

***The Breathing City Project*¹:**
Drawing Interpretations from the Atmosphere;
Patterns of Behavior and the Negotiation of Knowledge.

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Abstract.

The Breathing City project is an arts and science collaboration between an Urban Meteorologist (University of Reading), a Designer/Researcher and a Composer/Sound Artist (University of Brighton). *The Breathing City* is an interdisciplinary project in the sonification of urban environments in conjunction with urban meteorological events. The project brings together diverse fields of research and practice from soundscape composition, narrative, sensory experience and cognition to urban meteorology and pollution dispersion, in a creative and exploratory dialogue.

This paper documents the development of a collaborative process, from the initial discussions establishing common threads and emergence of shared concerns, to the exploratory creative processes, developing various modes of representation ie. evocative soundscape, visual imagery and scientific models to communicate and share insights into the challenges of understanding localised phenomena within a global context.

Understanding complex events and processes requires a unique interaction of the sensory, the aesthetic, the analytical and the rational. To witness complex systems in nature, such as flowing air currents above a city or the formation of clouds, can be at once highly evocative and yet illustrative of a process explicable by theory if one has learnt to see or discover the information or 'data' within the urban atmosphere(s).

Keywords: Interdisciplinary Collaboration, Sonic environment(s), Urban Climate Models, Data Representation, Sensory Experience, Complex systems.

¹ *The Breathing City* project is part of the *Spring Group* - a large scale Arts and Science interdisciplinary research initiative between the University of Brighton (Faculty of Arts and Architecture and Medical School), University of Reading (Meteorology Department), University of Sussex (Centre for Computational Neurology and Robotics) and University of Exeter (Meteorology Department).

Working within *The Breathing City* project, a composer/sound artist interested in the wide ranging aspects of narrative and sensory experience, a designer interested in the cross-referencing of the senses in relation to the formation of knowledge, and an urban meteorologist with a passion for music and for the performance aspect of conveying ideas, are working together to gain insights into graphical representations of complex phenomena and our understanding of the issues at play. In working between these fields, we repeatedly encounter boundaries between the ‘rational’ and the subjective, and between concepts, constructs, and experience; and must attempt to find a language that addresses what connections there may be.

Initially the process of creating the soundscape composition involved gathering live-recorded sounds from various locations in the United Kingdom, USA and India, with the intention to absorb the ‘feel’ and character of a place. When listening on location, whilst making live-recordings, only fragments of meaning and layers of information were consciously clear/obvious. However, only later did a more expansive ‘picture’ emerge – one that is at-once site specific and intensely personal. During the process of working with the recorded/displaced sounds in the studio environment the repeated conscious listening to this sonic urban morphology not only evoked memories of the place but also unfolded often specific discoveries of meaning or a multiplicity of associated interpretations (Augoyard and Torgue, 2006). Through intensive listening a relationship evolves to the material and the process of experimenting with the available technology in the physical and virtual studio environment opens up a multitude of sonic possibilities. The organisation of the material is in most cases guided by the unfolding meaning of the material itself and techniques of layering, juxtaposing, mixing and altering emerge through experimentation. The organisation and re-organisation of the sound material constructs entirely new places, which can either side-step reality or highlight reality by fine tuning the perception or ‘sharpening the lens’ to discover a specific perspective, or approach which enables us to say what we want to say about a place or places (Westerkamp, 2002).

As a soundscape composition *The Breathing City* is a sonic expression of urban landscapes and lived environments that are interwoven with ‘social histories and political organisation of space’ (McCartney, 2002). The soundscape triggers memories and associations, a confluence of time and place.

In the popular imagination, it may be thought that data ‘exists’ out there in the atmosphere, waiting to be collected and brought in to the lab. In fact data does not exist; it is a conventionalized way of expressing the product of an interaction between a device and the forces that act upon it. For example, if we put a mast into the air holding an anemometer at roof level, the output from the device may be converted into streaming data in which we may perceive recognizable patterns of behavior concerning wind. In order to understand any ‘meaning’ in data, the design of the device must be explained in conjunction with the data it produced, since the data is best thought of as co-constructed between the device and the atmosphere.

