

## Sonic Intimacies: The Sensory Status of Intimate Encounters in 3D-Sound Art

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I am looking and listening – all around me – enjoying the flora and fauna at the Rio Verde or Verde River, a large perennial stream running through the Tonto National Forest in Arizona. I am seeing the bright blue sky and from time to time the calls of small birds passing by is making me conscious of the wide open sonic space that envelops me. I am surrounded by lots of willows, reeds and cattails and I am listening to their voices: the gentle weeping of the willows and the delicate rustles of the reeds and cattails in the breeze. I am also witnessing voices coming from the ground: a chorus of humming crickets occasionally punctuated by the soft sound patterns of human footsteps up on the sandy bank behind me. I am turning my attention to the murmuring river water which is inhabited by such fish as the Gila chub, mosquitofish and Sonora sucker. Sometimes I am hearing a splash of a fish jumping in the water. I am thoroughly present in this place, aware of the scale of place and the density and even the temperature of the air – until I am looking down and the absence of my feet from the sandy river bank is reminding me that I am actually not there – I have no feet, no legs and now I am realizing that I don't have arms and hands either – I am floating in this place. I am remotely present, wearing a virtual reality headset and a pair of high-quality headphones. The “Tonto National Forest Sojourn” (2013) is part of an ongoing series of virtual reality (VR) experiences, under the title *EcoRift*, that allow the audience to feel intimately present in pristine and remote natural environments - often not readily accessible to most people.<sup>1</sup> *EcoRift* fuses two sensory domains, the visual through 360-degree photography and the auditory through a matching dynamic 3-D sound field created through high-order ambisonic field recordings. It invites the audience to turn away from their everyday surroundings and to have intimate, that is private, personal, and somatic responses to the environments they discover. Here art is no longer an object isolated from the audience for their individual or communal observation, but an immersive environment that is dynamic and affects audience's body and mind in individual and different ways.

Such sound art forms for VR have offered new experiences for audiences that facilitate what the phenomenological philosopher Maurice Merleau-Ponty and more recently philosopher Don Ihde called embodied relations.<sup>2</sup> They involve audiences in a set of unique relationships with technology that leads to an embodied engagement with the world that could not occur without the technology. The special case for *embodied relations* is that we are not momentarily aware of the role of the technology that facilitates that interaction because we embody the technology. Traditionally such technologies as eye glasses and walking sticks are commonly used by humans and easily incorporated into their body schema and so we understand their phenomenology. The *EcoRift* VR experiences are a post-phenomenological example where the experience is mediated digitally and believably engage the user with environments not readily within reach.

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<sup>1</sup> For sights and sounds of *EcoRift* nature sojourns see [http://www.ecolisten.org/location\\_index.php](http://www.ecolisten.org/location_index.php) Accessed 20 March 2019.

<sup>2</sup> Don Ihde, *Technology and the lifeworld : from garden to earth*. (Indiana University Press 1990), 72.

When the Oculus Rift Kickstarter came online in 2012 and promised the development of full immersion in sight and sound via VR headset, it was immediately obvious that a new approach to intimately experiencing places, otherwise inaccessible, would become possible. Upon delivery of the first Oculus Rift headset in 2013 we began to create content for this technology. We had been working with communities in national parks across the American Southwest to record each month the sounds of a series of sites to track climate impact. We had engaged local communities to monitor changes in the sonic environment and develop environmental stewardship in their local communities and started to build a growing publicly accessible sound archive of geo-located and geo-tagged high-quality field recordings.<sup>3</sup>

It soon became clear that we could also make VR captures of these places using 360-degree photography and video and ambisonic audio recording (360-degree spatial audio capture) and thus started the *EcoRift* series of VR nature sojourns. At first it was necessary to hard-code these environmental experiences and as Unity3D and other gaming development tools started to provide VR visual solutions, we teamed up with Blue Ripple sound (UK) to create ways to link ambisonic audio with the visual field. This process provided a groundbreaking experience – the calculation of the visual perspective and the listening perspective in realtime so that the audience could receive full 360-degree auditory cues from the environment. This new version, featuring nature sojourns in American Southwest deserts, was launched at the 2014 conference South by Southwest Eco (SxSW) in Austin, Texas.

