

Breath-taking: Creating artistic visualisations of atmospheric conditions to evoke responses to climate change

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Abstract

As solutions and strategies to counter climate change make little progress and scientists struggle to get their findings accepted in the public domain, alternative ways to foreground the urgency of climate change action and prompt changes in behaviour require attention. As long ago as 340 BCE, in his *Meteorologica*, Aristotle made connections between the body and the atmosphere that surrounded it. He compared our breathing in and breathing out to atmospheric exhalations, which he believed to be the way that clouds formed. Throughout history artists and poets have created representations of the atmospheric world, often with the intention of communicating its emotional effects. This paper will explore the potential for art to influence behaviour and attitudes towards climate change by linking the atmosphere and emotions through artistic representations.

The air that we breathe

At almost midnight, high on the Látrabjarg cliff at the westernmost point of Iceland I faced the almost-setting sun and breathed a lungful of some of the purest air in the world. Being aware not only of my extraordinary location but also of the stuff I had so deeply inhaled I contemplated the special atmosphere that surrounded me and considered what that might mean in the context of global climate change. Carbon pollution seemed a far-off problem as the extraordinarily clean air, flowing to me from across Canada and sparsely-populated Greenland, had been scrubbed free of even minute impurities by rain and clouds before it enveloped me. There are few places on earth where the air can be deemed 'clean' and current issues surrounding global climate change that focus on CO₂ emissions, greenhouse gases and so forth – terms that few people can personally relate to – give rise to visualisations of polluted, unhealthy air that we imbibe with every intake of breath. In Australia, unless we live in places such as the LaTrobe Valley in Victoria, where the evidence of the burning of brown coal to

produce electricity is clear as it is pumped into the atmosphere, we are largely protected from the visible signs of carbon pollution. My personal, embodied experiences of the atmospheres of Iceland and the LaTrobe Valley lead me to consider the possibilities for shifting perceptions of climate change from those presented in emotive, media images of stranded polar bears and melting ice caps to ones related to individual, personal experiences through presentations of images and installations created by artists that engage with the surrounding atmosphere so vital to life.

Closer to home, Cape Grim at the north-west tip of Tasmania lays claim to being the cleanest air on the planet and is home to the Australian government's Baseline Air Pollution Station, whose unique 'Air Library' collects samples as a 'pure air' yardstick for scientists world-wide. The station provides vital information about changes to the atmosphere through its collection of extensive data illustrated in graphs and statistical representations in annual reports.¹ However, according to Harold Fromm, 'the dependence on technological means of measuring air quality has presented a very skewed picture of what it means – what it *feels* (my italics) like – to be a person amidst pollution'.² While scientists present data regarding air quality or the effects of carbon dioxide on global warming in this way, for the majority of the general population the graphs remain abstract, distant and difficult to interpret. The presentation of statistical evidence is also an ongoing issue for scientists themselves as the data can be manipulated and presented as being significant through their carefully plotted lines and inconceivable start and end dates but without meeting the statistical criteria for significance.³

Current issues of climate change have, according to John E. Thornes and Gemma Metherell, sparked 'a growing interest in the environmental and social history of air pollution and the sustainability of the air that we breathe'.⁴ Climate change in the nineteenth century was 'far more dramatic and visual than it is today' through smoke pollution that blanketed the larger cities of Britain and Europe in a pall of toxic haze that could not only be seen but also smelled and tasted. 'Air', or the atmosphere, is composed of invisible gases, predominantly nitrogen (78.09%) and lesser amounts of oxygen (20.95%). Carbon dioxide, one of the principal greenhouse gases causing the problems associated with climate change makes up only 0.039% of the air that we breathe and yet a very small rise in this proportion may lead to extraordinary and unimaginable scenarios. Given that it cannot be seen and exists in such seemingly small amounts the role that carbon dioxide plays in global warming is not easily comprehended and is often conflated with other kinds of air pollution such as smoke and car exhaust, which may be clearly visible in dark bands along the horizon or sensed by their smell. Writing about his own experiences of living in 'the dramatically polluted environment of northwest Indiana', close to steel mills and power plants, Harold Fromm declares that the personal realities of bad air remain almost unexplored:

