Aspects of Presence in Telerelating

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In 1992 I designed and studied virtual entertainment experiences which participants entered once or once in a while, alone or with strangers, for two to ten minutes (Heeter, 1992). For the last two years, I have lived, worked and taught in cyberspace 10 to 15 hours a day. Ninety-five percent of my human interactions occur through technology. I use and study the application of personal, affordable technologies for "telerelating" -- conducting and enhancing close personal relationships such as boss-employee, teacher-student, coworkers, friends, family, and romantic partners.   What seems important about "presence" has changed dramatically.

In considering short virtual entertainment experiences, personal, social and environmental presence were important as ways of making the experience seem real -- you know you are there because you see yourself, because others see and respond to you, because the environment responds to you. But for telerelating, it doesn't matter whether you feel like you are "there" or not -- what matters is whether you can express yourself, perceive the other (who of course exists), communicate, and feel connected.

Technology enables people to connect in fascinating ways. Media richness and social presence literature consider the sensory channels available to participants -- but that's only one of many parameters defining the extent and nature of presence enabled by different media. In this article, I will use 9 common, inexpensive personal communication technologies as examples in explicating interesting parameters for presence. Related research will be noted, and comparisons will be made with face to face presence. Table 1 summarizes the technologies and parameters.

Telerelating technologies offer enhancements over face to face presence for some but clearly not all parameters. Most critically lacking, telerelating technologies so far fail to convey eye contact, facial expressions and real body images of people.

EYE CONTACT

Picture phones and video conferencing tend to do a terrible job of conveying eye contact. Most conferencing systems have the camera above or off the side of the monitor, so it never feels like the other person is looking right at you. To give the appearance of looking right at someone, you need to stare directly at the camera. When you do so, you actually can't see the other person at all. (Imagine an exchange where both people are staring at the camera to appear to be looking at the other, neither seeing each other...) This subtle deficiency is one example of how classifying communication systems only by sensory channel overlooks important parameters of presence. Yes, there is a visual channel. But no, it doesn't work the same way human eyes do.

One solution to eye contact in one to one video conferencing is to have the conferencing image projected onto a clear plastic display instead of being shown on a monitor. Cameras line up behind the clear plastic at exactly eye level. When you look into their eyes on the projected display, you appear to them to be looking into their eyes too. Prerecorded holograms can be created, so far at great expense, where the actor's eyes appeared to follow you around the room.

Two very different communication media have provided some of the rush of knowing for a moment I have someone's complete attention. For several years, my boyfriend and I each had a dedicated "love pager." No one had the number other than us. Set to vibrate when a page is received, we would periodically buzz each other during the day. Thus, in the middle of teaching a class or walking down the stairs, a subtle vibration would tell me at that very moment he was thinking of me. The immediacy felt like eye contact, only a little more startling to go from alone to in touch without a physical presence to portend the event.

Another telerelating technology with an eye-contact-like feel is ICQ instant messaging (www.icq.com). You identify co-workers, friends and family. The system shows you when your selected people are online and allows you to exchange messages and files with them directly, without going through email. When a message is sent, the receiver's ICQ icon starts flashing; they click RECEIVE to receive the message. It's like email, only more personal, immediate, and limited to select communication partners. The history of exchanges is stored by person, so you can review all of the messages you and another have exchanged. In addition to messaging, it is also possible to request a "live chat." When both parties agree to chat, a private space opens up divided in half with the top region displaying one person's typing and the bottom for the other person's chat. Both parties can type simultaneously. As each letter is typed, it shows up. Chat is a mode entered only on special occasion -- usually the regular messaging is employed. Thus, chat is a period of particular focussed attention and immediacy. It too can feel like eye contact, as you watch each letter appear and know that the other is typing those letters RIGHT NOW, to you.

FACIAL EXPRESSION/NONVERBAL AFFECT

In face-to-face communication, facial expression provides important feedback about how the other is responding to what we say and do. Smiles, frowns, nods, confused looks, rolling eyes, winks, bored expressions, looking like they're about to speak all influence the communication exchange. We read both voluntary and involuntary expressions of affect. They show us the other is paying attention, and give clues about how they are responding to us. These cues also help define turn taking. Facial expressions of the person when they are NOT talking matters more when they are talking because attention by the listener shifts to words and vocalizations during while the other person talks. A televised lecture with audio but no picture still has most of the content. But audio of the audience with no picture loses most of that content.

