

CONVERSATIONS WITH CLEMENT MOK AND JAKOB NIELSEN, AND WITH BILL BUXTON AND CLIFFORD NASS

(INTERVIEWED AND EDITED BY
RICHARD ANDERSON)



(top left) Bill Buxton, (bottom left) Clifford Nass
(above, left to right) Clement Mok, Jakob Nielsen, and Richard Anderson

The 1999 Conference on Human Factors in Computing (CHI 99) had as its theme “The CHI is the Limit.” At the conference, participants posed the following questions: What are the limiting factors to the success of interactive systems? How can we enable users to overcome those limits? What techniques and methodologies do we have for identifying and transcending limitations? And just how far can we push those limits? This theme and its questions provided a framework for the first live interview sessions to be conducted at a CHI conference.

Tapped for these interview sessions were some of HCI’s most original thinkers. Clement Mok and Jakob Nielsen were asked to address the Web and Web design limits to human–computer interaction (HCI). Bill Buxton and Clifford Nass tackled human limits to HCI. Wayne Gray and Bill Gaver compared their perspectives on methodological limits to HCI. And Don Norman and Janice Rohn squared off to address organizational limits to HCI. The interviewer was the Interviews Chair for CHI 99—Richard Anderson, whose work is all about setting the stage for avoiding or overcoming limits to HCI and who has conducted several interview sessions over recent years on the stage of the BayCHI program.

Two of those CHI 99 sessions are reproduced here. At least one of the other sessions will appear in an upcoming issue.

Web and Web Design Limits to HCI: A Conversation with Clement Mok and Jakob Nielsen

The first session paired individuals who have come to the Web from very different places. Both have made impressive contributions to the Web and to Web design.

Clement Mok is chief creative officer of Sapient Corporation, a consultancy that bills

itself as the architects for the new economy. In 1988, Clement founded Clement Mok Designs, later renamed Studio Archetype, to establish clients’ digital presence using interactive media and eventually the Internet. (Studio Archetype was acquired by Sapient Corporation during 1998.) Before forming his own agency, Clement spent 5 years as a creative director at Apple Computer. Clement is the author of *Designing Business: Multiple Media, Multiple Disciplines*, published by Adobe Press.

Jakob Nielsen is a principal of the Nielsen Norman Group, a user experience consultancy. Until July 1998 he was a Sun Microsystems Distinguished Engineer and the company’s Web usability guru. Jakob coined the term “discount usability engineering” and has invented several usability techniques for fast and inexpensive improvements to user interfaces. Jakob’s most recent book is titled *Designing Web Usability: The Practice of Simplicity* (New Riders Publishing).

Richard Anderson: *Are most Web sites well designed?*

Jakob Nielsen: *Definitely no. My conclusion is that about 90 percent of all Web sites have miserable, miserable usability. That does not mean that the other 10 percent are great;*



Richard I. Anderson
Usability/Design/
Discovery Adventures
63 Woodside Lane
Mill Valley, CA 94941
(415) 383-5689 x2
Fax: (415) 383-5187
riander@well.com
rianderson@acm.org
rianderson@baychi.org
[http://www.well.com/](http://www.well.com/user/riander/)
[user/riander/](http://www.well.com/user/riander/)



Clement Mok and Jakob Nielsen

it just means that they are acceptable. That also does not mean that users spend 90 percent of their time at bad Web sites. People spend most of their time at the good sites, but if you look across all Web sites, the vast, vast majority are extremely difficult to use.

Clement Mok: I'm going to answer very much like a graphic designer as well as an art director: it depends. I honestly don't think that our criteria for good Web site design have been determined. The very fact that we quickly make judgment calls about what is good reflects a bias; our judgments are loaded and are colored by a set of lenses. Jakob is from a constituency in this community that is coming to the Web from software development, while I and others come to the Web from the world of communication design. We both have a bias going into this world, and within those limited parameters say things like, "good is about clarity of communication;" or "good is about usability;" or "good is about performance," when in fact, a good Web site is all these things with nuances of gray in-between.

Clement Mok



Richard Anderson: *Clement, in your book *Designing Business*, you talk about how old habits die hard. What are some of the old habits that you believe are holding us back or slowing things down in Web design?*

Clement Mok: Old habits holding us back reflect the things that we don't know; we very often fall back on things that we know

and have been very comfortable with. In looking at the Web and the Internet, each community or discipline needs to fundamentally look at their genetic makeup and their DNA and at what they consider "good" to be, and then challenge the assumptions on which they base their views.

Jakob Nielsen: Actually, I think that a lot of the things that we do know are still waiting to be applied. This applies to the software...for example, makers of Web browsers still need to implement a lot of the things that we knew in the hypertext field 10 years ago. If we would just do what we know, we would get better browsers.

Regarding Web sites, I'm leaning toward the view now that Web sites are just fundamentally never going to really make it. When I say "never," I mean in the next 10 years or so, because any substantial Web site is a contribution of a very large number of people. You can have a central design team in a company that is in charge of the home page and in charge of the information architecture and search and big picture kinds of things. In many companies, there are decent people working on these things who have a decent clue as to how to do them. So, those things may in fact be done well. But, take five clicks from the home page, and what are you going to get? Something horrible done by a product marketing manager in Kentucky. So the challenge is not just to get the central Web team back at headquarters to understand how to do good Web design, because we are achieving that via our speeches and books and consulting and such. The challenge is to get the thousands of people who are contributing their content to understand good Web design; that is a much harder challenge—a challenge that I don't think will be met over the next 10 years.

Intranet design is even worse, because there you have some random person in the next department creating Web pages. It's a long time coming before we get all these people to understand how to do Web design well.

Richard Anderson: *Talk about some of*

the disciplines you both say need to be involved in the design of Web sites. What are some of them, and why should they be involved?

Clement Mok: Let me start with just a few from my perspective. The Internet started out to be a communication medium, so the discipline and craft of communication design is apropos for Web site design. But the Web has evolved into a way of doing business, a way to conduct transactions. So skills that have to do with interaction design, software design, application design ... are needed.

But those are just the surface disciplines. You also need to have a good understanding of the psychology and the social science behind how people interact with the world. Understanding the ergonomics of how something is used is not enough. The Internet and how we deal with the Internet is only a part of a bigger picture. We need to understand how it all fits in with our daily lives.

That entire spectrum of disciplines is needed. It might be difficult to apply all disciplines on every single project. But when one looks at the projects out there and the kinds of Web sites that get implemented—many fall short because these disciplines are not applied.

Jakob Nielsen: I agree that you need all these different disciplines. And you can add more. In the future, we will probably have more multimedia on the Web, so you will need people who know about film production or audio design. Right now, the Web is mostly visual design and text and information architecture, but we will keep adding as it changes.

Today the Web is also the main driver for business strategy. So you also need people who understand business models.

I've been known to make lots of snide remarks about marketing people. Actually, I make snide remarks about clueless marketing people. You need clued-in marketing people who understand that the Web is your connection to the customer. The user

interface is your customer interface; the two are the same. Therefore, you need usability to be there, because if people can't use the Web site, they are going to become customers of some other company.

But the right business model also has to be there.

On the other hand, we should not be saying that you can't design any Web site unless you have a team of 50 people, including three Harvard MBAs. Sometimes just one person is enough. But in that case, you have to have all these little hats to put on. And you'll need to put on your little usability hat once in awhile and say things like, "Let me go and get some other person in and see if they can use the site." So even if you're the only person involved, you still need to get that outside perspective.

Richard Anderson: *Jakob, the working title of your upcoming book is Secrets of an Information Architect. What are some of those secrets?*

Jakob Nielsen: I can't tell you; you'll have to buy the book! (audience laughter)

There are a lot of different levels of information architecture, and some of the more fine-grained levels may not be appreciated. The bigger level deals with how to structure the entire information space. That is often the focus of the professional information architect or is why you need several people on the team, because that's not something that your average marketing person or average writer will be able to do.

There is also information architecture in the small, like when you're constructing a story—let's say a product description. That product description should not just be a page, it should be a set of pages, and architecting that set of pages is information architecture in the small. This may not require a professional information architect; the marketing person might be appropriate for that level of information architecture.

You can get even smaller to answer questions like, "When it's just a few pages, how do you connect them?" An analogy is the work of an interior architect compared to



Richard Anderson

the architect of the building; different people work at different levels. In information architecture, it's specialized information architects for some things, Web site editors for others, and also people who are responsible just for a set of pages for a certain event, a product, or an article.

Clement Mok: It's interesting how information architecture has very different interpretations in different communities. At Sapient, we define information architecture very differently than Jakob just defined it. The practice of information architecture in our firm is also very different and is actually more specialized. We look at information architecture within the framework of a concept. Yes, we use the word "information," and we also use the word "architecture," but we look at the information architecture from the perspective of the user. We focus on user experience and on what users want out of their experience, and we do so within the framework of a concept as opposed to the thing being created.

There needs to be more discourse about the language of information architecture, because it is a word that gets misused and has very, very different meanings within different communities.

Richard Anderson: *Jakob, you have written and also spoken lots about how people read on the Web, and you've said that too many sites are designed by print people with advertising backgrounds. What is or what should be the difference between Web design and print design?*

Jakob Nielsen: I think that there is a very large number of differences. There is the difference in page layout, where in print you have a fixed canvas you can work with, and the entire thing is immediately presented to the reader when the reader turns a page in a magazine. On the Web, download time dominates usability to a great extent, plus you don't really know what the user has on-line, therefore you cannot control every pixel.

Another difference lies in the writing of the words that go on a page or go into an

article or go into a headline. When writing headlines for print, you can very often use teasers, puns...fun headlines, while that doesn't really work in the Web. In the Web, you have to be much more straightforward and describe clearly, in that one headline, what the page is about, because people are not going to spend the time reading the rest of the page. In the Web, remember that the default is that you arrive at a bad page. When a user goes to a new page, on average it's bad—on average it's "Back" button time; users don't give a second to decide whether they want to dig into the page. Sure, people also take a short amount of time to decide whether to dig into a print article, but they can more easily see the photo illustrations, because they are immediately there; in the Web, the illustrations are going to come downloading later. In print, it's easier to read subheadings or additional text in addition to the big headline; on the Web, only a few things dominate.

In a study I did recently with Mark Hurst, we looked at how people could apply for jobs online, and the result was horrible. In one example, the person proceeded through a series of steps and finally arrived on a page that had the headline that read, "You've now completed the job application." So what did the user do at this point? The user said, "Ah, good, I'm done," and closed the thing. Now if the user had bothered to read the body text, she would have seen "blah, blah, blah, blah, blah, and by the way, we want to make sure that you are really sure this is the correct thing to do, so please press a confirm button to actually enter your application into the database." Nobody reads that body text. Users don't click the last button that says, "Not only am I done, but I confirm that I'm done." The person went through all the steps, did all the work, and thought she was done because of the headline, and she lost all her work.

Clement Mok: Jakob, you are drawing some very broad generalizations about things that don't work. In the world of communication design, we consider appropriateness and context. What you said might

Clement Mok



be true for that job application, but you imply that it is applicable to every Web site. Attributes of tease and the ability to provoke or to communicate desirability or lust or ... all these things do and should play an important role in the Web.

Jakob Nielsen: I think those things should be put elsewhere, not in headlines.

Clement Mok: Put them elsewhere? Where?

Jakob Nielsen: Well, you still have the body text, and you do have things like illustrations. Note that I don't say "have no graphics;" I say, "minimize the graphics."

Richard Anderson: Along those lines, Jakob, you say that of "look and feel" on the Web, "feel" is more important.

Jakob Nielsen: Right.