The physical and psychological signs of air pollution which are the most important and for which the visual and odorous merely provide confirming evidence of the extent to which one's total being is shaped each day by the particular chemical mix of the air.⁵

In his seminal study of lay perspectives of global climate change Willett Kempton found that because it can be both seen and felt, the layperson tends to regard air pollution as one of the main causes of climate change and breathing in such pollution is a major personal concern. Some of his respondents believed that the atmosphere would run out of oxygen if the greenhouse effect got closer to 'our air' and that they were ingesting all the aerosols and ozone that according to them was being projected up into the atmosphere. He also found that his small but diverse sample of respondents conflated air pollution with the atmospheric carbon that contributes to global warming and that this is one misconception that prevents them from taking any responsibility for changes in behaviour as they are incapable of 'cleaning' the air. Kempton's study revealed that in general people are concerned about climate change but the information they receive is confusing, impersonal and distant.⁶

Sensing weather and feeling air

Breathing in and breathing out are taken for granted and yet the same air from the atmosphere that surrounds us that contains all the extremes of the climate inevitably becomes a part of us all.⁷ It is the air itself that causes us to breathe due to differentials in atmospheric pressure in our lungs, inside and out we are totally connected to and reliant on air and as such our bodies are part of and instrumental to a whole environmental system. As John Olsen observes:

Air protects, envelops and bathes us. With each breath I take, I am reminded that I am not a single, totally self-reliant, and autonomous entity but a biological system intimately connected with the invisible membrane pressing in on my skin, refreshing me and giving me life. We do not cause air. Air causes us. Breathing is a process that occurs without our conscious intervention.⁸

The affects of the atmosphere on mental as well as physical health were particularly prominent in the early, polluted years of the nineteenth century in England when many artists, such as John Constable and J.M.W. Turner and poets Percy Bysshe Shelley and John Keats, expressed their feelings and emotions through depictions and descriptions of the aerial world that surrounded them. Jonathan Bate claims that, 'A living reading of Keats' "To Autumn" in the age of global warming, must begin with the knowledge that we have no choice but to live with the weather'.⁹ Keats suffered from consumption and as such had no choice but to gape expectantly into the air, modified by the newly emerging industrial pollution, as it literally controlled his life. His ailment gave him a peculiar insight into the ways

that we are inextricably connected to the atmosphere. However, apart from his physical health, as for so many of the artists and writers at that time the atmosphere was even responsible for their sense of wellbeing and in a letter to his friend J. H. Reynolds in 1816, he described the time when the skies eventually cleared after three years of polluted, ash-laden air following the eruption of the Tamboro volcano in Indonesia:

How beautiful the season is now – How fine the air. A temperate sharpness about it. Really, without joking, chaste weather – Dian skies – I never lik'd stubble fields as much as now – Aye better than the chilly green of the spring. Somehow a stubble plain looks warm – this struck me so much in my Sunday's walk that I composed upon it. I hope you are better employed than in gaping after weather.¹⁰

Keats' acute awareness of the air that he breathed could be a lesson for us today. During a 24-hour period each person 'consumes' between 3,000 and 5,000 litres of air, the same air that has blown over Cape Grim and also the LaTrobe Valley. This air contains all the visible and invisible contaminants emitted by major polluters such as power stations and road and air traffic along with the pristine air blowing from the more remote regions; we are unable to distinguish or separate dust and air pollutants from carbon dioxide and oxygen or control the mix as the air swirls around us on global currents. 'Air is a gas, and the original meaning of the word *gas* is "chaos". The forecasting of any complex, non-linear system ... is inevitably a probabilistic process based on a set of variables and conditions'¹¹ states John Olsen when he writes about our fruitless efforts to influence the climate. And according to Bruno Latour, 'Climate control is not inspired by a mad ambition for total mastery of the elements, but by a reasonable wish to ascertain what sort of breathing space is most conducive to civilised life.'¹² But without having to travel to the extremes of our planet to have a bodily experience of what it actually feels like to breathe the cleanest air in the world, in what ways can awareness of carbon pollution be made a personal issue by aligning it to feelings of well being to engage communities?

