

UC Irvine

Environment / Sustainability / Climate Change

Title

Distracted: Poetic Interpretations of Climate Data

Permalink

<https://escholarship.org/uc/item/1055s39t>

Authors

Sade, Gavin
Bracks, Priscilla

Publication Date

2009-12-12

Peer reviewed

Distracted: Poetic Interpretations of Climate Data

Gavin Sade
Queensland University of Technology
QUT Creative Industries Faculty
Musk Avenue Kelvin Grove
QLD Australia 4059
g.sade@qut.edu.au

Priscilla Bracks
Kuuki
Brisbane QLD Australia
<http://kuuki.com.au>
cil@kuuki.com.au

ABSTRACT

This paper introduces the creative work *Distracted* and discusses conceptual, aesthetic and technical aspects of the work. The work was conceived as a luminous, interactive, computational media installation informed by our interest in the Antarctica. Through the paper we focus on: how the work addresses the themes of climate change and sustainability; how we attempted to work with selected sets of scientific data to evoke the delicate yet extreme nature of the environment and the ways in which ice is a record of the earth's geological history and recent human impacts; and how the process of making this artwork caused us to reconsider our practices and formulate strategies for redirecting our practice in a manner that addresses the challenges of sustainability.

1. INTRODUCTION

This paper focuses on a creative project titled *Distracted*, and specifically the first prototype, which was produced over the Southern Hemisphere summer of 2008/2009. The overall project (as yet incomplete) employs a practice led research methodology to investigate how art and design can engage with the subject of climate change. In making the work, a second but no less important question emerged: that of how we may redirect our creative practices in light of our concerns about sustainability.

The creative work, *Distracted*, was initially informed by our interest in Antarctica and the role that continent's ecologies play as a metaphoric canary in the global climate mineshaft. The first prototype, discussed in this paper, was conceived as a luminous, interactive installation, where the sonic and visual characteristics were derived from data that provide evidence of humanity's ecological footprint, and contextualise human life within a larger geological timeframe. Accordingly, we selected two specific data sets, the Keeling Curve and climate data from the Vostok ice core sample.

The process of creating the work and reflecting upon the outcomes to date, have raised questions about the sustainability of our creative practice. As electronic artists we have often created work using well-established display methods such as screens and data projectors. Expanding our practice into the sculptural realm required us to more directly consider the toxicity and sustainability of materials, and our utilization of technology. The insights gained have helped us to better understand the complex relationships between people, nature and technology and the ways in which our practices defuture. That is, to consider how through our practice, we both create and destroy. As a result, we have now begun to formulate strategies for redirecting our practice in a

manner that addresses these challenges. This knowledge will be applied in next stage of the *Distracted* project.

2. BACKGROUND

The initial creative inspiration for *Distracted* came from several sources. The first of which was a fascination with the Antarctic's harsh yet beautiful environments, and a curiosity that we developed this deep fascination through experiences of the continent mediated by way of technology.

The title for the project came from our interest in the paradox that the very technology that enables us to experience these distant wonders, also often provides a distraction from the way human activity is having adverse effects on the environment. Coverage of crisis such as climate change and the destruction of ecologies appear insufficient to divert attention away from entertainment media. Yet whilst we appreciate the beauty of the world through documentaries viewed on our computer or television sets, the very process of making these media technologies, diminishes the potential futures of the environment displayed on the screen. We are literally distracted from the issues of climate crisis until it enters our world through major environmental events.

The key glacier, Ol' Skintop, had retreated 4.62 Grables during the last twenty-four-hour period. And the temperature, at noon in New York, has exceeded the previous day's by 1.46 Wagners. In addition the humidity, as the oceans evaporated, had increased by 16 Selkirks. So things were getting hotter and wetter; the great procession of nature clanked on, and toward what? Hnatt pushed the 'pape away...

[2:8]

In 1958 – only 8 years before Dick published the words above – Charles Keeling began recording concentrations of atmospheric carbon dioxide at the Mauna Loa Observatory in Hawaii. 50 years hence, this data set – commonly referred to as the Keeling Curve – is one of the key pieces of scientific evidence showing rapid increases in atmospheric carbon dioxide levels over the second half of the 20th Century.

