Book Reviews

Tom Zillner, Editor

Information Ecologies: Using Technology With Heart

by Bonnie A. Nardi and Vicki L. O'Day. Cambridge: MIT Pr., 1999. 232p. $27.50 (ISBN 0-262-14066-7).

The Media Equation: How People Treat Computers, Television, and New Media Like Real People and Places

by Byron Reeves and Clifford Nass. Cambridge: Cambridge Univ. Pr., 1996 and 1999. 305p. $28.95 (ISBN 1-575-86052-X); paper, $15.95 (ISBN 1-575-86053-8).

The books I am reviewing this month are interrelated because they both focus on information technology and our changing world, with the two volumes looking at different levels of the picture. The broader, and to me more intriguing, view is presented by Nardi and O'Day in their wonderful book *Information Ecologies*. Although it is not clear from the capsule biographies of the dust jacket, Nardi and O'Day are anthropologists who study the world of technology in a number of locales, and they here report the findings from their field work. Among the case studies they discuss are an examination of the activities of reference librarians at two corporations and a look at a virtual world created for and by elementary school students. But they do much more than simply present case studies, although these alone make the book a worthwhile read. In addition, they argue that the most useful way to look at information technology is through the metaphor of "information ecologies," "system[s] of people, practices, values, and technologies in...particular local environment[s]." They adopt this biological metaphor after carefully considering the most commonly employed information technology

metaphors: technology as tool, text, or system. In turn, they find each of these metaphors wanting.

It is particularly important to choose carefully the metaphorical lenses through which technological developments are viewed. Each particular metaphor has consequences for how sanguinely we view a technology, and it is often worthwhile to use multiple metaphors to enhance our world view. The information ecology metaphor is particularly appropriate for an anthropological view of local "habitats" and their inhabitants and artifacts. In turn, an anthropological view is particularly apt for capturing the human side of technology (thus the subtitle: *Using Technology With Heart*). This is a side of things that can be overlooked in other metaphorical views, particularly since it requires that the sticky issue of values be considered. Unfortunately for all of us, there is a reluctance to talk of human values when considering technology. As Nardi and O'Day note, there is a tendency to either enthusiastically applaud new technology without regard to its effects, or to condemn all new technology as inherently debasing to humanity, or to simply resign oneself pessimistically to the inevitable development of technology and our lack of control over it.

Nardi and O'Day tend to be cautious optimists, claiming that we can control technology, and the way to exercise that control is through our own local encounters with information ecologies. Thus, rather than bemoaning the dehumanizing effects of the Internet, *Information Ecologies* explores the successful use of Internet technologies to set up a virtual world for students and the elderly in Phoenix, Arizona. Instead of thinking or acting globally, exploit the technology locally, but do so in a way that makes sense in terms of human values. On the taxonomic scale of technology views, ranging from gloom and doom (e.g., the views of Clifford

Stoll) to perpetual optimism (e.g., Nicholas Negroponte), I place Nardi and O'Day somewhere in the middle, but as I suggested, leaning toward cautious optimism. In fact, they spend several chapters discussing the views of others and offering prescient criticism of the deficiencies of those views. Of particular interest to me was their analysis of the French sociologist Jacques Ellul, who apparently sounded the alarm concerning the stress to mind and soul of constant technological change in 1954, well before the current crop of doomsayers. Nardi and O'Day find Ellul's views, as articulated in *The Technological Society* to be compelling. Yet, they claim, the rise of the Internet can counteract the trend that Ellul saw toward monotonous sameness and lack of diversity in the face of technological efficiency. Perhaps so.

One thing that I was looking for in *Information Ecologies* were some practical tools for engaging in the kind of exploration of information habitats that Nardi, O'Day, and other anthropologists engage in. There is a spate of interest lately in the role of anthropologists in the design and deployment of new technologies, and I would like to determine its applicability to my modest software development projects. Unfortunately, I was mainly disappointed on this score. In fairness to the authors, they did not set out to spell out the anthropological methodology of exploring information ecologies in any detail. The purpose of the book is rather to argue that viewing the world of technology as a set of interconnected information ecologies is useful and accurate, and in many cases superior to other metaphorical views. They succeed in this goal. Now I want them to go on to write a book on using anthropological methods in these ecologies without necessarily becoming a professional anthropologist.

Nardi and O'Day do touch extremely briefly on a few conventions of interviewing subjects, with

their most important technical discussion centering on what they call "strategic questioning," which they present in the context of evolving information ecologies. They provide useful categories of questions to be asked, and specific examples. Although it may seem obvious to ask penetrating questions of members of an information habitat, this is one area in which software developers in particular fail miserably. Another seemingly obvious pointer is to pay attention. Again, its obviousness is deceptive, since most of us are poor observers who make many assumptions about the characteristics of a work activity without observational evidence.

As evidence that people introducing new technologies to an ecology do not follow these simplest pieces of advice you can turn to the chapter "A Dysfunctional Ecology," to see how badly technology can fail for nontechnological reasons. This case study deals with a major teaching hospital that introduced a monitoring system into its neurosurgical operating suites that captured instrument readings as well as complete audio and video. The system was installed to aid neurophysiologists, experts who are called in to advise neurosurgeons at key points during complex surgeries to ensure that patient neurological function is not compromised. The neurosurgeons and neurophysiologists at this hospital decided that it would be more efficient for the neurophysiologists to be able to remotely monitor multiple surgeries simultaneously. Both groups failed to consult with the other constituencies among the operating team, the nurses and anesthesiology staff. These groups believed that their privacy was being compromised, particularly since it was possible to tape any procedures at multiple workstations throughout the hospital. I can easily envision similar sorts of problems due to lack of communication in introducing new or modified technology into other milieus, e.g., libraries. Although the consequences might not lead to the potentially life-threatening situations that could arise in an operating suite, there are certainly possible outcomes where service to users could be undermined.

