

ANTHROPOMORPHISM: FROM ELIZA TO TERMINATOR 2

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IN CONTEXT
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INTRODUCTION

"I feel depressed."
"WHY DO YOU FEEL DEPRESSED?"
Eliza, 1966

"Open the pod bay door, Hal."
"I CAN'T DO THAT DAVE"
2001 A Space Odyssey, 1968

"MAN OF THE YEAR"
Time Magazine, 1982

"YOUR DOOR IS AJAR"
Chrysler Le Baron, 1983

"I WILL ERASE YOUR MESSAGES"
Phonemate Answering Machine, circa 1988

"YOUR FRIEND JILL GILBERT HAS PUBLISHED AN
ARTICLE ABOUT DEFORESTATION IN THE
AMAZON AND ITS EFFECTS ON RAINFALL IN THE
SUBSAHARA"
Knowledge Navigator, Apple Computer, 1988

"HI, MY NAME IS BRENDA, AND I'LL BE YOUR
COMPANION AS YOU USE THE AMERICANA
SAMPLER."
Guides 3.0, Apple Computer, 1990

"HASTA LA VISTA, BABY"
Terminator 2, 1991

Within the human-computer interface design community,
there is a longstanding tradition against the use of

anthropomorphism in the interface. Like any taboo,
simply sweeping away the issue (assigning human
characteristics to the computer) does not make it go away.
The examples above highlight some of the contexts in
which scientists, designers and filmmakers have explored
the implications of anthropomorphizing the human-
machine interface. Some techniques, such as talking cars,
have dissipated in response to users' distaste. Others, such
as the Guides approach, need further refinement; and still
others, like the images floating through popular culture,
warrant examination as they help us define both our
fantasies and fears about our relationship to machines.

With command line interfaces and text only systems, the
effect of the anthropomorphism taboo translated as, "don't
use the first person in error messages." As Ben
Shneiderman notes, a message that avoids pronouns
altogether such as "To begin the lesson, press return" is
preferable to "I will begin the lesson when you press
return" [7]. However, as the field has matured, we are
working with more sophisticated systems that involve
graphics, full-motion video, sound and speech, virtual
environments, and telepresence, as we collaborate with
designers who come from traditions where
anthropomorphism is not only accepted, but encouraged.

There are a variety of task domains in which representing
the system in the interface runs up against this wall of
resistance. The design of multimedia authoring tools and
content may be the fastest growing domain as these
systems move off of our desktops and into our living
rooms now that CD-I, CDTV, and other consumer devices
are actually on the shelves of department stores. With
video on the computer screen, the human figure often
plays a prominent role in the interface. Recently, there has
been a discernible increase in the gratuitous use of the
human figure with poorly lipsynched talking heads or
systems that fool the user into thinking that the system is
intelligent. However, there are also examples of effective
uses of human characteristics that take advantage of the
semiotic shortcuts provided by costume, gesture, facial

expression or voice intonation to help explain why the system is behaving in a certain way.

Another task domain involves representing autonomous behavior in an information retrieval system or more general operating system. While the human figure is not always necessary for representing agency as defined by Alan Kay [2] or Brenda Laurel [3], anthropomorphism can be a useful tool for designers if its strengths and weaknesses are understood. In addition, a distinction between delegation and agency is emerging. While the act of delegating may make the user feel more in control than a system that implicitly forms a model of the user, the issues of representation and communication remain. When delegating the task of filtering email, for example, to whom or to what are we delegating the task? What is the nature of this entity and how do we communicate with it? What is the nature of the distinction between delegation and agency and how does it affect representations in the interface?

The limits of direct manipulation and desktop metaphors are most evident when we leave our desktops altogether and enter the immersive world of virtual reality systems or the portable world of "personal digital assistants" [4] a highly anthropomorphic term now in vogue among Apple Computer's marketeers used to describe portable electronic calendars, organizers and cellular communicators. Agency on the part of the system will need to be adequately represented while the conversational component of direct manipulation is enhanced.

Finally, it is difficult to discuss anthropomorphism without also re-examining the moral and philosophical issues associated with the debate. At the philosophical level, we are constantly redefining what it means to be human. As Sherry Turkle observes, "people have a stake in seeing themselves as different" [9] from machines. The inability to distinguish between human and machine, the real and the constructed, or to be unable to "pull the plug" plagues many characters in science fiction. According to Donna Haraway, "Late twentieth-century machines have made thoroughly ambiguous the difference between natural and artificial, mind and body, self-developing and externally designed, and many other distinctions that used to apply to organisms and machines. Our machines are disturbingly lively, and we ourselves frighteningly inert" [1].

PANELISTS' POSITION STATEMENTS

Susan Brennan

Susan Brennan a psycholinguist, received her Ph.D. in Cognitive Psychology from Stanford University. She also holds an M.S.V.S. from the MIT Media Lab, where she worked on computer-generated caricature and teleconferencing interfaces. She has done research in human-computer interaction at Atari, Apple Computer, and Hewlett-Packard Labs, including five years on HP's

Natural Language Project. She is currently Assistant Professor of Psychology at the State University of New York at Stony Brook. Her current research interests include the role of mutual knowledge in human communication, lexical choice, mental models of conversational partners, and conversational repair.

Those who debate the value or evils of anthropomorphizing the interface are missing the point. Certainly it's irritating to interact with a system that's superficially anthropomorphized or cute. And in an electronic medium, where communication takes place over a channel much narrower than face-to-face, imitating a human being can be misleading. But that is not a good reason to throw away all of speech and language as a communication modality.

