

# Breath: An Installation

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## Abstract

Mystery attracts imagination. Humans sense the immensity of natural forces, envisioning a shaping of the world beyond what can be seen. The video installation *Breath* is based on the immense space of ocean and air, and the invisible transfer of oxygen into the atmosphere from the unseen action of immeasurable planktonic organisms, an environmental phenomenon that sustains all of human life, and one which is threatened by the warming of the atmosphere and changing ocean chemistry.

This paper outlines the shape of the installation *Breath* a work in two-channel video (one fixed-media channel and one interactive) with immersive sound and infrared interactivity. The paper will describe its modus operandi, the research and environmental consequences propelling the work, its imagistic and sonic references, and the interactivity that implicates human interferences within vast environmental and sustaining movements.

## Keywords

Interactive video installation, Deep time and environment, Real-time interactive systems, Cornell collaborative installation, Oxygen from ocean, 3D sonification; Oceanic atmospheric interchange, Climate change, Plankton, Carbon dioxide cycle

## Breath: An Installation

*Mystery attracts imagination. Humans sense the immensity of natural forces, envisioning a shaping of the world beyond what can be seen. The video installation "Breath" is based on the immense space of ocean and air, and the invisible transfer of oxygen into the atmosphere from the unseen action of immeasurable planktonic organisms, an environmental phenomenon that sustains all human life, and one which is threatened by the warming of the atmosphere and changing ocean chemistry.*

*Breath* proposes simultaneous worlds where the reality that we know is interrupted by complex underlying influences that shape the world in every moment. This paper outlines the shape of the

installation *Breath*, a work in two-channel video (one fixed-media channel and one interactive) with immersive sound and infrared interactivity.

The project is a collaboration between Deborah Cornell (visual artist) and Richard Cornell (composer and sound artist). *Breath* is a very large scale, 2 channel, interactive video event with immersive sound, installed in a physical space where viewers can assemble. Its full and deep dimensionality is only perceived in the presence of physical human bodies. A link to the work on line is at <https://vimeo.com/929167701>

The work is an outgrowth of our prior projects that seek to restore the sense of relationship with elements of the natural world, in response to increasing environmental threats. This current work exists in a direct relationship to other contemporary electronic environmentally charged works. Examples include *Wake* and *Unmoored* by Mel Chin from 2018, a mixed reality art installation in Times Square presenting the imagined vision of a city flooded by climate change and submerged by rising ocean. <https://news.artnet.com/art-world/mel-chin-confronts-climate-change-times-square-virtual-reality-artwork-1317413>

And Adam Sebire's multi-channel video *Sikujumaataarpoq* (2022-23), a 4 screen video projection; 2.1 channel audio, an immersive audiovisual installation from a remote part of Earth's melting polar regions, where water is found in its solid form. Video vignettes focus on the humans and non-humans whose existence there is undergoing rapid transformation. (Its audio samples ice sounds collected by cryosphere scientists working around the globe). <https://www.adamsebire.info/the-works/anthroposcenes/#anthropoScene5>

Olafur Eliasson's installation, *Ice Watch*, a powerful example, engages and confronts its urban viewers with large pieces of melting glacial ice, transported from Greenland's fjords, and transposed to

their common spaces. No longer a distant hypothetical, the bare fact of climate change is right in front of them.

<https://olafureliasson.net/artwork/ice-watch-2014/>

Our own prior works engaged video and digital printmaking with sound. *Eclipse Phase* referred to the strong solar forces at play in natural and cultural settings; *Reflecting Place* considered the relationship of place to language, culture, and environmental perception; and *Quiet Skies* stressed the decline and loss of songbird populations, using multi-channel interactive processes that responded to sound levels that viewers created by their presence. *Breath* builds on these former works, but the enormity of the processes we reference has increased many fold, and that involves the invisible interchange and relationship of the world oceans to our own bodies in the form of the oxygen that we need to live.

The stimulus for this new work came in the form of a single fact in the literature from the Scripps Institute of Oceanography, UCSD. “Scientists have long recognized the significance of phytoplankton—microscopic organisms that drift in aquatic environments—due to their ability to photosynthesize. These tiny oceanic algae form the base of the aquatic food web and are estimated to produce around 50% of the oxygen on Earth” as they rise and fall in diurnal rhythm. <https://scripps.ucsd.edu/news/phenomenal-phytoplankton-scientists-uncover-cellular-process-behind-oxygen-production>

This was such a surprising revelation that we could not stop thinking about it; this led us to research aspects of this activity and its relationship to other oxygen production and to human breath (fig. 1).