Richard Anderson: Elaborate on that.

Jakob Nielsen: Basically, the Web is a very user-driven environment. You go to a Web site to get what you want, when you want it, how you want it. That is the feeling of going to a Web site. So, if the Web site feels accommodating, feels that you're in control, feels that it's giving you what you want... that gives you a good, good feeling—a good experience of being there. That feeling is to a great extent dominated by the simple fact of speed. Speed is not the only thing that matters, but it's very important. If you just sit there and wait, whatever comes might be good, but you often get annoyed by the wait. In the studies, anyway, users say it's not worthwhile waiting. You get this irritating feeling that this Web site is sluggish and that it's slowing you down. You think that they think that they are more important than you are. They're not really giving you service. It's sort of like entering a physical store and finding sales clerks all dressed in fancy Armani suits and not wanting to talk to the customers. Now that's a bad store. Those are not helpful sales clerks.

Clement Mok: It's really about relevancy and context. If you walk into a store where all the clerks have on white lab coats, you would still have a problem. You might think, "Wow, yeah, things are really efficient," because they all dress alike, they look like sales people, and you know how to find them. But that is just as much of a problem. It's too clinical; it's a very industrial-strength way of dealing with things. There is a warm-and-fuzzy component that needs to be there.

In short, there are no absolute rules. The minute that everyone thinks there are and follows them, the Web will lose its relevancy for the user.

Jakob Nielsen: I think it's a matter of degree or where the main emphasis is. For example, with print, the "feel," so to speak, comes from leafing through the magazine. So it has some importance, but the "look" dominates. On the Web, because you are driving and you are moving, the "feel" dominates, which is not to say that the "look" is irrelevant. It's a matter of the balance between the two components.

Clement Mok: Consider an art gallery. If there's no "look," it's going to be hard for that art gallery to be compelling. Is that not true?

Jakob Nielsen: On the other hand, consider the Web site of The Museum of Modern Art; that Web site is really unpleasant to use. For example, they don't have the biggest part of their collection online. They do use thumbnails, but I don't think they use them effectively. At least that was true when I looked at it a month ago.

Clement Mok: Nothing is absolute.

Jakob Nielsen: Okay. It is certainly true that if you want to be able to get to a high-resolution scan of a painting, that may in fact take a minute to download. But before you get to that, you want something that says there are these 10 or 20, or even better, a thousand paintings online for you to look at.



Jakob Nielsen

Clement Mok: I agree, but it's the absolute statements that absolutely frighten me. (audience applause)

Jakob Nielsen: On the other hand, if you don't say these things, people are going to continue creating horrible, sluggish, Web designs.

Richard Anderson: *Clement, is the way that you design for the Web different than the way that you design for print?*

Clement Mok: Absolutely. I think it goes back to the absolute part and the nonabsolute part. Print is finite; it is an object that is not temporal. The Web, on the other hand, does not have a sense of permanence; it is quite ephemeral. A Web site is not only a framework and a structure you plug components into over time. It evolves and morphs in ways that make it hard to get a sense of what this one thing is at any one point. The fundamental difference is that what you are designing does not have a permanent state; it is fluid and has different dimensions over time. It is, in fact, closer to performance art; it's hard to describe what performance art is at any one point, because it is constantly in flux.

Richard Anderson: *What do you consider to be the role of the designer? What is the responsibility of the designer?*

Clement Mok: Facilitate, mediate, inspire.

Jakob Nielsen: Also to take the users' role—to be the users' advocate on a project. A lot of other people on projects are all focusing on what the company wants, such as dumping lots of messages on the poor user. Again, the Web is so user-controlled, users are going to go where they want to go. But that fact is still new to most business people. The designers are the ones who have to stand up for the user and say that we have to make it easier for people to get here, or we have to present information in a way that makes sense to someone who does not work at this company and does not

understand all our special terminology. In the various project meetings, designers have to stand up for the poor users because they are not there. Hopefully, every now and then they are brought in for a usability test. But, on a day-to-day basis, it's the designer's responsibility to stand up for the user.

Richard Anderson: *Clement, in your book you talk about how some of the disciplines that you believe need to be involved in Web design are not necessarily prone to collaboration. Is creative design such a discipline?*

Clement Mok: Graphic designers as well as software designers are trained and genetically engineered to be solo pilots. They sort of meet and get the brief; then they go off and do their magic. And I think engineers are that way, too. Inherently, and given the training that people have had, it is about being stars—about individually creating great experiences. The Web is so complicated with its many interdependencies that it's important to not only nurture the great creative individuals, but to also create the great squadrons and the squadron leaders.

Richard Anderson: *Are usability engineers prone to collaboration?*

Jakob Nielsen: That's an interesting question. Usability, at least if you take it seriously, is about understanding different perspectives and understanding how other people think. So, theoretically, usability engineers are better at collaboration. They can still argue and say, "No, this is how it has to be," and they can get very stubborn sometimes because all experience and 20 years of research show that the download time has to be this fast. Indeed, that is something I'm going to stand on also.

Richard Anderson: *How do you achieve collaboration? What is the secret to getting people to collaborate?*

Clement Mok: Collaboration, I think, requires engaging the individual or the

Clement Mok



group to take on a change. The minute that the metalevel of understanding within the group that the group is about to do this one thing is not there, collaboration is not going to work. When people are in disagreement, they don't buy-in at the metalevel that they are about to alter something fundamentally. You have to operate at a concept level so that people are engaged and ready to accept a change.

Another piece of the equation is about communication and really listening, and about creating a forum in which disagreement can happen. Agree to disagree, and create a respectful environment to facilitate that. You can agree to disagree without having the respectful environment; that will destroy collaboration.

Last but not least, I think you actually have to have a physical space in which you physically work together.

Jakob Nielsen: I also think that having some sort of external criterion for how to proceed can help. Otherwise, you risk everyone arguing against each other: should we do this or should we do that? And everyone might argue until the cows come home. This is where the user becomes quite important. If our main goal is to create the optimal user experience—to really satisfy customers, then that can become the decision criterion. If you have that idea, and we have this idea—well, they are both good ideas. What will be decided will depend on what actually gets the users their results faster, or on what sells more, which I guess is ultimately often the goal. Having that external decision criterion is important so that the decision is not based on who can argue the strongest.

Richard Anderson: *Jakob, you have said that you believe that 80 percent of the Fortune 500 companies will fail, because they won't make the transition from the visible world to the virtual world.*

Jakob Nielsen: Right.

Richard Anderson: *Say some more about that.*

Jakob Nielsen: I think that most big corporations are doomed when it comes to the Internet, because the Internet is an environment in which you are extremely close to the customer. It's about direct contact. Yet these big companies have lots of layers of insulation between their decision makers and the actual customers. The decision makers never see a customer in most of these places. And in most of these places, the way to get promoted is not by doing something good for the customers, but by being smarter than the other vice president. That kind of organizational structure may have actually worked very well in the past when change was very slow, when things moved very slowly, and when sheer mass of scale had major benefits. The Web is a much faster moving thing.

Tight contact with the customer is becoming much more important. In the old days, you could send out sales people to schmooze the customers on the golf course, and that's how you could overcome the fact that the company didn't really care about its customers. Nowadays, if you don't care about your customers, it is blatantly obvious from the Web site, because it is not customer oriented, and people just go to some other place instead. So most of these big companies are genetically suited to work in an old-style, industrial environment; they are not well suited to work in an interactive environment where the quality of customer service and truly caring about the customer is the important thing.

The 100 or so of them that will survive will be the ones in which the CEO decides that the Internet is the future. If there is a channel conflict, too bad—we are going to go for it anyway. We are going to kill our own internal departments instead of having someone else kill them. Most companies are not willing to do that.

Clement Mok: I agree with you on many of your points. But when you talk about failure, are you saying these companies will just go away, or are they going to have to deal with how they fundamentally operate their business and with how to interact with the



Jakob Nielsen

customer through another intermediary? Are they going to have to look at who they are, what their brand is about, and building customer confidence?

Jakob Nielsen: There are probably several different transition strategies. One strategy is to start up another brand and sort of feed it, but basically it will grow up to be a new thing. And then you can argue, wasn't it really the old company that transversed into a new company? Maybe it was, and if companies do that, and if you look at it that way, the survival rate might be greater. But the old company is still going to shiver and become much smaller than it is now. I'm not so sure that 80 percent of these Fortune 500 companies will die, in the sense that they will have no revenue in 10 years or 20 years. But I think they will disappear from the list; they will be so much smaller.

What are the new companies that are going to grow up instead? Well, some might be spin-offs of some of these old companies. In many cases, they will just be completely new companies. Those who are really doing well on the Web today are almost all Internet-only companies—companies that are pure, pure Internet.

People often ask me for the secret of Amazon.com: how come they are so much better than anyone else? I don't think they have any secret other than that user experience is their number one criterion: does this make it easier for people to buy a book or more difficult for people to buy a book? That is how they decide what to do. All the older companies have all these impediments in place that make it difficult for them to have this one criterion of "are we going to make this easier for our customers or not?" They have five other criteria to think about as well.

Clement Mok



Richard Anderson: *Jakob, you have argued that very few companies really understand how to use the Web or how to compete on the Web. Yet, you have argued that companies must keep Web agencies on a tight leash. Shouldn't it actually be the other way around, to the extent that that is possible?*

Jakob Nielsen: Well, maybe you're right. It's probably true in both directions. People like Clement are the ones who actually understand what they are doing to the Web. So they can be responsible for managing their clients or getting them to understand what to do.

I put it the other way around, saying that the company has to closely manage the agencies, because you also have this phenomenon where some people just go off and build a Web site—sometimes a very nice Web site, but one that is disconnected from the company. That does not affect the mental change needed for transformation into a Net-centric corporate culture. You can have a Web site that looks wonderful and may actually do a few things very wonderfully, but if it's disconnected from the base company, the base company is never going to be very good. You can see this in a lot of the airline reservation sites. They are doing nice things on the front end, but the back end is not intended for consumers. So it is never going to be a really good travel agency online. That is why I say that the company must decide it is going to be an Internet company and that it is going to be in control of its projects.

Clement Mok: The way that Jakob is talking about these relationships is very interesting. In the world that I come from, it's called, "managing brand—managing and extending the brand experience." Really talking about what a company's brand attributes are and what they might be allows a company to move into these new spaces. Let's say that McDonald's wants to create a personal information management Web site; McDonald's brand is not going to allow them to do that with credibility even if they are able to develop the best user experience. It is about the connections to and relevancy with the brand that existed in the analog world; it is about what those relationships are and how they're managed and about how well brand attributes transfer.

At the same time, interaction with the customer online creates new brand attributes

that influence the dirt-world brand. Take UPS as an example, which took the effort to go after Federal Express by developing a robust Web site. Now perhaps as competitive as Federal Express, they have developed brand attributes of being a major technology player that have transferred to their dirt-world presence. I don't think too many people are really looking at how significant such changes can be.

Jakob Nielsen: I think you're right, that doing a good job on your online press can reflect back on your old-world press and say, "Yes, this is an efficient company, and, for example, we can get your package out, and you can track your package ..." On the other hand, it might play the other way around, which for some other companies is often the case. Some companies try to develop a brand of being very welcoming, very serving to their customers. But, go to their Web site, and you basically can't do a thing. I think that is hurting these companies' brands in a lot of cases.

Richard Anderson: *Jakob, you've described the Web as a "low trust society." What do you mean by that?*

Jakob Nielsen: The Web is a low trust society, because you click in something and you get something in response, but how do you have any clue whether it is any good? Not only that—the current atmosphere of the Web is that of utter disrespect for people's rights. It's like, "let's trick people into giving us their e-mail addresses, then we'll spam them forever after." There are all these little boxes that say "yes, I want a good offer," but do you have any idea what you will get if you check those boxes. It's too much about conning users caught up in the Web; it's not about true disclosure about what's going on, such as saying "every two weeks we're going to send you a certain type of message."