On the telephone, nods are replaced by "uh-huh" and smiles by laughter. Phone calls are full duplex, meaning both parties can speak at the same time and still hear each other. Turn taking still works reasonably well with two people and full duplex.   Some online audio conferencing systems are half duplex -- only one side can have the floor at a time. Overt signaling is needed to indicate one side's turn is over and the other side may talk.

The ability to perceive and express affect is reduced with no visual channel. However, I often prefer phone to in person or to videophone meetings. Phone allows me to focus completely on what is being said and the affective vocalizations without being distracted by embodiment or extraneous visual cues.

Picture phones are often used in one to many or many to many situations. The result is lack of facial closeups, or closeups of one person at a time. It's difficult to read group responses in a video conference based on visual cues. In addition, with inexpensive picture phones, the bandwidth is limited resulting in very low frame rate and poor video quality, even in one on one video phone calls. Only exaggerated facial expressions held for several seconds come through.

I taught a class of 15 students who met in Michigan, with me in San Francisco using videophone, speakerphone, and controlling a computer projected in the classroom. The class liked use of the picture phone for industry guest speakers. They were displeased with the picture phone for class discussion when it was just me and not a special guest. I believe this was because their expectation and desire for seminar-like discussion was different. With a guest, they wanted to be able to meet and see what this person was like. They wanted to be able to perceive facial expressions and demeanor. I posted a still image of the guest on a web page, and the picture phone carried a live head and shoulders shot. The students were not expecting the guest to lead a class discussion. But when it was me, over and over again each week, they were less enthralled with seeing my fuzzy video image and more wishing I would notice when they had something to say or were confused or annoyed. They wanted to be perceived, which worked poorly when one camera tried to cover 15 people.

Perhaps because live audio and video are available, phone and picture phone users tend not to develop additional methods of expressing affect. Email, chat, pagers and other communication media employ more alternatives. Pagers offer a severely limited bandwidth -- alphanumeric, or even numeric, 10 characters. Teens and other lovers have adapted the technology to their own communication needs, working out a system of codes with

agreed upon meanings. The bandwidth is so limited, pagers used in this manner are used primarily to convey affective content rather than complex communication.

The use of "emoticons" is common in chat and email. In face-to-face presence I actually miss the ability to punctuate something meant as a joke with a smiley face. The lack is even stronger on the telephone, where I can't provide facial cues to indicate I'm not being serious. Merely smiling at a humorous remark does not feel as sufficient compared to being able to type lol (laughing out loud) or haha. I end my emails with "hugs" more often than I end my face-to-face meetings with a hug. Email and chat are NOT void of affective communication.

Microsoft's Comic Chat displays you and your chat partners as animated characters in a paneled cartoon. You can choose to be represented by one of many different cartoon characters. A "wheel of faces" in the bottom right corner of the chat window gives a choice of facial expressions. As you type your chat responses, you can click the expression you want your character to make. Comic chat builds a comic strip as the chat occurs. When one frame gets full of dialog boxes, a new frame is created. Algorithms decide which characters appear in the frame and where to place the dialogs, when to switch frames, which facial expressions to use when the user doesn't specify.

Blaxxun's 3D chat avatars let users select different emotive animated sequences, by clicking on buttons labeled "Hello - Hey - Yes - Smile - Frown - No" in addition to either text or voice communication. I have not used the system extensively, but I suspect that participants pay more attention to emotional expressions when they are talking than when they are listening. And I suspect that this emphasis is backwards. Active listening in a 3D chat room should involve ongoing expressions of affect. I wonder what that would be like in a class. Twenty avatars all positioned so the instructor could see their faces, actively reacting to a mini lecture-discussion? Probably it's too unnatural to require what is usually involuntary affective responses to be made intentionally.

Unlike phone and face to face, chat situations do not require turntaking. Participants can talk concurrently. In Microsoft chat, one can SAY a message which is posted as a regular chat statement, WHISPER something to a particular person, THINK something that shows up in a thought balloon, or describe an ACTION (Serene feels remorse for her oversight...).

