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Closeness at a Distance

Can Virtual Technology Ever Achieve That Human Touch?

By Joel Garreau
Washington Post Staff Writer
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To my breakfast with Ruzena Bajcsy, a Czech-born computer scientist, I carried her favorites: black coffee, mint cookies and roses.

Washington Post reporter Joel Garreau, in North Carolina, has a virtual breakfast with computer scientist Ruzena Bajcsy, in Pennsylvania. (Chris Seward - for The Washington Post)

Video
- Tele-immersion Demo

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This was no ordinary assignation. I was sitting down for our morning meal at the University of North Carolina. She was sitting down in a room at the University of Pennsylvania.

Between us was not the usual three feet of air but a humming, blinking array of computers, cameras and cables.

One of its developers, Jaron Lanier, says this array is a cross between a holodeck and a transporter beam, the closest thing to "Star Trek" now available. Beam up the coffee, please, Scotty. The gear: a desk with a 3-D screen the size of a windshield and a starfish-shaped microphone for extremely lifelike sound. On my brow is mounted a black sensor that tells the computers where my head is, so when I move, my view of the breakfast room in Philadelphia changes.

Welcome to "tele-immersion." Lanier doesn't think it will be commercial for 10 years, if then. But the idea is to use a future Internet to transmit human presence of great psychological and emotional depth in a fashion so real that it fools the mind.

I poured the French roast I'd brought for us to share. She smiled. I placed a rose between us. She demurely looked away.

I reached for her hand. She reached for mine. They almost seemed to touch. But almost was not enough. Her fingertips broke up into shards of three-dimensional light as they pushed toward me, out of the range of her imaging computers. Nor would she ever smell the coffee or the roses. Or the subtleties of my soap, sweat and pheromones.

For some time now you've been told that telecommuting will diminish traffic,

that distance learning will make college campuses obsolete, that virtual corporations will eliminate bosses, that airlines will become quaint, and that with a fat enough electronic pipe into the home, each of us will be able to retreat to our own personal mountaintop in Montana, being lured down into the flatlands only to breed.

The tyranny of the ages--the shackles of human bondage that require humans to physically meet--will finally be broken, so this official future goes.

But history shows that even the zeitgeist is subject to certain immutable human delays.

Missing Prana

"The come-to-Jesus moment for me in my understanding of all this came back in 1990," says John Perry Barlow, the retired Wyoming cattle rancher and digital guru who is co-founder of the Electronic Frontier Foundation.

"A fellow named Ranjit Makkuni was doing a teleconference at Xerox Palo Alto Research Center. It was connected with PARC's research facility in Portland. There was this video wall with high resolution and 3-D sound. Half the room was in Silicon Valley and the other half seemed to be in Portland.

"I asked him, 'Does this work?'

"He said, 'No.'

" 'Why not, what's missing?'

" 'The prana is missing,' he said.

"That's the Hindu word for breath and spirit. Are we ever going to be able to get prana through a wire? That's an interesting question."

Prana, if course, is a spiritual term strange to Western ears. It's usually translated as "vital energy" or "life principle" and literally means "vital air." But it also connotes energy, power and the animating force of the cosmos. It's a word that comes up among researchers who are studying our brave new world in which e-mail, chat rooms, instant messaging, Web phones, Web automobiles, Web TV, pagers, satellites, cable modems, wireless Palms and tiny video cameras perched atop computer screens support hopes and fears that our civilization is about to cross some line, to create instant villages and virtual tribes with the power of electronics.

Are we indeed entering some new realm in which humans are represented more by their electrons than by their flesh and blood? Is being there--face to face--obsolete? Do we need prana?

Remote--and in Control

Electrons can and do successfully connect humans, sometimes, in ways that are boringly simple to the engineers dreaming of tele-immersion.

Take breaking up with somebody, for example. Every teenager knows the best way is over the phone, says Steve Jones, co-founder of the Association

of Internet Researchers and head of the department of communication at the University of Illinois at Chicago. "The phone is fairly intimate. You can hear a person's voice and make assumptions from their tone and inflection, but you still don't see the person. And you have control--you can hang up."

Women say they love e-mail because it allows them routinely to keep in touch with their family without wasting time talking to them, according to the Pew Internet and American Life Project.