Plus, there's a lot of horse trading with various Web sites. For example, Alexa, which is sitting on a vast database of personal information, was recently bought by Ama-

zon.com. We may have had great trust in the previous management—maybe they're still in place, maybe they are very nice people. I have nothing against them knowing what Web sites I visit. However, Amazon.com might decide that was not a good investment next month and will decide to sell them to some evil empire. The point is that users are being traded like cattle, and as long as that's the attitude on the Web, that we're eyeballs, that we're not really customers, that we're not really individuals, that we're not really treasure, that we're like a Third World colony set to be strip mined—as long as that is the attitude on the Web, users' trust will drop and drop and drop, and people will become more and more distrustful of any kind of offer or promotion that is attempted.

Banner ads are a great example of that, because users have this notion that if they select a banner ad they are going to get junk—they're not going to get what was being offered. This is despite the fact that there are some ethical advertisers, including the CHI conference which advertised this session via a banner ad, and sure enough, it's happening. But so many other advertisers are not ethical; for example, they advertise, "Click here to speed up your Internet connection" or whatever, and you click there, and it's just an ad for some stupid thing you would never want. You get a few of those, and at the end of the day, you say you will never click on an ad again.

Clement Mok: I think there is another dimension to trust. Trust is lost very quickly, but trust is also built up very quickly. Amazon.com and eBay have made explicit disclosures about what they are going to do with the information users provide. This has affected the amount of users' trust; this affected beliefs about how they conduct business and what they are as companies. The building of trust in those brands was accelerated. But, at the same time, technology can accelerate a loss of trust and confidence in a brand if many key principles are violated.

Jakob Nielsen: I agree that you can build



Jakob Nielsen

trust in the Web if you faithfully follow up on all your commitments. But the Web in general is really suffering from this kind of low trust; it is a distrustful environment where people are very skeptical about any promises that are made. However, Amazon is a company that continues to follow up; people have this notion that if they order something from it, two days later it will be there.

I've gotten a lot of e-mail about a certain other bookstore about its claims that books are in stock. People have said that they looked for a book on Amazon.com, which didn't have it or said it would take three weeks to deliver. So, they went to this other bookstore instead, which said, "Yes, we have it in stock and will ship it in two days." So they bought it at this other bookstore. What happens? Three weeks went by before they got the book. In effect, the bookstore lied to them. Whether the bookstore lied to them because the book was in stock until a half a second before they ordered it we will never know. But those particular customers will never buy at that bookstore again.

Clement Mok: The whole issue of fulfillment and of reliability of information is an important piece of what I think is a very complex puzzle about trust.

Richard Anderson: *How might we get away from banner ads? Is that a possibility?*

Jakob Nielsen: My answer is micro-payments. Those who pay are the ultimate customers and will ultimately be the ones things will be designed for. I don't think we can develop what is going to be the most important communication medium in the world if it is purely advertising based. That medium is not going to serve society—it is not going to serve people. Unfortunately, people will have to pay, and they just have to recognize that there is no such thing as a free lunch. If you want to have a service that is paid for by advertising, it is going to be designed for advertising. Articles are not going to be written in a way to give you the best information; instead, they will be

chopped up in little unpleasant page views to maximize the number of advertising exposures. This will get worse and worse as the click-through rates drop and drop and drop. My prediction is that the click-through rate will be cut in half every year and will reach 0.1 percent in 2001. And as the click-through rate drops and drops, there will be more and more devious things done; advertisers will try to squeeze a little bit of revenue out of all those eyeballs.

Clement Mok: Two weeks ago, I was sitting on a panel with representatives of ad agencies, and they were asking exactly the same questions. "What do we do with banner advertising? Is there going to be new kinds of banner advertising?" It was fascinating to hear that they could not think out-of-the-box and were instead thinking there will need to be different forms of direct marketing and more advertising formats for and different ways to treat banner advertising. Their solution is to not look to banner advertising, but to look at what they need to do to develop an ongoing conversation and relationship with their customers. Until advertisers get burned so bad and spend so many advertising dollars without getting any return on their investment, we will continue to suffer from this whole notion of having banner ads and interstitials and all sorts of other funny words; say, what the hell are those things?

Jakob Nielsen: They are just making worse ads—more and more intrusive, more and more annoying ads. I think people will react more and more against that—buying software that screens out the ads, for example. That should be seen as the final cry for help. If it's so bad that people actually pay money for software to get rid of these ads, that's a true sign that this entire strategy has failed.

And, Clement, your comment about relationships with customers is such a key point. Good relationships are not based on taking out your club and banging a customer over the head. If you want to have a good relationship with a customer, you don't start out

Clement Mok



by cheating them, which is what many of these current ads are doing. Your approach needs to be more trustful, more relationship based. Think of it more as marketing and less as advertising. Build up Web sites that actually give customers good service. That, I think, is a very, very viable strategy.

However, that means that content Web sites are going to lose their revenue sources. They had better think of other revenue streams.

Richard Anderson: *You made a quick reference to micro-payments. Can you say a little bit more about those?*

Jakob Nielsen: The main problem with micro-payments is that there are too many schemes right now. It's not that there are any technical problems. Too many different schemes have been invented. I think that Microsoft has abandoned their responsibility to lead the industry here. They should decide on one of them, put it into the operating system, and just ship it from now on. That is the only way it is going to work. People are not going to download something to plug into stuff—that just doesn't work. You can say good things about Bill Gates or bad things about Bill Gates, but the fact is that he rules the world. So, it is his job to just pick one of them. I don't even care which one. My favorite is MilliCent™, but I don't really care. Just pick one of them, and stick it into the OS. Then the OS can become the enabling mechanism for the network economy. If it's not done properly, it's not going to work.

Actually, the Microsoft antitrust suit that is going on is interesting, because it hinges on a user interface question: should the Internet really be part of the operating system? Should the browser be integrated or not? Despite it being a user interface lawsuit, none of the parties have dared call a user interface witness. I think it is because both of them know they would be in deep trouble. If the government called me as a witness, I would say, "Sure you need to integrate the browser with the operating system; kick out this stupid lawsuit—it's

without merit." On the other hand, Microsoft wouldn't like to have me there, because I would also say that this so-called integration is just a little Band-Aid™. We want real integration. I can give them a list of 10 additional things they need in the next version.

Richard Anderson: *Studio Archetype conducted a study with Cheskin Research on the trustworthiness of e-commerce. Say some more, Clement, about that study.*

Clement Mok: A client had come to us and said, "Design a very secure site for us, and design it so it looks like it is secure." What??? "Looks like it is secure?" That confounded us. Isn't it enough to make a Web site secure? The answer is "no."

We decided we would conduct surveys, do focus groups, etc., to try to understand what people identify as trustworthy. We talked to a variety of people—from people within the industry to total novices—about what they felt was important to building trust. We found that many of the things we had thought were important, like security encryption, are important, but we also found that building and destroying trust happens in a short amount of time in this Internet space. Technology performance plays a role, security marks play a role, brand plays a role ... but navigation plays the most significant role in shaping trust. You can have a no-name brand, a teeny tiny company, but if you make your Web site very clear and easy to navigate, you can build up trust very quickly.

People's response to several well-known brands was miserable. For example, people couldn't find any product in the SharperImage.com Web site, and they rated the company very low as to the extent to which it was trustworthy to transact business with. That navigation was of greatest significance was the most surprising finding.

Jakob Nielsen: To me, that says that if you make it usable, then people will feel more welcome and will trust it more. The analogy with the physical, old-fashioned



Jakob Nielsen

shop is that if you have salespeople who are helpful, that is better, and if you have salespeople who refuse to talk with you, and you get this feeling that they have something to hide, this is not a site that really will work and where you can get things done.

Although Clement didn't say this, their report about the e-commerce trust study is available on the Sapient Web site, and I think it is a very good report.

Richard Anderson: *Studio Archetype has a discipline called "brand strategy." What does a brand strategist do?*

Clement Mok: Brand strategy is about trying to reconcile the brand attributes in the dirt world with the brand attributes in this new digital world. What is the tone of the conversation between the two? It can be a friendly conversation or a very hostile conversation. What it is can shape what a brand does and determine whether the attributes are relevant or have credibility. Brand strategists within our firm look at this space for companies that are like deer standing in a vehicle's headlights and being told to go change—to do something on the Internet or they won't continue to exist as a business. We are helping companies find and articulate their brand attributes in the dirt world and in the Internet space, then figure out a path forward as to how to change or build customer perceptions. Brand strategists mind those relationships with clients.

Richard Anderson: *Jakob, I think I've seen you quoted as saying that companies are preoccupied with branding.*

Jakob Nielsen: Well, I'm not sure I said that exactly, but they probably are. The potential downside to branding is that some people think of branding as image. What I claim branding really is is the customers' impression of you and what they actually get from you—in other words, the actual experience. This goes back to the question of whether look or feel is more important. The feel, or what you actually get, is in many ways what determines the true brand in the

long term. Let's take an airline as an example. The airline can run a million ads that say their planes are always on time, but if there is an hour delay every time you fly with the airline, at the end of a very small number of trips you would say that this is not a reliable airline. It's similar with the Web; every single click is delivering some service to the customer. Therefore, the feeling of the delivery of that service determines the brand much more than that which some people who talk about brand get more preoccupied with. They're preoccupied with the superficial aspects of branding, such as how big our logo on the home page is. They ignore the substantial aspects of branding, which are about promising the user or customer a certain thing, and then delivering it. If you do not deliver it, people will very quickly learn to ignore you, because they get bombarded with so many messages in modern society.

Clement Mok: The great digital brands are going to be about companies who actually manage reliability—reliability of providing valuable information. There will be variations, but as we move forward, the great brands will be about reliability rather than just quality.

Richard Anderson: *Jakob, one of your columns is entitled "Personalization is Overrated." Is it really?*

Jakob Nielsen: Personalization is overrated, because it is the bad excuse of the person who can't design a good Web site. It's like, I can't figure out what to show to the user, so we can just leave it up to them; since I don't know to design it, I'm sure the user can do it. That is basically the attitude you find in some places. It is the responsibility of the Web designer to design that experience, that environment, for the user, so that the user can then take or enter that environment and get what they want. A navigable environment in which you can actually figure out what to do and get what you want now is the more important goal.

That does not mean that there should be no customization features. It is very nice for

Clement Mok



users to get in and tweak the design: let me see more of this or less of that, or let me always get the weather forecast from my home town, and so forth. I do believe in that type of customization. What I do not believe in are the cases where the system is trying to model or second-guess the user and stereotype them. Do you know the infamous thing on Amazon.com that says, “Welcome back, Jakob, except if you’re not Jakob, click here”? It goes on to say that you really should buy these crime novels. I don’t really care about crime novels. Yes, I bought quite a lot last week, but they were for a birthday present for somebody else. It’s trying to be too smart about it. What is very good is that for every book they list, they also list five other relevant books. Every day you are interested in some other thing: today I am interested in this book, so here are five other books that are relevant. That is a way of being driven by the users’ immediate needs and requirements. When you study these things with users, you will quite often get feedback that says, “Don’t box me in; I’m not just that person; I have broader perspectives and views.”

So, I’m not saying there should be no customization features; they can be useful. I’m just saying to not rely on customization as the main design strategy to overcome deficiencies in simple navigation.

