

ENVIRONMENTAL DATA AS SENSORY EXPERIENCE

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Abstract

Information visualisations within the field of environmental art are often imbued with an agenda for catalysing changes in behavior. They are political images that rhetorically ask how we might act differently in our relationship to what is being measured. This paper explores the complexity of information visualisations by discussing the radically different informatic strategies deployed in the installation artwork, *What the Frog's Nose tells the Frog's Brain*. Exhibited at ISEA2013, the work uses smell as a medium for producing information. The politics of smell remain relatively open, making it a rhetorical device rich with possibilities for exploring alternative modes of information production.

Keywords: Information, visualisation, data, electricity, olfactory, perception, infrastructure, smell.

Driven by the quantification of almost all of our activities and surroundings, data visualisation has emerged as a broad category of contemporary creative work. Visualisations and particularly those deployed within the field of environmental art, often present information with an agenda for catalysing changes in behavior. They are political images that rhetorically ask how we might act differently in our relationship to what is being measured. Yet this agenda assumes direct relationships between data, understanding and action- relationships that break down in the face of complex environmental issues such as climate change.

This paper explores the complexity of information visualisations by discussing the radically different informatic strategies deployed in the installation artwork, *What the Frog's Nose tells the Frog's Brain*. Exhibited at ISEA2013, this work explores the possibilities of smell as a medium for producing information. The politics of smell are ambiguous and remain relatively open, making it a rhetorical device rich with possibilities for exploring alternative modes of information production.

Smell is a mechanism for interpreting the world. In contrast to vision, which occurs via the interpretation of light reflected from surfaces, smell is an embodied experience. Olfactory sensation involves the detection of molecules from the surrounding material world as they are inhaled and lodged in the nasal passage. When in the presence of an un-

pleasant odor, our reaction is emotional and embodied – we feel disgusted and instinctually want to move away from the source. As such, smell is a powerful medium. In the context of visualisation works, it offers a system of representation that is incompatible with the common visual rhetoric used to convey the relationship between human action and environmental consequence. Deployed in *What the Frog's Nose tells the Frog's Brain* to represent electricity data, the use of smell opens up new possibilities for bringing the viewer into a more intimate relationship with their electricity demands.

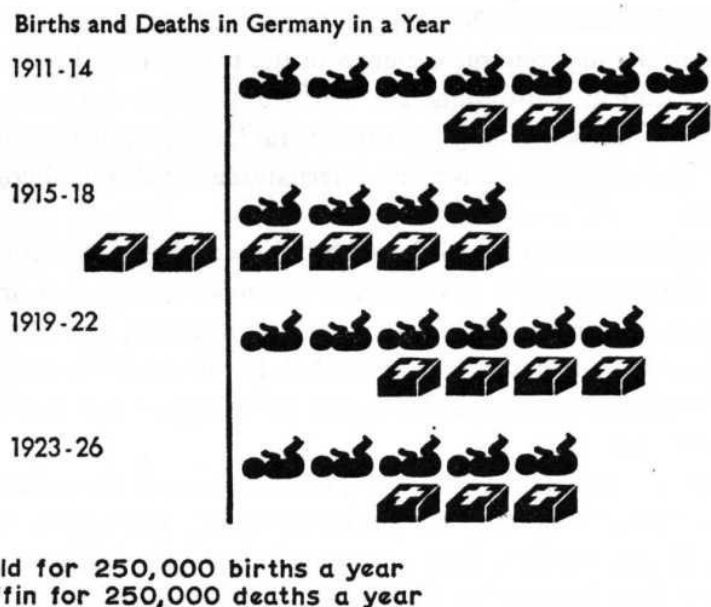
Information visualisation has a rich history predating the boom of the last decade, a boom that has been driven by increasing personal computing capacity. Much of this historic work is well documented [1], yet a discussion of some key examples is useful for tracing some assumptions and complexities that persist in contemporary visualisation work.