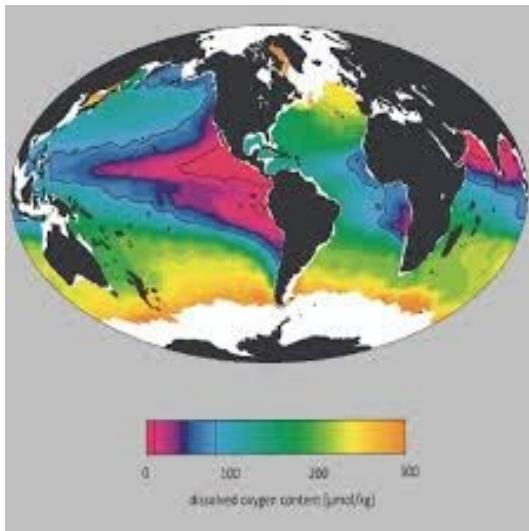


Figure 1. Dissolved oxygen content in oceans. Courtesy: Johannes Karstensen, GEOMAR. Monika Rhein, Reiner Steinfeldt, Dagmar Kieke, Ilaria Stendardo and Igor Yashayae, “Ventilation variability of Labrador Sea Water and its impact on oxygen and anthropogenic carbon: a review”.<sup>i</sup>

It was not long before the impact of climate change entered the research. Scientists are urging greater study as to the quantification and processes of oxygenation and implying the need for greater consciousness of our interdependency, and on the need for uninterrupted existential rhythms.<sup>ii</sup>

Phytoplankton in the ocean contain chlorophyll to capture sunlight. Carbon dioxide is consumed during photosynthesis, and oxygen is released. Phytoplankton in the oceans and leaves in the air are ubiquitous in their separate spheres. Terrestrial and marine plants transpire oxygen into the atmosphere, needed by all animals and humans on the planet for life. Humans and animals inhale oxygen then exhale CO<sub>2</sub>, returning its constituent elements to marine and terrestrial plants.

The impact of this invisible relationship proved compelling to us, and it forms the central element in *Breath*. The intertwining of human lives, their impacts, and the invisible forces underpinning our existence is the predominant theme. Representing the complexity (albeit invisible) of the oceanic/human interchange demanded a layered approach.<sup>iii</sup> Meant to be immersive, the principal video element is itself large and multidimensional (fig. 2).



Figure 2. “Breath” by Deborah and Richard Cornell. As presented at Dartmouth College, May 2023. Copyright Deborah and Richard Cornell

The first channel presents a complex narrative among ocean, land, and humans, implying both physical dependence and cultural response. Underlying much of the imagery is a graphic image collaged of representative images from space, land, and ocean (which is sometimes overt, but often obscured). Aerial photography from NASA generated from satellites that perceive the curve of earth are the entry point of video 1. This video is structured to progress through global movements and transforms from planetary, tidal, oceanic imagery, to air, to human intake and cultural representations of the human presence (rock art depictions, a Caryatid figure from the Erechtheion, the *Deluge* of Leonardo). The element of breathing is introduced through rhythmic reductions of light that result in a darkened video state. These dynamic breathing intervals are interspersed throughout environmental imagery of fire, storms, and climate change (tidal creep,

severe lightning storms, consuming flame). This shifting narrative eventually returns to ocean and suggests the “dead zone” consequences of acidification and ocean warming.

The second video channel presents a parallel universe, a concurrent intervention of content that implies our constant dependence on the continuous activity of healthy phytoplankton. The narrative of this second channel appears in the space without a discernable cause only becoming visible when activated by human presence, by movement that occurs at a distance threshold, as recognized by an installed infrared sensor. Models of plankton developed from scanning electron microscope images are seen throughout video 2 - animated as a particle system and interrupting the narrative of the primary video. The plankton overcome the ongoing first narrative with added color, scale, clarity, and light. These fade over 3-5 seconds, returning to the original narrative of climate distress - until new movement is detected in the space to recall the oxygen connection.

Thus, the two instances of reality (presence) exist simultaneously but separately, one overcoming the other, until the resiliency of the first reestablishes itself (fig. 3).

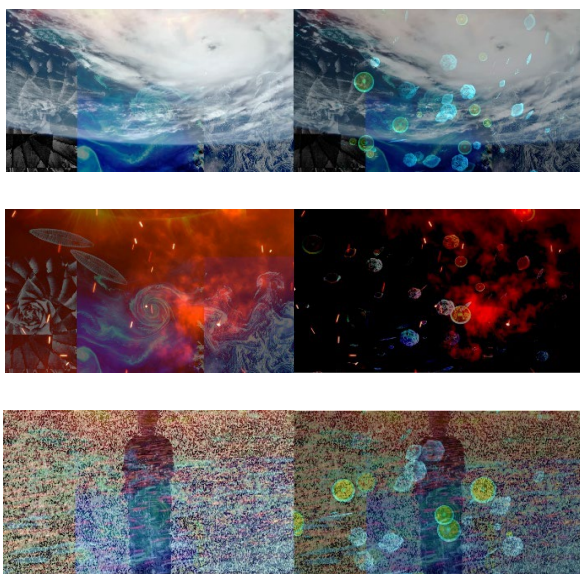


Figure 3. Stills from “Breath” by Deborah and Richard Cornell. In the composite images, the left still is from Video 1; the right still shows Video 1 with a sample of Video 2 in evidence (activated by infrared sensor). Copyright Deborah and Richard Cornell.

