

"Culture has been likened to an iceberg; nine-tenths of it lies beneath the surface, out of our immediate awareness."

—Sharon Ruhly,
Orientations to Intercultural Communication

Cross-Cultural Communication



Computer-Supported Cooperative Work

MY JOB IS TO CREATE TOOLS to help people think together, across boundaries of time, space, and culture. I am a CSCW researcher working for NTT Human Interface Laboratories in Japan. CSCW (Computer-Supported Cooperative Work) is a new interdisciplinary field devoted to the study of the nature of cooperative work and computer-based technologies to support it (often called "groupware"). How do people solve problems together? How can computer and communication technologies help the group problem-solving process? Those are the kinds of questions I pursue.

BY

HIROSHI ISHII

Through a strange series of circumstances I found myself delivering a lecture on the state of the art of Virtual Reality to a dozen research managers at NTT (Nippon Telephone and Telegraph). These are the people designing the mind amplifiers of the future. It wasn't easy to tell how they were reacting to my words — with the exception of Hiroshi Ishii. Every time I started talking about something weird and fringe-like, such as computer-assisted group minds, I could see his eyes light up. He was eager to interrupt me with questions — a very un-Japanese conversational style. Later he showed me what he'd been working on and I could see why he was so excited. His project, called TeamWorkStation, was a prototype tool for collaborative thinking. He's plugged together computer screens, video images, voice communication and computer graphics to create a nifty system for supporting cooperative work. I wanted one.

We started cooking up this article as soon as he told me he was interested in using these systems to explore cross-cultural communication. Can technology penetrate cultural barriers? I don't know. But Hiroshi Ishii, Senior Research Engineer of NTT Human Interface Laboratories, is determined to put the question to the test.

—Howard Rheingold

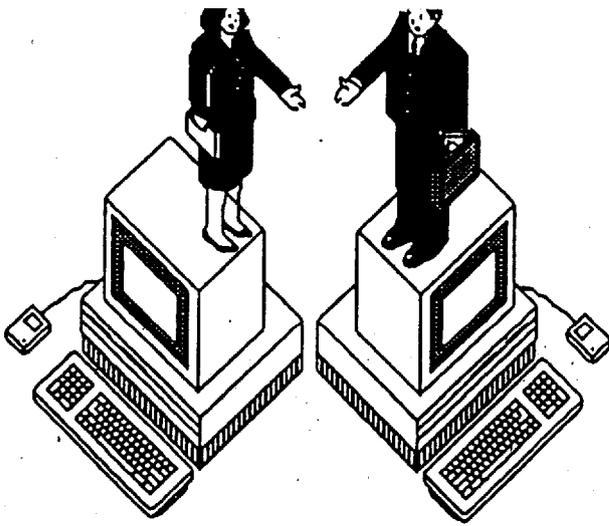
Recently I have had chances to work in western academic societies such as Association for Computing Machinery (ACM), ACM Special Interest Group — Computer-Human Interface (SIGCHI), CSCW, and others; those experiences helped me become aware of the importance of "culture" in the design of computer-supported communication tools. These experiences can be compared to the sudden awakening from a deep sleep.

When I became aware of the differences between American and Japanese social protocols, I began to understand more deeply my own cultural background. I think of my reawakening to the cultural component of my own thoughts and beliefs as a kind of counter-culture shock. I came to understand that the tools we are designing for CSCW are more usefully seen as cultural tools than as computer tools.

Through the discussions I participated in, along with many foreign researchers, I realized that research into human interfaces, communication and CSCW share common goals — to understand the nature of cross-cultural communication and to design systems to facilitate formulation and communication of ideas using computer technology. People who are trying to make computers easier to use are wrestling with one aspect of the same problem faced by groupware designers. We know a great deal about how our communication and computing technologies work, and we are only beginning to learn how people use these tools in their intellectual work. We are also beginning to understand that these questions about how people use tools together are cultural matters, and a few of us suspect that these technical issues might lead to some help in dealing with the broader human issues of cross-cultural communication. The ability of telecommunication and computer-based technologies to overcome time and space constraints seems to be an essential foundation for tools to promote international collaboration in a variety of fields. We are building on that foundation.

"Human interface" has long been interpreted as an interface between an individual user and a computer ("human-computer interface" or HCI). Research into ways to improve human-computer interfaces had mainly focused on communication issues between an individual user and a single computer, such as screen layout, icon design, data visualization, pointing devices, etc.