Otto Neurath was an Austrian political economist and early pioneer in practices of visually articulating quantified information. During the period from 1921-1934, Neurath worked at the Museum of Society and Economy in Vienna where he co-founded the visual language known as the Isotype or the International Picture Language [2]. Isotype symbols remain ubiquitous in public signage today. The symbol of the swerving car that warns of slippery road conditions and the familiar male and female silhouettes on

public bathroom doors are all examples of Isotype. This language consists of simplified, abstracted symbols and was developed for the communication of complex statistics in Neurath's museum exhibitions. In these exhibitions, statistical information was represented through visualisations using Isotype and rapidly inspired the further development and use of this graphical approach around the world [3]. Isotype was developed with the political agenda of democratising information and one of Neurath's primary goals was to show people how the world really is [4]. As is shown in Figure 1, quantified information is described through the repetition of simplified visual symbols. Certain graphical strategies, like varying scales or using spatial perspective to indicate quantitative information, are deliberately shunned in the interest of visual simplicity. In this example, the effects of World War 1 in the period 1915-1918 are clearly shown by the number of deaths outweighing the number of births.

Central to the graphic strategies of the Isotype is the elimination of detail and contextual information from the visualisation. Designed to be accompanied by text, these images privilege graphic simplicity in order to draw the viewer's attention to the statistical information within the image. As articulated by Benjamin Fry, a contemporary information visualisation practitioner and author, "(o)ften, less detail will actually convey more information, because the

Figure 1. Otto Neurath's Births and Deaths in Germany in a Year [5]. (© Springer).



inclusion of overly-specific details cause the viewer to disregard the image because of its complexity” [6]. Yet ironically, Fry hits on a central weakness of the Isotype and visualisation work in general. The apparent simplicity of these images obscures the complexity of how the data they contain was collected and what was deemed relevant and irrelevant for inclusion. The obviousness and seeming clarity of visualisations grants these images legitimacy and an apparent objectivity that is open to misuse. In the well-known writings of Edward Tufte, numerous examples are cited of what he refers to as ‘chart junk’: visualisations that adopt graphic strategies to skew datasets to serve various agendas [7]. What Tufte illustrates is that visualisation is a tool that is as likely to be used in the service of reactionary agendas as it is to be used in the service of clear and objective communication as was Neurath’s dream.

The irony of both the Isotype visualisations of statistical information and of contemporary computationally driven visualisation work is that these images actually require an enormous amount of contextual education in order for people to critically engage with them and therefore understand what is being represented. A similar critique is well developed by Benjamin Bratton and Natalie Jeremijenko in *Situated Advocacy*, in which they discuss these issues in relation to environmental data works [8]. In this text Jeremijenko critiques the oversupply of environmental information in art and design projects in recent years, specifically disputing their claim to the production of better knowledge of our environmental conditions. She argues that designers and artists have typically failed to ask how the environmental information was collected, why particular datasets are privileged over others and therefore what ideologies might be reflected in these choices. Although these creative practices aim to provide a critical environmental discourse, they do not adequately interrogate the politics of their information production nor provide their audience with access to this contextual information. This relates to the paradox of visualisation projects: although they aim to communicate information, if this is done uncritically, they concurrently obscure aspects of how and why this information was collected. For visualisations to be effective and truly political instruments, they must engage with the process by which the information is produced.

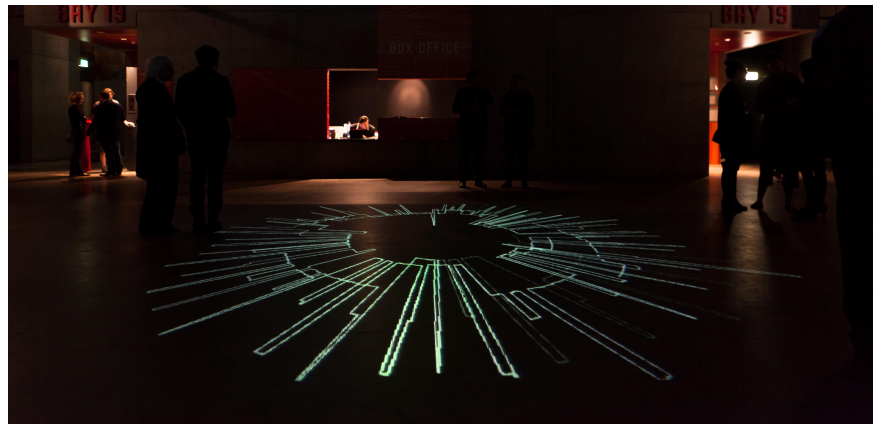


Figure 2. KiloWatt Hours, 2011. (© Tega Brain. Photo © Alex Wisser).