"Students tell me that they find voice mail extremely useful for dealing with bosses whom they dislike," reports Joseph B. Walther of Rensselaer Polytechnic Institute, a leading theorist of new media.

"They wait for the time when these bosses go for lunch, and then call. That way they use the connective technology to avoid connection. We have a lot to learn about how people will adapt to the capabilities of greater connection and disconnection. Adapt they will, and usually in pretty intelligent, even if not cheery, humane ways."

Community can indeed be created on Internet message boards by thousands of people posting brainstorms about hundreds of different subjects, experience has shown. The bad news, notes Howard Rheingold, author of "The Virtual Community," is that they "trend away from consensus," as he delicately puts it. Visit a pioneering online community like the Well, and you rapidly discover it's a great place to start a fight.

If there are specific things you want to know about a place you can't go, video cameras are useful. Suppose you're on the ground and something goes wrong aboard a space shuttle, says Tora K. Bikson, senior behavioral scientist at Rand Corp., who studies advanced communication and information technologies. A tele-link could help, adding video to the stream of audio communication.

"Just recently there was a tele-medicine project on Catalina Island," 22 miles off the Southern California coast, she says. There's a lot of diving off Catalina, so on the island there is a hyperbaric chamber to force oxygen into the bloodstream of divers with the bends.

"But when a diving accident happens, the chances of an emergency doctor being there are like zero. In the past, the procedure was for the Baywatch paramedics to fire the chamber up, while somebody calls a doctor at the University of Southern California emergency hospital. He describes the patient, and a conversation ensues. Like the doctor says, 'See if he can wiggle his toes upward.' But then there's the question of what he means by that. . . . With a pretty good bandwidth link, the doctor can look at the patient, and there are various things the doctor knows that he doesn't even know he's looking for."

"Distance learning" is more than 200 years old. The Boston Gazette ran ads for shorthand lessons by mail in 1728. Three quarters of a million Americans were enrolled in correspondence classes in 1995, when the Web was still in its infancy--more than entered all public colleges and universities as freshmen. Today there's a gold rush to Internet learning. Everything from courses in building maintenance to master's degrees in business administration are being offered remotely.

And there's always the demonstrably effective and profitable tele-technique of elevating hormonal levels despite distance. We call it pornography.

Yet note how many of these electronic connections boil down to one of two predilections--either people prefer to have their contact with other humans limited by the machines, or they feel that a little bit of linkage is better than none at all.

What happens when the machines get truly formidable, streaming unlimited quantities of electrons toward you? Will the machines then be able to replace normal human face-to-face contact? Will we figure out a way to digitize prana?

The Real Deal

Three days after the electronic breakfast date with Ruzena Bajcsy, I met with her again, this time face to face, at her office at the National Science Foundation in Arlington.

To get to her office, I had to pass the four-person bank of uniformed security guards, and then the wave of receptionists behind their imposing lobby furniture, and then Bajcsy's secretary behind her impressive desk.

Bajcsy's office was larger than most living rooms, appointed in mahogany and ficus and featuring a couch and matching armchair as well as an oval conference table with 10 dark chairs. Atop NSF headquarters, her office had two walls of windows looking out over the panorama of Northern Virginia. Her desk had two flat-panel displays, two conventional computer terminals and two ceiling-mounted computer projectors.

This was clearly an important and powerful woman.

Nothing in her e-mail, or in the first breakfast meeting in which she had appeared at a distance, had managed to convey this context.

Again, I brought coffee, mint cookies and roses.

This time, when I presented her with the roses, she blushed.

When I'd given her the roses in cyberspace, she didn't.

You Can't Touch This . . . Or Can You?

When it comes to new technologies, Chuck House is a believer in progress, however slow. He compares the search for transmitted human presence with the long quest for human flight.

Yet House--who was one of the founding fathers of the personal computer revolution, and is now the societal impact and science policy director of Intel--is dubious that face-to-face is going to be eclipsed by virtual encounter anytime soon. He thinks the search for artificial human presence will be comparable to the search for artificial human intelligence--a lot more complicated and decades-consuming than it might first appear. He bases his skepticism on how far we have to go from the lameness of today's videoconferencing.

For openers, he doesn't believe that today's electronic meetings are better than none at all.

"Consistent remote attendance heightens frustration, builds alienation, and serves to segregate more often than integrate the remote attendee," he writes.

