any ravens during the previous days. They appeared as soon as the trumpets started playing. They began to fly in front of the trumpet players, doing barrel rolls and all sorts of aerial acrobatics, cawing in and out of the trumpets, and matching pitches with the trumpets" (DUNN ET AL, 1999, p.63).

Examples introduced at 'surreal soundscape' are heard as an acoustic intervention, despite the temporality in which the sounds are heard or created. Composition *Verdan* and *Shadow* utilizes studio practices of audio edition incorporating extra sound materials not embedded in the original soundscape recording. Moreover, Dunn's experience interacting with the trumpet players and ravens, in a reductive perceptive, all parts, humans and ravens intervene acoustically in the soundscape.

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‘Natural soundscapes’, unaltered representation of acoustic environment

As an aesthetic experience, hearing nature in its full acoustic context creates different awareness. As previously described by Jack Loeffler’s recordings of Mexican wolves or similar approaches, it opens the debates around the perception of time and conservation. This kind of work commonly addresses the interaction between humans and the acoustic environment, and acoustic alterations that might occur during the recording. For example, Bernie Krause recalls in his article *The Loss of Natural Soundscape*, his experience while recording. “Soundscape refers to any acoustic environment… In its pure state, where no human noise is present, natural soundscapes are glorious symphonies” (KRAUSE, 2002, p.27). This particular attitude towards soundscape composition allows us to perceive the different ecosystems in its behavioral context of the living creatures that occur in that particular place.

Soundscape as a listening aesthetic experience can offer creative use of field recordings to design soundscape compositions, which has opened new ways of hearing. Being able to hear recordings in a different time and place where the actual recording was done is significant not only in the perceptual field. But augment our understanding of the different human or animal population’s behavior that exists there. “Soundscape studies methodologies are increasingly being shared within community engagement projects with the aim of not only raising listening awareness but also developing a localised perspective of what a community soundscape means to those that live within it” (MARTIN, 2018, p.21). Composers and sound artists who usually explore the nature of the sounds embedded within the soundscape raise different strategies to document the acoustic environment utilizing diverse and contrasting available technology. Usually, this kind of work focused on using different recording devices to capture best acoustically the soundscape, later to be heard back in a sound system. Usually, it is aimed to obtain clean recordings in high-definition resolution, according to the technological capacities.

By using diverse recording technology, it is possible to address either artistic or scientific applications. For example, soundscape can be useful as an alternative to traditional methods of fauna census. This contribution has been gaining popularity in different areas like artificial intelligence, ecology, environmental preservation, and so on. One advantage in using soundscape in its unaltered recorded form helps as a tool for fauna census. It is possible to develop innovative ways to count fauna members of different species like birds. In comparison, traditional methods used by specialist ornithologist systematically cover an area on foot, observing and visually identifying bird species (BRÜGGEMANN ET AL, 2021). Summarizing,

'natural soundscapes' provide a direct link between arts and science, in addition to creating wide and contrasting art pieces.

'Surreal soundscapes', mixing synthetic and nature

It is possible to find bold creative compositional approaches in what we differentiate as '*surreal soundscape*'. One significant difference between the two soundscapes' compositional approaches is the role of the artist while working. In the first approach introduced, '*natural soundscape'* is usually a passive role during the recording process by the artist. While in the latter, 'surreal soundscapes' artists take an active role seen as an action-reaction. Creating new works utilizing sound materials to work within the traditional matter of composing. To clarify, in an analysis attached to musical interpretation, I focus on Max Richter's composition *Shadow* exemplifying 'surreal soundscape' composition practices.

Richter's composition is found as a section of the album entitled *Recomposed* by Max Richter: Vivaldi, The Four Seasons. This composition is integrated by songbirds with reminiscences of what it sounds like re-synthesized Vivaldi's *Four Seasons*. Richter combines processed new sounds with songbirds to compose a novel piece that frames nature in a double meaning. To hear the songbirds is easy to associate with nature, but the synthesized sound extracted from dreamy reminiscences of *Viva*ldi's *The Four Seasons* can be seen as the second allegory associated with Richet's work framing nature. Vivaldi's composition has been historically related to nature in a shared constructed imaginary linked to music and nature. Therefore, the metaphor found in Richter's work has an active role in modifying nature in a musical experience. Despite this brief analysis that enclosed different issues each would require a new whole work. This example illustrated a constant shift in our perception of nature through music and sound.