Thus far the examples discussed have been of voluntary affective display. For now, involuntary affective expressions are rare in telerelating technologies. At least today. Rosalind Picard's Affective Computing Group at the MIT Media Lab (www.media.mit.edu/projects/affect/AC_research/communication.html) is working on technologies which measure, display and respond to involuntary affective responses. Scheirer (www.media.mit.edu/affect/AC_research/projects/affective_avatars.html) is developing "Expression Glasses" using a full-face mask to provide detailed fine muscle information about facial expression and temperature to drive the avatar's expression, providing further visual feedback to conversational partners. If the person blushes, the avatar would blush at the same time, providing an accurate representation of affective reality in the VR interaction." Expression glasses could also be used by a video lecturer to students in a remote location, providing a "barometer" of collective emotional expressions of interest or confusion. The anonymous nature of the glasses allows individual students to express their emotions without necessarily being forced to identify themselves, contributing to the average class emotion.

Whether used in "mood jewelry" or as sensors for telerelating technologies, Picard's group is developing sensors and displays for involuntary affective reactions including: GSR (Galvanic Skin Response); EKG (Electrocardiogram); EMG (Electromyogram); BVP (Blood Volume Pressure); Respiration, and Temperature.

Face-to-face presence does not allow us to monitor these reactions in our conversation partners directly. Technology may make them part of how we interact. Rather than asking "how are you feeling," we may be able to know our partner is running a slight fever and has elevated blood pressure. Or perhaps they are in an unusually high state of relaxation and are emitting strong levels of beta brain waves. Someday involuntary affective responses may play a larger role in telerelating than they do in face-to-face presence.

EMBODIMENT

Frank Biocca and Kristi Nowak (in press) coin the phrase "PROGRESSIVE EMBODIMENT" to describe the increasing prominence of the user's body and immersion of our senses into the computer. Their focus is on 3D immersive environments. Biocca and Nowak point out embodiment also occurs in other media, with fewer sensory channels.

Visiting museums in Prague, I was struck by the 6 inch round wax stamps attached by a ribbon to 16th century official documents. The wax stamp was the king's official seal of approval. The way we sign our name is a limited form of embodiment, as is our signature line in email. Big curly cute letters suggest a curly cute signer. Terse hard to read signatures suggest busy people with more important things to do than pay attention to how they write. Our answering machine greeting is another representation of self. Even our names are a form of embodiment which contribute to others' impressions of us.

I used an asynchronous discussion board (WebTalk) with my class. Students could select a nickname and they could upload a graphic they wanted to represent them when they sent messages. Every time someone sent a message to the class WebTalk, their nickname and their image appeared beside the message. Some students uploaded photographs of themselves. Some uploaded cartoon characters or abstract shapes.   Thus, some relied on their natural embodiment, while other students chose fantasy or symbolic forms to represent themselves. Some nicknames were derived from students' real names (j@-net for janet). Others were unrelated (animus and griffin). Serious group discussions of user interface issues were held online among this disparate collection of comic and real - looking characters.

Does this mild degree of embodiment influence the communication? How could it not. I knew them first through their handle, their image and their words. Three weeks later I met them once for an hour in person. The nicknames did not appear to be chosen with influencing grades in mind. An online discussion in which "drunk driver" and "ace student" debate interface design issues have some initial stereotypes to overcome or live up to. One was represented by his senior prom picture and another by a graphic of a princess. When I grade her assignment, my image of her is that princess, overlayed with a dim memory of that time I saw her in person.

Comic Chat (www.microsoft.com/windows/ie/chat/), 3-D and 3-D chat rooms, and other communication environments with graphical representations are theoretically limited only by the imagination, but in practice they are limited by technology, system factors and artistic skill. The first time I tried Comic Chat, users could choose any one of eight comic characters. Now there are 22 preset choices. Many different individuals look identical in the chat cartoon panels. In the Palace (www.thepalace.com), all visitors and participants who have not paid the entry fee show up as a PacMan graphic. In other systems, visitors show up in one form, and paying customers have a wider range of choices, including customization.