Sound, of course, tells us much about what is happening all around us - outside our restricted visual field. Our actions in the environment are often led by sound. We hear a bird and look around in order to see it. We hear car tires screeching outside our visual reference field and turn around to find out what is happening and to discover whether we are in danger. This process is referred to as sensory fusion. The fusion of the auditory and visual stimuli allows us to construct a sense of the world around us - even in our sleep.

VR offers a unique opportunity to explore and manipulate sensory fusion, sensory depth and sensory breadth in an intimate way because donning a VR viewer and headphones cuts some of our senses off from the outside world and presents us with a simulated world with us at its center.

### **Sensory Fusion**

Two experiences of *EcoRift*'s nature sojourns brought this point home. In initial development we made two scenes for testing. One included an ambisonic recording made in Joshua Tree National Park which is marked by a rocky desert landscape. At the initial development stage, imagery for this scene was not available, so we used a set of images from another location which was not dissimilar in its makeup of large rocks and gravel on the ground, but much smaller in scale. The recording was made in a wide open valley, essentially a large-scale open space. We found that audiences sensed the difference between the visuals and the sound pertaining to scale. People asked if the sound and the imagery they were experiencing were from the same place. They sensed a disconnect between the auditory and visual domains. It was hard to understand what exactly they picked up on, but they understood that some qualities of the sound did not match the visual experience. These reactions point to a very highly refined human perceptual ability: a) to

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<sup>3</sup> The sound database can be found here: [http://www.ecolisten.org/sonic\\_events.php](http://www.ecolisten.org/sonic_events.php) Accessed [http://www.ecolisten.org/sonic\\_events.php](http://www.ecolisten.org/sonic_events.php) 20 March 2019.

seek out change and to understand the validity of sensory fusion taking place in the real world b) to sense distance and openness from reverberation characteristics c) to understand reverberation coming from hard or softer surfaces (as examples, a hard surface reflects more high frequencies and a soft surface, such as plant foliage, absorbs high frequencies) and d) to match the aural data to what we are seeing. These aspects show how our senses provide a global environmental awareness while also focusing in on specific local events. Again, sound tells us where specific events take place and how close they are to us. This is achieved through amplitude, frequency response, and reverberation.

A second learning experience in human sensory acuity in VR was made after the recording of both the ambisonic sound and visuals at the edge of the Rio Verde river in Arizona's Tonto National Forest. The audio-visual materials were formed into a VR scene and shared with a variety of users. Audiences then found that the closeness of the surrounding trees and sand bank behind the viewer conjured a claustrophobic feeling. Furthermore the audience did not find the VR scene credible because the horizon was too close and they failed to have a sense of the space beyond the close and immediate features. These reactions prompted us to re-record and photograph the site with the recording only a few feet from the original so that a clearer sky could be seen and the 'outside' perspective became more accessible. This small change in the perspective of the capture made a substantial difference in experience for users who now found the scene credible and enjoyed being remotely present at this site.

A continuing point of interest to *EcoRift*'s authors is a site captured in the Coconino National Forest in northern Arizona. The scene places the audience on a large grass plane with crickets jumping from tuft of grass to tuft of grass. It was recorded in the midst of the cricket-breeding season when large numbers of these insects flew, jumped and chirped and provided fascinating and highly directional sound events around the listener. They quickly attuned listeners to the three-dimensional quality of the sonic space. The sound events also attune the audience to the various scales of perception available in such a VR scene from the close and highly defined, fragile and small-scale cricket sounds to the wide open horizon and the large open clear, blue sky. After a few minutes in this environment, a crow flies across the sky from far right to far left. The crow is in the middle ground - not very close, but not really distant. The sound of the crow's wings are audible in this quiet environment and the call of the bird occurs regularly as the bird passes across the horizon.

The images used for this scene are fixed photographic images - stitched into a 360-degree environment and aligned with the compass direction of the sound recording. No bird appears in the static imagery, yet many people report seeing the bird flying across the sky. Even when told that there is not bird in the photograph, they continue to believe that they 'see' the bird at the location where they hear the crow's vocalization.

Although formal experiments have not been undertaken, it has become clear that the 360-degree auditory cues play a very important role in convincing the audience that they are present in the remote and virtual place they are experiencing. The strength of this perception is underlined by the many users who look down and are surprised to find out that they do not have legs. This reaction suggests that they felt sufficiently present in the virtual environment to suspend disbelief, to understand from their immediate senses that they were indeed present - the discovery of missing arms and legs in the photography then comes as a surprise if not a shock.

