



The Human-Machine Interface: Inviting Your Computer Into Your Patient-Clinician Relationship

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In this issue featuring new technology in medicine, there should be one article reminding us of the importance of “high touch” to balance “high tech.” Marshall McLuhan offered a metaphor to describe the pace of change that disturbs our equilibrium. “The entire world, past and present, now reveals itself to us like a growing plant in an enormously accelerated movie.”¹ We must attend to the way new technologies touch us and make us feel, and to how the use of technology in a patient setting demands a complementary personal touch from clinicians. This is required to make certain the patient’s experience isn’t too clinical, rational, distant, hard-edged, cold, or impersonal. Though you will read about many new technologies in this issue—video CME, genetic therapies, investigational procedures, electronic records, sensor technology—I will focus on the most ubiquitous phenomenon: the human interface with technology, most specifically the human interaction with the computer. You and it. And how you relate.

McLuhan’s dictum, “The medium is the message,”¹ raises the question: With the computer becoming the predominant medium in our clinician-patient interactions, what is the message? Is the computer yet another machine driving a wedge between patient and clinician, or, because the computer can be so animate, is this a machine that can help build communication and relationship?

The Chart

The patient’s medical record has long played a part in the patient-clinician interaction in the exam room. Even after the mystery inside the dog-eared paper chart was opened to the patient, the chart was never alive like the computer on the desk, which now holds the electronic medical record. The computer, initially animate with color, fly-down menus, flashing arrows, pictures, and the perception of remote control by a moving mouse, is now a portal to an enormous, interconnected world of information and people. Stepping into this experience of elec-

tronic connection reenacts that moment in film when the cave wall rolls back revealing an exotic world beyond. The patient’s chart never had a person so vividly on the other end of a paragraph of text as it does now with immediate electronic communication. This mechanical and electronic tool has morphed imperceptibly into an entity with a personality, at the least of a servant and assistant. As you use this tool, what doesn’t break through into your everyday awareness is the computer’s ability to elicit emotion and provoke a response in both you and your patient.

Human-Computer Research

The human-computer interface is an interactive space—a field between two entities. What occurs in this interface, if ignored or misunderstood, can have significant consequences. In a recent book, *“The Media Equation: How People Treat Computers, Television, and New Media Like Real People,”* authors Byron Reeves and Clifford Nass take a psychological rather than a technical perspective and describe through psychological experiments that more is going on in this person-computer interaction than meets the eye. “People’s response to computers is fundamentally social and natural.”² Many of the authors’ experiments were based on theories and experiments about human-human interactions.

Our normal social responses are now unconscious and automatic, having developed from ancient times. As such, computers, a modern medium, engage our “old” brains, which apply these social rules. Our primitive brains have not evolved to recognize that an inanimate technology, which acts animate, like a computer, is not human. “The human brain evolved in a world in which only humans exhibited rich social behaviors, and in which all perceived objects were real physical objects.”² So the human brain is evolutionarily set to respond to “interactions” as interpersonal. When the computer asks us questions, sounds like a man or woman, or displays an animated picture, we respond socially. “People have done some amazing things in our labs. They

have taken great care not to make a computer feel bad, they’ve felt physically threatened by mere pictures, and they’ve attributed to an animated line drawing a personality as rich as that of their best friend. What seems to be true is often more influential than what is really true. Perceptions are far more influential than reality defined more objectively.”²

When a person asks for an evaluation by another person, people tend to respond politely. In one of Reeves and Nass’ experiments, a computer asked for an evaluation of itself, in the format of an interactive survey. The participant’s response was polite, as if the computer were human. It is fascinating that these people denied being polite, or influenced by the computer.

Steven Johnson, in *“Interface Culture: How New Technology Transforms The Way We Create & Communicate,”* notes “Apple’s Macintosh had ushered in the entire rhetoric of visual metaphors: the desktop, the trash can, the folder, the mouse. Why not imagine the computer as a person? If we are going to be talking to our PCs, we might as well give them the opportunity to talk back.”³ To test just this concept, Reeves and Nass performed another experiment on personality expressed through sound, in which people were asked to purchase a book on a Web site by an extroverted synthesized voice. As is known to occur in humans, extroverted people classified this site as higher quality and more credible than did introverted people. “Psychologists would say that one of the most powerful cues to how I treat you/regard you is the tone of your voice.”² Both style and gender play into this. Females believe a female voice more than a male. All believe a male voice is more intelligent.¹

In a third experiment about the psychology of self-disclosure, Reeves and Nass found that when a computer discloses information about itself to users, it elicits more complete and detailed answers to questions from the users. This demonstrated that reciprocity is a strong impulse in a social interaction. The implications are obvious for patient-clinician interaction. How-

ever, what has been historically true is that the scientist-doctor withholds information, especially personal information, in order to maintain objectivity. The point is that the clinician-patient interaction is a social encounter and follows primitive social rules. By extension, your interaction with your computer follows the same social rules. When the computer is invited into this patient interaction it is perceived to be a person in spite of reality.

Developing Computer Emotions

Taken to the next level, in *Affective Computing*, Rosalind Picard, professor of Media Technology at MIT, writes “not about how people feel about computers, but giving emotional abilities to computers.” She presents “a compelling image, not only of how machines might come to have emotions, but why they must. Computers will recognize your emotions and use a shared emotional vocabulary for more natural, entertaining, and effective human-machine interactions.”⁴

To that end, in a fourth experiment, Reeves and Nass determined that personalization and adaptation by a computer to a user's habits during a test resulted in less confident users performing better on the examination. In addition to the implications this has for how we interact with computers in medicine, it relates to how we interact with more or less confident patients in our interactions.