CSCW is rooted in the work of Doug Engelbart and others in the field of "augmenting human intellect," and the pioneering explorations of others in the use of



word-processor software increases your ability to share the ideas with other people by sending the document to them through the mail or as an interoffice memo. If you can send the document electronically, instantly, anywhere, amplifying the power of the media again amplifies the power of the process. Word processing is just a micro-step of higher cooperative work in an organizational context.

"Communication" has also long been traditionally interpreted in terms of "electronic communication" based on the "Open Systems Interconnection (OSI)" seven-layer model, which is widely known by engineers in the telecommunication world, but which doesn't make much sense to non-engineers. The OSI model deals with incompatibilities between different hardware and software by creating standard formats for exchanging data at different "layers," each of which has a set of protocols for mediating between foreign systems. The way data is encoded for transmission is one layer, the way information is transported across a network is another layer, the way information is presented on screens is another layer, etc. Engineers have worked to provide high-speed, broad band, and reliable communication networks using a variety of hard technologies. They have created the foundation for doing things with groups of people that haven't been possible before. In this OSI framework, however, the subjects of communication are not human beings but the computers or programs. This is not what I pursue. I much prefer to explore the notion of "interpersonal communication" because I believe the subjects of communication should be us, the people of the world. Focusing on design of CSCW tools raises our focus of attention from "electronic communication" level to "interpersonal communication" level.

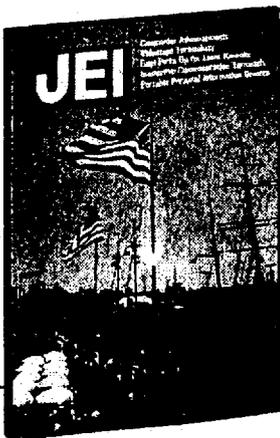
computer conferencing/computer networks.¹ The field is growing anew with the advent of inexpensive, powerful computer and communications technologies. The telecommunications infrastructure for delivering powerful information tools to large numbers of people is being built today. Now that the technology has advanced so far, it is time to devote more effort to the human side of the system. The new directions in designing CSCW tools for truly widespread adoption have had the effect of shifting our focus on human interfaces from HCI to "human-human interaction mediated by computer and communication."

We do not interact with computers, but through computers. Operating a computer is not a goal in itself for the vast majority of people; to most of the population, the greatest potential of computers lies in their capabilities as media for human-human interaction. For example, making a document using

Through CSCW research, I realized that the notion of "human interface" is equivalent to the notion of "communication" at a

JEI

JEI (Journal of the Electronics Industry) is an English-language trade journal from Japan that covers the Japanese consumer electronics industry in depth. I rely on JEI to keep up to date on Japanese audio, video, and telephone innovations (not computers), sometimes up to a year before they are known in the US. Very unusual products, trial balloons, prototypes, with neat photographs. Technical

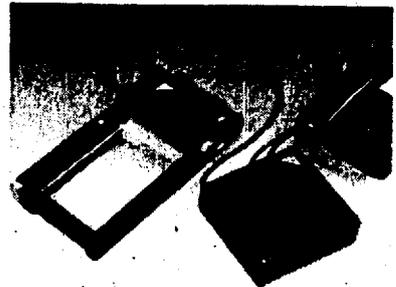


material is presented in some depth — not just widget-talk but discussion of underlying technology.
—Mike Leibhold

Portable Digital Information System: Ricoh MC50/IM-A/IM-F50

Ricoh's digital imaging system consists of three units: MC50 copier, IM-A image controller and IM-F50 facsimile interface. The MC50 is placed on top of the original and can be previewed through the viewing glass. The copier uses a 768-pixel image sensor and scans the picture automatically. When connected to the IM-A, it is able to copy 16-step halftones, reduce the original to 80 percent, enlarge it to 200 percent and produce mirror images. The IM-A incor-

porates an RS-232C interface, so it can transmit the processed image to a PC. The IM-F50 transforms the copier into a facsimile. Original documents up to 4 x 6 inches can be transmitted to any facsimile unit capable of handling data at 4,800 bps (G3 standard). Documents as large as 8½ x 11 inches can be transmitted to the IM-F50. The MC50 measures 157 x 307 x 48 mm and weighs 1.3 kg including batteries. The IM-A measures 130 x 130 x 34.5 mm and weighs 450 g. The IM-F50 measures 157 x 157 x 50 mm and weighs 850 g.



Ricoh MC-50 with IM-F50.

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higher level. And I found that most communication difficulties come from cultural gaps among people. The same "code" can be interpreted in a variety of ways, depending on the undersea part of the iceberg — the framework for interpreting words, gestures, and expressions that is part of membership in a culture. Japanese and Americans and others have fundamentally different decoders at the cultural level, and communication difficulties result when that isn't taken into account. Therefore I believe that international collaboration is very critical for human interface research and CSCW investigation of the nature of cross-cultural communication and the possibility of "cross-cultural groupware." Specifically, how can we go about designing modern communication systems that will help people overcome the cultural barriers to communication?