For the average person, knowledge of climate change is principally gained by way of televisual media. Like Phillip K. Dicks' pape on his fictional future Earth, contemporary news media informs us of glaciers retreating, ice shelves breaking up, rising temperatures, and increased hurricane activity. These

broadcasts cite facts and figures, showing images of places often far away and removed from the consciousness of our everyday lives. Graphic data visualizations and images of human suffering are juxtaposed on screen with entertainment and advertising. In this form information remains abstract, with little or no connection to the viewer, until such an event affects our lives directly. Our understanding of the unfolding climate crisis must therefore be considered in the context of technological mediation, and the cultural forces that work to construct our shared reality.

The project to map and digitize Earth has increased our collective ability to understand climate change. Likewise, information and communications technology presents us with the potential to experience distant environments, fragile or hostile, from the comfort of our homes. Yet, we would be remiss not to pay due attention to the act of mediation, and ways our technological artifacts are implicated in the social construction of knowledge.

Of specific interest is the ever-expanding role of the screen in our world, and the ways the screen is involved in both revealing the world, and concealing the world. Introna and Ilharco [5] describe our relationship with screens an *existing agreement*, – that we agree to the screening of the screen. Fry described this function of the screen as a worlding that hides itself.

“We are disorientated, homeless in an ecology that while totally visible is almost totally concealed. The worlding of the televisual hides in darkness (itself and that which it will not image), in the proliferation of images, which makes identification impossible and a ‘hiding in the light’ in which display occurs with the appropriate codes of reading withheld. [4: 246]

In other words – seeing is believing – we agree to focus our attention on the world pictured on the screen while paying little or no attention to that which is not pictured, or cannot be pictured.

Screens hold our attention through their ability to represent the world in a regular arrangement of pixels. However, they are equally engaging as a result of the way screen content fixes focal attention within space. Dunne [3: 125] notes, “*screens are like ‘super-matter’: once switched on, all attention turns to them, and their material qualities are demoted to status of package or container as the viewer searches for real content, information.*”

It is here that we find screens, and ourselves, caught between realist and constructivist ontologies. Screens present images we agree are “real” and confirm that issues such as climate change (global warming) have a definitive ontological reality, irrespective of any techno-socially constructed ontological status.

3. WHY CREATIVE ACTION

Artistic works are of significant interest when examining the complex relationships between human society, technology and the environment. Artists often set out to make the familiar strange or unfamiliar, to explore and unsettle established relationships, or to question norms and assumptions. Artistic works often therefore, provide glimpses and insights into the complex relationships between humans, technology and our environment. Art may also explore the boundaries between realist ontologies, and the ways knowledge is constructed socially.

Ascott [1] suggests that in the world of global telecommunications technologies, artists often work to de-authorise meaning, and as a result enable us to reconstruct the world.

What is so breathtakingly lovely about a networked world, the telematic culture, is that it is beyond representation, or rather that, in the congregation of representations that it sustains, an ebb and flow of meaning, semantic transformations, uncertainties, and ambiguities are made possible. In the world as net, we can play with meaning, “play in deep seriousness” (as Tomas Mann defined art), which empowers us to de-authorise meaning just as it enables us to reconstruct the world. [1: 258]

These characteristics of creative works and practice provide us with opportunities for engaging with the subject of climate change and an audience. However, it is also the reflective nature of practice led methodologies which has allowed us to question our own relationship to the subject of climate change and sustainability.

4. ABOUT THE WORK

From our initial intentions we set about making a prototype of the work, with the first stages of creative development focusing on exploring a possible form. After considering several different forms, we finally settled upon the ice core, which are both information rich, and beautiful objects in their own right.

Ice core samples are drilled in large ice sheets (both Antarctic and other glacial sources), to obtain samples of atmospheric chemicals and particulates from different periods of our geological history. These samples are trapped in the ice and air bubbles that form in the ice as it freezes, creating a library of Earth’s atmospheric history. While data extracted from ice core samples is most commonly used to understand Earth’s climatic history, ice cores also store chemicals released by human activity. For example, chlorine-36 resulting from atmospheric nuclear tests has been found in air bubbles the Upper Fremont Glacier, at depths corresponding to the years of such tests. So, in spite of the fact that we’d never seen a real ice core except in images viewed on the Internet (or perhaps because of that reason), we settled upon the notion of creating a work that resembled ice cores.