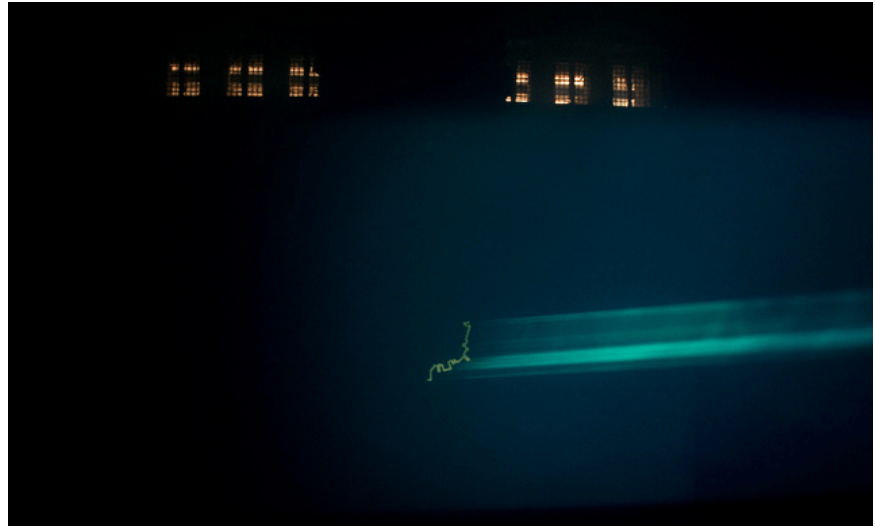


Figure 3. CO2NE, 2010. (© Tega Brain. Photo © Sarah Caufield).

In response to the complexity of information visualisation, in 2012 I began to explore the possibilities of using odour as a medium for information production. I began to explore non-visual aesthetic strategies for creating relationships to environmental information. This exploration built on some of my previous installation works that measure and visualise electricity usage measured from public buildings. These works include *Kilowatt Hours*, 2011 (Figure 2) that uses electricity information to inform a projected 2 dimensional animation and *CO2NE*, 2010 (Fig. 3) that renders this information as 3 dimensional space. These earlier works respond to some of the shortcomings of visualisation work discussed here by engaging with the process of collecting the data as well as the process of visualising it. Yet as with much visual media, the information contained within these installations remains at a distance from the viewer. *What the Frog’s Nose tells the Frog’s Brain* responds to this observation. This installa-

tion work uses smell to produce electricity information as a sensory and embodied experience.

Humans are equipped with an incredibly sensitive sense of smell. As observed by Wagner and Jasper [9] in their thorough article *Notes on Scent*, humans are able to detect substances like pyrazines at concentrations of 1 part in 500,000 million – literally by the molecule. However despite this acute sensitivity, smell remains commonly misunderstood as a subjective sensation. As observed by many authors, the human sense of smell is actually incredibly objective – humans are consistently able to detect the same molecules at extraordinarily low concentrations and it is rather our ability to accurately describe a scent that is subjective [10]. What smell lacks is an adequately descriptive vocabulary. As Kant observed in 1798, “*all the senses have their own descriptive vocabularies, e.g. for sight, there is red, green, and yellow, and for taste there is sweet and sour, etc. But the sense of smell can have no descriptive vocabulary of its own. Rather,*

we borrow our adjectives from the other senses, so that it smells sour, or has a smell like roses or cloves or musk. They are all, however, terms drawn from other senses. Consequently, we cannot describe our sense of smell” [11].

