

COMPUTERS AND THE MIND with HOWARD RHEINGOLD

JEFFREY MISHLOVE, Ph.D.: Hello and welcome. Our topic today is "Computers and the Mind," and my guest, Howard Rheingold, is a writer with unique expertise in both science and technology as well as consciousness research.

Howard is the coauthor of *Talking Tech: A Conversational Guide to Science and Technology*. He's also the coauthor with Dr. Willis Harman of *Higher Creativity*, and he's the author of *Tools for Thought: The History and Future of Mind-Extending Technology*. Welcome, Howard.

HOWARD RHEINGOLD: Howdy.

MISHLOVE: It's a pleasure to have you here. You know, one of the remarks that you made to me earlier today struck me quite a bit, and that is that the computer revolution hasn't yet started. I think that's an extraordinary perspective when you consider the amazing changes that we've already gone through in just the last ten years with the personal computer revolution.

RHEINGOLD: Yes. Well, the personal computer of today's computer revolution is really like the crystal set.

MISHLOVE: The crystal radio.

RHEINGOLD: Right. There are enthusiasts who like to fiddle with it, who get a great deal out of it. And there is a great deal to be said for it. However, the universal computer that everyone can use, that's got the kind of power that can enable people to do very interesting things, really hasn't come along yet. We haven't reached the point of the radio, much less the television age.

MISHLOVE: In other words, someday in the future we'll look back at the most advanced computers that people are putting on their

desktops today, and we'll think of them like the old RCA phonograph with "His Master's Voice" and the big trumpet sticking out of it.

RHEINGOLD: Oh, absolutely. We already do that. If you have a computer on your desktop, you have something that's thousands of times more powerful than the first computer that the government made at the end of World War II.

MISHLOVE: And that computer was just huge.

RHEINGOLD: Yes.

MISHLOVE: A hundred feet long, ten feet high, three feet deep, something like that.

RHEINGOLD: Yes. They say that in Philadelphia, the lights dimmed when they turned the thing on.

MISHLOVE: That was back in the late forties.

RHEINGOLD: Right. So it's only about thirty years for this technology to have achieved a state where not only is it thousands of times more powerful, but it's so much less expensive that instead of the government owning one, people can own them on their desks. However, ten years from now I think we will see machines which are so powerful and so much more intelligent than they are now, that people actually will be able to find uses for personal computers on a scale that they don't today.

MISHLOVE: Uses that maybe we can't even imagine today, or that only a few people have imagined.

RHEINGOLD: Well, yes. It's not that the computers aren't capable of doing things. It's that they aren't arranged for people to use them easily to extend the powers of their minds. They've been used to do payrolls and they're used to do all kinds of great special effects and to run fancy equipment, but we're really at the beginning of the age where computers are being used for what ultimately will be their

most powerful and most significant use, which is to extend the power of the mind.

MISHLOVE: You refer to computers in your book as mind- expanding technology, almost the way we used to refer to LSD, I suppose.

RHEINGOLD: Well, I would think a better analogy would be books -- that you could substitute the word books for almost everything we're saying, and in terms of the impact on individuals and society that's the kind of mind expansion that's possible with the computer revolution.

MISHLOVE: And I suppose, if we go back to the days of Gutenberg, one might say that of course the whole world was revolutionized by the printing press, but it must have been as controversial then as perhaps computers are now, in some ways.

RHEINGOLD: Well, there were a lot of similarities.

MISHLOVE: Putting thousands of scribes out of business.

RHEINGOLD: That's right. And the people who had access to books were really the elite, a very small percentage of the population, like today where really the techies, or the enthusiasts, are the people who have the most interest in and access to computers. Yet when books became easier to print and distribute the literate population of Europe went from a small percentage to the majority within a hundred years; it completely changed the world.

MISHLOVE: And of course books have the potential to expand our minds, expand our lives, in many, many different ways and different directions. And yet I get the sense, Howard -- you might correct me if I'm wrong -- that computers when they become as commonplace as books in our culture would have an effect that would be exponential compared to what books have done.

RHEINGOLD: Well sure, because in not too many years we'll be able to store the Library of Congress in a machine the size of a book, that maybe a schoolchild can afford to carry. But not only that; you can have full-motion, full-color movies and voice, music; every other medium can be included in the computer. And that's really the key, is that it can be all other media in one little package. So the jump is going to be much larger than the jump of literacy.

MISHLOVE: One of the intriguing areas that interests me is artificial intelligence, and I know it's quite controversial. There are those who claim that the whole artificial-intelligence establishment has failed over the last twenty years to live up to the expectations and the promises that were made, and yet there does seem to be progress, particularly in the area of expert systems. It makes me think that if we talk about a young child, would it be possible, for example, for a child to have a little instrument the size of a book that could include not only the Library of Congress, but a personal teacher for that child, that could introduce him step by step into those vast areas of knowledge?