Cross-Cultural Groupware?

Groupware consists of the computer and communication system that supports a group of people working together. In the design of groupware it is very important to capture the structure of social process within a group. However, it is difficult to build any general and standard model of human communication because protocols can be extremely different at a deep level from one community to another community. Let me give you two examples.

The Decision-Making Process and *Nemawashi*

Japanese companies reach decisions in a certain way, one that is very different from most American decision-making processes.² Decision-making in Japan is a collective process involving many people. The person pushing a plan spends a lot of energy to gain consensus before the formal decision. Before the proposal document is sent around, he explains the plan to everyone concerned at informal meetings and through personal contact. He tries to get the tacit agreement of others, and this effort decreases the possibility that the plan will not be supported. Getting a consensus beforehand is a key to success. This kind of groundwork is called *nemawashi* in Japanese. "Nemawashi" means that all the people who approve the plan at all levels will have the feeling of participation in formulating it; this makes it possible to implement the plan more smoothly.

In American companies, responsibility and authority are clearly defined, and the person in charge can usually decide anything that comes within his authority immediately. Without turning to a discussion of which one is "better," I would like to point out that major differences exist between social processes associated with executive decision-making in Japan and USA. Decision-making in Japan and USA is based on very different

Local Knowledge

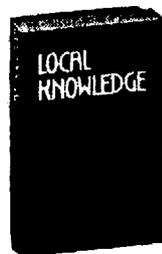
*A couple years ago, when I was searching the anthropological literature for "untranslatable words" to include in my book **They Have a Word For It**, I discovered that one anthropologist in particular seemed to turn up the most interesting examples of those words that I called "the cracks between worldviews." His name was Clifford Geertz. I've since discovered the pleasures of reading his unorthodox anthropological essays, collected in this anthology. The cracks between worldviews, the elements of worldviews, the parallel universes of worldviews, and the institution-warping power of worldviews seem to be his turf.*

It took a long time for anthropologists to look closely at what anthropologists do, to try to understand the ways different cultures try to understand one another. And that effort left them in the same intellectual thicket where the semioticians, linguists, literary critics, and artificial intelligentsia find themselves these days — wrestling with the meaning of meaning.

Local Knowledge is a spearhead, driven deep into the contemporary controversy over meaning by an anthropologist who thinks about matters anthropologists never thought about before. Most importantly for the nonspecialist, Clifford Geertz knows how to write a spellbinding sentence about the most esoteric topic.
—Howard Rheingold

• To see ourselves as others see us can be eye-opening. To see others as sharing a nature with ourselves is the merest decency. But it is from the far more difficult achievement of seeing ourselves amongst others, as a local example of the forms human life has locally taken, a case among cases, a world among worlds, that the largeness of mind, without which objectivity is self-congratulation and tolerance a sham, comes. If interpretive anthropology has any general office in the world it is to keep reteaching this fugitive truth.

• We like to think that the reality principle is good for us, except perhaps when it finally kills us. But a serious effort to define ourselves by locating ourselves among different others — others neither distanced as Martians, discredited as Primitives, nor disarmed as universal Everypersons, bent like us on sex and survival — involves quite genuine perils, not the least of which are intellectual entropy and moral paralysis. The double perception that ours is but one voice among many and that, as it is the only one we have, we must needs speak with it, is very difficult to maintain. What has been well called the long conversation of mankind may be growing so cacophonous that ordered thought of any sort, much less the turning of local forms of local sensibility into reciprocal commentaries, mutually deepening, may become impossible. But however that may be, there is, so it seems to me, no choice. The primary question, for any cultural institution anywhere, now that nobody is leaving anybody alone and isn't ever again going to, is not whether everything is going to come seamlessly together or whether, contrariwise, we are all going to persist sequestered in our separate prejudices. It is whether human beings are going to continue to be able, in Java or Connecticut, through law, anthropology, or anything else, to imagine principled lives they can practicably lead.