A second practice found in this compositional approach 'surreal soundscape' composition can be seen in some David Dunn's work. His focus helps us to redefine compositional concepts related to interspecies aural interaction. As earlier discussed, interspecies communication is addressed in his works. Looking at Dunn's description of the acoustic interaction between the trumpet players and the ravens, it is possible to link different ideas and concepts integrated into soundscapes to interspecies communication when the ravens react to the sounds performed by the trumpet player. Similarly, some of his research is focused on interacting with insects, which creates a sophisticated methodology using technology as a medium to interact.

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For example, Dunn's recent research deals with bark beetles, which are insects that infest the trees to later destroy them. Dunn and scientific colleagues implemented a method to project sounds that could be perceived by the insect by using transducers attached to the trees. This research led him to apply audio technology to enhance acoustically what is sensed by insects and humans to find different patents (RAPPAPORT, 2017). Dunn helps us to exemplify creative work, dealing with an innovative approach to a specific environmental problem, specifically changing the insects' behavior to not infest the trees. It needs to develop a system that records the sound produced by bark beetles in its frequency range which is completely different to mammals or birds. This method uses projected recorded sounds of "the aggression calls made by the male insects… together with artificial squawks and bleeps of the same frequency" (GILES, 2010, p.20). This research demonstrates the difficulty of working with recording and reproducing sounds in a completely different range and mediums of sensing acoustically. Thus, the entire idea of using sound differs from the conventional approaches to composing that are fixed in the hearing range of humans. Author Barry Truax helps us to contextualize musical practices as an interdisciplinary compositional approach. "The relationship between what I will call listening knowledge and interdisciplinary knowledge, in other words, the relationship between the experiential and the scientific [sic], and specifically how contemporary electroacoustic technology allows them to interact" (TRUAX, 2022, p.280).

'Surreal soundscapes' as a compositional approach is related to different areas of interest like music, sound edition, acoustics, technological development, and interspecies communication. The outcome can have a wide variety of results coming from aesthetic experiences like the ones introduced by Richter's work. Similarly, in this compositional approach can be found scientific applications like behavioral shifts conducted through sound, as David Dunn's work exemplifies.

Technology enhancing the interdisciplinary soundscape composition

Different authors like Tania Rubio and Patricia Gray introduce a new term useful for our study: biomusic (RUBIO 2020; GRAY 2014). As the junction among different disciplines that relate transversely within others such as, biology, acoustic, ecomusic, zoo-music, and so on. Biomusic conglomerate manifold and contrasting artistic practices that can be found in 'surreal soundscape'. Furthermore, it is possible to differentiate aesthetic concepts and concerns between the two discussed approaches to soundscape composition.

‘Natural soundscape’ composition relies on making clear audio recordings from the landscape to be recorded. While, ‘surreal soundscapes’ combine the landscapes’ audio recording along with synthetic sounds, or live performance recorded and the possible interspecies interaction while performing. For both approaches a key element is the actual place recorded. For example, if the recording takes place near the seashore, it is clear that ocean sounds and fauna like seagulls will be heard in the recording. In contrast, ‘surreal soundscape’ also involves such acoustic environments, but altering the natural or original content either by music performances or by adding sounds from synthesizers during the edition processes.

Similarly significant is the technology used for its interdisciplinary outcome. As an example, different researchers have implemented multichannel technology not only to create artistic pieces but also to improve different strategies for fauna census and identification (BRÜGGEMANN ET AL, 2021; FROMMOLT and TAUCHERT, 2014; WHYTOCK and CHRISTIE, 2017; PRIYADARSHANI ET AL, 2018). To describe the process in which soundscape facilitates fauna classification and census using different technologies, it is necessary to associate it with different disciplines like algorithmic recognition, environmental studies, bioacoustics, and so on. “Over the last century, audio technology has transformed our relation to these acoustic sources by making all sounds available for creative production” (TRUAX, 2022, p.279).

Thus, soundscape as an interdisciplinary field of research has been closely related to different recording technologies. Recently, technology like ambisonic recorders has made it possible to obtain audio recorded with acoustic signals that refer to the spatial perception of sound. As previously described, the multichannel array system employed by Celis-Murillo and colleagues to sense fauna uses a defragmentation of the acoustic space, which is possible due technological capacity that the multichannel recordings enhance. Ambisonic recordings work as a multichannel array that codes and encodes audio signals to reinforce spatial cues through sound. “A particularly interesting trend in soundscape composition is the use of multiple loudspeakers for reproducing the work, the performance practice called ‘sound diffusion’ in electroacoustic circles” (TRUAX, 2008, p.105). Resulting in immersive experiences of listening that increase the analytical and perceptual hearing embedded in the recordings. This has been useful not only for artistic experimentation, but also for disciplines that find soundscape as a related area like ecology or fauna census.