RHEINGOLD: Well, there are already people working on that, and it's not so much that you include a personal teacher, as you create tools so that children can explore through that world. If you've got the Library of Congress and all of the paintings in all the museums of the world in your lap --

MISHLOVE: You'd need a docent.

RHEINGOLD: You need a docent, or you need someone who shows you how to explore it. And if you can explore it, rather than sitting in the classroom and having people feed it to you, the way you learn is equivalent to the way people learn to speak their own language. Nobody ever sends you to school to learn to speak English; you do it, because you're immersed in it. And I think that we're going to see the day when children are immersed in all the knowledge that has ever existed. And you're right; artificial intelligence, most people

have thought about it in terms of replacing human beings, and maybe the terminology, artificial intelligence or thinking machines, is frightening to people. However, if you think of the techniques that people are developing to make computers more capable of being used by people, what we're going to see coming out of artificial intelligence research are not machines that replace people, but tools that help extend people's capabilities, just the way that reading and writing and arithmetic extend people's capabilities.

MISHLOVE: Some computer scientists have suggested that perhaps we'll be entering into a phase, a generation or several generations, where we move from using computers as a tool to more or less having a symbiotic relationship with the computer.

RHEINGOLD: Right. Actually, the interesting part of the history of personal computers, and personal computers in general, is that they really grew out of the vision of one man who felt that the computers of his day, which were these giant machines that were hidden away in buildings, that were guarded by a priesthood, would really give way, because of the miniaturization of the electronic revolution that made the machinery so much cheaper -- that eventually individuals would be able to use computers in a partnership; that the machine would be able to do things, like go fetch whatever book you want, that humans are not capable of doing. Or multiplying large amounts of numbers, or storing all the information you want. And the human can do things that no machines can do -- recognize patterns, think creatively, use intuition. And in a symbiotic partnership, as in biology, the whole system would have much greater power than just the machine or just the individual.

MISHLOVE: I think it's very important that we emphasize that there are certain functions of the human mind which seem to be way beyond the capabilities of any machine that we can envision for a long, long time into the future.

RHEINGOLD: Oh, absolutely. My two-year-old daughter can do things that the Defense Department would love to get a computer to do. She can recognize her mother's face. It's very, very difficult to get computers to do the kind of complex recognition of patterns that humans can do very easily. Even more significant is natural language. We seem to be wired to learn natural language. You simply can't teach a computer to translate from one language to another by putting a dictionary in its memory. You come out with all kinds of strange things. There was a famous case in which the quotation, "The spirit is willing, but the flesh is weak" was translated into Russian using one of these programs and then translated back into English, and the English translation was, "The vodka is agreeable, but the meat has spoiled." So you really need a human to know what context means; you need to know everything in the world in order to translate a simple sentence.

The key really isn't to try to make computers to replace people. The key is to find those things that computers can do to help us do what we do best, and do it better -- just the way that learning the alphabet enables people to think.

You really couldn't think of things that you can think of now, knowing how to read and write, if you didn't know how to read and write. It opens another whole universe for you.

MISHLOVE: How would you envision that the coming revolution in computers will affect the human mind?

RHEINGOLD: Well, I think that a lot of people feel that computers and other technologies are dehumanizing in this technological society. People are really separated from one another, and the sense of community that we used to have has somewhat disappeared. I think we're already beginning to see the beginning of using computers to create communities. The difference between computers, when you use them as a communication device, and all other communication devices that have been invented is that the

computer can actually help you find people that you want to communicate with. You see people using computer bulletin board systems.

MISHLOVE: People who are widely scattered but have certain narrow interests that they share in common.

RHEINGOLD: Right. You don't know who it is that you want to talk to, but you know that you want to talk to someone who's interested in hang gliding, or ancient Greek, or religion, or politics. You can go to a bulletin board system, find people discussing this through the computer, then find out who the people are, maybe get to know them. So it reverses the usual way we make friends -- you meet people accidentally, and you talk and find out whether you share interests. With the computer, you can find people who share your interests, and then choose to meet them if you want.

MISHLOVE: I do recall some psychological studies that indicated that when people communicate via these conference systems, they often respond in a way which shows very few inhibitions in terms of using sexual metaphors in their language, or in terms of acting aggressively in their dialogues. Perhaps it's because there's a certain kind of anonymity.

RHEINGOLD: Well, it removes most of those cues that we use to judge or prejudge people. You don't know what race the person is, you don't know what gender they are, and you don't know what age they are. All you can see are their thoughts and their communications, and you judge them on what they say, not what they appear to be. I would say that's one of the big advantages of that communication medium. Like every other communication medium it has its disadvantages. You miss a lot of the nuances that enable you to know that somebody's joking because they're smiling, although their words may sound rather serious. But I think whenever a new communication medium comes along, people find new ways to use it and form new kinds of communities. Notice we're now

talking about communication media, and I think that really is the answer to your question about one of the revolutions we're going to see -- the computer not as a device for calculating large numbers or doing fancy graphics or doing word processing, but as a way to help people communicate with one another.