## Sensory Depth and Breadth

The *EcoRift* nature sojourn series (2013–) now comprises more than twenty sites in the American Southwest, Mexico and Germany. In each instance audio footage of up to 20 minutes in length is paired with 360-degree photographic panoramas from the same locations to create aesthetically stimulating and flexible human perspectives. The sites include locations in Organ Pipe Cactus National Monument at the U.S.-Mexico border, Joshua Tree National Park in California, the Beaver Creek Biosphere Reserve Watershed in central Arizona, the Mojave Desert National Preserve, the driest area in North America, and the Tonto and Coconino National Forests, both nature sanctuaries in Arizona with great biodiversity. While the idea of a virtual reality is commonly associated with technological hardware, artist-theorist Roy Ascott theorized in the early 1990s that nature

is the first virtual reality – in which the pure data of an undifferentiated wholeness are programmed, shaped, and categorized according to our language, fears, and desires. We have always placed it in opposition – to culture, the city, technology. Its strength has lain in this opposition, as much a refuge as a force. But now the binary opposition of town and country, for example is disappearing.<sup>4</sup>

Ascott opined that, thanks to new telematic systems “the country can no longer claim a hegemony of pure and authentic natural processes.”<sup>5</sup> He proposed that artists working in the electronic space will ask “what nature might *become*?” and “how we interact with a proliferation of separate realities?”<sup>6</sup> The idea of a virtual reality that does not exist physically, but in the form of a dream or imagination, for instance, may be as old as humankind. The concept appeared in print probably for the first time in Antonin Artaud’s *Le Théâtre et son double* (1938) describing the illusory aspects of theatre, its spaces, objects and characters. It also appeared in Damien Brodrick’s science fiction novel *The Judas Mandala* (1982) before it was popularized by Jaron Lanier and others in the technological realm in the late 1980s.<sup>7</sup>

Paine’s *EcoRift* nature sojourns build on Ascott’s ideas. He pondered whether in the foreseeable future, due to climate change, some forms of nature as we know them today may only be experienced in the form of time and space capsules in virtual reality archives.<sup>8</sup> In

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<sup>4</sup> Roy Ascott, *Telematic Embrace: Visionary Theories of Art, Technology, and Consciousness*, ed. and with an essay by Edward A. Shanken (Berkeley, CA: University of California Press, 2003), 327.

<sup>5</sup> *Ibid.*, 327.

<sup>6</sup> *Ibid.*, 329.

<sup>7</sup> Antonin Artaud, *Le Théâtre et son double* (Paris: Gallimard, 1938) and Damien Brodrick, *The Judas Mandala* (New York: Pocket Books, 1982).

<sup>8</sup> Garth Paine quoted by Anni Heino in “Garth Paine’s *Future Perfect* in development at IRCAM/ZKM,” *Australian Music Centre Magazine*, 8 March 2018, accessed 20 March 2019 <https://www.australianmusiccentre.com.au/article/garth-paine-s-future-perfect-in-development-at-ircam-zkm> .

virtualizing sites in nature preserves, Paine transcends both Euclidian space and Newtonian time whereby users can immerse themselves in these remote places instantly, be it for the purpose of intimate pleasure, relaxation, therapeutic benefits or scientific observations.

*EcoRift* nature sojourns combine two media, visual and aural, but listening is the focus. As Ascott, emphasized “the auditory space is more pervasive than the visual space in the electronic present” and “in the ratio of the senses,” sound may come “to count for as much as the image.”<sup>9</sup> Perhaps it may even count for more than the image as the ear can go where the eye cannot. The immersive static photography provides the listener with a mere visual context for sound. In the *EcoRift* series, still photography has been found preferable to moving images (which emphasize the sequential or successive character of the visual mode and were used in *Ecorift*'s developmental stages). In developing *EcoRift*, we found that, more often than not, video imagery was approached as visual task to be solved (finding and counting the animals in moving images), taking up most of a user's cognitive capacity. The value of the fixed visual image lies in the user's ability to explore active listening – paying attention to the interrelations between the visual and sonic worlds. Thanks to dynamic spatial binaural cues, the sensory experience can be self-directed by the user who is fully immersed in a representation of a place. The headtracking of the headset is linked to roll, pitch, and yaw varying the visual point of view and rotating the ambisonic soundfield providing full 3D auditory-visual cues. Listeners can move their head to determine auditory spatial coordinates as they would experience them in the real world – in Ascott's words “the acoustic experience has become more focused as the environment becomes more intelligent and responsive to us.”<sup>10</sup> Thus, unlike with other fixed media works, here listening and viewing are not limited by the artist's narrowly chosen aural and visual perspective which often suggest linearity and narrativity. Here, in the words of Marshall McLuhan and Harley Parker, the user no longer has to “encounter all things through a rigorous storyline.”<sup>11</sup> The audience freely carves their individual intensely private perspectives from a given environment. Perhaps due to their vivid and temporal nature *Ecorift*'s sounds often prompt the impression of visual movement obviously not represented in the photography.