With novel technologies and their applications, soundscape has been an interdisciplinary tool that enhances different research and works from other disciplines. For example, as previously mentioned, Antonio Celis-Murillo introduced a novel approach to bird census. His approach contextualizes a community of experts dealing with soundscape and its potential contributions

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to the field. In particular, the application of the fauna census has been gaining popularity. One advantage in using soundscape as a tool for fauna census is that it is possible to count bird calls despite not being able to witness them. Thus, it is possible to obtain an accurate census rather than using traditional methods.

Conclusion

Traditionally, when referring to soundscape composition, it is agreed that art pieces are created with recorded environmental sounds. Generally, this kind of "work was to document acoustic environments… to increase public awareness of the importance of the soundscape, particularly through individual listening sensitivity" (TRUAX, 2008, p.103). Practices found in Murray Schafer and Bernie Krause, help us to classify them as 'natural soundscapes'. Particularly when obtaining recordings with unnoticeable human activity is shown to be challenging. For example, Bernie Krause recalls when recording the spadefoot toad (*Scaphiopus hammondi*) at Mono Lake in the eastern Sierras. How low-flying jets can cause changes in the biophony introduced by the frog losing the acoustic life-serving protection (KRAUSE, 2002, p.29). Thus, this approach facilitates environmental analysis contextualizing the soundscape behavioral awareness of the different species taking place during the recording process. To obtain good soundscape recordings is required to master skills while obtaining clean and transparent acoustic recordings from different places that challenge people from amateurs to leading professionals.

Dunn's works exemplify a complete plate of artistic and scientific questions and his intention of contributing to help with a global problem faced by the forestalling devastation is quite significant. Or is the entire process an artistic outcome? Similarly, Richter's work rises in a musical composition, a metaphor focused on nature and its constant shift in our relationship between art and nature. The creativity and possibilities found in both figures, Dunn and Richter expand our imagination redefining the link between music and landscape. Dunn's works exemplify an innovative collaboration with a scientific community interested in understanding fauna behavior, and its potential shift through sound. Therefore, we associate some of their artistic interdisciplinary practices with 'surreal soundscape'. The interdisciplinary link to multiple fields of interest results in adventurous pieces redefining the idea of composing with environmental sounds and data. It shows artistic imagination working with specific concepts like interspecies communication.

Two compositional approaches were described in this work: "surreal and natural soundscape". Both relate to different disciplines like acoustic, aural fauna algorithmic recognition and forestalls devastation; related music areas like biomusic, ecomusic zoo-music, and so on.

Similarly, it breeds our relationship with music creating new ways of hearing and understanding the perception of reality. “Joel Chadabe stated that the current artistic practices of electroacoustic composers are rooted in the idea that new technologies, unlike traditional musical instruments, can produce sounds used to communicate core messages, including information about the state of our environment” (BARCLAY, 2014, p.497).

As compositional approaches, they contrast in the aural representation of reality. On one hand, ‘natural soundscape’ represents the actual place with all its acoustic phenomena that occur during the recording. On the other hand, ‘surreal soundscape’ creates a non-real listening experience, either by incorporating musical performances aiming to interact with living creatures or by adding synthesized sounds in the post-recording edition. Nevertheless, both compositional approaches gather together in different ways and concerns contributing to sharing areas of interest among artists and scientists. It deals with different and extensive technological possibilities to record with a constantly increasing resolution, contributing to research areas like acoustic fauna recognition. This facilitates the specialist to compose the soundscape’s sonic materials by choosing among the multiple possibilities like the artist’s passive or active role during the recording process.

Summarizing, we have defined two compositional practices related to interdisciplinarity by employing different and contrasting technological applications. The examples described in this work, identify differences and similarities between ‘surreal’ and ‘natural’ soundscape composition. This might result in contrasting methods to obtain data on interspecies communication and behavioral patterns using sound as the medium to analyze. In general, soundscape boosts interdisciplinary collaborative approaches, creating an immense body of works from different areas and focus of interest. Debating and addressing the different outcomes either scientific or artistic utilizing audio technology like multichannel audio recording.

Acknowledgements

This research was supported by the postdoctoral scholarship of DGAPA UNAM.

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