

Human-Data Relations and the Lifeworld

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ABSTRACT

This paper introduces a new approach to classifying the way in which data visualizations mediate our experience of the world. In doing so we will use the concept of human-technology relations as developed by Don Ihde, a phenomenological philosopher of technology. Following a synopsis of Ihde's four human-technology relations, each is then developed in the context of specific data visualization technologies/artefacts.

Keywords

Data Visualization, Design, Experience, Theory.

1. INTRODUCTION

In contemporary society, data visualisations, in the form of demographic statistics, financial reports, economic trends and others are now being disseminated through many forms of media, which compete for people's attention, contemplation and comprehension. To date, research has mainly focused on *effectiveness* and *efficiency* as the main factors for assessing the value of data visualisations. The purpose of this paper is to look beyond these criteria and focus on evaluating the way in which our world is mediated by data visualisations. In order to do this, we have used the concept of human-technology relations as developed by Don Ihde in his book *Technology and the Lifeworld: from garden to earth* [1].

2. IHDE'S HUMAN-DATA RELATIONS

Ihde asserts that when we think about how our everyday experience is mediated by technology we can characterize this by placing four unique relations along a continuum of human-technology relations, each of which positions us in a slightly different relation to the technology. He classifies these as: *Embodiment Relations*, *Hermeneutic Relations*, *Alterity Relations* and *Background Relations*.

According to Ihde, *Embodiment Relations* are characterized by a "partial symbiosis" of a person and a technology during which the technology in use is "embodied" and becomes "perceptually transparent" [1]. An example given by Ihde is eyeglasses or a telescope, where one looks through rather than at the technology. *Hermeneutic Relations* involve reading and the interpretation of the technology. Although one might be focused on the technology, what one actually sees - immediately and simultaneously - is not the technology itself but rather the world it refers to. An example would be a thermometer; we must interpret the output on the display before we can apply it to the world it refers to. Ihde calls the third type of relations *Alterity Relations*. In this case, technology is experienced as a being that is otherwise, or as Ihde describes, a "quasi-other". An example would be an intelligent robot. Ihde's argues that the first three relations differ from the last one as they are classified as technologies that require

direct and focal attention. The final category is located at the periphery of human attention. *Background Relations* is understood as "present absence", as something not directly experienced yet giving structure to direct experiences. For example, an automated home heating system does not require daily attention, however, it continues to shape the inhabitants' experience by providing a warm and comfortable environment [1]. Now that we have briefly summarized Ihde's four human-technology relations the next sections will focus on these relations in the context of data visualizations, presenting a specific real-world example for each of the four relations.

2.1 Human-Data: Embodiment Relations



Figure 1. SenseTable

According to Ihde an embodiment relationship with technology involves the technology being transparent or withdrawing from our perceptual awareness. The focus of the human is not on the technology but on the content that it is referring to. To describe this further using a real-world example we have chosen SenseTable [2] as shown in Figure 1. Designed as a learning application, SenseTable utilizes physical objects, projections and sensory feedback in order to visualize a set of complex phenomena that would otherwise be difficult to comprehend using other modalities such as mathematical descriptions and formulas. When students interact with SenseTable they see *through* the physical and virtual objects that make up the interface to what is being visualized, the principles of System Dynamics and Chemistry. It is important to note, however, that the degree of perceptual transparency one experiences is dependent on a number of factors, including: the familiarity with the application and domain. For experienced users, SenseTable offers directly experience of the phenomena by manipulating the physical interface, they *embody* these objects and their focus is now on the results of their actions (the visualisation). It is acknowledged that some people may see SenseTable and other such applications as

being on the periphery of what is generally recognised as a data visualisation. Arguably such applications may be defined as simulations and not visualisations. However, it was decided to include SenseTable as an example of embodied relations as it possess many features that are typically associated with data visualisations. This open issue will however be addressed further in future research.