Personal appearance communicates novice status, technological savvy and lots of other attributes of a person. One company used avatars constructed from multiple angles of a person's real face. But most use abstract representations unrelated to the individual's natural embodiment (thanks to Nowak and to Neil Stephenson's 1993 Snowcrash for that phrase). At Blaxxun (www.blaxxun.com) participants can choose among three sets of pre-fabricated avatars: Blaxxun fantasy (34 choices), Blaxxun realistic (8 choices) and Blaxxun zappa digital arts (6 choices). Particular worlds using a graphical chat room technology can use avatars designed specifically for that world, and the world can restrict participants' choice of avatar while the person is in that world. Individuals can also create or purchase custom avatars.

The Worlds Away web site (www.worldsaway.com) points out the importance of an avatar's "persistence of identity." When your appearance is as changeable as your clothing (moreso, in fact), how do you maintain your own sense of identity and how do others keep track of who and what you are, forming a coherent sense of each other over time?

Reeves and Nass (1996) discovered the MEDIA EQUATION: media equals real life. Nowak (1999) extends this proposition to telerelating: "We interact with and through technology as we interact with people in our natural environment." She predicts people will continue to use as much information as they can process when creating mental models of others. "When traditional cues are not available, people will turn to other cues to provide them with information to categorize others."

The likely impact of avatar choice works in two directions -- your avatar affects the impressions others have of you. But it also affects your behavior. Comic Chat researchers observed people have a tendency to role play and to respond to conversations in ways appropriate to their character. Thus, participants who chose the alien comic character often pretend they are aliens. Those choosing a cro magnum cave man, or a guy with a bag over his head have also been observed to act the part.. These examples are obvious. But the influence likely extends to more subtle influences on behavior. Probably the impact is strongest when you see your representation as well as the representations of others.

Rampoldi (in progress) is examining contextual choice of avatars and the personality characteristic of self-monitoring. Telerelating technologies present greater opportunity for self monitoring than face-to-face exchanges, including choice of representation. She is looking at whether people choose different avatars for different functions (such as job-seeking or meeting friends). Even when we make a limited choice among eight comic chat characters, our choice of avatar can't help but have an impact on our telerelating presence, even though everyone knows the avatar has no relationship to our natural embodiment. The Reeves and Nass Media Equation studies of responses to computers provide a body of support for this kind of proposition. For example, they found even when people knew the gender of the computer voice was randomly assigned, they responded in stereotypic ways to male and female voiced computers saying the same words.

Media Artist Tamiko Thiel is developing a cyber-totemic portrait of me, rather than trying to model my physical body in 3D (mission.base.com/tamiko/vrml-art/). Thiel is using elements of me and my environment to which I am attached and that have special meaning. The current version uses images of me tossing my hair and images of my cat as atavistic stand-ins for me in cyberspace. Her work opens dimensions beyond literal avatars for self representation.

Affordable picture phones make people look worse on screen than they do in real life. The contrast is high. Angles are sharp. Lighting is usually unflattering. Brownmiller(1984) lists eight dimensions typically associated with femininity in decreasing order of importance: 1. Body; 2. Hair; 3. Clothes; 4. Voice; 5. Skin; 6. Movement; 7. Emotion; 8. Should Appear to Lack Ambition. All of these are restricted in today's telerelating technologies.

Personal home pages are another form of representation of self. They may be simply published for the world in general to look at. Or they may be linked to personal profiles either for virtual students or for users of ICQ or chat rooms. Personal home pages provide a blank slate of fairly unlimited size for self expression.   Judith Donath's Social Media Group (persona.www.media.mit.edu/SMG/) proposes that personal web pages are a new form of virtual fashion, and they are studying "cultural dispersion" on the world wide web. Donath (1995) suggests "the Personal Homepage is fast becoming one's online self-presentation. Readers may not only read facts about the person, but also perceive more subtle aspects of the person."

LaRose and Whitten (www.telecommunication.msu.edu/faculty/larose/websection.htm) explore the concept of "teacher immediacy" in online learning, asking what aspects of instructor interactions are the most important. They found "providing feedback and praise to students are the most important, followed by the opportunity to hold conversations before class, asking questions of students, organizing activities outside of class and smiling at the class. They also found that students tried to get a sense of what kind of people the instructors were and what they were like as teachers from the information provided on the web. Quirky personal information along with candid photos were especially important in sensing the personality of the instructor and the course.