MISHLOVE: It seems to me, if we look at the most recent cycle, the last five to ten years of computer growth, people made vast predictions that the rapid rate of acceleration in home computer use would continue, and then we've seen in the last several years that that has sort of tapered off, and now there's a modest rate of growth. It's as if people had wonderful ideas about what these computers could accomplish in terms of communities communicating, and how many people would be on line on the various data bases -- the Source, or Dialog, or CompuServe, and then what happened?

RHEINGOLD: Well, what happened was that, as I said, the revolution hasn't happened yet. All of those things that people envisioned really are going to come. You can't really do them with, A, the hardware that we have; it simply needs to be more powerful, just as today's computers are much more powerful than the first computers that were invented.

Because the electronic components become more powerful every year, we can predict that in five or ten years they will be powerful enough to cross a threshold -- the kind of threshold you see when you project still photos on a screen. If you project them fast enough, twenty-four frames a second, you're no longer looking at still photos, you're looking at a movie. There's an illusion of reality there. When computers get fast enough, powerful enough, and cheap enough to put on your desktop and have the kind of power that they have only in laboratories now, we'll begin to see those possibilities.

I said there were two parts to it. One was the computer on your desk being powerful enough. The other part is what they call the

infrastructure, and you can kind of think in terms of the highways and automobiles at the beginning of this century. There were a few people who put on special outfits and were enthusiasts who repaired their own cars, and they went out and drove them on Sundays. But there were no highways, there were no service stations, there were no automobile tire manufacturers, there were no oil refineries. The entire structure which enables, for better or worse, our society to be the mobile society that it is, hadn't existed.

Now with computers, those highways are the telephone lines that we use today to connect one another, which are being replaced with higher-capacity lines, so that in maybe ten years we will be able to send along those lines telephone conversations, television, computer data, all at the same time, and a computer will take care of those communications for you, so that you can blend them all. It's like all of the media that we have now, except with interactivity.

MISHLOVE: One of the concepts that you have used in your book to describe the future of what computers will become is the term fantasy amplifier, and that suggests things new and different, things that we haven't tried yet that will be sort of a qualitatively different realm of what people will be doing with their minds and these machines. What is a fantasy amplifier? How would it work?

RHEINGOLD: Well, a pencil or a paint box is a fantasy amplifier. It enables you to externalize the ideas that you have, show them to other people. Now, most people are not trained in visual communication, for example, visual expression. Yet we know that everybody has a very sophisticated mechanism for interpreting visual data. Most of the way we think has to do with our visual system. We're beginning to see things like the Macintosh computer has paint programs they're called -- MacPaint was the first one. Now we see all kinds of them. By taking care of lower-level details, like where do you put a dot on the screen, the computer empowers people to draw who weren't able to draw before, just the way a spread sheet enables people to make predictions about financial figures they

weren't able to do before, because they didn't want to make all those calculations; or a word processor makes it possible for people to edit and compose in ways that they weren't able to do before.

By automating a very low-level part of the task of, say, visual communication, we can now create a society in which people can not only talk to one another and exchange words, but also exchange visual communication. That's one possible element. You can have groups of people, who may not know each other before they come together, join together on some project, and they may be in different parts of the world, and they can send word to each other and use shared visual spaces to create solutions to problems, or to have fun, or to create art.

MISHLOVE: There are people, for example, I guess, who have tried to have groups write novels together, using some of the bulletin-board type systems.

RHEINGOLD: Certainly -- groups to write novels. You can use the same system for art and exploration or for accomplishing things in the world. One of the reasons that computer conferencing came into being was that people who were trying to accomplish things like cure blindness in Nepal found that the only way they could coordinate getting medicine and donated services and doctors and airplanes and red tape all arranged so that they could do what they wanted, was by using computer conferences.

So here we have the same medium people are able to have fun with, to communicate with one another and to accomplish things. Previously we sort of compartmentalized our playground and our office. Here they may be the same thing for some people.

MISHLOVE: If we look at the realm of consciousness technology, especially throughout history, you can see that many cultures have developed systematic methods for expanding consciousness -- yoga, for example, or the techniques of shamanism -- for deepening the mind, for entering into altered states of consciousness, sometimes

for cultivating a sense of ethics, or a sense of profound wisdom. Is there a sense that computers also could serve as consciousness-technology tools along this vein, in the spiritual realm?

RHEINGOLD: Very definitely. This is another one of those revolutions that hasn't happened yet. Like any other tool, it's not the tool that does it, but it's the ability of a skilled person to use that tool that can accomplish things. The fact that computers and computer-storage technologies are able to store a great deal of the images and sounds, for example, in the hands of someone like a shaman, would enable them to lead people to discoveries of states of their own consciousness that otherwise would be very difficult, if not impossible.