Seeing is believing

One of the difficulties of communicating climate change is that it is taking place over a span of time too great for us to comprehend, having only our own short lifetimes to measure it by. And it is invisible even if we are regularly presented with apparent visual evidence of climate change through photographic images of polar bears stranded on melting icebergs and catastrophic events such as floods and hurricanes or rivers reduced to a trickle, which may or may not be the result of unusual rising temperatures, yet all of which have become emotive symbols of changing climatic conditions. Images such as these raise a level of fear in the general population, which may subsequently lead to feelings of helplessness or guilt and of 'being a bad person', the associated emotion of fear.¹³

Climate scientists such as Mike Hulme are uncomfortable with the ways that climate change is communicated in the media, 'through the language of catastrophe and imminent peril, as "the greatest problem facing humanity"'¹⁴, which he believes lessens the many other ways of thinking and knowing about climate that may also include 'feeling' that he considers is essential to personal and collective decision making. Conversely Kari M. Norgaard argues that although emotions can be a source of information and an impetus for social action, 'the desire to avoid unpleasant emotions and the need for emotional management can also prevent social movement participation.'¹⁵ Given the great range of ways of addressing climate change we reel from apocalyptic predictions to mundane, over-simplistic solutions such as those provided in Al Gore's list of 'Things to do' at the end of his film, *An Inconvenient Truth*. He suggests that we 'Plant a tree' or 'Use less hot water', phrases which are quite at odds to the ominous predictions and visualisations in the film itself.¹⁶ If catastrophic predictions and scientists' graphs and statistics are either not making any impact on us or causing feelings of fear and guilt or even, presenting such unimaginable situations that paralyse us then what alternatives are there to bringing climate change awareness to sectors of the community?

Visualisation from a scientific perspective

In general, according to Richard Feynman, we are unable to comprehend complex ideas and theories: 'Our imagination is stretched to the utmost, not as in fiction to imagine things which are not really there, but just to comprehend those things which *are* there.'¹⁷ Jonah Lehrer claims that the only way we can make sense of the world is by making associations through metaphor and analogy, through the formation of mental imagery to individually picture the world we know. This is the reason, Lehrer argues, that the sciences need the arts and that once the metaphors are accepted as being important to science then we can think about ways to make them better and therefore better communicate science. 'Artists', he says, 'can help make the scientific metaphors *tangible*.'¹⁸ Beth Carruthers concurs with this by claiming that art and art making can offer alternative visions of the world, ones that 'insist upon the subjecthood of the "object" and reveal a world of inter-subjectivity and relationship'.¹⁹ In other words, if art can evoke feelings about our world then we can possibly be motivated to make necessary changes in our lives to preserve it.

Art can assist in upholding differences such as those between science and art while also bringing them closer together and one of the ways that artists can do this is by engaging us into a world of sensations and relational aesthetics or artistic practices. Nicolas Bourriaud explores these notions through examples of what he calls relational art. According to Bourriaud, relational art encompasses 'a set of artistic practices which take as their theoretical and practical point of departure the whole of human relations and their social context, rather than an independent and private space.'²⁰

The artwork creates a social environment in which people come together to participate in a shared activity. Bourriaud claims that 'the role of artworks is no longer to form imaginary and utopian realities, but to actually be ways of living and models of action within the existing reality, whatever scale chosen by the artist.'²¹ In relational art, the audience is envisaged as a community. Rather than the artwork being an encounter between a viewer and an object, relational art produces intersubjective encounters. Through these encounters, meaning is elaborated *collectively*, rather than in the space of individual consumption. I will return to these ideas later.