The current prototype of the work is 1850 mm high x 660 x 660 mm and consists of 3 ‘ice cores’ made from acrylic tubes of varying heights, asymmetrically arranged on a ply-wood plinth. Within each tube (or core) are individually controllable LED’s and resin bubbles encasing found organic matter, suspended on fibre optic cabling. In all there are 700 LED’s, and over 1500 resin bubbles. The work also contains 8 proximity sensors that detect presence. A computer running software built in Processing, and custom made electronic circuitry operates the work’s visual effects.



Figure 1: Prototype 1 of *Distracted*.

In our attempt to move away from screen-based works containing what Dunne describes as visual super-matter, detracting attention from the materials of which they are comprised, we determined that the ice cores themselves could act as screens, through the use of internal, controllable illumination. To achieve this aim, we placed the individually controllable LEDs inside each core in random locations, then accurately mapped these positions so we could 'draw' an image to the surface of each core.

The LEDs were placed in an inner tube, which was then sanded by hand in a manner inspired by ice core firning. Outside this inner tube, we range lengths of fibre optic thread, upon which thousands of clear polyurethane resin 'air bubbles' were glued. Inside the air bubbles, we have placed all manner of organic debris found in the forest adjoining our studio, ranging from leaves and seeds to dead spiders and insects. The overall result is that the LEDs in the inner tube provide a diffuse illumination that shines through the clear 'air bubbles' revealing the materials inside each one. Combined with the inner LED illumination, the fibre optics emits tiny point sources of light at points where the fibre optic thread was gently scratched with sand paper.

The illumination of the LEDs within each core is derived from a visualization of data taken from ice core samples, and also responds to the proximity of an audience. The Vostok core is currently the longest drilled core, reaching back over 400,000 years to reveal information about 4 glacial cycles. [7]



Figure 2: Detail showing resin "bubbles" on fiber optic thread

Data from the Keeling Curve was used to effect the sound, as it tells a rich story about our climate and atmosphere. Not only does this data set show an increase in CO₂ over time, it also shows the seasonal patterns of carbon dioxide emissions. The regular rising and falling of CO₂ levels relates to reduced carbon dioxide intake by trees during the Northern Hemisphere, and increased intake following the new growth of Spring. This conjures a poetic image of the planet breathing, which exists irrespective of any increase in CO₂.

These data sets were visualized by mapping the selected variable, for example CO₂, particulate levels etc, to a dynamic particle system that is rendered on the array of LEDs inside the poles. Hence the poles do not represent time vertically. Instead a segment of time is from moment to moment, presented as a snapshot on the entire pole, as data from the sets is mapped to the parameters of the particle system.

In approaching the task of visualizing the data sets we took some creative license. For example CO₂ levels are mapped to the birth rate, size and vertical speed of particles, however the range of these parameters has been constrained so to produce a slower moving organic visual result. While particulate levels has been mapped to the birth rate and speed of particles in a second particle system and constrained to produce small fast moving white flashes.

Likewise, we took similar creative liberties when sonifying the data sets. The sound design for the work primarily involved the sonification of the Keeling Curve, which we used to manipulate a granular synthesis patch created in MAX/MSP that processed recordings of blocks of ice cracking and melting. These sound effects were then combined with an evocative bed track that is slowly modulated using the same data set.

The generated visual and audio materials are combined with changes caused by audience interaction, as they come within close proximity to the work. This human induced change in the work acts as an important metaphor, but we have otherwise resisted the temptation to simply use the interface as a didactic display device. Instead, we have chosen a more poetic approach of using the data to generate visual effects, and an evolving soundscape that is evocative of the ice, fluids and the notion of change.

Interaction with the work causes a progression through the selected data sets. As people first encounter the work, it displays data from pre-human eras. Human interaction with the work results in slowly moving forward in time through the data sets. Increased presence around the work leads it to move more rapidly through the data sets towards the 21st century.