Thomas Lewis agrees. "To the dismay of the videoconferencing industry, people don't really like it--they find it flat, boring, empty and irritating," says Lewis, a clinical professor of psychiatry at the University of California/San Francisco School of Medicine, and one of the three authors of "A General Theory of Love," a book that addresses what science has learned about human emotional connection.

With today's video gear, for example, it is impossible to establish trust by looking a person straight in the eye. The camera, of course, is slightly off to one side.

"Every face-to-face interaction involves an incredibly complex eye contact ballet," notes Lewis. "It's like those Morse-code signal lamps you see on ships in World War II movies: on, off, on, on, off, off, on, on," he writes in an e-mail. "Somehow, the brain is deciphering that complex eye-contact stream to derive critical emotional information. How do lovers first connect? Their eyes meet from across the room. What do lovers do to cement their connection? They gaze into each other's eyes. What's the first thing a liar does to disguise his emotional miscommunication? He breaks eye contact. Somehow--and we don't know exactly how--the brain reads eye contact duration and patterns, and pupillary dilation as well, and weaves together emotional meaning out of it that we all rely on without ever realizing how we're picking up and assembling the cues."

High-quality three-dimensional sound that easily allows a listener to know which person in a group is making a point--or even lets people intelligibly jump in on what other people are saying--is something even phone conferences are bad at.

Voice is complicated. "I can tell exactly when one of my patients is depressed--the voice gets a ragged-around-the-edges sound that, once you've heard it and know it, is unmistakable," says Lewis. "The brain is highly attuned to the musical qualities of speech because it's getting huge amounts of information there" beyond the words actually being spoken.

Given overwhelming quantities of brute computer firepower a decade from now, these problems may prove to be the relatively easy parts.

But what about touch and the neurotransmitter changes that it sets off?

"Babies who don't get enough touch sicken and die," says Lewis. "People crave it. They can't get enough of it. In fact, the healthful effects of being touched are so powerful that if that's all you get--just being touched by a healer--many people will do just fine with that. Thus the whole rise of chiropractic and massage therapy as Western doctors retreat behind their masks and scanners and rubber gloves."

Very little is known about the power of smell, other than that it triggers some of our most intense memories, traveling straight to the emotional areas of the

brain without going through a filtering step. It's well understood that women who are emotionally and physically close will synchronize their menstrual cycles. In animals, the odor of a strange male can stop a female's pregnancy, causing a fertilized egg not to survive. Pheromones appear to be more than smells--they function in defense, as alarms of impending danger. In the closely associated sense of taste, professional flavor judges can detect qualities so subtle that they defy the mechanical measures of physics and chemistry.

Who knows what makes humans tick? Only in the last half-century did researchers such as Ray Birdwhistle and Edward T. Hall codify the study of body language, revealing that some cultures won't trust people unless they're willing to stand close enough to allow their breaths to be smelled.

Physical clues tell us how we may talk. "What I say in a boardroom is completely different from what I say in the urinals during the break," says John Seely Brown, co-author of "The Social Life of Information" and director of the legendarily inventive Xerox Palo Alto Research Center.

Anybody who's had a sensitive conversation in a car with a child knows how this works. "In the car it's informal, not like sitting at the dinner table," says Brown. "The child's attention is riveted in the same audio space as yours. But it's not eyeball to eyeball. Looking straight ahead saves embarrassment. If the child wants to tell you to back off, she stares at you for a moment, and then turns completely to the right and looks out the window. All those messages are part of the communication."

Other physical cues abound. Recent research shows that human senses are vastly more complicated and numerous than the traditional array of five, according to the late Carl Pfaffman, a renowned Rockefeller University professor of physiological psychology. They include sense organs in muscles, tendons and joints that detect motion, organs stimulated by gravity and acceleration that provide a sense of balance, receptors within the circulatory system that are sensitive to carbon dioxide and changes in blood pressure, and receptors within the digestive tract that mediate hunger and thirst. There are even cells in the brain that are sensitive to changes in temperature within the brain itself.

These are among the reasons House's test for successful face-to-face contact is found in a family Thanksgiving dinner.