Some scientists are already seeking alternative means of disseminating their claims about climate change and the potential for influencing perceptions and behaviour. Stephen Sheppard hypothesises that certain kinds of visual communication, especially visualisations of realistic landscapes, which attempt to look into the future and which engage the emotions, 'may substantially enhance awareness-building on various complexities and implications of climate change, and may help motivate behavioural change at the individual to societal levels'.²² However, according to Sheppard, as an alternative to graphs and charts few such visualisations addressing climate change have yet been produced or subjected to research evaluation. Daily we are made aware of the power of visual imagery to communicate complex and not-so-complex messages quickly and effectively through the commercial advertising and popular media we are surrounded by. In many ways vision, as in sight, is our dominant sense but vision, as in visualisation is also *perception*, an embodied awareness that enables a vital connection to the world and a means to locate ourselves within a network of relationships that link self and other and the ways we come to know and experience the world. Vision, not only relates to our ability to physically see and to visualise but also enables internal paths of imagining, which as so important to the ways we interpret visual information.

When we view dramatic images such as those already described via the media we not only see what is portrayed in an unemotional way but we can also engage mentally with what is presented to imagine the situations we view. Such imagery and subsequent imaginings can be powerful ways to reach our emotional sides. Sheppard claims that 'Imagery ... which triggers affective responses, has been shown to improve cognition in some cases and to influence people's decision-making'²³ such as that of certain advertising, which is created not only to inform or engage emotionally, but also to influence behaviour, to encourage us to buy certain products for example. If, as Sheppard suggests, realistic landscape imagery is most affective in communicating complex issues and engaging us emotionally and metaphoric imagery can bridge the gap between science and the general population, then certain kinds of experiences could be more effective than others.

The popular 'disaster' movie, *The Day After Tomorrow* of 2004, which graphically depicts the apocalyptic results of global climate change, received mixed responses from environmental activists and climate scientists. On the one hand they credited the film with an important role in alerting the wider public to the possible effects of climate change but they also criticised it severely for communicating misinformation and, what they termed, 'lousy science'. Sheppard's research has found that the overly dramatic effects in disaster movies confuse the general population who are then unable to distinguish fact from fiction, which makes connections with scientific reality difficult. Similar research into the use of images for visual communication in relation to climate change carried out by Nicholson-Cole shows that people are most emotionally affected by national and local imagery, images that they feel attached to in a personal way rather than clichéd, global ones.²⁴ And, again according to Sheppard, 'gaps in behavioural motivation seemed to be related to difficulties in personalising climate change'.²⁵ The findings of both Nicholson-Cole and Sheppard indicate that to reach the emotional side of viewers imagery should not confuse as to its reality or otherwise and its content should be easily related to on a local level. According to Sheppard, 'We should take the perceptual leap and seek to engage the public's emotions'²⁶ and he believes this is worth attempting even if changes do not immediately occur as simply getting people to engage means they may think more seriously about their future and allow them to perceive that they have choices to make. He also proposes that the use of landscape visualisation in regard to climate change could possibly affect behaviour if it provides what he terms, 'disclosure' or 'a window into the future which is personally meaningful and tangible, making the global both local and personal, showing possible negative and positive outcomes' and 'drama' or 'a vivid and compelling presentation with emotional content'.²⁷

While Sheppard proposes such convincing ideas about the role of visual imagery in affecting behaviour his research has been predominantly in regard to digitally manipulated, documentary photographs of landscapes both rural and urban. In his study, Sheppard relies on the 'truth' of the photograph and does not consider that 'reality' as presented in photographic images is a construction and dependent on the viewer or perceiver of the photograph, rather than a given or a fixed entity. By focussing solely on photographic images he does not examine more complex visualisations that are neither realistic representations nor ultra 3D fictions. At no point in his extensive study does he acknowledge the role of art and artists in the making and presentation of imagery and installations that can address most aspects of both his and Nicholson-Cole's questions.