There are classes of things that are done better with speech and natural language than with direct manipulation. These things include delegating complex or redundant actions and doing anything that's not in the here and now. When Sutherland [8] presented the first direct manipulation system, the idea was to enable people and computers "to converse rapidly through the medium of line drawings". What makes direct manipulation work is NOT the fact that it's visually conducted, but it is conversational. A conversational interface, whether it is visually or verbally conducted, results in a coherent sequence of behavior. And when speech and language interfaces become more conversational, they will take their place along with direct manipulation in the interface.

We should stop worrying about anthropomorphism and work on making systems capable of behaving as coherent interactive partners. Whether these partners are anthropomorphized or not, they should present their limitations frankly. People are used to dealing with many categories of partners: friends, strangers, the hard of hearing, disembodied voices on the telephone, readers who will come along after they are gone, foreigners, children, and dogs. This flexibility has been documented even among the very young; 5 year olds use more simple language when talking to 3 year olds than they do talking to adults (6). It is this fundamental adaptability of human beings to their partners that makes the whole human/computer enterprise possible in the first place.

Brenda Laurel

Brenda Laurel has worked in the personal computer industry since 1976 as a programmer, software designer, marketeer, producer, and researcher. Her academic background is in theatre, and she holds an M.F.A. and a Ph.D. in theatre from Ohio State University. In 1990, she joined Scott Fisher in founding Telepresence Research, a company to conduct research and development in virtual environments and remote presence technology and applications. Brenda has published extensively on such subjects as virtual reality design, computer-based agents, and interactive fiction. She is editor of the book, The Art

of Human-Computer Interface Design [Addison-Wesley, 1990] and author of Computers as Theatre [Addison-Wesley, 1991].

"Virtual reality" is a medium that brings the whole issue of what an interface is into high relief. With more conventional systems, interfaces are conceived as ways of representing preexisting computational functionality to human participants. In virtual reality, on the other hand, the interface - that is, a multisensory medium that aims to establish a sense of presence in a representational context - is often a solution in search of a problem. The questions that most VR designers wrestle with are: What kinds of actions might one perform in this medium, and to what end? How can activity be paced? Without the familiar accoutrements of desktops, windows, or command lines, how can participants be constrained - that is, how does the world reveal its potential to a person, and how can a person be prevented from falling off the edge of the world? In the same way that people and other animate beings provide such constraints in "real life" situations through observation, interaction, and dialogue, agents are an obvious and powerful source of such constraints in virtual worlds.

In virtual environments, as in scientific visualization systems with conventional graphical interfaces, the whole point is to represent information, theories, processes, and ideas in ways that are directly accessible to the senses. The same theory applies to the representation of sources of agency. The central premise of virtual environments is to replace sensory input from the physical world with technologically mediated sensory information, without disrupting the connections between sensation, perception, cognition, and emotion. The aim is to enable people to respond holistically to such environments. There is no place in the theory of virtual environments for a disembodied "system" as a source of agency, communication, or collaboration; indeed, such disembodiment forces its mirror image on the participant and precludes the possibility of holistic response.

In the sense that the dogma of direct manipulation prohibits the use of anthropomorphic or animistic representations for complex agencies that exhibit organicity and/or emergent intelligence, it also precludes our use of such agencies as tools for thought, creativity, or productive work. It is not the notion of anthropomorphic agents that is the real obstacle to human empowerment through computers, but rather the straitjacket of interface orthodoxy and the persistent devaluation of any phenomenon which cannot be neatly measured in controlled experiments.

Ben Shneiderman

Ben Shneiderman is a Professor in the Department of Computer Science, Head of the Human-Computer Interaction Laboratory, and Member of the Systems Research Center, all at the University of Maryland at

College Park. His technical interests include user interface design, human factors research in programming, hypertext, and computers in education. His 1987 book Designing the User Interface: Strategies for Effective Human-Computer Interaction (1987), Addison-Wesley Publishers, Reading, MA (464 pages), has recently been published in Japanese, translation by Nikkei-McGraw-Hill, in its second edition.

Every technology passes through an immature phase in which human and animal models are used as metaphors for design. Lewis Mumford describes the process in his chapter on "The obstacle of animism" in *Technics and Civilization* (1934): "the most ineffective kind of machine is the realistic mechanical imitation of a man or another animal...for thousands of years animism has stood in the way of...development."

The artificial intelligentsia have made the same mistake in their misdirected pursuit of human-like robots, natural language speech recognition to support interaction, and now human-like agents that magically maintain a user model and cleverly anticipate user needs like a perfect butler or secretary. I believe that these scenarios are obstacles in the development of truly powerful and simple tools that will empower users through direct manipulation of objects and actions.

My sentiments are based on my reading of historical precedents and on empirical studies. The talking automobiles and cash registers are gone, the human-like bank teller machines seem like anachronisms, and natural language interaction seems archaic and slow. By contrast, the dynamic visual world of direct manipulation brings us powerful spreadsheets, effective simulations, lively videogames, intuitive data visualizations, convenient page layout packages, and engaging graphical user interfaces. Users are empowered by having a clear predictive model of system performance and a sense of mastery, control, and accomplishment. Empirical studies consistently find support for direct manipulation styles of interaction. I call on those who believe in the anthropomorphic scenarios to build something useful and conduct usability studies and controlled experiments to compare their designs with direct manipulation. Direct manipulation designs can often be improved, but they are a more appealing direction, as far as I am concerned. I am sympathetic to human faces appearing onscreen if they are to represent human beings. My objection is when the computer is portrayed as a human; such misrepresentations are deceptive, counterproductive, and morally offensive to me.

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