Unlike corporate conferencing, "most family gatherings for holidays, birthdays or weddings do not feature extensive readings, database references or PowerPoint slide shows," he observes. Instead, they substitute "hugs, kisses, laughter and clowning around" as well as ritual and ceremony. "Shouts of joy and screams of delight fill the air; the background noise gets deafening. It is hard to kiss the bride electronically. You can eavesdrop, but you cannot partake of the wine. You become a passive spectator, not a participant.

"The test will be when videoconferencing is valuable for long-distance love affairs," he says. "The fact that it is not, while the telephone and even e-mail are, is more than suggestive about the deep psychological cost."

Virtual as Virtue

If the search for meaningful distant human contact is equivalent to the dream of flight, Jaron Lanier is a sort of anti-Wright brother. He can't help it. For

openers, he's a white guy whose hair just won't fall into anything other than long convoluted dreadlocks. In his twenties, Lanier invented the phrase "virtual reality," along with much of the gear that went with it, like the goggles, helmets and wired gloves that you can now play with at any Dave & Buster's.

Today Lanier, 40, is chief scientist of the National Tele-Immersion Initiative. The object of his game is to convert advanced sensors at one end of a hookup into virtual reality at the other, using the breathtakingly powerful next-generation Internet 2 test bed as a connector. These inventions are being developed at the University of North Carolina, the University of Pennsylvania, Brown and other schools.

"I hate air travel," Lanier says. "We are the friend of the subconscious and the enemy of the airline." He sees tele-immersion as in a race with the decline of air travel quality--not just the crowding and delays but spectacular accidents associated with stress on the system. "Air traffic's safety record is one of the great achievements of mankind. But if we start seeing crashes involving hundreds of people within sight of freeways and apartment buildings every month or so, people will start looking for an alternative," he says.

"People being able to connect to each other in new ways using technology is the very essence of human adventure on the grandest, most spiritual scale. This isn't going to happen next year. It's about the most mysterious stuff there is. It's a subjective experience--the search for prana."

But that's not the same as perfectly duplicated reality, he says: "I think it's important to distinguish two concepts. One is perfect realism--an inability to distinguish one form of contact from another. Tele-immersion is clearly distinct from that. Tele-immersion is like clothing--appropriate at some times and not at others."

John Perry Barlow thinks the ultimate measure of the future of face-to-face contact will be the sales of jet fuel. "We know that there is no human condition with fatter bandwidth than face to face. We know that the more interaction people have virtually, the more inclined they are to seek face-to-face contact. It's a natural human instinct, to climb the spectrum of bandwidth. That's why the Internet is going to do for the sales of jet fuel what the personal computer did for paper."

(Remember the paperless office? Instead, what you've got, thanks to computer printers and fax machines, is more documents than ever.)

Lanier doesn't disagree with the jet fuel test. But he thinks that about 10 years out, the airlines will start flunking because they'll be doing such a bad job and tele-immersion will be doing a good enough job. Growth curves will cross between travel and the demand for human contact in cyberspace.

"If you start seeing people canceling plans to build airports because the demand is not really there, that'll mean that it's working."

Wishing You Were Here

Tele-immersion can't be all bad. When Ruzena Bajcsy meets me at her office door, she gives me a warm hug.

This time we actually share the coffee and the cookies. We compare notes on our virtual first date. She mentions with no small irony that she wishes she saw more of Henry Fuchs, who runs the University of North Carolina end of the tele-immersion initiative.

"We have a true collaboration. When I am in Philadelphia, we talk every Sunday. We have this phone date at 10 in the morning. We discuss what happened the previous week and what we are going to do the following week.

"But then I really feel personally a need to see him. Whether it's just to touch him or what I don't know. I cannot explain it to you. It's part of our friendship. We have known each other six years, and we mutually make an effort at least every two months to meet--even if I just go for a day to North Carolina."

Is every two months good enough?

"Well, that's how it works out. Whether it's good enough is hard. We complement very nicely. Henry is a dreamer and he is your consummate technologist. I am a visionary in a way, as you can see from all of this, but I am also much more with my feet on the ground in the sense of what can be done and how long it will take, realistically."

You're talking about melding two different kinds of people. Is that why it would be better if he were here all the time?

"Well, not all the time. But if we could have these Sunday meetings more personal, then--"

Bajcsy looks away.

"I don't know if the work would be better, I'm not convinced. I just think that I'd personally feel more satisfaction with the personal contact with him because I just like him very much."

The fresh, powerful sweetness of roses wafts through the room.