MISHLOVE: You mean, in the hands of a shaman, this could be very interesting. I've heard of Buddhist monks creating mandalas and meditation images on a computer, but the person would already have had to attain that. You're not going to become a shaman, or become a Buddhist monk, by interacting with a computer. Or do you think you might?

RHEINGOLD: Well, if you're not literate, you're not going to become a great writer. If you are literate, that doesn't mean that just because you have a pencil and a paper, or a typewriter, you're capable of becoming a great writer.

However, you can go to school and you can learn to express yourself and communicate. So like any other skill, or any other literacy, there are people who have a great deal of talent. There are people who have less talent, but working at it will enable you to do things that you couldn't do if you didn't work at it. So it's not that the tool's a magic wand, that by possessing a computer you will achieve higher consciousness. On the other hand, by using the computer -- certainly mandalas are a technology that was developed a thousand years ago by people who were interested in using the fact that the human mind is very closely connected with imagery, and if you want to show

people how to change parts of their mind, you can use images and sounds.

Well, a computer is a tool par excellence for storing, retrieving, transmitting, and manipulating images. In the hands of someone who knows what they're doing, you have a kind of mandala to the nth degree. We're just going to have to wait and see what the shamans and the yogis and the gurus of the computer age have to offer.

MISHLOVE: There's a sense in which what I hear you saying that the desire to do this, to grow, to learn, has to come from within the person -- that the machine will never substitute for that inner sense of motivation.

RHEINGOLD: Yes, I think that's the mistake a lot of people make, and it's a natural mistake of thinking, oh, the computer's coming along; it's going to do something to us.

MISHLOVE: People often get over-infatuated with the possibilities.

RHEINGOLD: Right. The book didn't save the world. The Bible is a book, but so is Mein Kampf. Are you going to blame the technology for the evils of people who have written books, or are you going to place the power of the Bible in the technology of the printing press? No, it's a medium for transmitting ideas to large numbers of people. I'm saying that the tool itself is neutral, but it may have great power, and it's going to depend on people using it.

That's the ultimate computer revolution -- when it gets out of the hands of the enthusiasts and the techies, to people who are interested in art or religion or consciousness or community activism or neighborhood politics or any way of changing people's minds, then we're going to begin to see things happen.

MISHLOVE: Well, with the expanding technology that we can forecast -- perhaps greater changes in the next ten years than we've

seen in the last ten years -- what can we begin to do to prepare ourselves for these eventualities?

RHEINGOLD: Well, I think the best thing we can do is to get out of the way of the kids, and that the problem with every new communication medium is that the people who are used to the old communication medium have a hard time retooling their minds to accept new things, whereas children pretty much adapt to it right away.

MISHLOVE: This has always been the case in the history of computers. Every time a new innovation came along, the old computer experts would resist it.

RHEINGOLD: Yes, because of the compressed nature of the history. It's as if you took a technology that took a thousand years to mature and had it happen in thirty years. Everyone who is used to doing it the old way can't fathom the fact that there's now a new way to do it.

MISHLOVE: You don't need punch cards anymore.

RHEINGOLD: Right, exactly. And we're always going to find that some kid who fools around with the machine is going to accomplish things that engineers said couldn't be done. By the way, the whole thing about computer literacy, I think, is a real sign that computers haven't become smart enough to deal with us yet. It's really not a matter of people not being smart enough to deal with computers. Computers simply have to have the power and capability of knowing what it is that you want.

MISHLOVE: In other words, the idea that young children should learn computer programming or computer languages to get through high school is simply an indication that the computers aren't smart enough.

RHEINGOLD: Right, right.

MISHLOVE: These kinds of programming skills may soon be outmoded then, as computers learn to interact with us at our level of intelligence.

RHEINGOLD: Right. The key skill is not how to operate a piece of machinery, but how to think -- how to use tools to think with, how to use new tools, and how to recognize powerful ideas when you see them. It's going to become much more general, much less specific. Nowadays you can pretty much guarantee, because of the technological rate of change, that if you study something specifically in school, you're going to be obsolete by the time you get your degree.

MISHLOVE: So the most important message of the computer revolution is that it's really a people revolution, and in a people revolution it's the development of our inner skills to deal with ideas, to go deep within ourselves to discover our own values, our own purpose, that's going to make the difference in our success.

RHEINGOLD: I really believe so. I really believe that's what the liberal arts education used to be -- the idea that if you learn a little bit about what everyone in art and history and civilization has done, you're going to be a better thinker.

MISHLOVE: Howard Rheingold, thank you very much for being with me. It's been a pleasure.

RHEINGOLD: It's been a pleasure for me too.