Clement Mok: Another way to cut what Jakob is talking about is, in my world, called “point of view—editorial voice.” People still like to be led through information and resources that have a very distinct point of view. That piece of the equation is often missing.

Richard Anderson: *Clement, who has influenced your work and your perspective a lot?*

Who are the people you have greatly admired—people who have influenced the perspective that you are sharing with us today.

Clement Mok: A lot of people. One is Steve Jobs—actually, not Steve Jobs himself,

but the Macintosh team. Being part of that team shaped the way that I look at the world of designing the entire user experience. It is not just about the screen or the graphics; it is about looking at how the machine, the box of that machine, and its contents fit within the space. It is about the supporting tutorial that goes along with the machine, and about all the demos. It is my focus on the totality of the experience and the need to work together to create great experiences that Steve and the entire Macintosh team influenced.

Others who influenced me were the husband-and-wife team of Charles and Ray Eames. They are designers. They try to connect the most mundane day-to-day things with technology that is useful and desirable. They have designed films. In [19]62, they did an amazing multi-image show with 30 some-odd projectors at the U.S. Pavilion in New York City, which in a way was the start of the multimedia movement. And they did the powers of ten. They have looked at technology not as the end, but as the means—the means to connect. Making connections—making meaningful connections—is so important.

Richard Anderson: *Jakob, same question.*

Jakob Nielsen: Back when I was a student, I read a lot of Ted Nelson’s books: *Dream Machines*, *Literary Machines*, and those books. They influenced me a lot and actually got me into hypertext. He was extremely visionary, even though he never actually shipped anything, which doesn’t matter because he wrote some very, very good books.

The other person I’ll mention is John Gould at the IBM Watson Research Center. I’m actually very different from John, because I don’t go around measuring everything very carefully. He did. He believed that anything you could have a discussion about could be measured. He did some extremely careful studies on how people read from computer screens versus paper, and varied every possible parameter of all that, to final-



Jakob Nielsen

ly discover the need to have better resolution. We still don't have that needed resolution, even though the need has been known since his studies were presented at one of our early CHI conferences. It is a disgrace that we still have such bad screens.

John was really a great...I was a great admirer of him. I learned a lot from John Gould even though I'm not doing things in his exact style. I am more into the "let's do some quick-and-dirty kind of thing, and get the insight," rather than get all the numbers John would have wanted.

People like Jack Carroll, Tom Landauer, and Tog [Bruce Tognazzini] —how can you not say Tog?—also influenced me. Lots of good people.

Richard Anderson: *In a very recent interview, Clement, you talked about how you learned about humility as a student. What role should humility play in the wild world of Web design?*

Clement Mok: None of us know where we are going. You don't know what you don't know. We are colored by our past experiences, and we can go out and claim that we know everything and that this is the way it should be. I have done that; we have all done that. It is a part of human nature. It's easy.

It's much harder to ask, "Why not?" When we take on a project, we ask our clients the appropriate list of questions, such as "Why are you doing this?" and "What's the business objective?" When someone off the cuff throws in something that appears to be audacious and bizarre, we totally discount it. In some projects, that something was a brilliant idea, but we just threw it out the door. We should have looked at it and asked, "Why not?" That is how the bold and bright and extraordinary ideas come about. Ted Nelson and Marc Andressen [inventor of Mosaic and co-founder of Netscape] are two people who asked, "Why not?" The Web is the result of asking, "Why not?" Humility comes from failing to and then seeing that you didn't ask the "Why not?" question. That is when you say, "Yeah, I messed up big time."

Clement Mok



Richard Anderson: *How has humility played a role in your work, Jakob?*

Jakob Nielsen: Well, I don't know. Clement is certainly right that there is a lot of stuff we don't know, particularly about the Web, because it is so understudied. It is amazing that you have hundreds of millions of people using the same system, and we don't really know why.

On the other hand, there are a lot of things we do know, and I think it is more my responsibility to go out and say, "People, this is wrong; this is what you should do." Even if it's only 90 percent sure to be true, it still has a much better chance of moving people in the right direction, rather than overlooking these things. If in 99 percent of the cases that you make download times faster you also make user experience better, you might as well tell people that. Otherwise, they are not going to pay attention to that issue.

The concept of humility does play a big role in Web design. You have to remember that when you're designing a Web site, you're designing this little speck of dust in the universe of the entire Internet. You're contributing a tiny little minuscule increment to this bigger user experience. I call this Jakob's Law. Jakob's Law of User Experience is that users spend most of their time on other Web sites. No matter who you are, people spend most of their time on other Web sites. That says to me that you cannot drive the user; they spend most of their time elsewhere.

Clement Mok: Jakob, what if your "99 percent" is wrong? What if it is only 85 percent?

Jakob Nielsen: Well, it's still the big majority, right? It is true that there is no rule that doesn't have an exception. Good designers know the rule, and they also know when to break it. However, most of the millions of Web sites and billions of pages are designed, as I said before, by some product marketing manager in Kentucky. You have to tell these people the basic rules, and then once they get to be brilliant...

Clement Mok: But broadband and many other things are coming down the pipe very soon. Hence, I think that dictum of 99 percent with regard to download time is irrelevant.

Jakob Nielsen: But the download time issue will always be with us, because it is based on basic human characteristics. The one-second response time rule says that anything slower than one second is going to feel unpleasant, is going to feel sluggish. Even if you can say for sure that at some point in time we will have enough bandwidth to send a current Web page in a second, I'm sure some designers will find a way of making it a fancier page that is slower to download.

Eventually, you'll be right, but that will be more than 10 years from now.

Audience Member: *I wonder if the window of opportunity to fix the Web is closing. I wonder if (a) people will so totally mistrust it, that all will abandon it, or (b) we'll just accept it, with the poor performance it has. After all, we all still shop in stores where people are unhelpful and either wear fancy suits or white lab coats, and those stores seem to be doing quite well.*

Jakob Nielsen: I don't think it's too late. I really believe we are still in the infancy of the Web, and it's going to become much bigger and much better. I really believe that the Web is the ultimate consumer empowerment medium, because every single mouse click is a vote for what's good and what's bad. That drives the traffic to a better Web site, and the worse sites fade away a little bit. I am very optimistic. As new things come out, the better Web sites will bubble to the surface, and the poor ones will fade away.

That is also why I think, by the way, that the current stock market valuations are problematic. There is this notion that whomever is sitting on a good market share now will inevitably have good market share in the future. But, there is very little loyalty on the Web, and if something better comes along, people are going to go there instead.

Audience Member: *Many leaders of the information economy seem to bemoan the fact that the Web and the Internet have not become the pervasive, ubiquitous appliances that they expected, or that it's taking longer than they expected. Do you think the obstacle is financial—that people can't yet afford the technology for it to become ubiquitous? Or is it the bandwidth? Or is it the lack of really useful stuff for people to do online?*

Clement Mok: All of those things, but patience is virtue. Adoption sometimes takes 10 years. Consider the penpoint operating system; it actually started in 1990 or 1991. Things take a bit of time.

But, indeed, a lack of useful, usable, and desirable things on the Net is preventing it from being ubiquitous.

Jakob Nielsen: I agree. But I think that the cost is also an issue, because it is still too expensive—particularly overseas. On the other hand, that is the one thing we know will go away. If all other problems in society were like that, we would be happy. Ten years from now, the computer will cost 1 percent of what it costs today. So, that problem will go away.

A much more serious issue is not being addressed very well right now. Some of the recent data from Denmark says that personal computers are now in 52 percent of all Danish households. That is only 3 percent more households than 2 years ago. So, there has only been a minuscule number of additional households getting a PC. Sales are still strong, but that is because the same households that already had a PC 2 years ago are buying more. So, basically, the other half of the population are just not buying. It's a mix of lack of motivation, because there is nothing for them there, along with a matter of things being too difficult for them. If you compare the user interfaces of Windows 95 and Windows 98, the incremental increase in usability might in fact be 3 percent. To get the other half of the population to go online, these systems need to be more than just a little bit better—they have to be enormously better. That is what we are still wait-



Jakob Nielsen

ing for. There are certainly projects under way to make systems enormously better. But, right now, they are just too difficult to use.

Audience Member: You've talked about how to get people to agree when they are collaborating, and about the trust issue, and about banner ads and how we might get away from them. I think it all comes down to getting better data. In the trenches, when you're working with the ad sales people and the producers and the designers and the engineers, and there is disagreement about what should be on the page and about where the ads should go, what do you do? There is such a paucity of information out there right now. It's very hard for me to argue to the sales people why we don't need the banner at the top or why we don't need the sponsorships on the side. Because I have no data to support my claims, they don't believe me. This is a call to action to the community to do more studies, to identify the things that will enable users to get what they want and advertisers to get what they want.

Jakob Nielsen: I agree. There is incredibly little research being done on how people use the Web and why people use the Web. There is some amount of usability testing being done that affects individual designs, but there is not much generalization happening. Yes, we need more. And I guess we do need more data about what makes advertising work well, even though I think banner advertising on the Web is a doomed endeavor.

Audience Member: Though our field is a little over 20 years old at this point, I have been a little bit disappointed in how much progress we have made—in how much impact we've had on the computer industry. I would have hoped that by this time we would have institutionalized usability as part of software development, but I don't think we are anywhere near that.

My bigger disappointment is that when the Web really began to take off, which was

only a couple of years ago, there was no evidence that our 20 years of experience had any impact at all on Web design. I'm wondering if you have any hypothesis about why no impact was made when the Web first started to take off, and about how we can do better in the next 10 years.

Jakob Nielsen: Usability has never been a success in computer companies, because they haven't cared about customers. They have been able to get away with that, because the customers let them get away with it. Because the people who buy the software don't really know or understand how it is being used, and for lots of other reasons, computer companies don't need to make usability their guiding criterion.

The Web is a little bit different. On the Web, usability is becoming a guiding criterion for quite a number of companies. In the beginning of the Web, this was not the case. At the beginning of the Web, everyone was so excited: "Wow, I can put stuff up, and people in New Zealand can see it." They never thought about how it was going to be used. There was a revolution just in the fact that you could put stuff up. That is probably why usability was downplayed in the very early years of the Web, and why wild experimentation, which was probably appropriate for that stage of the Web, was up-played. People tried all kinds of odd things, most of which didn't work, but that was fine for the pioneering stage. We have now entered the stage of attending to the business critical aspects of things, like whether you keep your customers and whether people can find products. Usability is critical on e-commerce sites, because if people can't find the products, they are not going to buy them. You can now tell that a large number of companies are, in fact, making usability a very major, major issue in the management of the Web. Internet-only companies certainly are, but so are some old-world companies.

Clement Mok: I want to add that the CHI community was not part of that initial community that was really developing and doing things on the Net. So, much of what

Clement Mok



you had learned was never transferred. Being a player, and being involved as a practitioner within that space, is important to achieving that transfer of knowledge. There is an amazing amount of catching up that needs to happen.

Richard Anderson: *My final question is related to that. Has the onset of the Web advanced the field of human-computer interaction or set it back?*

Jakob Nielsen: Very narrowly construed, it has set it back, because the design is now like design was for IBM mainframe terminals. That's the type of design you get for a lot of applications people are putting on the Web. So, very narrowly construed, the Web has set the field back dramatically.

But I think the Web has extended it, because it is now business-critical. That, I think, is the ultimate. We know a huge amount of stuff about human-computer interaction, but it's just been sitting there in conference proceedings and not being used. Because of the Web, usability has changed

from being some sort of nerdy specialty that a few people would gather to discuss at this kind of conference, to being what makes an entire billion-dollar company live or die. That change in the importance of usability is 100 percent due to the Web. The fact that the Web now makes your customer interface into a user interface has so changed the importance of this field that we can now go pick up all the research off the shelf and say, "Okay, we know how to do this; let's go do it." The people who do that will be worth billions of dollars more than the people who don't.

