

Chapter 12

Materials of the Data Map

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ABSTRACT

Data mapping is the essence of being human. This report follows the process of data mapping; the transmission of a structured utterance from one domain to another. It starts with signals in the world and moves through experience and engagement with the world through those signals. The paper develops descriptions of the materials and mechanisms of data mapping. The descriptions are aids and conveniences in the effort to understand the systemic workings of the process of communication. From a systems perspective one might find points of leverage in their own involvement with the processes of communication and data mapping. Recognizing these leverage points can help in activities of art making, information design and in simply living.

INTRODUCTION

This paper is an artist statement of sorts, an informal excursion exploring the process of communication—tracing the passage of a message or signal from transmission to reception. Receiving messages is one half of living. Responding to messages is the other half. This paper concerns itself with the materials and mechanisms of the former. It offers and advances simple and useable definitions to help artists and designers as they

develop and create their own messages. From an analytical perspective these ideas can become quite difficult to understand, but I believe that there is perhaps a less rigorous yet practical way to think about how we engage the world. The hope is to provide a “clear portrayal of the complexity” that is the process of data mapping, from our visualizations and sonifications of information to the more fundamental ways that we experience life (Tufte, 1983).

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DATA MAPPING

Being human is data mapping and information processing—processes both basic and complex. Data mapping does two things to a signal.

1. A data map *abstracts* the signal. This abstraction accommodates mediation, fitting the format of the medium that will carry the signal.
2. Abstraction *reduces* the content of the signal and reduces the amount of data carried in the signal, facilitating its transference and possibly its eventual comprehension when received further along the signal path.

Each medium is itself mediated, again abstracting and reducing a signal. Sound for example starts as a vibrating object. Vibrations are transduced into changing pressure moving through the medium of air. That energy is transduced again into the tension of the eardrum, carried as mechanical energy by the ossicles of the inner ear, which is mediated through the cochlear fluid into the complexities of the auditory nerve and the brain. Often signals are abstracted into many maps in parallel, which we then receive synchronously—hearing and seeing for example. A signal that is simultaneously seen and heard (perhaps also felt and smelt) is a common example and a daily experience for all of us. By the time we receive signals from the world we are far removed from the source of the transmissions. All we receive are shadows, abstractions, maps of data being sent across the distances between us and the real we are immersed in. The signal loss over these distances is immense, yet miraculously communication still occurs.

To begin this excursion some informal definitions will help. What follows are some lists, some charts, some conveniences that are themselves maps of how we wade in the ebb and flow of the ocean of information surrounding us. Processing this information is the essence of being alive.

THE INFORMATION FOOD CHAIN

The terms data, information and knowledge are often used erroneously as synonyms. Their use in this paper has them situated in a dependent relationship similar to organisms on a food chain (Figure 1). The discussion begins at the base of the chain where no signal exists. Here there is unfocused energy and the promise of a signal—noise.

Noise

Noise is the primitive, the base upon which everything depends. Without noise there is nothing. Noise is the fundamental utterance of difference. *It manifests as randomness.* For example, in audio synthesis noise is simply created by mapping a sequence of random numbers into amplitude, as seen in Figure 2 (Dodge & Jerse, 1985). We essentially hear all frequencies at once. If this sequence changes at rates within the audio spectrum the sound is a rumble or hiss, perhaps the “shhh” of the ocean or the rustling of leaves. Some believe this will be the sound of the universe at the end, at maximum entropy. The visual equivalent is usually described as white light, the seeing of all frequencies of the visible spectrum at once. Perhaps a more accurate equivalent might be the snow we see on a TV screen that has no signal, which would average out to gray light (Figure 3).

Noise is essentially a non-signal (but not nothing) that is always different so paradoxically always the same. The most important thing to understand about noise is that, if measured, at any given moment its value is random. Difference is constant. There is no relationship between any two values from one instant to the next. From the ground of noise as defined here we move up the chain to data.

Data

Data then is what noise is not. Data is the opposite of constant difference. It brings in sameness

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