The sound program is developed primarily from field recordings of atmospheric, terrestrial, and marine origin that are extensively processed and mixed in a spatialized format (Dolby Atmos<sup>iv</sup>). Weather-related sounds, such as rain, wind, and thunder, are blended seamlessly into roaring wildfire, moving water, and the percussive cracks of snapping shrimp, the wingbeats of birds, human breathing, and the breathing of large cetations. Multiple spaces are suggested by this soundscape, from the intimate to the vast. In these spaces, sound behaves in quite different ways. (In sea water sound travels at about 1500 meters per second. In air the speed of sound is about 350 meters per second.) In *Breath*, sound suggests the interconnectedness as well as the profound differences of these environments: some acoustically dry, crisp, others highly reverberant, including the intermittent overlay of video 2. For creating and realizing such a complex sonic space, the immersive techniques we employ are ideal.

Both sound and video suggest rhythms on different scales, our solar orbit, our planet’s rotation, seasons, tides, surf, breathing, etc. A central idea is the daily migration of plankton vertically in the water column. The looping form of the work, its shifting episodes, and its surface rhythms, all participate in those great patterns.

A metaphor for the workings of human interference in the environment, *Breath* catalyzes an awareness of the responsibility for environmental change. As relates to the theme, *Everywhen*, and the subtheme, “Shifting Temporalities,” the work presents a visually complex video experience that combines the deep time of planetary movement with historical intervals and with the momentary intake of breath. In an interactive environment, the complex environmental story unfolds.

*Breath* is our attempt to create a visceral sense of the invisible rhythmic breathing in and out of the world that contains us.

<sup>i</sup> Courtesy of Johannes Karstensen, GEOMAR. Monika Rhien, Reiner Steinfeldt, Dagmar Kieke, Ilaria Stendardo and Igor Yashayaev, “Ventilation variability of Labrador Sea Water and its impact on oxygen and anthropogenic carbon: a review,” *The Royal Society* 375, No. 2102 (13 September 2017). <https://doi.org/10.1098/rsta.2016.0321>

<sup>ii</sup> “Growth rates are strongly linked to temperature, yet individual species often differ dramatically in their temperature dependence (Thomas et al. 2012; Boyd et al. 2013). In turn, these differences

lead to predicted range shifts as oceans warm (Thomas et al. 2012 ... Ultimately, understanding how the effects of global change will propagate through phytoplankton communities to influence biogeochemical cycling requires understanding the individual and combined effects of stressors on phytoplankton from species to functional groups. The key to obtaining this knowledge rests on elucidating the links between environment, species traits and trade-offs, and their performance and function.” Elena Litchman, Paula de Tezanos Pinto, Kyle F. Edwards, Christopher A.

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Klausmeier, Colin T. Kremer and Mridul. K. Thomas, "Global biogeochemical impacts of phytoplankton: a trait-based perspective," *Journal of Ecology* 103, No. 6 (November 2015): 1384-1396. <https://www.jstor.org/stable/24542687>

iii The technical requirements for presenting *Breath* are:

Space: A room with a white wall or screen, preferably 20' from the projectors to the projection surface. The space should have somewhat limited light, to permit the effects of the intermittent dual video projection. Sound interference should be as minimal as possible.

Equipment:

Two portable projectors, one above the other, capable of a 20-foot throw distance.

Media player for primary video/audio channel.

A temporary shelf for the second projector and one for the sensor.

Computer running the program for the interactive video channel. Infrared sensor, e.g. Kinect.

Speakers configured for surround system, 5.1 minimum (or stereo)

Cables & tools for installing and orienting the projectors.

iii Developed by Dolby Laboratories for cinema, Atmos delivers immersive, spatial audio over a multi-speaker array providing a semi-spherical sound scene. Individual sounds are treated as objects, and they can be positioned at any azimuth and elevation and filtered to indicate distance. (<https://www.dolby.com/en-gb/technologies/dolby-atmos/>)

## Authors' Biographies

Deborah and Richard Cornell's collaborations are presented worldwide, including New York Town Hall, NY Electroacoustic Music Festival, Krakow Print Triennial, Taiwan Normal University, Kala Institute, Buenos Aires, and Dubai.

Deborah's awards include Grand Prix-Krakow Triennial and the Bunting/Radcliffe Institute, Harvard. Her works are seen in Krakow, Istanbul, Melbourne, and Los Angeles, with presentations in Perth Australia, New York, Dallas, and San Francisco. Collections include Boston Museum of Fine Arts, Hangzhou Art Academy, DaNang Museum, Turku Art Museum Finland, RISD Museum, Boston Public Library, RMIT Melbourne, Weisman Art Museum.

Richard Cornell works in acoustic and electroacoustic media. Awards include the National Endowment for the Arts and the Fromm Foundation, with performances worldwide. He was commissioned by Boston Musica Viva, Boston Modern Orchestra Project, and the Muir Quartet. Recordings are with Sony Classical, Albany, Summit, EMI Virgin Veritas, and Ravello labels.

They are Professors at Boston University College of Fine Arts.