The Varieties of Reality

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Digital technology is being used to distort and corrupt reality.

The phrase virtual reality has an oxymoronic flavor, as acknowledged in Wikipedia (tinyurl.com/edg7z). In essence, it is an extension of drawing and painting, though digital technology is making it a drastic extension. Photography had a better right to the term, but digital technology has now given the lie to the old saying "the camera never lies."

More recently the phrase *augmented reality* has appeared in Wikipedia (tinyurl.com/2buf25) and popular writing on computing. An essay in *The Atlantic* by Jamais Cascio (tinyurl.com/yh53r6d) discussed how this technology could "strike a fatal blow to American civil society" and presumably to other societies as well.

This attack on reality seems to be a theme nowadays in digital technology, and it's hard to say where it's likely to go in the long run. A recent news item describes work toward "a world where your contact lenses double as a personal computer display, superimposing information in front of you" (tinyurl.com/yjab5nt).

The professional issues here are many and various, and deserve concentrated evaluation by computing professionals.

WHAT IS REALITY ?

The main definition of "reality" in the *Oxford English Dictionary*, second edition, is "the quality of being real or having an actual existence." The difficulty here is that, for any individual, quality stems from observation and evaluation. Thus, reality is subjective for individuals.

Digital technology affects subjective reality by changing what individuals experience and what they make of what they observe. Otherwise, reality is an interactive construct. Physical reality is built by the consensus of those actively concerned in defining and understanding particular classes of things. Social reality is built by the interaction of people living within a physical reality that they exploit and change.

For example, a particular science is continually developed by collaboration of specialists in the area of reality specific to that science, and a particular technology seeks to change social reality in an area of social activity by exploiting the findings of scientists.

Digital technology sits behind both science and technology. After all, language is the digital technology behind human social development, and the digital machinery we now use so widely has a profound effect on both social and physical reality.

SUBJECTIVE REALITY

People are individuals because everyone has a different personality. Personality changes through experience. Experience is the combination of what we perceive and what we make of it.

Perceptual reality comprises what our senses tell us about ourselves and our surroundings. Conceptual reality comprises attention, contemplation, and response.

History tells us how human society and its technologies have changed the content of perceptual reality, though that content has changed much more in developed countries. In particular, photography, radio, television and all-conquering modern digital technology have for many in the developed world completely changed the balance of what we perceive from predominantly actual to predominantly representational. A representation has a reality of its own, but that is not the reality of what is represented. Listening to rock music on your iPhone is not at all the same as listening while attending a rock concert.

The implications of this are profound, especially for the very young. Two years ago, researchers in Australia found that "three and four-year-olds on average watch more

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 Published by the IEEE Computer Society

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than 70 minutes of television daily. For seven and eight-year-olds, viewing time rises to an average of almost two hours" (tinyurl.com/y8bapkn). How will such children learn to tell fact from fiction, coercion from instruction, and good from bad? And now videogames are being made for young children.

Conceptual reality is the basis of culture. The richness of culture springs from the depth of contemplation, and from the ability to analyze perceptions and choose from a range of responses.

Living in society means that each member's subjective reality deals with that of others. Interaction is complex, springing from perceptual reality and involving various degrees of attention, contemplation, and response, and various numbers of interactants from time to time.

Traditionally, when people were in company they interacted in various ways. They learned how to interact successfully in their childhood when they interacted with other children and with parents and teachers, who fostered the development of good interactive skills. Good interactive skills were those that considered others as equals with rights and duties to be respected. This was a healthy social reality.

Digital technology tends to hide social reality from the individuals using it.

In the past, science and technology have enriched conceptual reality by providing more to contemplate. For humans, contemplation is facilitated and extended by language, which provides the means to make fine distinctions and to better remember past experience.

By contrast, the aim of television and much digital technology is to capture and keep attention and to promote unthinking reaction, for example, when shopping in a supermarket. This diminishing of contemplation erodes personality and individuality. The pity is that digital technology could be used to extend the opportunity for personality development, in particular through DVDs and the Internet, by giving users individual control over the representations they watch and the vocabulary they use to exercise that control (for example, see *The Profession*, March 2008, pp. 104, 102-103).

INTERACTIVE REALITY

People do not usually live in isolation. Indeed isolation has been used as a punishment, and solitary confinement is arguably a form of torture (tinyurl.com/c4feho).

Television and digital technology are changing social reality for many. The overloading of perceptual reality and the stunting of conceptual reality bring a selfishness that lessens respect for others, and even respect for law and order. This is particularly evident in the marketing of consumer products that typically promote sensual satisfaction.

Digital technology tends to hide social reality from the individuals using it. Much is made of social networking on the Internet, but that social reality is gaunt compared to networking in physical proximity.