The disconnect between smell and language, and the resultant plasticity of its description, was demonstrated by an experiment published by Trygg Engen in American scientist in 1987, in an article titled “Remembering Odours and Their Names” [12]. Participants were asked to first describe a series of scents with no verbal stimulus, and then in a second test, asked to identify the scents via multiple choice. Engen concludes that once a subject has an expectation of what the name of an odor might be, that name will largely control the sensation which will be perceived as fitting the name. By contrast, the presentation of a scent before a name is available does not have a similar effect. The unavailability of a verbal response leaves one in what he calls a “tip of the nose” state, unable to recall a name even though the odour is familiar [13]. For smell, context is everything.

Engen also observes the incredibly tight bind between smell and emotional memory that can persist over long durations of time. Unlike our visual memories, time has little impact on our olfactory memories which can remain intact over many decades. The presence of a scent encountered at a moment of emotional significance can transport us back to that moment with an uncanny vividness. The perfume worn by a first lover or the smell of a hospital after an accident can strongly evoke the emotion and sensation of that experience decades later. Some select smells also inspire an innate and predisposed response. The smell of burning hair is unmistakable and always alarming, the scent of chlorine ironically indicates dirt and the smell of scatole, which smells of faeces, always disgusts us. Could the tight bonds between certain scents and their predisposed responses be exploited for the design of information interfaces?

What the Frog’s Nose Tells the Frog’s Brain (Figure 4) consists of an experimental device that monitors the electricity use of the surrounding building. When the device measures an increase in electricity usage above a predefined threshold, it deploys a scent in the gallery. The scent selected was that of cade oil. Derived from the distillation of the sap of the tree *Juniperus oxycedrus*, cade oil smells acrid and smoky. The viewer’s

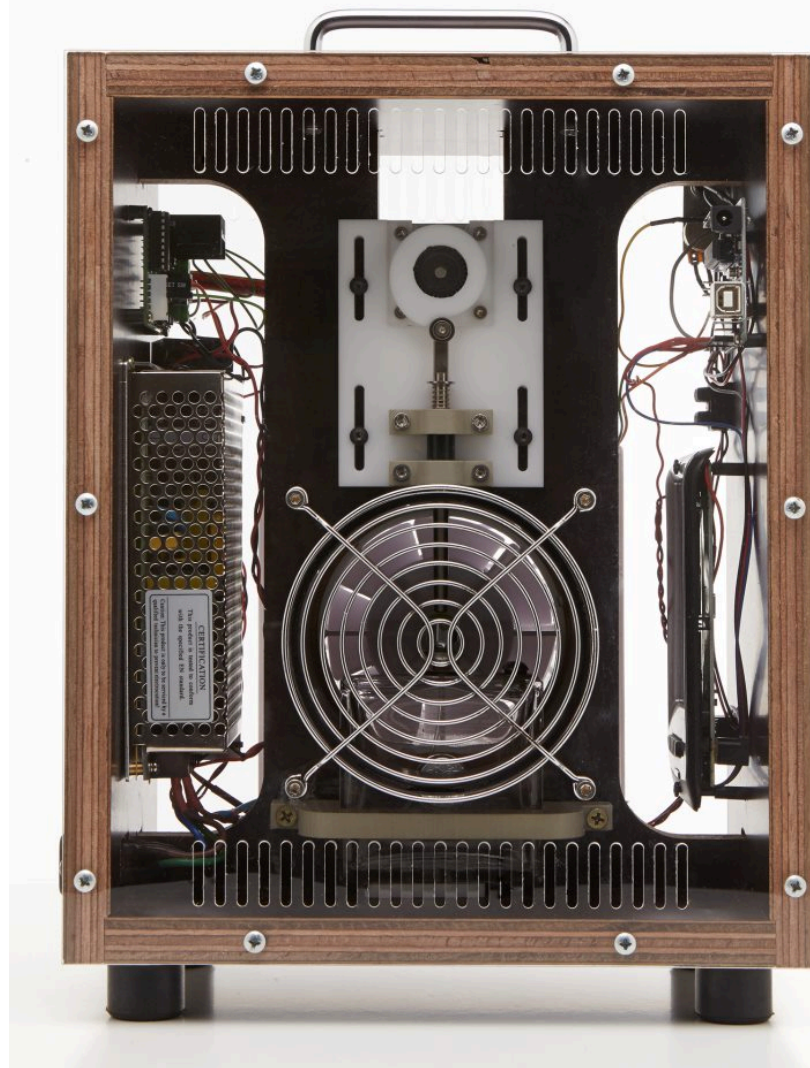


Figure 4. What the Frog’s Nose Tells the Frog’s Brain. (© Tega Brain. Photo © Leigh Russell.)

