Toward a Phenomenology of Human-Data Relations

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ABSTRACT
The objective of this research is to describe and better understand the essence of how embodiment influences and augments an audience’s experience of data driven artefacts. It seeks to explore, through creative practice, whether embodying data in tangible metaphors contributes to an audience's capacity to construct meaning at its interface.

Author Keywords
Interactive Design, User Experience, Phenomenology.

ACM Classification Keywords
H5.m. Information interfaces and presentation: Miscellaneous.

RESEARCH SITUATION
I am a part-time external PhD student at Strathclyde and currently near the end of my 1st year of a 4.5-year PhD program. My work is strongly interdisciplinary and may be situated in the field of Interactive Design, at the intersection of Human Computer Interaction and Information Systems.

This research is based on the belief that alternative insight and meaning can be achieved by representing data using tangible artefacts, which can be touched, felt, heard, held, or even possessed. Consequently, these artefacts act as the embodiment of the source data. They capture the imagination and engage the interpretative and perceptive power of its audience through both their experiential, tactile or artistic qualities.

Over the past year I have conducted a number of primary studies. These include a comprehensive review and investigation of various contemporary data representations ranging from consumer devices to public art works. I collated and classified these using the concept of human-technology relations as developed by Don Ihde, a phenomenological philosopher of technology [2,3]. Following this, I conducted a study, which involved designing several data driven artefacts that represent the same data source using different modalities. Of the three artefacts created, DataBox used haptic feedback in the form of knocking to represent the raw data. SonicData represented it through auditory feedback and the same data was also represented using a traditional bar graph. To investigate the affect these modalities had on people’s experience of the data we carried out an adapted Repertory Grid Study. (paper submitted to DIS’12).

CONTEXT AND MOTIVATION
In contemporary society, data representations are now an integral part of every aspect of our daily lives. Data in the form of demographic statistics, financial reports, environmental data, and others are been disseminated to screen-based media, which compete for people’s attention, contemplation and comprehension.

The focus and motivation of this research is to represent socially relevant data, in a manner that exposes data insight and affective responses that may be difficult to uncover when using traditional methods such as one-dimensional static graphs and charts.

BACKGROUND AND RELATED WORK
This research builds upon theoretical and practical developments that have occurred in the field of Information Visualization over the past two decades. It also exploits more recent developments, which aim to democratize the access of data to large cohorts of lay, or non-expert, people. These recent movements represent a significant step away from the traditional focus on developing data representations for well-defined, narrow, expert tasks, and data mining tools targeting only professionally trained experts.

The exploration and use of alternative modalities to present data began with the emergence of visualizations such as Ambient Displays [7]. This approach has been further developed through novel information visualization subfields that include Information Aesthetics [4], Artistic Visualization [8] and Data Art [5]. There has also been recent theoretical investigation into alternative approaches, such as data sculpture. Zhao and Vande Moere [9] identified a model of embodiment to analyze the connection between data and representation, and the connection between representation and the audience’s knowledge and experience. My research seeks to build upon these theoretical foundations through creative practice, experimentation and evaluation.

THESIS STATEMENT AND RESEARCH GOALS
To date, the majority of published research considers effectiveness and efficiency as the main factors in assessing the value of data visualizations [1]. The goal of this research is to extend the present evaluation framework of data representations to include user-experience and in particular affective responses as motivating factors when evaluating the quality of these representations. This approach will attempt
to fill this research gap in order to support work that seeks to represent raw data using alternative modalities. Presently, there are a number of preliminary questions that are key to charting the course of this research:

- What influence does the embodiment of data artefacts have on the experience of these and how does this affect the way information is accessed and received by the audience?
- What meaning is made from the data, infrastructure, and participative levels of engagement with data artefacts?
- What do we know about whether or not there is a sense of fulfillment or completion for the audience or user-participant when interacting with multimodal data representations?

**RESEARCH APPROACH**

The research can be described as attempting to describe the role embodiment plays in data representations. For this purpose, the research approach is phenomenological oriented, developing findings inductively, with the purpose of describing the essence of our experience with multi-modal data representations. Phenomenological based studies will be designed with the aim of describing this experience along with the cognitive effects and affective responses when interacting with bespoke data representations.

**DISSERTATION STATUS**

At DIS’12 I will be at the end of my 1st year of a 4.5-year PhD program. Following the conference I plan to conduct a comprehensive field study. This will involve selecting and interviewing people who commonly interact with data representations in their work and personal lives. The aim of this is to gain an understanding of people’s experience when interpreting data through consumer devices and interfaces. It is envisaged that this study will inform the design process of further data driven artefacts in my project.

An outcome of my work so far has been the adaptation of the Repertory Grid Technique to accommodate a group study. With the purpose of strengthening and refining this adaptation, I intend to carry out further studies using this method, as well as comparing this adaptation to its original by conducting side-by-side studies. It is hoped that this research method will be used throughout the PhD program to efficiently analyse the experience of using data representations that were designed and created as part of this study.

**EXPECTED CONTRIBUTION**

Recently there has been a dramatic rise in the amount of research focusing on the storage and retrieval of data. We have also seen a rise in the movement to democratise data through the Open Data movement (cf. [6]). An area that seems to be somewhat ignored is how the public engages with, interprets, and experiences data. This work intends to address this research gap by providing guidelines for the design of multi-modal data representations and exploring issues related to human-data relations.

**REFERENCES**