Clement Mok: I think the Web has fundamentally altered the fabric of how we even look at interaction. We have been siloed and have been largely looking at applications. But the Web is a communication medium, and it's an application, and it's software, and it's a distribution channel for your business. The Web has fundamentally altered our process of thinking about what we are all as a community trying to shape and create. So, I think it is all for the better.



Jakob Nielsen



Human Limits to HCI: A Conversation with Bill Buxton and Clifford Nass

Cliff Nass is an associate professor of communication at Stanford University, with appointments in Symbolic Systems, Sociology, and Science, Technology, and Society. In addition, he is codirector of the Social Responses to Communication Technology Project. His areas of specialization are experimental studies of social-psychological aspects of human-computer interaction and statistics. He has published extensively, including *The Media Equation: How People Treat Computers, Television, and New Media Like Real People and Places* (Cambridge University Press), which he authored with Byron Reeves.

Bill Buxton is a designer and researcher specializing in human aspects of technology, human-computer interaction, and technology mediated collaborative work. He is chief scientist at Alias | Wavefront Inc., as well as its parent company, SGI, and is an associate pro-

fessor in the Department of Computer Science at the University of Toronto. Bill is well known to CHI conference attendees, having presented some wonderful work at almost all past CHI conferences, but a couple of CHI conferences ago, he threatened to never return. He appeared at CHI 99 from Japan through the power of technology.

Richard Anderson: *Bill, why did you tell a CHI conference audience a couple of years ago that you would probably not return?*

Bill Buxton: While I didn't necessarily mean it literally, I wanted to express my concern and disappointment with our discipline and the state of HCI. When I look at the design of computers, for example, I see nothing since the introduction of the Xerox Star which shows much progress. And I question



Richard Anderson

the value of the research we'd been doing in the community. If I piled up all the literature that has been published by the CHI community since the Star's introduction, it would be taller than I am by far. Yet it has brought us nothing that's gone significantly beyond the Star, and, significantly, the innovations represented by the Star were accomplished without the benefit of such a body of research! So what does that say about the value of what has followed? It is not that the research was a waste of time; it has told us a lot. But in terms of helping consumers and affecting the design of these things called computers that we foist upon them...I would say that we've had very, very little effect. I find this lack of impact an interesting challenge, and I also find it a disappointment.

Richard Anderson: *Cliff, as I recall, the CHI community didn't exactly warmly embrace you and your research not too long ago...perhaps partly because of the association you had with the development of Microsoft Bob. I wonder if you could tell us some of the reaction that you received early on?*

Cliff Nass: I think one should separate the reception of the research program, which certainly wasn't warm, from the reception of Microsoft Bob, which also wasn't warm! In the research program, we were trying to do something radically different—and trying to challenge a lot of the fundamental ideas lurking around CHI and the interface community (more generally). So, it wasn't surprising that it took a long time and study after study before people began to say, "Hey, there may be something here." And happily now the work is more warmly received. With Microsoft Bob, what happened was really a hysteria towards that product, which I think had more important and unique interface insights than any other product I'd seen in a long time...in fact, since the Xerox Star. Now there were problems with it, as there often are with first-time products. But I think that now we should calm down. It's been over 5 years since Bob was released. It's time to go back

and really look at that product and understand how many important and great ideas appeared in it, and, sadly, how few have entered the interface community more generally, and how many have entered without giving credit to Bob.

Richard Anderson: *Let's talk about some of the underpinnings of that work. (I'd like both of you to talk about the kinds of things that you want people to understand and attend to regarding human limitations, but let me start with Cliff.) What is the SRCT model, Cliff? What is the "media equation?"*

Cliff Nass: Fortunately, it's one of those things that can be summarized in a sentence. In essence it says, "People's interaction with computers, television, and other media is fundamentally social...and we mean "fundamentally" in the strongest possible sense. One can take the theories of how people deal with other people and apply them to human-computer interaction, and also take the experimental methods and experiments that are used to understand these theories and apply those, as well, to understanding and testing human-computer interaction. By doing that, we discover many, many new things we never would have guessed were true—and also change our focus to variables that might be important to regular people—variables such as fun and liking...things that tend to be absent from CHI conference presentations.

Richard Anderson: *Is it always true...do people respond to technology socially in all cases?*

Cliff Nass: I think it's most useful to think of the answer as "yes." One of the reasons that the reception at CHI may have been a little less warm than it otherwise might have been was that I believe that people should try to state their theories in the strongest and most forceful possible terms. This doesn't mean you believe them that strongly, but it means that you voice them that strongly so that others can know when they agree or disagree. So, I think the answer is "yes." Fur-

Bill Buxton



thermore, I think that we learn a lot more when we make believe the answer is always “yes” and focus on those one or two times in everyone’s life when we are able to think past it.

Richard Anderson: *What characteristics of technology prompt social response?*

Cliff Nass: That’s a great question, and that’s actually something that we’re really trying to nail down. One of the most likely things to do it is the use of language. I’m not talking only about speech here, though speech clearly ups the social ante. Even a text-based system that uses language is enough to generate social responses. Interaction, cognizance of what happened before, and reacting to that cognizance...doing something social that’s normally done by a person...that seems to cue social responses. Things like voices, faces, and the other anthropomorphic features are also relevant. It doesn’t take much at all.

Richard Anderson: *Why do these characteristics cue social responses?*

Cliff Nass: We think that the answer is an evolutionary one. The greatest opportunities and the greatest problems a human faces are other people. Though not true of all species, all our primary predators and our primary prey and our primary mating partners are all in the same species. Therefore, humans have evolved so that when they see anything that even hints at being human, their brains immediately kick in and say, “Ah ha, this is a person! And I will act as such because there are so many advantages to doing so.” Our ancestors that didn’t do that really lost out. So we are living with an old brain that’s now confronted with new media that comes along and fools us and tricks us. But our brains are so powerfully directed to those evolutionary fundamental responses of socialness that it’s almost impossible to overcome.

Richard Anderson: *What are some of the important social rules that you believe need*

to be understood in order to execute social aspects of user interface correctly?

Cliff Nass: Just about all aspects of human behavior...simple things such as politeness and flattery, and richer social rules such as being part of a team, feeling cooperative, all the ways we induce cooperation, and all the ways we induce trust...all the things that make us feel like we’re working together and we’re being polite and we’re being predictable (predictability is a fundamental social response)...anything that makes us feel like this is a natural and social experience.

Richard Anderson: *Give us an example of how tending to politeness could affect user interface design?*

Cliff Nass: That was actually the first study we ever did—way, way back. It simply involved people working with the computer, and then either the computer they worked with or a different computer...asking, “How well did that first computer do?” With humans, we know what would happen. If Richard asked me, “How do you like the interview so far?” I’d obviously say, “great.” You in the audience would likely say “great” as well, but you might say less nice things than I would. Because of the social demands when people ask questions about themselves, they get more positive answers than when others ask. When we did the same things with computers, sure enough, people gave significantly more positive responses to the computer that asked about itself.

Another important point is that they denied this vehemently, even after being showed the data. They said, “Well, it obviously applied to all those other computer scientists who didn’t know better; it couldn’t possibly apply to me!” So that was a clue that we were on to something, and we’ve probably done 40 or 50 experiments since.

The way that plays out in interfaces...most interfaces are remarkably impolite, not just in the Miss Manners sense, but in the sense of following the Gricean rules of polite interaction and all the other rules of polite interaction. We have interfaces that con-



Clifford Nass

stantly violate politeness norms. Yet, we're surprised when people don't enjoy them, get angry at them, get frustrated, etc....

Richard Anderson: *Why do so many people despise the dancing paper clip?*

Cliff Nass: I was involved in the work on the dancing paper clip, but I think they're right to despise it for many reasons. The single best reason is a fundamentally social one. When you ask people why they hate that paper clip so much, one of the first things they say is, "Well, every time I write 'Dear Fred,' the thing pops down and says, 'Oh, I see you're writing a letter,' and they dismiss it. The first time, it was okay, it was helpful. The second time, it was at least trying. But by the forty-seventh time, it was clearly being at best passive aggressive and at worst down right hostile, implying that I couldn't make a decision about the right thing to do." Well, we know what we do with people like that—we hate them. In fact, the first rule in the Dale Carnegie course of "How To Win Friends and Influence People" is—remember things about people. The paper clip doesn't do that. Also, it manifests a particular personality style that is not terribly popular; it's a rather dominant, unfriendly personality type. Those are some of the reasons.

Now with that said, there are characters in there that lots and lots of people like—unfortunately, the interface was designed so that you couldn't discover them. But if you go in and look for the other characters, the research shows that almost everyone finds a character that they like. Its lack of memory is still annoying, and that's a problem, but there's a range of characters in there; unfortunately, that was hidden in the interface.

Richard Anderson: *When we swear at a computer, should it swear back?*

Cliff Nass: It depends on what you're using the computer for. This is important. There are cases where we want the computer to seem to have high status relative to us; there are some cases in which we want it to seem

to have lower status; and there are some cases where we want it to seem to have equal status. For example, if you had a very complicated medical monitor, you wouldn't want it to sound highly submissive and tentative, saying, "Well, perhaps you need a little more insulin right now—maybe we should consider that." Instead, you would want one that seemed confident, dominant, and basically in charge. And if we swore at it, it should say, "Don't do that to me! I can swear at you, you can't swear at me." There are other devices, other contexts, other roles, other situations...in which we want a submissive interface. So, the answer is that the interface should be consistent with the role that it has—exactly as we admire those people most whose behavior and personality match the roles that they have.

Richard Anderson: *MIT and IBM recently announced plans to develop a computer's ability to detect users' emotional states so that it can respond more appropriately to users. Do you think that these plans have promise?*

Cliff Nass: Yes. I think that there are really two problems—both are important, but only one of which is interesting to myself and my lab. One is a very hard problem. How do you detect emotion? How do you identify what a person's emotion is? The other problem is—what do you do about it? We recently proposed an interface that did one of three things. When it measured your emotions, it either said, "This computer has detected your emotion. It is such and such, and it will adapt to that emotion to make the experience go better." Or it said, "This computer has detected your emotion." Or it said, "This computer has detected your emotion. It's going to really impede your performance, so get with it and fix that!" Now, all three of those responses can be really appropriate in various contexts. Hence, the hard question (I think) is not, "How do you identify people's emotions?" but "What do you do with them once you know them?" Again, I think the psychological literature has answers to those questions.

Bill Buxton



Richard Anderson: *Bill, let me shift over to you. A lot, although certainly not all, of your work has been focused on input devices. Give us a brief overview of some of that work—but particularly its motivation.*

Bill Buxton: This will be a bit of revisionist history, probably, since what I say today is probably different than the story I would have told you 20 years ago.

I believe in natural language systems, but I also believe that body language is part of that natural language. In our use of manual input, primarily in interacting with computers on the input side, we were basically handicapped—literally with one hand tied behind our back for the most part, and without the use of all of our fingers except for one. Our ability to articulate using body language was just horribly restricted.

I'm a musician. I started out just trying to make better musical instruments and trying to make art with computers; that's really where my interest in input devices—and a lot of the insights—originated.

As my experience grew, what I found was that it wasn't just music systems that neglected input. The same was true whether you're doing a drawing, doing a spreadsheet, or anything else. Graphics got all of the attention—this is funny, because I work for a computer graphics company. There was a discrepancy between the bandwidth that the computer could use getting to me and what I could use to get to it, as well as the richness of the vocabulary that I could apply over the same bandwidth.

