

Following Shakespeare through: being, love, wisdom, knowledge, information, data, bits, and discernable differences; from bits to being

Being

“To be or not to be:”

Love

Romeo and Juliet

Wisdom

Should we travel?

Knowledge

Ability to plan future highways

Information

Average number of cars per day

Data

Date and time a vehicle passed

Bits

Eight bit bytes for characters

Discernable differences

Pits burned in an optical disc

The Practical: Bits and Bytes

Bits are no longer stored directly on media (e.g. magnetic or optical) or transmitted over media (e.g. fiber optics). Over a decade ago, storage densities and transmission speeds were increased at the expense of bit integrity. Now, a bad bit is created occasionally, a bit that can not be read correctly. An average CD (Compact Disc) has from 50 thousand to 500 thousand bad bits. An average DVD (Digital Versatile Disc) has from 500 thousand to 5 million bad bits. To solve this problem, error detecting and error correcting codes (ECC) were invented. A simple error correcting code is to have three copies of each bit, and if the values (1 or 0) of two of the copies are the same, then the value of the third copy is changed to agree with the value of first two copies.

A more complex example of an ECC is the parity scheme used in RAID (Redundant Array of Inexpensive Disks). (RAID also rearranges the bits into stripes for faster access.) The actual ECCs used on disks, and in data communications, are very much more complex than the RAID parity scheme.

The ECC codes are mixed in with the data that is recorded. (On CDs and DVDs, the bits are then spread around the disc to avoid localized errors created by fingerprints and scratches.) As ECCs become more complex, to handle higher and higher error rates, they take up a larger and larger percentage of the data storage capacity of a disk or the data transfer capacity of a transmission system. Eventually the extra room required by the ECC exceeds the additional storage capacity gained from accepting a few bad bits. This is the balancing point that determines the actual storage capacity of storage media and data transmission media.

Thus, the bits actually written to media are mixed with ECC bits. The (logical or theoretical) bits, that we conceptualize as having been written to media, are actually the result of applying an ECC. The ECC is used to recreate the logical bits that were conceptually written to the media.

The pits on the media are described here as ‘discernable differences’ and the logical bits that we conceptualize as storing our documents are described here simply as ‘bits’. These ‘bits’ exist one level above the ‘discernable difference’ in the illustrated hierarchy.

The Practical

For the more practical part of this paper, please skip to the top of the page, third column: Bits and Bytes.

Shakespeare

Without Shakespeare, it would be hard to talk about being, love, and even wisdom.

With Shakespeare, we can say that being and love are expressed on stage, by actors who never met Shakespeare. The actors read Shakespeare’s (preserved) writings.

We preserve documents for many purposes. One of the purposes of preserving documents is to get the benefit we derive from performing Shakespeare’s plays.

Our writings help us remember who we are as a society, how we govern ourselves, and why we believe what we believe.

And, our writings make it possible for us to communicate with the future.

Interstitial Spaces

Shakespeare wrote his plays down. Before writing was widely used, one could say that part of a person’s expression was transmitted when another person memorized a story as it was told by the person. With writing, only the characters of the alphabet exist. With Samuel F. B. Morse (1791 - 1872) and his “What hath God wrought?”, the telegraph, as we know it, was born in 1844, and Shakespeare was reduced to a binary code for the first time.

Where is the being, love, and wisdom? Why, they are in the interstitial spaces between the bits. This makes no sense, because there is nothing in-between the bits in the mathematics of Boolean logic or in the numeracy of binary codes. However, the lack of sense does point to the possibility that nothing is transmitted in communication between people, but rather that, in communication, on person creates an environment in which a second person can create an idea related to the idea of the first person. In a Shakespearean play, the actors create an environment in which the people in the audience create the experience of being, love, and wisdom.

An Interstitial Moment:

Contemplating the interstitial spaces between the bits.

We could avoid considering the issue of interstitial spaces, except for the fact that this non-sense deals with our most important reasons for preserving documents.

Other places we create what is not there:

In a movie theater, our mind creates an image on a movie screen when the shutter on the movie projector is closed and there is no light in the theater to create an image on the screen. We create all of the instruments in an orchestra even though we can only hear a single level of sound pressure (volume of sound) at each point in time.

We take the totality of a document and create more than the sum of its graphic elements (its parts). We create Shakespeare from his works.

When we create Shakespeare, we create our own personal Shakespeare. In communications, a person created their own personal idea within an environment facilitated by a second person (the communicator). Because each person creates their own idea, each person’s idea is different, unique, and belongs to that person. It really is the person’s idea, even if it is a lot like the communicator’s idea. Often two people argue that they each are the owner of an idea, and that the

other person has merely copied their idea. In fact, both persons have a similar idea, but they both created it on their own. Similarly, we are often surprised at the differences between what we know to be our idea and what other people did when they worked at implementing our idea.

Creation at work

Labeling records or boxes with sequential numbers is an act of creation. We overlook it as an act of creation because we focus on the simplicity of writing the numbers. The creativity becomes clear when we try to explain how sequential numbers have brought order to chaos in a series of documents that we have managed. We know sequential numbers worked, in fact, the effect of sequential numbering was magical, but it is very hard to explain to someone who has not had the experience of sequentially numbering documents and thereby bringing order to chaos.

Creativity is required to move between the levels

You cannot have enough stuff (or media) to know that you have even one discernable difference (like a laser-burned pit on an optical disc). You cannot have sufficient discernable differences to create a bit. No amount of bits can produce data. The bits have no order or meaning. No amount of data can produce information. It is not possible to gather enough information to become knowledgeable. It is not possible to be knowledgeable enough to be wise. It is not possible to be wise enough to love. You cannot love enough to be.

Only a person can move up between levels. It is a leap of faith, a leap of creation, that a person makes to attain the next higher level. We can do it, we can teach it, but we cannot explain it, and we cannot understand it.

Computers can’t do it

Computers can not move between levels, computers cannot even be on a level. No computer understands a discernable difference. No computer can create a bit, or data. People declare laser pits to be discernable. People declare that bits have values. Computers don’t have a clue.

Ontology

Traditionally, ontology is the study of being. More recently, in computing and information management, ontology has become known as the study of objects (and their connections). Enjoy the bits, but don’t forget being. [<http://www.FormalOntology.it>]