personal interpretation of this scent defines its emotive potential – it may alarm or unnerve or bring back past memories. However with ongoing use, the presence of this scent would act as an ambient reminder of the viewer’s own ecology, of their intimate connection to a system of electricity provision.

What the Frog’s Nose Tells the Frog’s Brain is an information work that breaks away from the visual realm and therefore also from the aesthetic strategies so privileged by Neurath. By producing information via ambient sensation, the work responds to some of the complexities of common data visualisations. Conventional electricity meters typically fail to motivate us to alter our daily behaviours, making these informatic interfaces ripe for redesign. Yet it would be naive to simply add smell to the armoury of communicative strategies available for connecting our actions with their environmental consequences. As my creative experimentations show, smell is a highly rhetorical system of suggestion and

one that trades the clarity of the visual for a more ambiguous yet deeper connection to the subconscious. In this way, *What the Frog’s Nose Tells the Frog’s Brain* draws attention to the innate bias of our own perception of the visual and by doing so, demonstrates that the technological production of information does not simply mediate how we understand our environment, but is potently active in its making.

References and Notes

1. See the numerous publications of Edward Tufte such as:
Edward Tufte, *The visual display of quantitative information* (Cheshire, CT: Graphics press, 1983).
Edward Tufte, *Envisioning information* (Cheshire, CT: Graphics press, 1991).
Also more recently published is:
Ben Fry, *Visualizing Data: Exploring and Explaining Data with the Processing Environment* (California, O’Reilly, 2008).
2. Jordi Cat, “Otto Neurath”, *The Stanford Encyclopedia of Philosophy*, Edward N. Zalta (ed.) (Winter 2011).

<<http://plato.stanford.edu/archives/win2011/entries/neurath/>>.

3. George Pendle. "Otto Neurath's Universal Silhouettes", *Cabinet Magazine*, 24 (Winter 2006/2007)

<<http://www.cabinetmagazine.org/issues/24/pendle.php>>

4. Otto Neurath. *International Picture Language; the First Rules of Isotype: With Isotype Pictures*. K. Paul, Trench, Trubner & Company (1936).

5. Otto Neurath, "From Vienna method to Isotype." in *Empiricism and Sociology* (Netherlands: Springer 1973) p. 218.

6. Benjamin Fry. *Visualizing Data: Exploring and Explaining Data with the Processing Environment*, Sebastopol, (California, O'Reilly, 2008).

7. Tufte (1991) [1] p.34-35.

8. Benjamin Bratton & Natalie Jeremijenko "Latent interfaces, Suspicious images" in *Situated Technologies Pamphlets 3* (New York: The Architectural League of New York, 2008).

9. Adam Jasper and Nadia Wagner, "Notes on Scent, How do you smell?" in *Cabinet Magazine*, 32 (2009).
<http://www.cabinetmagazine.org/issues/32/jasper_wagner.php> .

10. Many authors have observed the difficulty in describing smell in language. These include:

Jaron Lanier, *You are not a gadget*. (Random House Digital, Inc., 2010) p.164.

Trygg Engen, "Remembering odors and their names." *American Scientist* 75, No. 5 (1987) pp. 497-503.

Immanuel Kant. *Reflexionen zur Anthropologie* (Rice land, 1882).

11. Cited by Jasper and Wagner [9] and translated by these authors from Immanuel Kant. *Reflexionen zur Anthropologie* (Rice land, 1882).

12. Engen [10].

13. Engen [10], p. 501.