It always has struck me that if you wanted to make substantial change in user interface, first of all, change the devices, and second of all, focus on the input devices. Six months of research and a couple thousand dollars focused on input will get you way further ahead than 10 times that investment on graphical output—just because of the relative stages of maturity. So, in my own work, I went where the weak spots were. Today, I'd give you a slightly different answer, and this ties in with some of what Clifford was talking about. Today, if you ask people what's going on with computers,

that is, what's changed, they're probably going to list the following: that they're smaller, they're faster, they're cheaper, there's more of them, they're networked, they can sense location and motion, and so on, and finally, the input/output devices are changing.

Now, I'm pretty sure that the answer that I would get from almost everybody in the audience, or anybody they know, would be about the same for the first few items on the list—smaller, faster, cheaper, and more of them. However, when you get to the bottom of the list, things are going to be fuzzier. This is significant, since I believe that in terms of design and where we're going, my list was given in inverse order of importance! That is to say, for anybody working in HCI, the most important things are the input/output devices. The second most important things deal with location and motion sensing. (And I mean "location" in a social sense as well as a spatial sense, so I know my location relative to this other device or in terms of this person or in terms of other things around me.) The third most important: the networking. Everything else is actually completely boring as a research topic to anybody in HCI, because there are millions of people working on smaller, faster, cheaper, etc. That stuff is going to happen anyhow, so why waste your time on it?

As I said, of greatest importance are the input/output devices. Coming back a little bit to Clifford's way of speaking, it's about first impressions. It's what you see, feel, and hear that shapes the core of your mental model of the nature of the beast. When I give lectures, I go around and ask people to draw quickly, in 15 seconds, a picture of a computer. I have over 3,000 of these things in my filing cabinet, and over 80 percent of them don't include a computer; instead, there is a CRT, a keyboard, and a mouse—the input/output devices. Those are the things that shape the mental model. If I had asked people to do the same thing in the '60s, they would have drawn key-punches and some other things; again, the computer would have gotten left out.

That leads to a most powerful realization:



Clifford Nass

the most powerful thing shaping our mental model is an accident of history and is, therefore, a candidate for change. If I have a good sense of the mental model I want to create, in terms of the right model for the right person at the right time, by designing the affordances of the I/O transducers, I can conjure that model up in the user's mind.

In my view, the only good computer is an invisible computer. So, if a user is conscious of interacting with a computer, it represents a failure of design. So, a lot of the issues that Clifford is talking about start to not only challenge our thinking, but also to provoke questions as we move into the family relationships that we would see in ubiquitous computing and embedded computing—especially when you start thinking about foreground and background types of interaction. Most of the social interaction that Clifford and Byron speak about is around the foreground and not the background—which is actually one of the main areas for future change.

Richard Anderson: *Let me follow up with a related input device question. You have argued for a need for a collection of strong, specific devices, each best suited for limited tasks. What do you mean by that?*

Bill Buxton: In evolution, whether we're talking about biology or almost anything else, strong, specific systems have typically won out over weak, general ones. I believe the same is true in user interfaces and interacting with computers. The notion of a general-purpose computer and general-purpose workstation is simply an obsolete notion.

To sort of paraphrase some of what Clifford says—it's extremely rude. The skills that you and I (and everyone else) have acquired, and on which we base our sense of self and our identity, are completely ignored. Our systems, by their design and by their physical manifestation, are contemptuous of what we've spent our lives learning how to do.

People keep saying, "Why can't computers be as easy to use as a pencil?" Well, my wife went to art college. She spent something like 18 or 20 years learning how to use a

pencil effectively. But what happens when she sits down in front of a computer? She gets something that is unworthy of a grade-school child—because it's a general-purpose device—it's a 15-dollar device. You need something to capture the skill of somebody who has the skill of drawing. And the transducer to capture the skill of an artist is very, very different than the transducer needed to capture the skill of a court reporter or of somebody operating a car.

My view is that very strong, specific devices are how you make computers disappear, and how you change the computer from something that gets in the way into a prosthesis that helps empower us and actually makes the world simpler.

There's a very simple litmus test for me in design. Does the design make the world easier to navigate and function in, or more complicated? If it makes the world more complicated, it's bad design.

Richard Anderson: *Does the CHI community understand design?*

Bill Buxton: The CHI community isn't a design community. That's not an insult, by the way. There are lots of communities that aren't design communities. I don't believe that the CHI community is primarily concerned with design. This is manifest in many ways, such as in the very small interaction between the CHI community and, for example, IDSA [the Industrial Designers Society of America], which is concerned with one aspect of design. It's not a criticism. It's an issue of not having found a way to work together.

Let's look at priorities. If you talk to computer manufacturers, they'll tell you that they can't afford to spend more than a few dollars on a mouse or a tablet or to manufacture a keyboard. Yet, a good watercolor artist has a set of sable watercolor brushes, the collection of which costs more than the total cost of a Macintosh computer. The cost of a single violin bow of a professional violinist—the bow alone, not the violin, just the bow—costs more than a Silicon Graphics workstation. Somebody who's highly skilled

Bill Buxton



is willing to do whatever it takes to acquire the technology that will be able to capture the subtleties of nuance of gesture or of whatever, just to accommodate the skill that they've spent years and years acquiring. It's the contempt for that skill that's manifest in general-purpose devices, which are basically jacks-of-all-trades, masters-of-nothing. That frustrates the hell out of me.

Richard Anderson: *Will the day come when collections of strong, specific devices will be easy to obtain?*

Bill Buxton: Absolutely. But, ironically, good design is a really thankless task, because if it's really good design, you probably don't notice it in many cases...it just disappears into the ecology of your everyday world. The things that don't work are the ones that shout out at you. So, failures dominate your perception, because successes just become invisible. We are starting to see strong, specific devices coming out and working very well. Though when I say very well, it's relatively speaking.

I felt sorry for Clifford and this whole thing with "Bob," and I'd like to use that as an analogy to talk about introducing new ideas. First of all, I'm curious how Bob would have been received in the press and other places had it come from Apple rather than Microsoft. I think a lot of the negativity had nothing to do with the design at all—it had to do with where it came from. Regardless, why would we expect a new paradigm to have been gotten right the first time or early on? One of the fairly successful new approaches out there right now is the Palm Pilot. But what's interesting about that is that everyone in the audience probably can make a list of the companies that have gone bankrupt and failed in doing pen-based PDAs. Yet, despite a litany of failures (one after the other), one came out that in many ways is indistinguishable from things available 10 years ago. But Palm got a few little subtle details right that made all the difference. It's still a terrible device, but it meets threshold...it actually does what it's supposed to do. And it will still get better.

There are lots more examples like that that are going to emerge. Things will evolve, but there'll also be a lot of casualties along the way.

Richard Anderson: *Cliff, I wonder if you would like to respond to Bill's comment about Microsoft versus Apple.*

Cliff Nass: Yeah. That was something that was, in fact, reported in the press. A couple of reviewers thought it was an Apple product and said, "This is great, another breakthrough in design by Apple," but when they found out it was by Microsoft, they sort of reamed it.

A related notion is that it was a foray that said, for one of the first times in computing, "This is not for people who love computers. This is for people who have tasks to get done." I think that the incredible reaction of people in the computer community was partly due to their feeling that they were being left out. In fact, we went back and looked at the literature that came out when automatic transmissions first appeared, and you read things like this: "Automatic transmissions will allow anyone to drive. Instead of needing to go to courses and understand how the car really works, any ignorant person can get into a car and use it. In fact, even women will be able to drive this new automobile." The extent to which that was exactly much of the press on Bob was remarkable. "Why, they think you can use a computer without taking a course!"

Bill is exactly right—there is incredible value in designs that meet a particular need for the expert. But there is also incredible value in designs that meet a need by working for people who want to know nothing about it...who don't want to study for one minute. Both communities need to be helped, and Bill's idea of specialist devices actually helps both communities. But the primary ox that was gored with products like Bob was saying, "This isn't a game that you guys who build computers can play in." I think Apple could have pulled that off better than Microsoft, but it was a startling and upsetting notion.



Clifford Nass

Richard Anderson: *Bill, some of your other work has involved the use of 3-D interfaces. Jakob Nielsen started one of his fairly recent Alert Box columns with the words, "2-D is better than 3-D, because people are not frogs." Is he correct?*

Bill Buxton: Maybe if he lives in South Park. (audience laughter)

Richard Anderson: *Is there a large role for 3-D on the Web?*

Bill Buxton: There's an assumption embedded in your question as to what the Web is. Do I think 3-D has a large place in the Web, as we know it today? No, probably not. The number of people that work with VRML [virtual reality markup language] and the success there have not been particularly great. But the notion of Web browsers today is totally boring and just not interesting to me at all.

When I think about 3-D and networks and sharing and so on, I think 3-D has a huge place. You know, it's the old cliché: if the only tool you have is a hammer, then you see the world as a bunch of nails. If the only tool you have is a Netscape or an Explorer browser, both of which are identical conceptually (going through a CRT and a keyboard and a mouse), then you see things very differently than if you changed the nature of what the transducer is. What you are doing would change, the content would change, the location would change, the adjusters would change, and the values of different external representations (visual representation of 3-D) would change as well. It's the lack of breaking out of those constraints and those assumptions which is inhibiting to CHI.

Jakob writes provocative things, but this provokes me in the wrong direction. The thing that worries me to death is that if people listen to something like that, we're going to end up with a situation similar in nature to the situation where we didn't understand the line-oriented text editor until after it was obsolete and we were all into graphical user interfaces. We're going to understand graphical user interfaces to

about the same level once they're completely obsolete, and at the same time, very few of us will have spent time saying, "I'm assuming that the graphical user interface and the Netscape browser and the CRT are obsolete. They're not going to be around much longer. What's next, and how does 3-D (and audio and gesture) fit into that new world?"

Regarding some of Clifford's notions about our relationships with computers—what happens when the computer is actually just the large whiteboard that I walk up to and that looks like any other whiteboard? Will we have the same kinds of relationships that he and Byron talk about in their book when I have a very strong, specific thing for teaching up on the wall that looks and feels just like a whiteboard? I'm taking notes right now on my Cross pad—it's just a pad of paper and my pen. How is my relationship with that machine different than the relationship my great-grandfather had with a pad of paper? When you break out of the box and consider these other forms, the perceptions of the machines change, and the devices change. And with these new perceptions and the new tasks and contexts that come with them come opportunities to exploit things like 3-D and audio. So, it's hard to talk about the representation without talking about the language or the messages and the types of models that you're trying to communicate with those representations.

Cliff Nass: I agree with Bill. But a warning: the problem with radically new things is that the first ones are usually atrocious. The first movies were atrocious. The first books were boring and atrocious, though I suppose the Bible doesn't count. For the most part, when we try new things, our first attempts are much worse. Part of the lesson in Jakob's "2-D versus 3-D" claim is that it's a lot easier to do rotten 3-D than it is to do rotten 2-D. And it's a lot harder to do great 3-D.

The problem for a community that's in a world where things change rapidly is that it tends to become a very reactive community. When bold new interfaces appear, we immediately say, "Oh, it's terrible because of this...I

Bill Buxton



don't have to study it any more. I don't have to try to draw understanding out of it." So, the depressing notion is that as these bold ideas appear, the first ones aren't going to be as convenient to use as a Netscape or Internet Explorer browser. Therefore, the community tends to ignore them as opposed to looking for the big ideas.