My purpose here is not to review the emerging literature of artificial intelligence, but to heighten awareness of the interpersonal effects that this computer-machine can have on clinicians and their patient interactions. While considering that your computer is a tool is perfectly appropriate and realistic, understanding these important interface effects can help you to favorably alter your interaction, and ultimately your relationship, with your patients.

The Patient, You, and the Computer: Permanente Learnings

When a clinician or surgeon employs a new technologic device, their focus is first

on technical mastery. At times, their focus is so intense on the device, they can lose sight of the secondary effect of distancing the patient, or even the team that supports them. Not everyone in the room is peering through the lens of the bronchoscope or laparoscope, which are not activities in isolation like using a microscope. The necessary teamwork for the highest performance requires that the clinician-technician include the team members in the procedure. Now with a computer in the exam room, it is not acceptable for the clinician to become lost in the computing process, ignoring the patient.

The impact can be even more significant to the patient, as Picard notes that “... emotions influence memory and memory retrieval.”⁴ For example, you are familiar with the patient's amnesia of the oncologist's or surgeon's comments after first hearing that they have a diagnosis of cancer. Similarly, a patient could have diminished recall of a clinician's explanation of test results if the patient feels estranged in the interaction because of the clinician's preoccupation with the computer.

With the introduction of the electronic medical record into several regions, clinician experts are already aware of the need to acknowledge the presence of the computer in the room and take steps to include the patient in the interaction with the computer. It is categorically different than leafing through the chart for information. The chart isn't plugged in.

“The source of any information affects people's trust in that information,” Picard notes. “We all have the experience of somebody believing something just because it came from a computer, sometimes according it higher trust for this reason, while others have the opposite response.”⁴ Furthermore, what is “information” to clinicians (who understand the data) is just unintelligible “data” to a patient. Data become information when the clinician and the patient together understand it, and when they can view it as familiar. For example, “Show your patient the graphs of the numbers you enter at this visit,” says Dr David Price, Colo-

rado Director of Continuing Medical Education, who participated in a panel at this year's Permanente Executive Conference (PEC). He added, “Instead of graphing the child's growth chart by hand in the paper chart, we just turn the computer screen toward the mom, and show the new graph completed automatically. It's all done for us. The turning of the computer screen is very important. As clinicians we must make sure that we talk to patients and don't talk to the computer screen. Include the patient somehow. Physically get them proximate to you, turn the screen, show them what you are doing. And the patients love it. They really think it's cool. And when you go online for patient information, you can prompt patient questions by explaining what you are doing. This actually promotes interactivity. You can look shoulder to shoulder at the monitor, seeking information together.” Also make sure the patient is in a comfortable position to participate in this interaction with the computer. Don't leave them craning to see the screen from the exam table while you are comfortably in front of it.

When computers were first introduced into Colorado exam rooms, Dr Price made a point to ask patients, “How was this for you? Did you feel like you were part of the visit? Were we talking to you or paying attention to the computer?” He stopped asking because he was so focused on including them that they felt very engaged.

What complicates inclusion of the patient for some clinicians is that these clinicians are technophobic and initially unskilled at using a computer. Dr Andrew Lum, Colorado Assistant Medical Director for Service Quality and physician advisor to electronic medical record implementation, noted at the PEC, “In the training class, we had one person put the mouse on the floor to sort of step on it, and another person held the mouse to the screen like a phaser or something. However, a small amount of orientation can result in a high level of acceptance and participation.” What they have to work harder at is interacting with both the computer and the patient. Dr Lum comments on



CIS training, in *"The Electronic Medical Record: Barrier or Bridge to Effective Clinician-Patient Communication,"* in this issue of *TPJ*: "Physicians with strong interpersonal skills engaged their patients during their learning ('Bear with me while I do this on the computer') while those with poor interpersonal skills were unable to mitigate the interference of the CIS on their patient interactions."⁵ When they learn this skill, however, the outcome for patient and clinician is a superior care experience.

Another example of including the patient in a computer interaction occurs in Colorado's call center. Dr Price, continuing his comments at the PEC, noted, "When patients are talking to us in the call center (we have doctors in our call center now), we can talk to them like we know them (with the information from the electronic record). It really, really breaks down barriers. Patients don't feel as if they're calling this great big, amorphous call center and getting somebody who doesn't have a clue about what's going on with them.

We can pull up their record and, over the phone, say, 'Oh, you're a diabetic and I see you have some back pain, and you are taking these medications? We may be able to help you on the phone.' And make no mistake, members think this is cool. I mean, it is way cool." An added advantage is that patients don't have to retell their story. This has always been a major frustration for them.

Dr Robert Pearl, Executive Director and CEO of The Permanente Medical Group, who addressed the PEC, made, in my opinion, the most important comment during the CIS session. "In the end, people won't trust a system. They will trust a person."

Conclusion

The computer holds enormous potential advantage for us, particularly if we understand our interaction with it, our patient's interaction with it, and, in the context of the patient-clinician encounter, our inviting the computer into our interaction. Mastering these interface interactions will en-

hance patient-clinician communication and ultimately improve the satisfaction with the care experience for patients and clinicians. The additional important value for our members is the resulting improved quality of medical care.

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Senders

"Some of us, after all, are very good at expressing emotions and feelings, which means that we are far more emotionally contagious than the rest of us.

We infect each other with our emotions."

Elaine Hatfield and John Cacioppo, "Emotional Contagion," Cambridge University Press