Despite the book being not exactly what I (rather selfishly) want, *Information Ecologies* is a first-rate read and an important starting point for those concerned with better controlling technological change in the world of information.

Turning from an anthropological point of view to a psychological one, *The Media Equation* offers another important basis for technological design and implementation, particularly of computer software and multimedia. The release last year of a paperback edition of this volume, first published in 1996, provides a convenient pretext for reviewing this work. Reeves and Nass have supervised years of study and experimentation that have consistently demonstrated the truth of what they call the "media equation": that our relations with media, including computers and multimedia, are identical in key ways to our relationships with other human beings. This is true of all of us, even those of us sophisticated enough to understand that we are dealing with devices and human artifacts rather than people.

Reeves and Nass quite entertainingly present the technique they've used over the years to perform their research, on a step-by-step basis:

1. Pick a research finding on how people respond to each other or their environment.
2. Find the summary of the social or natural rule that the study has yielded.
3. Replace the words "person" or "environment" in the summary with media of some sort (television, movies, computers, etc.)
4. Find the research procedure.
5. Substitute media for one of the people or the environment in the procedure.
6. Run the experiment.
7. Draw conclusions.

Although this may sound facetious, it is in fact the recipe that produced the startling conclusions that we all tend to behave toward media much as we do toward other people. What's perhaps more important is that Reeves and Nass point toward techniques that practitioners can use to produce more effective media, including computer software. As a simple example, consider politeness. Reeves and Nass discovered that people treated computers with the same sort of politeness that they would other human beings, and in turn Reeves and Nass suggest that people respond better to "polite media." They then provide some fairly straightforward advice on producing polite computer programs, starting with Grice's Maxims, a set of politeness rules assembled by H. Paul Grice, a philosopher and psychologist. These center around truth telling, appropriate quantity of information (neither too much nor too little), relevance, and clarity. All of this is fairly unsurprising, but the authors spell out just how the maxims can be applied to the construction of computer programs. Further, they go on to suggest some rules of thumb of their own. For example, some computer programs produce verbal output but expect the user to key in his or her responses. This may be perceived by the user, possibly subconsciously, as forcing an impolite response, since mixing communications modalities is a *faux pas*. Thus, they suggest that if text input is required, perhaps only text output should be supplied.

This should provide you with some of the flavor of *The Media Equation*, and in turn you may be able to see a set of potential ethical dilemmas that can arise from utilizing

techniques that result from the research of Reeves and Nass. This set of problems can be seen most clearly in the chapter "Subliminal Images," where they discuss how subliminal messages could be inserted into new media to advertise products or to attempt to bolster employee morale. In fact, they say, ". . . it might be easier to accomplish subliminal intrusions with a computer than with a television, because software can respond to the particular input of individual users and timing is more precise." They immediately temper this insight with the caution that ". . . ethical and legal issues abound." Indeed.

Although some of the techniques that can be applied to new media do lead to ethical problems, I think that most of what Reeves and Nass talk about are just elements of good design. Subliminal suggestion seems to most of us to be out of bounds because it unfairly manipulates user response in a powerful way. The unfairness is that someone can be manipulated without his or her knowledge to do something outside of the person's normal behavior. Although the other techniques tend to subtly alter behavior, they don't generally result in an anomalous action by the user. If you think this is a kind of philosophical hairsplitting, you're right. The onus is upon the programmer or multimedia designer to use these techniques with great care.

In a past professional life I wrote computerized patient interviews for the psychiatry department of the University of Wisconsin. Researchers there and elsewhere found that people were generally more candid with the computer than they were with human clinicians. So the findings of Reeves and Nass were not quite as surprising to me as they might be to others. What did surprise me, however, is that the media equation is not a phenomenon solely of the naïve or inexperienced media and computer users. On the contrary, all of us, no matter how conversant we are with underlying technology, are susceptible to the effects described in *The Media Equation*. This vastly increases the power of computer programs and other media for both good and ill.

I want to emphasize that not all of the possible effects of human-media interaction are pernicious. Most are simply innocuous, and if techniques that benefit users can result from these effects there should be no harm in applying them in software or multimedia. In general, it's desirable to make user experiences of software and media pleasanter and more productive, and Reeves and Nass do an excellent job of providing pointers throughout the book. There are suggestions with regard to personality, emotion (including arousal), social roles, and form (e.g., image size, fidelity of sound, and video). None of them comes close to being as controversial as subliminal suggestion, although it continues to make me uncomfortable that people react to media as if they were dealing directly with other human beings. This is a disquieting finding, but it should not dissuade us from our jobs of designing good systems for users.

All in all, *Information Ecologies* and *The Media Equation* are both first-rate books that belong in our libraries and on our professional bookshelves. Both provide methodologies and techniques for making user interactions with automated systems a better experience, both in terms of accomplishing tasks efficiently and in terms of user satisfaction.—*Tom Zillner*

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