Local Knowledge

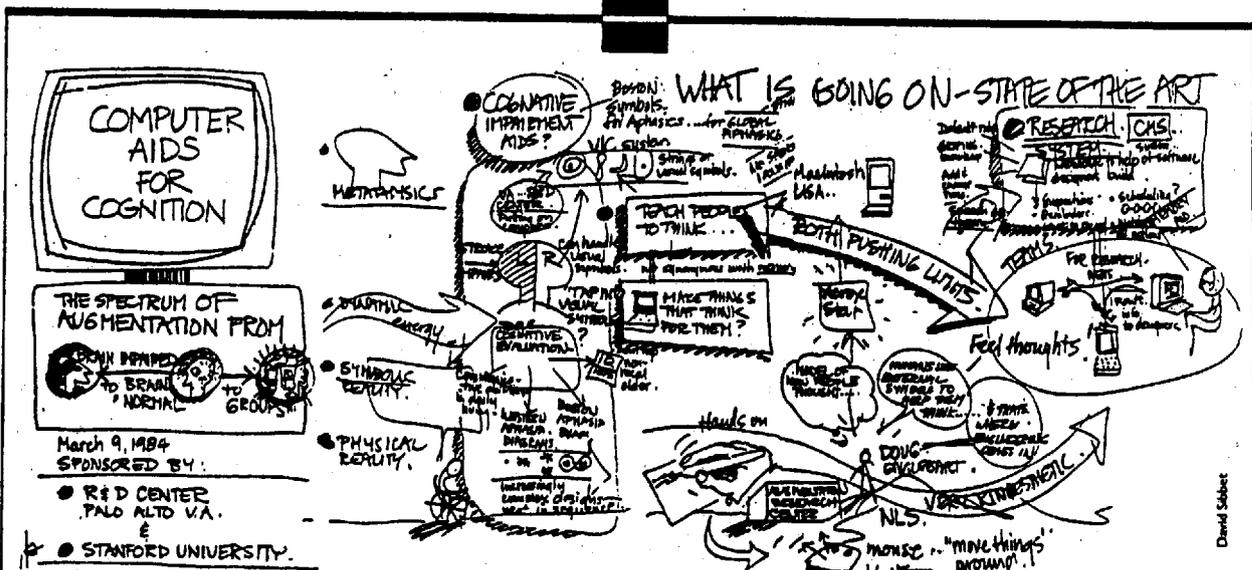
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cultural principles and social processes. In the near future, we must begin to integrate deeper understanding of these principles and processes with the computer architecture, human interface design, and other components of CSCW systems.

For example, computer-mediated communication systems often include a public bulletin-board-like area where a group

can discuss and debate an issue, along with a second, more private means of sending personal communications from any individual to any other individual or group of individuals (electronic mail, also known as "e-mail"). Note how Japanese and American decision-making teams might use the same system in somewhat different ways. Electronic nemawashi



Computer-Supported Cooperative Work

Here's the Old and New Testament of the mind-amplifier builders. Vannevar Bush, in *As We May Think*, got it rolling in 1945, when he posed the challenge in *Atlantic Magazine*: human knowledge was growing too complex, too vast, for traditional information systems; as the leader of the US scientific research effort in World War II, Bush was in a good position to see what was coming over the horizon. What we need, Bush proposed, is a kind of mechanical extension for human memory, a "memex," as he called it.

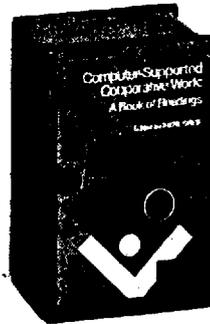
In 1963, Douglas Engelbart's "A Conceptual Framework for the Augmentation of Man's Intellect" set out the specifications for a computer-based system that would take years to develop — a new tool for augmenting intellectual work. The personal computer as we know it today, and many of the ways we use them in offices, factories, schools, and homes, grew out of Engelbart's pursuit of his vision at Stanford Research Institute in the seventies.

Together, these two papers constitute the Old Testament of the groupware movement.

By the eighties, the decades of development in thinking tools and new communi-

cation media, and the burgeoning impact of introducing word processors and electronic mail, spreadsheets and computer conferencing to intellectual workplaces, had prepared us for the next phase. Computer-Supported Cooperative Work, including social change and technological innovation applied to research and business organizations, was foreseen by the original prophets of augmentation and implemented by decades of their

disciples, from the ARPA crusaders of the sixties to the PARC infonauts of the seventies and the Apple multimedia evangelists of the eighties. Now, what exactly have these tools done to the way groups operate? The papers from today's CSCW contributors are about "A Performing Medium for Working Group Graphics," "Electronic Markets and Electronic Hierarchies," "Social Psychological Aspects of Computer-Mediated Communication." —Howard Rheingold