Graphical representations may obscure the complexities implicit in atmospheric modeling. *The Breathing City* project will in its final stage be a sound art exhibit that forms part of the larger *Spring Group* research activity across differing arts practices and specialisms in meteorological research. The individual projects within the group, of which *The Breathing City* is one, vary in scale from the urban to the global. *The Breathing City* makes use of the sonic medium, theoretical and visual representation and in order to locate human sensory experience with questions of

meaning and scientific analysis in the urban environment; it strives to understand complex atmospheric effects in a way that connects the personal with the general; the intimate with the environmental. Distinctive conceptual features may be discovered by cross-referencing techniques that straddle practices in art, design, and the scientific challenges of understanding ‘data’ through visual representation.

A map is a way of making sense of circumstances that extend from our immediate sensory experience; In a well known hand drawn diagram published by Edward Tufte of the ‘Historic Salyut 6 Cyclogram’, astronauts plotted co-ordinate points on a graph in order to ‘fix’ things for which their natural frame of reference had been removed; principally all conceivable ways of mapping the passage of time (Tufte, 1997). Graphs allow a relationship between two or more things to be described visually. This can be a creative process – finding the ‘right’ plot can take time to work on; also different relationships of variables can be tested, and the ‘process’ of constructing a representation or indeed a theorem can be considered with a visual expression of the salient features to assist reflection, recognition, and choice.

An example of ‘finding the right plot’ that emerged from a public presentation of *The Breathing City*, is the ‘100 mile block’ sketch which was initially an aid to thinking about the domain in which we were working, but upon reflection revealed a particularly significant problem with the manner in which ideas may be communicated. The diagram took its cue from an observation in the *Stern Report* (or known as *The Stern Review on the Economics of Climate Change* released October 2006 by economist Lord Nicholas Stern for the British government), specifically the limitation of the global climate model as computed with the present technical constraints which limit the resolution of the mapping of the whole atmosphere to a horizontal unit of 100 miles (and about 20 miles deep). In *The Breathing City* we have been concerned with the accessible realm of human sensory experience from the personal scale to the largest we can directly perceive, say a jet plane passing overhead or hearing a thunderstorm 10 miles distant. The anecdotal in this respect can provide an avenue to sophisticated connections concerning the construction of knowledge. For example; an experienced surfer can step outside the home in the early morning and ‘feel’ what the tidal conditions are likely to be several miles away, because of a complex of haptic and sensory experience in three dimensions of space and all the senses working together to contextualise each other. In sketching these two concepts together, i.e., the perceptions of the surfer and the 100 mile block from the *Stern Report*, it became obvious that there is a significant discrepancy of scale between the finest level of resolution of the global climate model and the maximum extent of expert human senses. The implication is that representations of the global climate model do not yet ‘connect’ clearly to human experience (Figure 1). The concerns of the whole *Spring Group*, in which projects at different atmospheric scales from the urban to the global are connected to each other, can be thought of as occupying areas of discrepancy between representations of the global climate model and the nuances of everyday experience. This has become an interesting connecting idea for the group.

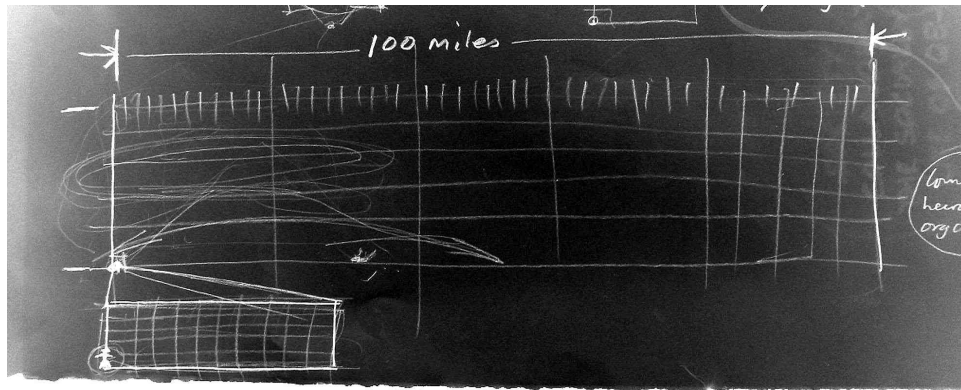


Figure 1 - Placing the Surfer within the hundred-mile block of the Global Climate Model (sketched drawing by Rose, C., *The Breathing City Project* 2007).