Readers might have noticed my use of TinyURL.com to save space in my essays, a very simple, impersonal facility. What a contrast to the more recent bit.ly that not only shortens your URLs but will "track the performance of your bit.ly links in real time" and provide "the complete history of your bit.ly links." This seems to me to be offering the same kind of social unreality or clutter that e-mail is said to bring (tinyurl.com/yk4jxrr).

The other kind of interactive reality relates to society's perception of the world we live in. One individual's subjective reality is not the same as another's. To interact successfully, people must reconcile each other's subjective reality. This is easily done if we are in the same place, speak the same language, and are prepared to give and take. But in the long term and in matters of detail, a shared, valid physical reality is much more difficult to achieve. And technologists must understand physical reality if they are to successfully change it.

The difficulty of understanding physical reality means that small subsocieties of experts—scientists, mainly—must concentrate on measuring and modeling their field of physical reality. This must be done numerically and mathematically, which is where digital technology comes in strongly. Their findings are available for technologists to exploit, and for interested others to learn from.

Different components of society at large will apply the findings of scientists in different ways and at different levels of understanding. One common misunderstanding is that science is composed of theories that might or might not be true. In reality, science is an ongoing endeavor and theories accepted by a community of scientists are, if the community is working properly, the truth as it is understood so far. But physical reality is so complex and changeable that scientists continually work, through measurement and mathematical contemplation, to improve their theories, just as breeders work to improve their stock.

CLIMATE CHANGE

The weird thing is that people use digital machinery that has only been made possible through the work of scientists to try to discredit the work of scientists. The most obvious case of this is the recent work of the climate

change deniers (tinyurl.com/yfjs5j5; tinyurl.com/ykbkjsp).

The issue of climate change is extremely important and multifaceted (see, for example, tinyurl.com/yzjjf7t). During the December 2009 United Nations Climate Change Conference in Copenhagen (en.cop15.dk), a huge amount of reporting took place, much of it speculation. The turmoil in America is particularly significant because on the one hand, the "Environmental Protection Agency has formally declared that greenhouse gases endanger human health" (tinyurl.com/ygbnrh3), while at the same time, "Only 45 per cent of the 1,041 adults surveyed on December 2-3 believed global warming was a proven fact" (tinyurl.com/ye8l9hs). And there is also turmoil in Australia (tinyurl.com/yl3kfpd).

When I last wrote in this column about climate change (Feb. 2005, pp. 104, 102-103), my emphasis was on the need for the profession to support increased collection of data. Since then, William F. Ruddiman's book, *Plows, Plagues, and Petroleum: How Humans Took Control of Climate,* has been published (tinyurl.com/yjte7sw). This book takes a look at the Earth's climate on a scale of millennia in a very convincing way.

The main influence on the Earth's climate is insolation. This is cyclic in a complex way because of three variations in the Earth's orbit: eccentricity, axial tilt, and precession (tinyurl.com/jd7cl). The cycle is of long ice ages separated by relatively brief interglacial periods. We are at the end of the most recent interglacial period, and temperatures started declining 10 millennia ago and should still be doing so. The temperature change has stalled variously, for example, eight millennia ago when agriculture with plows was developed, and is now going up when it should be going down. This conclusion is based on data extracted from ice cores.

There are uncertainties about the details of this argument, but the scale of time considered puts the quibbles of climate change deniers focusing on the last decade or so into stark perspective (tinyurl.com/yhmysxt). Further, the people who argue for a gradual adoption of countermeasures must be told, first, that projections of the early stages of the lead-up to Copenhagen underestimated the rate of change in many ways. Second, there is a real danger of a "sticking point" being reached, that is, of positive feedback setting in—and it might have already done so—against which even completely eliminating anthropogenic warming factors would be ineffectual.

Many have reached the consensus that an international agreement is urgently needed either out of Copenhagen or consequently. The role of the computing profession will be vital in the likely measures prescribed by such an agreement. Perhaps the most important is verifying that the agreed measures are being taken and evaluating how effective they are.

An important component of adapting to climate change is building up the capabilities and productivity of Third World countries. A large part of this must come through accelerated education and training, and digital technology provides an essential component.

In all the many roles for the computing profession in coping with climate change is that of the system engineer. As a former engineer, I wonder whether governments at Copenhagen and after will look at the benefits of agreeing internationally to make marketing costs a use of after-tax profits rather than a pre-tax business expense. Such a measure would move the emphasis of economics away from consumption toward construction. To be practical, it would have to be done in stages, though this implementation technique is much more familiar to system engineers than to politicians.

However, a more important task for computing professionals will be to reverse the degeneration of realities that poor use of digital technology is supporting. Computers and the Internet should be used to promote balanced subjective reality in individuals, equitable social reality in communities everywhere, and a deeper understanding of physical reality in all levels of society.

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