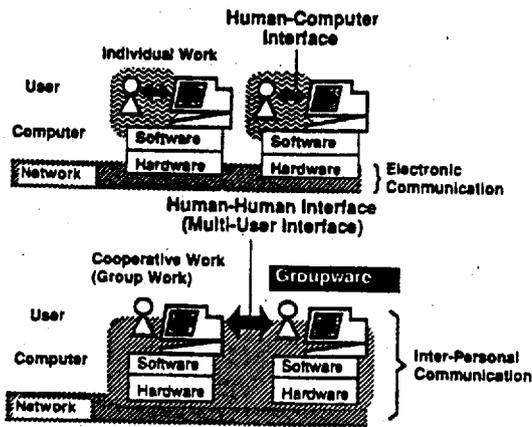


Computer-Supported Cooperative Work

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Professionally, our methods of transmitting and reviewing the results of research are generations old and by now are totally inadequate for their purpose. If the aggregate time spent in writing scholarly works and reading them could be evaluated, the ratio between these amounts of time might well be startling. Those who conscientiously attempt to keep abreast of current thought, even in restricted fields, by close and continuous reading might well shy away from an examination calculated to show how much of the previous month's efforts could be produced on call. Mendel's concept of the laws of genetics was lost to the world for a generation because his publication did not reach the few who were capable of grasping and extending it; and this sort of catastrophe is undoubtedly being repeated all about us, as truly significant attainments become lost in the mass of the inconsequential. —Vannevar Bush



would mean that a lot of the communication would take place invisibly, in many e-mail messages, behind the scenes of the public conferencing areas; American decision-making might involve more or less similar behind-the-scenes communication, but a lot of the debating and decision-making might take place "onstage," in the public area.

GDSS (Group Decision Support System) is an active research field. There is a variety of theories of decision-making, and the tools are designed based on these theories. Again, all theories carry a lot of cultural assumptions and the tools impose constraints on the group of users. Therefore GDSS imported from another culture can easily fail. Understanding these social and cultural differences is a starting point toward the design of next-generation groupware that can support inter-cultural collaboration. Of course, these brief examples are only generalizations; there are always exceptions, but I have found these generalizations to hold true to a significant extent. They should be studied further by social scientists and information system designers, working together.

Face-to-Face Meeting

The style of meetings in America and Japan offer another illustration of the role of cultural differences in decision-making. Participants in American meetings try to contribute to the content of the meeting. American managers expect participants to take personal responsibility and make an active effort. People are often very assertive. On the other hand, participants in Japanese meetings try to achieve harmony with others. They defer to others and often wait for others to draw them out. Japanese may be satisfied with sharing information and getting a feel for others' views even if they cannot get concrete results such as a decision or solution to a problem.

Japanese do not like debate over issues and ideas. Direct attacks on the ideas of others may prevent the achievement of harmony and mutual understanding, very deeply held cultural values. Japanese find it difficult to criticize another person's ideas because it can be interpreted as an attack on the personality of the person whose idea is criticized.

Americans seem to place emphasis on the exchange of words and specific explanations of ideas. However, Japanese communication depends very strongly on the context of the discussion. Facial expressions, postures, tacit understandings only hinted at in a few words, are very important.

In my own experience, I found that turn-taking is most difficult for me to learn to adapt to in discussions with Americans. Situation-oriented non-verbal cues for turn-taking in Japanese meetings are much more clear to me. In Japan it is very rude to interrupt other persons speaking. We have been taught to be patient, to listen until others are finished talking. However, in America, people must interrupt others in order to take a turn. Otherwise, there is a smaller chance of being able to express one's ideas.

In face-to-face meetings, non-native speakers of English always feel strong time pressure to understand and speak in realtime. For me, e-mail is a much more happy medium of communication for non-native speakers because e-mail allows users to take time to read and compose the messages. Under the strong time pressure of face-to-face conversation, it is very difficult to concentrate on the discussion for hours.

E-mail is now a narrow-band communication media based on low technology compared to what is now becoming available. It uses just text to express information: no multi-media. However, its asynchronous feature gives great benefits to non-native speakers. I believe this is just one of many roles communication technology can play in encouraging cross-cultural communication.

Conclusion

Each community has its own style of communication, and the world is full of communities that differ in fundamental ways. However, we live together on the planet, and we must collaborate internationally. We work together in scientific research, cooperate and compete economically, and discuss problems of mutual interest. Yet we know very little about the dynamics of cross-cultural communication, and little about the unique cultural biases in the way we communicate and make decisions. We need to understand each other better. We should use all the tools at our disposal to pay more attention to understanding the differences among us. And then we should start to think how to overcome this gap with or without technology.

Although I am not overly optimistic about what technology can do to overcome this gap, I expect next-generation groupware will be designed to take these cross-cultural issues into consideration. ■

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