During testing of the interface, it became clear that without external information, it was not possible to convey the data as clearly as it may be in a graph or some other scientific form of representation. We felt that to attempt to do so (and necessarily fail) would be an abuse of the material resources and energy embodied in the work. It was also very difficult for an audience member to determine the time from which displayed data was being drawn.

In conceiving the project, we felt we had a duty to produce an experience that goes beyond a graph, conveying the information that a graph cannot: namely a sense of personal connection to the data and its long-term implications for human (the viewer own personal) life. Just as Grables (Phillip K. Dick's fictional unit of measurement) is sufficient to convey the extent of climate change envisioned in his novel (i.e. it is so great that a new unit of measurement is required), the estrangement of this poetic interface allows new understandings of the data presented. As a result, the work is more like a raw ice core sample, presented for viewing, but providing no key or legend to its interpretation.

When displayed in a light controlled space, the visual and sonic environment the object creates, is captivating and immersive. This seduction opens a space for meditation upon the meaning of the data displayed, however, further development will consider whether the form remains too abstract to engender personal relationships to the information presented.

In relation to form, our initial temptation is also to make the work a larger, more immersive environment, however, this approach remains subject to successful research into appropriate sustainable materials, which is outlined below.

Our other consideration is that whilst the form of *this* prototype is clearly inspired by ice core samples, we have created what could be described as an ambient display device. The software created for the project allows us to use data from a range of sources to control illumination in real time, such as external sensors (using the Arduino physical computing platform) to data sources available online. That data can be sourced from scientific or historical sources, or can even be drawn in real-time from the

network. We are also therefore seeking opportunities to recreate the work in situations where the real time data displayed, directly reflects the site where the work is located, its audience's consumption of resources, and other relevant personalising factors. For example, the work may poetically display building utility use, and local weather patterns.

5. SUSTAINABILITY AND DEFUTURING

Whilst creating the work, we reflected on a number of unsustainable dimensions of our practice. These problems also haunt work produced solely in the digital domain, however, it became of greater concern for us as we gained greater control over materials and were able to exercise a degree of choice when constructing an interface from raw materials.

In making the form, we needed to select materials that performed both aesthetically, and environmentally. For example, we selected acrylic tubing to form the outer casing of the cores because it is durable, light-weight and relatively inexpensive. In comparing acrylic to glass we found that use of either material involved some level of compromise. Plastics occupy a complex position in the industrial ecology and often involve the use of toxic materials, but glass required custom manufacture, had a significantly higher embodied energy cost, and was heavier resulting in the potential for further greater energy cost in transport. The dilemma in selecting this material was to choose between a readily available plastic (mass produced through chemical processes involving many toxic materials) with non-toxic glass that requires almost three times energy to produce.

Whilst this decision was difficult, it was the clear polyurethane resin used to create the 'air bubble' inside the cores, which proved most challenging when Priscilla suffered a severe allergic reaction to the material. This bio-accumulative reaction is analogous to the planet's reaction to pollution which is stored in Antarctic and glacial ice. An apparently less toxic bio-resin is available in the United Kingdom, but this material could not be imported into Australia because it is a volatile, regulated chemical.

Priscilla's reaction to the polyurethane resin brought to the fore the often ignored bio-chemical interaction that occur between technology and our bodies, raising an issue we may explore in future iterations of this work. The plastic casing of computers, televisual displays, mice and keyboards, data projectors all leach gas into our working environment, and the vast server farms which underpin the internet (the infrastructure which brings knowledge of such environmental pollution into our homes) consume large quantities of raw materials and electricity. These server farms also generate large amounts of heat, and are therefore cooled by air-conditioning.

Needless to say, there are many dedicated people working to improve the sustainability of our materials and infrastructure, but these underlying issues are for the most part, concealed by the distraction offered by the content displayed on the screen. In designing future prototypes of this work, we have resolved to increase the perception that the materials *are* content.

This reflection is significant because it shifts our view of sustainability from a perspective of the subject as content, to viewing content as an inherent characteristic or property of the practice itself. This approach presents opportunities for the development of innovative methods and new understandings of the role art and design play in advancing debate on issues of

sustainability. Likewise, our attempts to understand the broader ecological economics involved in practice, are also significant.