An experience of nature through cultural agency

The ways that artists can make representations which directly relate to and align with issues raised here are twofold; through the creation of two-dimensional images such as paintings and photographs and by constructing

large-scale installations that directly engage the viewing audience, as in Bourriaud's relational art. Over the past 200 years or so artists have created representations of the atmosphere for a variety of reasons but often because polluted atmosphere produces the extraordinary sunsets and sunrises that are so attractive to artists. In the nineteenth century J.M.W. Turner and Claude Monet painted innumerable renditions of London and other places seen through the haze of smoke pollution and their art actually brought these fogs to people's attention. Oscar Wilde claimed that artists such as these actually made people aware of the pollution: 'people see fogs, not because there are fogs, but because poets and painters have taught them the mysterious loveliness of such effects. There may have been fogs for centuries in London. But...they did not exist until Art had invented them.'²⁸

In the early twentieth century the Dada artist Marcel Duchamp 'created' an extraordinary contemplative object, *50 cc of Paris Air*, a chemist's glass ampoule that supposedly contained a small amount of 'captured' air of Paris. At this time many artists were turning from paintings as an individual encounter with a viewer to the creation of artworks using everyday objects in imaginative ways. In this artwork of Duchamp who could gaze on such an object and not attempt to imagine the kind of air contained inside? Objects and artworks such as this relied on engaging the imagination and perception of the viewer to create a mental image or narrative.

The above examples of artists' representations of atmosphere rely on individual imaginative interpretation and a one-on-one encounter with the work of art. In the twenty-first century artists are more likely to create experiences through large-scale public installations more akin to Nicolas Bourriaud's relational art. Recently Paris-based art and design duo, Helen Evans and Heiko Hansen, collectively known as HeHe, have produced *Pollstream*, 'an intervention in environmental ethics' that created interactive environments in which members of the public could monitor levels of air pollution at the same time they were producing it. The viewers, or participants, were required to conceptualise themselves as collectively and individually responsible for their emissions. In one project, *Nuage Vert*, lasers and a camera tracking system project colour-coded information onto a waste burning plant and power plant within an area visible to the local residents. The plume of smoke from the plant changes colour according to the levels of energy being consumed; the chimney becomes a measuring tape or 'shared canvas' for the consumption of power in which all the community are involved. 'The PollStream Project speculates on aesthetic and contextual ways of materializing pollution in ways that alter our perception.'²⁹

Another example of art as collective encounter is that created by the Danish artist Olafur Eliasson, who through often extremely large-scale and highly inventive installations explores our perceptions of the natural world, especially ubiquitous phenomena such as the elements of the atmosphere. His work is predominantly about creating an experience for his viewers,

to make them aware of themselves feeling and sensing; that moment of perception when his viewer stops to consider what it is she is actually experiencing. Often his aim is to encourage viewers to reflect upon their understanding and perception of the physical world around them through the creation of works that capture fleeting aspects of the natural world, thereby evoking spiritual and emotional responses. Eliasson echoes the theories of the French philosopher Maurice Merleau-Ponty who asserted that we 'must make perception itself an object of consciousness by stepping back from it so that we do not view objects in the world *through* perception but by consciously being aware that we are perceiving them.'³⁰ In this way the physical body is central to the spatial and temporal construction of the world in which it is located and engaged. Eliasson plays with issues of reality, truth and representation that challenge his viewers to question their sense of their surroundings. According to Susan May, 'Experience is rendered both physiological and psychological in his works through an accentuation of the gap between the rational expectation of an occurrence and its correlation with the visceral experience of it.'³¹ To this end Eliasson reverses accepted conventions by making his perceptive viewer or his subject the object of his work, by creating artworks that require his viewers to rearrange their normal perception of their environment and the role they play within it.