To explore these processes in an art-science context, the boundaries or challenges that exist between the ‘rational’ and the subjective, and between the representation of knowledge and the complex competing themes that lie behind attempts at representation, require a critical attitude to all forms of communication in the process of attempting to work in this way. It is proposed here that an effective way of addressing these cross-disciplinary challenges will provide the basis for successful communication of abstract scientific concepts for non-specialists such when trying to promote the public understanding of science.

An intellectual, philosophical and ethical issue lies at the heart of this problem. That is, that if the ‘rational’ and the ‘subjective’ have been traditionally seen as mutually exclusive, an area of great potential significance to the development of understanding may be missed, namely the consideration of the *relationships between* the rational and the subjective, and practices that assist an appreciation of this relationship. This is where art-science practices can assist us. By this is meant practices that constructively influence both the art and the science, not one done after the other. The kind of practice we are looking for is neither the ‘scientisation’ of art nor the decoration of science with art.

In the history of science, the ‘scientific project’ had to begin by making a defence against superstition and so-called ‘folk knowledge’; hence the establishment of the concept of ‘rational truth’ as an ideal to be sought after. Although a discrete rationalizing capability is posited for humans throughout the history of western philosophy, this concept (or to be more accurate, the way it is described) is thrown into doubt by research into the embodied mind. (Lakoff and Johnson, 1999). Embodied mind research proposes that ‘rationality’ can only be a concept; a concept given cognitive location by both its *antithesis* (irrationality) and its *context* (experiential phenomena affecting sensory processes in the body). Returning to the basis of art-science collaboration as we began to discuss it above, we have therefore two vectors with which to address questions of the relationship between the rational and the subjective; namely (rational - irrational) and (subjective – objective). We also have the useful vector of (naive – expert) to apply when querying what we regard as ‘knowledge’. We may ask an interesting question about this concerning the operation of our senses; what do we, as humans, have, other than our subjectivity? We have sensory experience including such things as balance, pain, light, sound, touch etc, and we have concepts, theoretical conditions or narrative constructs which we may call

objective reality and rational truth. If both the ‘Rational’ and the ‘Objective’ are shown to be ideological or imaginary constructs, we are left with the effects of phenomenal experience upon our senses, which we narrate to each other in order to create a body of knowledge. Thus ‘how we tell the story of the weather’ reveals as much about ourselves as it does about complex phenomena, and attempting to understand complex interactions can be seen to involve something of the art of storytelling.

We have found it a useful technique to utilize, however tentatively, such two-vectored and three-vectored mappings as illustrated above (e.g. subjective/objective, rational/irrational and naive/expert) against which to test such questions as arise in our interdisciplinary discussions, such as: Where does logic reside in the subjective/objective? And what about logic as considered in relation to those other vectors? Differing approaches, presumptions and practices may be critically located in the art-science context by these means.

It is hard to imagine a condition in which our personal internal ‘aesthetic’ reading of our complex experience simply could not effect our attempts to rationalize complex information. It has been interesting to discover within the art-science scheme that is the *Spring Group* that while the participating scientists could be prepared to discuss such relationships, however oblique, within the art-science grouping, they would not feel able to do this within the more formal peer group setting where theories and representations are proposed and accepted. The implication being that the human aspects, the sensory, aesthetic experiential aspects of being ‘alive’ to something in the emotive sense, tend to be disallowed in science, or at least have not yet found a vocabulary with which to locate their effects upon mathematical and physical research.

The Breathing City project and the *Spring Group* are exploring these issues in a context that must be the most common to all human experience everywhere; i.e., the weather. In working together we draw upon many approaches of attempting to discern meaning from experience, from the traditional to the scientific, and from the aesthetic to the analytical.

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