*Ecorift* experiences have often been exhibited at national and state parks, museums, and festivals since 2014 and audiences have commented on the deep immersion, intimacy and strong sense of presence in these remote places afforded by the VR experiences - although they cannot sense them with their feet, hands and skin.

*EcoRift*'s nature sojourns suggest the concepts “remote presence” and “telepresence”, the latter advanced by cognitive scientist Marvin Minsky in the early 1980s when he discussed the “importance of high-quality sensory feedback” received by users who remote-control robots in an industrial environment.<sup>12</sup> If presence is the experience of one's surroundings mediated by “some or all sensory channels”, telepresence implies the perception of a temporally and spatially remote environment which is in addition to one's physical surroundings and mediated, for instance, by VR technology. Telepresence is experienced when, thanks to powerful sensory

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<sup>9</sup> Ascott, *Telematic Embrace*, 333.

<sup>10</sup> Ibid., 334.

<sup>11</sup> Marshall McLuhan and Harley Parker, *Through the Vanishing Point: Space in Poetry and Painting* (New York, 1968), 240.

<sup>12</sup> Marvin Minsky, “Telepresence,” *Omni Magazine* 2, no. 9 (1980), 44–52.



stimuli, the remote environment takes precedence over one's physical environment.<sup>13</sup> *EcoRift* users often feel telepresent because they perceive the mediated environments as real, vivid and rich due to sensory depth and breadth realized through craft and high-quality technology. Sensory depth in the auditory domain is achieved in that the high-order ambisonic soundfield provides full 3D auditory cues that respond to the user's movement via headtracking. For example, in the above described "Tonto National Forest Sojourn," the auditory scale of the site comprises ground level sounds of crickets, human footsteps on the sandy bank behind the listener, and water in the river. The scale also includes sounds in the range of the upper human body and higher such as rustling trees and the sounds of small birds flying above. Sensory depth is also realized through carefully chosen human perspectives in the high-resolution photography (See Figure 1) which meticulously matches the sonic environment. Sensory breadth is accomplished by the combination of two domains, the auditory and visual.



Figure 1 Photographic excerpt from *EcoRift's "Tonto National Forest Sojourn"* (2013)

*EcoRift* is a work in progress. Further VR experiences are in the planning and will be made available online via Web VR technology as navigable 360-degree photographic panoramas with navigable spatial audio. In addition, we are working toward making it possible for people to create their own VR captures of places in nature they love to inhabit, as a way to share the personal importance of both preserving the impression of a site and affording a sense of presence

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<sup>13</sup> Jonathan Steuer, "Defining Virtual Reality: Dimensions Determining Telepresence," *Journal of Communication* 42, no. 4 (1992), 75.

in that environment. One might ask if *EcoRift*'s desert sojourns are a kind of Nature II and what listening to and being in nature might mean to present and future audiences. Portability and affordability of forthcoming stand-alone VR headsets support increasingly wide distribution and engagement with experiences such as *EcoRift* and may in the longer term, contribute to a potential twenty-first century return to participation in outdoor nature experiences. Conservation may also be served. *EcoRift* presents fragile sites – too fragile for human visitation – but virtually accessible to the public. Distant communities and mobility-impaired people can also become present in these places. We might argue that *EcoRift* democratizes access to those pristine places out of reach for many people. Furthermore the personal and communal benefit of being in such places are currently applied and tested in therapeutic and wellbeing and ecological monitoring contexts.