In 2003 Eliasson was commissioned to create an installation in the cavernous Turbine Hall of the Tate Modern Gallery in London, which once generated electricity for central London. Originally the turbines were turned by the burning of coal and subsequently, following the introduction of the 'Clean Air Act' in the early years of the 1950s, through the burning oil, even though both these fuels are sources of the greenhouse gases that have contributed to climate change. Eliasson's installation, *The Weather Project*, was created literally out of smoke and mirrors. Consisting of a semicircular 18,000-watt bank of sodium yellow streetlights reflected in a half-circular mirror in the ceiling of the space, it created an illusion of a huge artificial, indoor sun in the darkness of the hall. The combination of the lights and their reflection along with a profusion of sugar smoke that produced a fine mist that permeated the space like polluted air from the outside environment, created a hazy atmosphere that engulfed the viewers in a sickly, misty gloom, very reminiscent of early nineteenth century London. As the day progressed the mist accumulated into cloud-like formations before it dissipated. Mono-frequency sodium lamps emitted light at a very narrow frequency, which meant that colours other than yellow and black could not be discerned. The combination of these elements transformed the space into one of foreboding gloom. It placed the viewer as the subject in the centre of the artwork where they became aware that they were experiencing a contrived environment and yet it produced feelings of apprehension for the future, which they were able to discern were quite of their own making. The exhibition reputedly attracted over two million visitors, the majority of whom would not have experienced the lethal London smogs of the early 1950s.

Throughout the duration of this installation, viewers lay on the floor of the gallery for hours on end, drawn to the powerful yet ominous experience of the work. The combination of the perceived industrial haze, the lurid yellow sun along with the history of the space in which they were enclosed was a potent mix that evoked memories and feelings of awe and smallness in the face of such disturbing and powerful work. Eliasson created a network of interconnecting responses and engagement in the public domain. His viewers found themselves completely implicated in his experiential installation – they walked in it, lay in it and breathed it in. In this way there was no separation between them as subjects, their association with the artwork and the atmospheric world around them.

Conclusion

The atmosphere that encases us has the capacity to affect our emotional state. By paying attention to our embodiment in this predominantly invisible substance and the role it plays in our lives through the agency of the imagination, we may be able to think differently and more clearly about the world where we live and what is occurring within it. The atmosphere has long been a subject for artists who have connected its pollutants and effects with feelings and emotions and there is a strong correlation between the air we breathe and perceptions of clean air and feelings of wellbeing. Even though the general population may confuse global warming and climate change with other atmospheric contaminants such as air pollution, becoming more aware of what is in the air as gaseous or particulate material may not be as serious a misconception as not being aware at all. While it has been demonstrated that images of landscapes that people can relate to, such as sunsets or local scenes, can engage the imagination it has also been illustrated that art installations, which engage on a bodily, experiential level can be powerful ways of communicating global issues. In this context certain works of art offer ways of encountering the world without conclusion, engage the imagination and present open-ended opportunities to involve the viewing public into processes of speculation and interpretation. In an encounter with particular artworks a viewer is invited to participate, not only through sight but also bodily and imaginatively in their own perceptive processes to recall personal experiences to make sense of global reality.