Telerelating technologies provide more control over embodiment than does face-to-face presence: more freedom of choice, more flexibility, and the option of turning off particular channels. Even within a telerelating technology, sometimes I elect NOT to use video during a picture phone meeting. Sometimes I mute the sound temporarily in a phone meeting.

Anonymity is possible in most text and 3D chat rooms and in most asynchronous discussions. Anonymity is NOT possible in face-to-face interaction.   It may be desirable for role playing, for asking questions in class, or as a form of social encounter. Anonymity has little role in telerelating with friends and colleagues.

TIME

Time can play a very different role in telerelating technologies than in face to face. Unless there is a moderator in control of the session, synchronous telerelating lacks the necessary cues to allow for rational turn taking. In a chat room, people type (or talk) at will, often at the same time as someone else. Phone conversations are a competition for who gets to talk, since only one can be heard at a time.

Asynchronous discussions have produced interesting results in online graduate seminars. Professors report the quality of interaction is higher in their online asynchronous discussion group than it used to be in the classroom. All students participate, rather than the most aggressive few dominating class time. And the quality of individual posts seem more well considered. Instructors report more discussion, of higher quality, from more different students. Students enjoy the association too -- MSU Virtual University has had classes of students request their discussion group be maintained throughout their MA program, rather than ending at the end of the online course.

Face to face interactions are temporally limited to those times when the communicating parties are physically together. Phone conversations the period when interaction can occur to those times when both parties are by a phone and it is socially appropriate to phone. On the other hand, email, chat, and asynchronous discussion are temporally ubiquitous -- it is never inappropriate to send a message. A sense of intimacy derives from exchanging a series of messages with someone at 1am, 2am, and 3am -- an extended late night conversation spread out over time. Instant messages feel more intimate and intrusive than email, because there is not an expectation that email must be answered immediately.

Face to face meetings usually take longer than phone calls, which usually take longer than email. Chat usually takes longer than email. Cell phones and instant messaging are intrusive but also intimate because of the intrusiveness. Most likely it's necessary to limit this form of intimate access to a manageable few.

HISTORY

Face-to-face interactions are transient. So are most phone conversations. However, most email and chat interactions can be collected, saved, reviewed and shared. Even subpoenaed. The collected history resembles an unusually comprehensive photo album of shared experiences. Collected history makes the telerelating interaction persistent, searchable, and reviewable. When you answer an email, it is possible to quote back segments of the original email, responding to each segment, then quoting the next chunk and responding to that. In contrast, during face to face presence, more comments are lost in the flow. You can't go back and react to each component of a previous sentence or paragraph. In fact, what the person actually said is hard to remember precisely. Time moves too fast, there is too much going on, and many distractions. Message creation and message reception are far less precise.

Comic Chat provides a beautiful graphical history, in the form of a comic book. 3D chat rooms become more complex, with physical movement, facial expressions, body language and dialog among two or hundreds of people. It's possible to record and play back a 3D chat in some systems. The viewer can navigate around within the playback to choose a point of view. So it can be recorded. But the complexity begins to approach face to face, losing some of the precision and control provided in less media rich telerelating technologies.

SELF MONITORING

Self monitoring is facilitated by telerelating technologies. The history function allows people to review their own communication. Blaxxun has a room where you choose your avatar, and then "check your body language" so you know what you look like when you choose different emotive actions. Picture phones often have two windows -- one showing the other end of the connection (labeled "you") and one showing the local connection (labeled "me"). After using that system for hours each day, I felt insecure walking out in the real world. I no longer had a direct window showing me whether I was centered on the screen, or in focus. Personal web pages are revisable. Avatars are changable.

PLACE

Face-to-face interactions are limited to situations where both interactants are in the same place at the same time. Telerelating does not require the interactants to be physically together. To what extent do different forms of telerelating feel like they occur in a virtual place?

Person to person phone calls occur in an abstract phone space lacking physical characteristics. On the other hand, using a speaker phone to bring a remote person into a group meeting is a form of telepresence. The distant person needs a mental model of the scenario to optimize their interaction. For example, it helps to know that you are a telephone on the table in the front of a large auditorium, containing a scattered audience of about 20 people. Or, it's a crowded conference room and you're in the middle of the conference table. Sometimes more than one distant person, from different distant locales, are conferenced into the same phone space. I found the experience more powerful when two distant participants each have their own speakerphone, located at different physical locations in the room. The physically present group has a greater tendency to treat each distant person as an individual. And the distant participants perceive spatial localization of the other distant person and the participants in the room. I suggest that some form of spatial localization of phone participants, even when it is just two people in a normal phone call, would change the way the experience feels.