As far as what happens when whiteboards become computerized...it's a lot like what happens with people in low-level service industries in the United States. They become relatively invisible, because the jobs they do don't require us to have a rich social interaction with them. A whiteboard that just takes information is like someone to whom you say, "please pick up this book for me." The person goes and gets it and brings it back, and you may say, "thank you" thoughtlessly, but there's no social interaction there. It's when the thing has speech or some other modality that cues social responses—then it's not just a whiteboard. So whether things are psychologically present or invisible is something that we navigate in the social-to-social realm as well as in the social-to-technology realm.

Bill Buxton: In your book, you talked about arousal. The measure of maturity might be when the thing that arouses me when I'm working with a whiteboard is what I wrote on the whiteboard rather than the whiteboard itself.

Cliff Nass: Yeah, I think that when technologies mature, they're either radically social or radically invisible. That's very much like the roles we have in society. I think the middle ground of where technologies go from foreground to background just isn't a sustainable model in the long run. There will be highly foreground technologies, and there will be highly background technologies.

Bill Buxton: Actually, I'll buy into that. Let's take the case where we push things to the extreme. Whiteboards aren't finely crafted musical instruments. If you look at the relationships that watercolor artists have with their favorite sable watercolor brushes

or that Stravinsky had with his pens and the kind of paper and ink he used... clearly he had an emotional relationship with them, which actually was consistent with the content...so, form and content had consistency. Look at the relationship one has with a really great car. These are clearly emotional things that go beyond what the whiteboard did. Which begs a question: can we make a whiteboard that just begs you to come up and do algebra? (audience laughter)

Richard Anderson: *Cliff, are we looking at Bill's picture as we would look at Bill if he was actually up on the stage with us?*

Cliff Nass: Well, I was thinking about that. Bill has the advantage of being much more handsome than I am, and he has chosen a particularly good picture of himself, and I'm stuck with what I have! On the other hand, and on the cheerier side for me, a study on synchronized speech done by Byron Reeves and Dave Voelker says that the fact that my lips move while I talk gives me an edge over Bill in that you think that I'm more honest and more intelligent. His words sort of win the day for him anyway! (audience laughter)

Bill Buxton: I'm not even going to touch that one!

Richard Anderson: *Bill, who has influenced your work and your perspective a great deal? Who are the people you have greatly admired?*

Bill Buxton: There have been a few people. My interest in user interface design was greatly influenced by Ron Baecker, one of my first mentors; I probably learned more from him about user interface design than anybody I've ever met. And there are some great people I worked with at Xerox PARC. But I'm going to actually step out of the CHI community—not to ignore those people, but because they're obvious, since I cite them in the literature.

One of the most influential people in terms of input devices was a guy named Hugh Lacain, who, with Bob Moog and Don



Clifford Nass

Buchla (both of whom I respect hugely), was building electronic musical instruments in the late '60s that I had the privilege to use and to work with. He may have been the first person I met who was a luthier—an instrument builder.

A lot of the people who have impressed me are crafts people who have an incredible ability to execute a detail in making beautiful things that are functional as well. I keep coming back to this notion of tools for artists, partly because I started out making musical instruments—electronic musical instruments. So influential has been the fact that with a beautiful violin or watercolor brush or similar device...you want to touch it, it begs to be touched. And the moment you touch it, you don't even have to play a note—it reflects the respect for your skill and your hard work that the builder...the luthier...embedded in the device itself. It's people like that who have most stimulated me.

Also, a number of musicians who I worked with early on stimulated me and triggered me. When you design something...when you're the propellerhead who designed the silly thing, and you know everything about it, supposedly, and then you hand the thing off to a musician, and they do things with your instrument or device that you never imagined was possible...in terms of stimulating respect and challenging you to go on further...that type of experience had a strong influence on me. I was very lucky, early on, to be exposed to that.

Richard Anderson: *Cliff, same question.*

Cliff Nass: There were three who I can identify. The first was my dissertation adviser, Jim Vandiger, who once said to me, "Do the best you can with the data you got. Don't try to really answer the question." And he said, "Remember that the history of the 13th century is based on two diaries, and when they find the third one, there's going to be a very different history of the 13th century, but we shouldn't stop historians." That really made me think, "Could you do these experiments—try to capture basic notions, not test every product, not ask

every user?" I think the answer is "yes"—realizing that your theories may be revised... that you may find the third diary or the new experiment. I think that was a very important lesson.

As for the second... When I started this research program, not only the CHI community, but also my own colleagues, thought I was a crackpot and urged me to do something else (I was going up for tenure at the time) and said, "This area is insane." But I persisted, and experiment after experiment didn't work, and my graduate students all left me, except for one loyal student, Jonathan Steuer. I was so miserable that I went off on a hike with my wife, Barbara Levitt, and said, "Well, I'll just clear my head and hike away." And so I hiked, and all of a sudden, it started to rain, in June, which is impossible in California. So, it was clearly only raining on me. And this was clearly the bathetic metaphor for my life, and I was about to throw in the towel when my wife said, "Why don't you just do an experiment you're sure is going to work?" And that one worked and led me to lots of others that worked.. So, she was a very big influence.

And the third... When I first encountered the literature in computer science about computer-human interaction, there was this remarkable arrogance of, "This is what normal people do, and this is what we computer scientists, who are deep and thoughtful in understanding the distinctions between computers and humans, do." And, "Oh, those pathetic people—one day we'll cure them and train them and make them take classes, and they'll be okay." This rubbed me the wrong way. This was a type of arrogance that seemed really suspicious. I was trained as a sociologist, so comments like that, that we're different than them, always raised hackles. So, I really wanted to set out to find similarities among people, and things that were education- and arrogance-independent. So, much of my work tends to look at things that are the same whether you know what you're doing or not.

That was the third influence, but I will say that that has really changed. To the credit of this community, this standing apart between

Bill Buxton



people who are computer literate and computer knowledgeable, and those who are not, is no longer one of contempt or patronization. So, I suppose that if I entered the field today, I wouldn't have that third inspiration.

Richard Anderson: *Bill has stressed the importance of making technology disappear in order to minimize its interference on human-to-human communication. Can the technology be designed so that the interfering role that it plays be played in accordance with social rules—perhaps making it a beneficial participant in the interaction?*

Cliff Nass: Yeah. I always look for human examples that are similar, and a human analogy is the superb translator. When you go to a foreign country to give a speech, and you have a translator, somehow the translator (though doing something quite disturbing and traumatic . . . changing your words and in some sense owning those words) can become invisible. The best ones become invisible; they become a mere "conduit." And as Bill said, the unfortunate part is that they lose all credit for the remarkable work they are doing, because good design does get invisible.

So, there are certainly ways to do it, and much to learn from humans. How do butlers become invisible? How do messengers become invisible? The issue is to think about, "What would we want a person to do to facilitate this interaction?" Sometimes it's, "go away," such as when you get fixed up on a blind date, where instead of just being told to appear at a place, you're brought to someone's house for dinner. How does that person gracefully start vanishing into the background to enable successful interaction? The person doesn't keep on popping up and saying, "Hi! Remember I'm going to facilitate this social interaction." Instead, the person starts things off, then smoothes the way through various clever tricks. Those are the types of skills that technologies can have that will facilitate interaction. But again, as Bill noted, the designers of those systems won't get the credit they deserve.

Bill Buxton: I'd like to give a concrete example that's consistent with this, an example that comes from some of the research that we did at the University of Toronto with the Ontario Telepresence Project. The underlying principle is that if we know the biases or the type of behavior that we want to evoke, then we can design the biases through the affordances of the devices so that that's the behavior you get. And one of the strongest biases on our behaviors is the bias of the path of least resistance.

We used to have these desktop video conferencing units that you could use to enter each other's room to talk (this is stuff that grew out of work at Xerox PARC and Xerox EUROPARC). When Hiroshi Ishii spent time with us, he never used the system. He would always walk down to my office, which was two floors downstairs. I finally said, "Why?" and he said, "Well, because it feels rude to just jump onto your desk. There's no way to approach." (Marilyn Mantei has talked a lot about this notion of "approach.") So, I hung a small monitor, camera, and speaker above the door, far away, which I could hardly see (but I could make things out), and the setup gave a very wide-angled distant view of just me and my desk. And I could also hear people when they would appear there. The video circuit was placed in a location appropriate to the social function of standing at the door to see if they could come in, and because of its distance from me, it degraded my ability to see the person. It also degraded their ability to see me in detail, but it enhanced their ability to see global context. If it was OK for them to move in, then they could move up to the desk where they got a very different type of view. So now there was a transition, and each location had a different set of affordances that were appropriate for the type of social interactions that would take place if there was a live person there.

By adding more technology to the room, but the right technology in the right place for the right function, the apparent technology and intrusiveness of the technology were greatly reduced; it didn't interfere, but there was much more technology there. And



Clifford Nass

each of the pieces was bad at some things, just as each was good at other things. The design grew straight out of the social or anthropological analysis of the architectural space and the social functions that appear at different locations in that space.

I got really excited when I read *The Media Equation*, because I wasn't familiar with that work. Clifford and Byron were taking a descriptive approach to things rather than saying, "This might be relevant to design." We had sort of stumbled onto this stuff. We didn't have any of the theory behind it, but we were applying it to design. So, my reading of Clifford's book sort of said, "Yes, that's why it worked; that can explain what we did." It was like finding the other half to something we'd been struggling with for more than 6 years.

Richard Anderson: *Bill, you have often argued that it is appropriate to design things to accelerate and encourage the transition from being a novice to being an expert, instead of designing something to be user friendly.*

Bill Buxton: Yeah.

Richard Anderson: *Might Cliff's work suggest that things need to be user friendly while guiding the growth of expertise?*

Bill Buxton: This is funny, because we just had a big argument about this today. Were you eavesdropping?

My concerns about the notion of user friendly have to do with the question of, "What the hell does 'user friendly' mean?" If you take a sociologist's perspective or a behavioral psychologist's perspective, you might be able to quantify it and measure it. I talk about enhancing the ability to make the transition from problem solving behavior to skilled behavior—novice to expert, because I know what those things mean quantitatively...I know how to measure those things (well, actually, I don't, but I'm lucky to work with smart people who do). But we know how to measure this stuff, and we can actually make specifications. And it's

meaningful.

By the way, when I talk about the novice-to-expert transition, I don't mean novice to expert as an artist or as an animator or as an accountant—I'm assuming you're an expert there. I'm talking about your ability to utilize the tools.

The term "user friendly" is a marketing slogan which I stay away from—just because it's become meaningless. Things in our lives, whether they be buttons, shoelaces, saxophones, pianos, guitars, or automobiles... none of those things are "easy to use"...none of those things meet Ted Nelson's "10-minute rule," which claims that you should be able to be functioning and working in 10 minutes. Ted is a charming guy and is entertaining, but that's a stupid statement to make about tools (if, in fact, he ever really made it). If you believed that user friendly was important, all the things I just listed, like the violin, the piano, and the car, would be obsolete, because they aren't user friendly in the sense that you can just walk up and use them. Yet, that's what most people mean when they talk about user-friendly computers.

When making the transition between novice and expert...should there be a smooth curve? Should there be a gradual transition? Should what I do in 30 stages of problem solving be developed and reinforced to help me later in the expert stage? Absolutely! And should I be swearing that whole time? Absolutely not! So, in that sense, yes, they should have a degree of politeness and civility. But I would never use the term "user friendly" any time, any place, except to rant about how much I don't like the term.

Cliff Nass: I agree with Bill. In fact, there are things for which your friend is not the right person to teach you. Some of my greatest teachers were not and never could be my friends; in fact, there were domains in which their harshness and ruthlessness really helped me to achieve my goal, which was to become expert in those domains.