2.2 Human-Data: Hermeneutical Relations

Arguably, the predominant relationship that humans have with data visualisations is a hermeneutical one. If we broadly define data visualisations as artefacts that represent data in a certain modality and which requires interpretation in order to form some insight into the data, then perhaps we maintain a hermeneutical relationship with all data visualisations. As one of the aims of this research is to help contextualise the practical work developed in conjunction with this research, we will use one example, Vessels of Ireland's National Debt (1910-2010) as shown in figure 2 to discuss hermeneutical relations with data [3]. Each of these vessels were created by inputting data that represents the national debt of Ireland since 1910 into an algorithm which processed this data and outputted 3D hollow vessels. These were then printed using a 3D-Printer. The purpose of creating vessels from the dataset was to encourage people to reflect on the economic, social and cultural implications that surround the conceived dataset in an interesting and unique manner. It was intended that the vessels themselves would be the immediate object of interest; however as the audience touch and caress the uneven and pointed edge of the vessels they would think beyond these on the topic of national debt. This process of mediation typifies the hermeneutical relations as declared by Ihde.

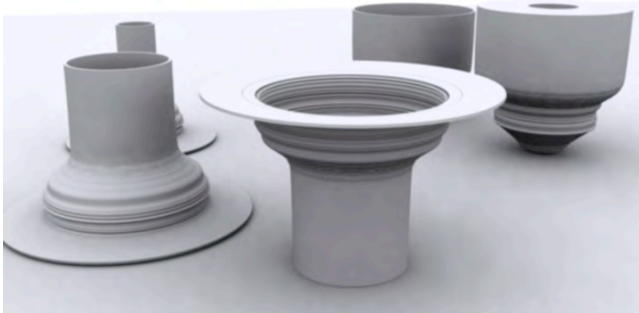


Figure 2. Vessels of Ireland's National Debt (1910-2010)

2.3 Human-Data: Alterity Relations

As noted by Ihde, *alterity relations* emerge in a wide range of computer technologies that display a *quasi-otherness* within the limits of linguistics and, more particularly, of logical behaviours [1]. Arguably, no other technology exemplifies these characteristics more clearly than in-car satellite navigation systems (SatNav). Once you have programmed a SatNav it becomes the centre of attention, as a *quasi-other*, to which we relate by obeying intelligent directions verbalised by the device. When describing alterity relations, Ihde also discusses the fascination humans have always had with the *quasi-autonomy* of technology. This fascination is very evident with the SatNav, however, with this also comes a degree of trust involved in this relationship. When this breaks down (we reach a dead-end) this

fascination and trust turn into frustration and even rage, not with oneself but with the *quasi-other*.

2.4 Human-Data: Background Relations

Ihde states that “background technologies, no less than the other focal ones, transform the gestalts of human experience and, precisely because they are absence presences, may exert more subtle indirect effects upon the way the world is experienced” [1]. This account may also be used to describe the concept of *ambient visualizations* or *ambient displays*. These technologies are generally defined as a category of data visualizations that convey time-varying data in the periphery of human awareness. One such example that occupies a background relation to its near audience is the eCLOUD as shown in Figure 3. The eCLOUD [4] is an ambient data visualization sculpture inspired by the volume and behaviour of an idealized cloud. On permanent show at the San Jose International Airport, the patterns of the artwork are transformed periodically by real-time weather data from around the world. Within the environment which it is placed (5 meters above the floor) eCLOUD has a background role, it does not



occupy the focal attention but nevertheless, as a piece of architectural art, it still conditions the context of its environment.

Figure 3. eCLOUD, San Jose International Airport, USA.

3. CONCLUSIONS

This paper presented Don Ihde's four human-technology relations and developed these in the context of data visualisation technology. Due to space restrictions only one example was presented for each relation. However, these examples not only show that our *Lifeworld* is mediated by data visualisations in education, public art and driving, it also demonstrates that data visualisations occupy each region of the continuum of human-technology relations as described by Don Ihde.

4. REFERENCES

- [1] Ihde, D. (1990). *Technology and the lifeworld* (p. 99). Indiana Univ Press.
- [2] Patten, J., Ishii, H., Hines, J., & Pangaro, G. (2001). *SenseTable: A Wireless Object Tracking Platform for Tangible User Interfaces*.
- [3] Hogan, T., (2011). *Vessels of Ireland's National Debt (1910-2010)* <http://tactiledata.net/?p=23>, accessed: June 2011
- [4] Goods, D., Hafermaans, N., Koblin, A. (2010). *eCLOUD*, <http://www.ecloudproject.com/>, accessed: April 2011