John Canny and Eric Paulos at UC Berkeley (www.prop.org) believe telepresence is more effective when the remote person is embodied into a robot with human-like characteristics. They have developed "simple, inexpensive, internet-controlled, untethered tele-robots that strive to provide the sensation of tele-embodiment in a remote real space. The physical tele-robot provides video and audio links to the remote space as well as providing a visible, mobile entity with which other people can interact." These PROPs are ideal for those people who like to wander around and have spontaneous meetings, to see what's happening, and to feel part of the group.

Pagers seem placeless. Perhaps for the moment of the vibration announcing an incoming message, one feels a brief link to wherever the incoming phone number originates. But only for a moment.

Email in its current rendition also seems placeless. Email comes from all over, but ends up in a generic email package on people's desktop. The header says it's from someone, not from somewhere. It's possible to have more of a sense of place with email. For example, Disney Mail for kids is a highly themed experience, so much so that sending and receiving animated cartoon infested mail probably feels a bit like going to Disney Land.

Instant messaging is more of a place than regular email. I would like to be able to customize the look and feel of the interface. Right now the ICQ standard interface has icons beside my co-workers to let me know when they're online. I'd like to add picture icons awake and asleep of the real people. Perhaps even have them "go away" when they've set ICQ to the away mode.

Asynchronous discussion is less place oriented than graphical chat worlds -- but asynchronous discussion spaces can still be themed and customized. Graphical chat by definition is place-based. The place where interaction occurs can be as intricately designed or more intricately designed than the avatars. Envisioning a space for a particular communication to occur, unlimited by the laws of physics or the difficulty of travel opens entirely new possibilities and challenges in the design of telerelating experiences. For example, classrooms today tend to be multipurpose rooms with no customization to the content of the course. Class meets in the same generic room throughout the semester. What if teachers needed to decide where the optimal space to meet is for each topic in the course? Is it ever better to meet in some generic nowhere than to meet in a special place which might help set a mood or reinforce a topic or even allow for unexpected discovery and interaction? But what is meant by place? It could be a single slide projected life-size on one wall or all four walls. It could be a model of a real place. Or live video of a real place. Or inside a molecule. Whether the chat/discussion space is a 3D model or a slight graphical allusion to a real physical space, it can set the scene for particular kinds of communication and even influence the communication which occurs.

Linda Stone's group at Microsoft is collaborating with The Fred Hutchinson Cancer Research Center to develop a virtual world called "Hutch World" that is based on the actual Hutch outpatient lobby (research.microsoft.com/vwg/). This password protected world extends the social support network for Hutch patients, their friends and loved ones. Participants will include families and friends of patients, patients, and the

Fred Hutchinson staff and volunteers. Hutch World incorporates such virtual venues as an auditorium, mail room and a school for children, all modeled on existing facilities at the Hutch.

Does a web site have characteristics of a place? (Does the phrase web *site* answer the question already?) We visit web sites. The extent to which it actually feels like visiting a place varies depending on the design. Plain text on a white background does not invoke a unique feeling. Inconsistent graphics with conflicting style yield a sense of disorder, a chord with wrong notes. Elegant coherence of visual style can be subtle or overt. The designers can intentionally emphasize the overall site on every page (welcome to the center for alien abduction) or the style can pull pages together into a single experience without emphasizing the sponsor or virtual location.

SITUATED TELERELATING

It's possible to take a class (or a friend) on a field trip to a garden or the zoo. Discussion about ecology and interspecies competition can thus be situated, made more vivid and powerful because of the venue. Discussion boards and chat rooms can also be virtually located in real places. However, telerelating allows interaction to be situated in a broader array of venues. Class can meet INSIDE of the text book. Discussion questions can be posed at the end of section 5 on the bottom of page 12. When (or is it where) a student has a question, the question can be asked and answered. Class can also meet INSIDE of a public television show. Ten minutes into a Nova science episode about volcanoes, an online fifth grade class can meet to talk about what they've seen.