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Endnotes

1. From the CSIRO website: www.csiro.au/Organisation-Structure/Divisions/Marine-Atmospheric-Research/Cape-Grim.aspx#a1 accessed 15 October, 2011.
2. H. Fromm, 'The psychedelics of pollution', in D. Rothenberg and W.J. Pryor, eds, *Writing on Air*, The MIT Press, Cambridge, Massachusetts, 2003, p. 4.
3. R. Hamblyn, 'The whistleblower and the canary: rhetorical constructions of climate change', in *Journal of Historical Geography*, vol. 35, 2009, pp. 223–236, p. 234.
4. J. E. Thornes and G. Metherell, 'Monet's "London series" and the cultural climate of London at the turn of the twentieth century' in S. Strauss and B. S. Orlove, eds., *Weather, Climate, Culture*, Berg, Oxford, 2003, p. 141.
5. Fromm, 'The psychedelics of pollution', p. 6.
6. W. Kempton, 'Lay perspectives on global climate change' in *Global Environmental Change*, vol. 1, issue 3, June 1991, pp. 183–208, p. 186.
7. L. Duxbury, 'A change in the climate: new interpretations and perceptions of climate change through artistic interventions and representations', in *Weather, Climate and Society*, vol. 2, no. 4, 2010, p. 295.
8. J. Olsen, 'Inebriate of air', in D. Rothenberg and W.J. Pryor, eds., *Writing on Air*, The MIT Press, Cambridge, Massachusetts, 2003, p. 87.
9. J. Bate, 'The ode "to autumn" as ecosystem', in *Studies Romanticism*, vol. 35, no. 3, 1996, p. 256.
10. J. Keats, *Letters Volume 2*, ed., H.E. Rollins, Harvard University Press, Cambridge, Massachusetts, 1968, p. 167.
11. J. Olsen, 'Inebriate of Air', p. 84.
12. B. Latour, 'Atmosphère, atmosphère', in *Olafur Eliasson: The Weather Project*, ed., S. May, Tate Publishing, London, 2003, p. 30.
13. K.M. Norgaard, "'People want to protect themselves a little bit': Emotions, denial and social movement nonparticipation' in *Sociological Inquiry*, vol. 76, no. 3, August 2006, p. 379.
14. M. Hulme, *Why We Disagree About Climate Change: Understanding controversy, inaction and opportunity*, Cambridge University Press, Cambridge, 2009, p. xxxiii.
15. K.M. Norgaard, "'People want to protect themselves a little bit': Emotions, denial and social movement nonparticipation', p. 384.
16. R. Hamblyn and M.J. Callanan, *Data Soliloquies*, Slade Press, University College, London, 2009, p. 48.
17. R. Feynman in J. Lehrer, 'The future of science...is art?' in *Fourth Culture*, SEEDMAGAZINE, 16 January 2008. www.seedmagazine.com/content/article/the_future_of_science_is_art/ accessed 24 April 2011, p. 4.
18. Ibid.
19. B. Carruthers, 'Returning the radiant gaze: art and visual embodiment in a world of subjects', 2003, www.culturalcurrency.ca/Theory.html accessed 28 July, 2011, p. 4.
20. N. Bourriaud, *Relational Aesthetics*, Les presses du réel, 2002, p. 14.
21. N. Bourriaud, *Relational Aesthetics*, p. 15.

22. S.R.J. Sheppard, 'Landscape visualisation and climate change: the potential for influencing perceptions and behaviour', in *Environmental Science and Policy*, vol. 8, 2005, p. 286.
23. Ibid.
24. S.A. Nicholson-Cole, 'Representing climate change futures: a critique on the use of images for visual communication', in *Computers, Environment and Urban Systems*, vol. 29, no. 3, 2005, p. 286.
25. S.R.J. Sheppard, 'Landscape Visualization and Climate Change', p. 642.
26. Ibid. p. 648.
27. Ibid. p. 647.
28. O. Wilde, (1889), 'The decay of lying', in *The Works of Oscar Wilde*, 1987 edition, Galley Press, Leicester, p. 925.
29. From www.greenmuseum.org/c/aer/projects/pollstream/index.htm accessed 5 January 2011.
30. M. Merleau-Ponty, 'Eye and mind', in *The Primacy of Perception*, Northwestern University Press, Evanston, 1964, p. 133.
31. S. May, 'Meteorologica' in *Olafur Eliasson: The Weather Project*, ed., S. May, Tate Publishing, London, 2003, p. 16.