However, these resonances between practice, creative works, and the larger issues we address, can be easily overlooked in productions of technological artifacts once the production processes develop a momentum of their own. (i.e. once certain stages of the project have been reached, it becomes difficult to avoid activities that defuture, if those activities were not envisaged during the initial design process.)

6. CONCLUSIONS

Redirecting practice involves a reflection upon the nature of practice, in a manner that allows us to make the familiar strange. By shifting our practice to focus on a different type of display and a different type of physical form, we have revealed issues we might otherwise have overlooked. An initial step in revealing is to unsettle the habitualised nature of practice that at first conceals these issues.

Future work on this project will focus on developing and exploring the visualization, and the ways an audience encounters the work in order to address our initial aims. We question the sustainability of our practice, and as we move into the second iteration of the project, plan to redirect the practice away from heavy material objects to work with lighter forms and structures, collapsible, recycled, reused, transparent, illumination from within and without. In relation to energy usage, we did use discarded LED's (manufacturer's seconds), finding a use for a material that might otherwise be discarded, knowing also that LED's consumed low amounts of energy. However, further work may improve the efficiency of other lighting devices in the work, for example the illumination of the optic fibre.

The voice of our previous practice urges us to make the work larger in scale as to evoke the experience of being immersed within the environments we are inspired by. To do so would require more computers, more equipment and more display technologies. The voice of redirection suggests an alternate approach – to reimagining the interactions between audience and the work – framing this in a manner that poetically foregrounds the ways human action and environmental crisis are interconnected, how human subjectivity (post human subjectivity) the symbolic relationships between us and environment comes into tension with our desires to use the environment to particular effect.

The development of this prototype has demonstrated that the traditional approaches to interaction design have not been completely serviceable when working with a different physical structure and mode of interaction. Strategies for future development include providing a way for an audience to individually interrogate the interface, connecting the work with the notion of science investigation. We also aim to draw

inspiration from Dunne's post optimal objects (1999), going beyond performance and optimisation of the user experience to explore the critical and aesthetic relationships between human society and climate, and using estrangement as a way of establishing a conversation about the subject of climate crisis.

7. ACKNOWLEDGEMENTS

Distacted was produced by Kuuki, and supported by the Australia Council for the Arts and the Queensland University of Technology.

The prototype discussed in this paper was created by:

Artists: Priscilla Bracks and Gavin Sade

Sound Design: Greg Jenkins

Programming: Glen Wetherall

Artist Assistant: Nicole Gillard

Wood work: Richard Vaughan

Electronics: Matt Petoe

Kuuki is an art, design, and media production collective directed by Gavin Sade and Priscilla Bracks. Based on the Japanese concept of kuuki – atmosphere, the breath or essence of things, and the things we take for granted, but cannot live without - Priscilla and Gavin seek to create things which enable people to appreciate and explore the value of creativity.

8. REFERENCES

- [1] Ascott, R. In *Telematic embrace : visionary theories of art, technology, and consciousness* (Eds, Ascott, R. and Shanken, E. A.) 2003 University of California Press, Berkeley, pp. 257 - 275.
- [2] Dick P. K. *The Three Stigmata of Palmer Eldridge*. New Edition 2003. Gollancz. London UK.
- [3] Dunne A. *Hertzian Tales. Electronic Products, Aesthetic Experience, and Critical Design*. 1999. MIT Press. Massachusetts
- [4] Fry, T. *A New Design Philosophy. An Introduction to Defurting*. 1999. UNSW Press. Sydney.
- [5] Introna H. and Ilharco FM, 2006, The meaning of screens: towards a phenomenological account of screenness, *Human Studies*, vol 29(1), pp 57-76
- [6] Keeling, C. D. The Concentration and Isotopic Abundance of Carbon Dioxide in the Atmosphere, 1960. *Tellus*, 12, pp. 200 – 203.
- [7] World Data Centre for Paleoclimatology. Ice Core gateway. Vostok Ice Core: <http://www.ncdc.noaa.gov/paleo/icecore/antarctica/vostok/vostok.html> (Accessed June 6 2009)