### **Conclusion:**

The burgeoning VR market has contributed to great improvements of the VR headsets' technological quality and facilitates the proliferation of VR experiences which promise to become a dynamic force in current and future artistic practice. When considering the emerging interactive art of the 1990s, Christa Sommerer and Laurent Mignonneau wrote that “the art work . . . is no longer a static object or a pre-defined multiple-choice interaction, but has become a process-like living system.”<sup>14</sup> As far back as 1977, Myron Krueger stated that

In the [responsive] environment, the participant is confronted with a completely new kind of experience. He is stripped of his informed expectations and forced to deal with the moment in its own terms. He is actively involved, discovering that his limbs have been given new meaning and that he can express himself in new ways. He does not simply admire the work of the artist; he shares in its creation.<sup>15</sup>

VR can be seen as an evolution of these earlier artistic practices. *EcoRift*'s nature sojourns can be understood as a collection of eminently intimate places where the user or audience become momentary creators of their experience, of the artwork itself. The VR space is not one that simply documents or presents something, but a space that simultaneously allows for creation. It is an exploratory space affording intimate physical and mental experience at its core.

Steven Feld alluded to this moment when he discussed presence in the great rainforests of Papua New Guinea and the phenomenology of sensing place. He eloquently points to the recombinant nature of sensation and placemaking, saying: “as place is sensed, senses are placed; as places make senses, senses make place.” Placemaking is a contract between environment and perceiver. The VR space is also a medium in which Feld's notion of acoustemology can be truly

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<sup>14</sup> Christa Sommerer and Laurent Mignonneau, eds., *Art as a Living System* (Vienna: Springer, 1998), 158.

<sup>15</sup> Myron W. Krueger, “Responsive Environments,” *Proceedings of the National Computer Conference* (New York, 1977), 431.

explored: “one’s sonic way of knowing and being in the world”; both testing out and reveling in “how sounding and the sensual, bodily experiencing of sound is a special kind of knowing.”<sup>16</sup>

This “special kind of knowing” is a crucial aspect in design considerations. It is possible to load the VR space with information, with interactive tasks, but we found that cognitive load is a critical consideration in how the designer leads the user to different kinds of experiences. We sought to direct the user’s attention toward listening. Through listening we have found that the user experiences a sense of context and presence that affords the security to relax and appreciate the richness of these nature environs, often stereotyped by passing visitors as barren or “empty.” In fact nothing could be more misleading – with time, these environments reveal themselves as rich with species, many of a scale not perceived when swiftly passing through them. As mentioned above, by contrast when video was used to represent the visual world, we found that users saw animals and then turned the experience into a task, seeking out and counting birds and other animals, losing their overall sense of place, of presence and ergo, their sense of value of that environment. Our design objective has been to bring these valued natural environments to a broad audience, to democratize access and to build a sense of stewardship, to defend and protect these nature sanctuaries from a position of personal experience, to understand something of what could be lost through climate change. How else could urban dwellers understand the value of these environments if they have never experienced them?

Critical to designing believable nature experiences is a consideration of interaction as an a-priori condition, not one of scenes or states, but a continuous dynamic morphology of experience. The users’ discovery of their explorations form into a kind of simulacra, a gestalt of all states that form a common perception of the environment. However, they are able to use their gaze to navigate through new environments, so they understand the mediated experience as a kind of portal into a collection of experiences comprising *EcoRift* and its interactive potential. The quality of their haptic/sensory engagement with the interface (their directed gaze), the feedback loop formed by somatosensory and listening phenomena form a techno-somatic dimension<sup>17</sup> that informs and shapes both elements it links (user and technological mediation) and through an awareness and sensitivity to the potential and latent agency of the relationship, between *soma* and *techne*, a materiality can be defined which is both fluid, viscous and porous, inviting the user to be present, to suspend dis-belief and to feel free to venture across the globe and revel in the wonders and value these often overlooked natural environments.

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<sup>16</sup> Steven Feld, “‘From Ethnomusicology to Echo-Muse-Ecology’: Reading R. Murray Schafer in the Papua New Guinea Rainforest,” *Soundscapes Writings Essays 2001*, accessed 24 March 2019 <http://www.acousticecology.org/writings/echomuseecology.html>.

<sup>17</sup> Garth Paine, “Interaction as Material: The Techno-Somatic Dimension,” *Organised Sound Journal* 20, 1 (April 2015), 82–89.



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