Several emerging collaboration systems allow groups of two or more people to see the same internet content, with chat rooms overlayed on the web space. Two people together, or a class can visit the NASA web site, ask questions of each other and of NASA scientists. E-commerce sites can use this technology for customer and tech support. Professors can take classes on tours of exotic collections, virtual museums, with themselves or other experts as guides. CrystalGate (www.crystalgate.com) is one example of this kind of collaborative technology. Their goal is "to bring human presence to the web." Right now when you visit a web page, thousands of others might be visiting it at the same moment, but you are unaware of them. Using CrystalGate's system, people at remote locations can experience web pages and other computer events and actions happen synchronously and in real time in a shared space in which they can also communicate with each other. The experience can be made persistent, bringing in the ability to "replay" the experience for an individual or group audience at any time. Cospace is another collaborative technology (www.cospace.research.att.com/info/). Cospace "dynamically builds up structural 3D maps of their browsing history. "The seamlessness is crucial to giving users a feeling of immersion in a continuous and transfinite network of 3D spaces -- an immersive 3D web."

TELEWINDOWS

I'm directing a project which uses picture phones in a particularly place-oriented way. We are locating one picture phone at the home of a recently homebound elderly person and another picture phone at the senior center they used to frequent. During the study, participants connect the home picture phone to the senior center picture phone, and leave the connection open for hours each day. The idea is to open a window between the home and the center -- to provide a casual sense of presence. Unlike a phone call where people talk and then hang up, the teleWindow will be kept open for long periods. Sometimes people will be interacting directly. Other times it will be like having someone in the house nearby.

Webcams are yet another spatial form of telerelating. Anyone can connect to a web cam over the internet and download an image of what is on video at the moment. In some cases viewers can control the camera. Other systems just let you look. The range of what can be seen live on the web through webcams ranges from newborn tigers to the Golden Gate bridge to college student's dorm rooms to a telegarden where you control machines to plant and water flowers.

I'm fascinated by the possibility of experiencing the rhythms and sense of a place. I hoped these webcams would provide that experience. To try it, I set up an extra computer on the internet connected to a webcam page. I discovered that webcams aren't really optimized to having users watch the webcam continuously. They are designed for the occasional short term visitor. Actually, the web cams would often tell me I was using up too much time on their server and would disconnect me. Also, the web page display spent more time on the black between screen grabs than on the images. However, it would be possible to program sites intended for ongoing

display. I would love to teach in a classroom where I could configure i-frames (internet flat screen picture frames) to display a particular webcam for a week or a month. For example, a watering hole in an African jungle, or a street corner in downtown Tokyo. Like a window to the world, kids would sometimes watch it intently, other times gaze idly, but overall begin to develop a sense of the flavor of that location. Wouldn't it be great to interrupt English class once in a while when a kid cries out "there's the lion!"

RITUAL TELERELATING

Telerelating technologies have evolved forms of ritual communication. It's easy to send virtual flowers, get well cards, thank you notes. One can put a wedding album online. Hold memorial services to mourn the dead. Send post cards. Hold town meetings. Vote on community issues. Sign petitions.

INTERNET 2, RICH MEDIA and TELERELATING

My focus in this article has been on affordable telerelating technologies available today. I contend these technologies afford new aspects of presence for interpersonal communication. Not that they someday will do so, but that many new aspects of presence not available in face to face communication are accessible right now. So, can the inventors pack their bags and go home, or does more better faster wider bandwidth technology hold additional promise for bringing presence to telerelating?

Wide bandwidth can bring better quality, 3D spatial audio and video. But wider bandwidth should not only mean "more like face to face." Telerelating technologies today open new facets of human interaction. With wider bandwidth we need a multitude of streams carrying the kinds of content and functions handled by diverse telerelating technologies today. Also, it's important not to be tied down to only locations on wide bandwidth networks. Spatial and temporal ubiquity is too important for telerelating -- portable, personal devices which extend particular parts of what gets carried over high speed networks need to be part of system. The ability to encapsulate place, to save histories of interactions, to choose representations of self and others, should also continue be part of high bandwidth future services. New ways of visualizing and representing human interaction can be explored to add even more richness to the range of human communication possible with technology.

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