So, is the goal to instantly make people happy (which is a perfectly fine goal)? Or is

Bill Buxton



the goal to get people to use a particular tool successfully so that in the long run they will be happy? Long-run happiness and short-run happiness are often competitive, and neither one is always the right thing to do. I don't know of any expert in any area who says, "Gee, the reason I'm an expert is because everything was so easy and everyone was just so supportive." Sometimes you need pushing. My graduate students tell me I err perhaps too much that way. Nonetheless, it's not always the right thing to try to be nice. The nicest thing you can do for someone is to help them meet their goals. Different people do that in different ways, because of individual differences and because different situations require different techniques.

And learning things in 10 minutes... I don't actually think Ted meant that. Ted says many things he doesn't mean, and I think that was one of them.

Bill Buxton: Unlike us, right? (laughing)

Cliff Nass: Right! We stand by what we say, Bill! (laughing)

Richard Anderson: *Yesterday, Clement Mok and Jacob Nielsen argued for a need for information designers, brand strategists, user researchers, software engineers, and all sorts of other disciplines on a Web design project. I'm interested in learning what disciplines the two of you emphasize the need for.*

Bill Buxton: I can't answer that question without qualifying it. Am I at a university? Am I at a research lab? Or am I actually building and designing products for people who are trying to do serious things (and art is serious, by the way)? Am I trying to make tools that ensure that the people who work for my company will still have a job tomorrow and ensure that the artists who use the technology (in our case, the animation systems) have the best tools available? Where I work today, the reality of trying to do good design and get innovation and new concepts into products is very, very different

than when I was at Xerox PARC or at the University of Toronto. The strategies and the approaches are very, very different. One of the reasons I made the transition to the company I am now at is because I wanted to understand both sides. Technology transfer—for things to get out from the time they're known to the time they're in the public—continues to take 15 years. I'd like to reduce that to about 7 years.

I also want to find out how to have the skill of user interface design understood so that people will respect it in the same way that they respect the skill of hacking an operating system or designing a microprocessor. Since the skill of design is not well understood, everybody is an expert, and they all have an equal vote. There's no other discipline that I'm aware of where everybody has an equal vote, regardless of their skill or expertise. So, one of the ingredients that will bring us to better design within companies and other organizations is getting to the essence of what the core elements of design are that we have to put into place...in terms of the organizational structure of our teams and so on.

Graphics design is really important, and a lot of people work on the visuals, but very, very few people work on interaction. The feel...the actual aesthetic of the gestures (the connectivity and the body language in that), and the dynamics of interaction, and the timing and the tempo, and the fluidity, ... this is the most neglected part...this is the area in which we have the fewest people who are literate. Therefore, we have these jerky, disconnected sentences in the body language of our interactions with computers.

Cliff Nass: I work very closely with a company, Netsage, that says, "To do design, you need social scientists, artists, and technologists." I think that's a pretty good formula. I want to emphasize a point that Bill made. There's been this idea that somehow design is this richly democratic process where we all listen to each other, we're all expert, we all take each other seriously. I don't think that is fully true. I think a better model is that we



Clifford Nass

figure out who knows the most about an area and listen to them most closely. The artist should listen to the social scientists about social science and to the technologists about technology...be informed about the true constraints and the opportunities. But the artists have to be trusted to do art; social scientists and technologists shouldn't be doing art. Nor should artists be doing technology. Since it's really hard to be good at one of these things...let alone two or even three...I think that division of labor makes sense. This idea of participatory design is a good one, but not when it means the abdication of expertise.

I was once teaching a class at Stanford, which often has these democratic impulses, and I said, "I can't remember who said this particular quotation: A or B." One of the students raised their hand and said; "Well, lets take a vote on it!" That idea about voting about facts...about voting about what's true, while it is charming and feels good, doesn't result in the best designs. You have to trust people at what they're really good at and interject stuff that you're really good at.

Bill Buxton: I've spent quite a bit of time in my current job around filmmakers. Film-making is clearly a highly collaborate skill involving tons of people with lots of different skills, but the fact is that there is one director...one who has final say. The way we do a lot of user interface design is that everybody on the executive team has an equal vote. If we made films that way, films would be like our user interfaces, and people wouldn't line up for a month to watch them!

I wish I could just wave a magic wand and say, "Here's how to do it." But when you're actually trying to build a commercial system, it's rare that you have the luxury of having that full suite of talents that Clifford and I sort of enumerated. And we left out some...we left out the usability testing people and the QA people and even others. All of a sudden you have such a huge team that you will never get a product to market, because either the team is too big to function or you simply can't afford it. That's the

Bill Buxton



problem. How do you do good design and get great user interfaces with economical teams? That seems to be a really important challenge. And it's a challenge which is all the more pronounced when we're still in an era where 95-plus percent of the computer science graduates in the world today still graduate without ever having written a program that was used by another human being, much less being marked on their ability to do so.

Richard Anderson: *Why is it difficult for people to trust the expertise of another?*

Cliff Nass: The problem has been that problems in computer science have historically been defined as technology problems. As the technologies become simpler and more accessible...so that you can use complicated programs without being a programmer, trust becomes equalized. In the days when the only people who could read were the priests (who were literate), nobody else had much say about anything. They could claim a monopoly on knowledge that was hard to challenge, because they claimed a particular skill that was so compelling and so unique, that it implied knowledge of all other things. In some sense, that's been the history of the field of human-computer interaction.

As computers get cheaper, easier, and faster, and software gets easier to use, no group can claim the core competency from which all power derives. As that happens, the social things will work themselves out...namely if no one can claim a core and critical position over all others, then they can't claim core competence in all areas. That's a very common sociological phenomenon. So, as more people can use this stuff and the priesthood breaks down, you'll start seeing a lot more trust and cooperation.

The early days of film weren't as cheery and remarkable as now. The cameraman, especially the person who could build and fix the camera, had an enormous amount of power and would often co-opt that into areas, such as directing, in which they might

not have any competence. Eventually, cameras got so reliable, so easy to use, that those guys eventually lost their status or the best ones retained their status for that particular role. So, I think it's a matter of the technology becoming stable enough for the priesthoods to vanish.

Bill Buxton: I think there's an additional issue. You need to know something about something before you know what you don't know. When you have a product to design or something you're trying to build and get into the hands of the ultimate user, you want to move...you want to be efficient. What you're trying to do is the equivalent of trying to do mathematics, and it's difficult to do mathematics if you have to explain arithmetic all the way along. It's the people who aren't even literate with the basic operations of arithmetic who believe that they know as much about math as you do.

I don't want to sound like an elitist, but education helps you build discrimination. You start to see differences that weren't there before. We know this about the history of photography in terms of resolution. We know that when Fisher played the first stereo, everybody said it sounded exactly like an orchestra, and we said the same thing about CDs. As we got more expertise and granularity, we started to realize that they don't sound exactly like an orchestra. Think of the paintings you saw in an art history course that made you say, "I could have done that." As you start to get some literacy, you realize, "No, I couldn't have." The point is that there is a basic literacy that has to be achieved before you start to see some of the finer granularity to how to make decisions and to why to think this way or that way. The basic assumptions that we need to all share so we can get on with the job are not there right now...they are there in more mature areas. But even art still suffers from this problem, so we shouldn't feel picked on. We should just recognize the phenomenon and start to figure what to do about it.

Richard Anderson: *Bill, you have talked about how people often focus on concepts*

that are wrong—that are too simplistic. For example, at a workshop of yours that I attended some time ago, you argued that people should be focusing on interactive perceptualization instead of scientific visualization. Also on multisensory instead of multimedia. What concepts are people focusing on now that are too simplistic, and what should they be focusing on instead?

Bill Buxton: I think that there are a number of things. We're overly simplistic about our view of how the Internet and putting computers in the classroom are going to revolutionize education. And I still question, in terms of epistemology, whether we know anything more than we did before that can be applied to the technology. For example, do we understand the difference between a whiteboard and a slate?

The fundamental problems are not technological in almost any domain in which we're trying to apply technology. The techno-centric view, as opposed to a human-centric view, is most simplistic thing. I think always of the technology as a prosthesis—whether it be a physical prosthesis or a cognitive prosthesis or a sensory prosthesis. To build a prosthesis, you need to know and have a theory of the function of the task it is intended to support. Then you can design its affordances in accordance with that model. We often cannot articulate the model that's underlying our designs, because we just do the design without the model. If I want to make a system for drawing, I had better understand drawing, not computers.

Richard Anderson: *You've also argued that we lack respect for human capability; indeed, you've stressed this already today. What human capability do we lack respect for that results in our lack of respect for human capability? Or to put it a little differently, what human capability do we lack respect for that makes it difficult to correct our lack of respect for human capability?*

Bill Buxton: It's interesting...you can go to any bookstore and see walls of self-help books about finding your inner self. I some-



Clifford Nass

times wonder whether this is rooted in the fact that a lot of us just aren't aware how we derive our sense of self, and what we're proud of, and our identity. In many cases, it has to do with the things that differentiate us from other people. Those are the things that we work hard at, because usually those differentiators are things we have had to work hard at. We probably have had some aptitude that we worked hard at, whether it be the kid who's the best math, the kid who's the best at music, the one who has the best calligraphy, the fastest runner, and so forth. If we start to understand that this is what's important to me... this is my sense of self and identity... and that everyone else has something like that, then the best thing that I can do as a designer is design things that amplify that, rather than ignore it and denigrate it—and as a result we're going to get great design. If many of us don't see what it is in ourselves that's important, then how are we going to take into consideration what is important in others in our designs...so that our designs amplifies what is important in other peoples. If we don't see it in ourselves, how are we going to see it in other people? Again, it's not a technological issue; it's just a question of what makes us what we are. (audience applause)

Audience Member: *A social perspective of interaction would suggest that people respond as they respond to people. I respond and interact with my mother very differently than how I interact with my daughter. With my daughter, I "emote" a lot more; I'm very accentuating emotional. With my boss, I'm very reserved. I differentiate, and I treat people as individuals, and I'm successful, because I can do that. I'm trusted, because I can do that. Do interfaces need to be able to differentiate, know the individual, and adapt accordingly or do they need to continue to just seek the successful central tendencies and serve the mass populations?*

Bill Buxton



Bill Buxton: You played beautifully into the argument I've been trying to make about strong specific versus weak general

systems. The more specific the device, the more I know about what it is, who's going to use it, context, and so on; therefore, the more appropriate the response can be. So, I would argue that your father's computer is going to be a different computer than your child's computer versus your boss's computer, because they will be distinguishable by the physical and social context in which they appear and where they are used and the behaviors that will be embodied.

The biggest problem with computers today is that they all have personality disorders—they would all have to be on Prozac if they were human beings. One minute I'm a word processor, the next minute I'm killing people in a game, the next minute I'm in e-mail, and the next minute I'm sitting there for erotic pleasure—what am I? If you look at strong, specific devices such as a personal computer which we commonly call a camera...it knows that it is a camera; it knows it's not a word processor; it behaves like a camera; it knows that its function is to have light in and chemistry out, or light in and pixels out; therefore, it behaves appropriately for its form and function and location. It doesn't have so much ambiguity, and the more I can let it know what it is.

Look at a flatbed scanner. A flatbed scanner has a personality disorder—it doesn't know what the hell it is. But if you look at the physical affordances, what the hell is it for if it's not for scanning flat documents? Yet, it doesn't know that it's for that, and it doesn't know anything about flat documents. And when you put a document on it, it can't say, "Hey, you're a color image—I'll do you in 24 bits," or "You're a grayscale—I'll do you in 8 bits," or "You're line art, so I'll do you in 1 bit," and things like that. It can have this kind of knowledge and take advantage of it. Xerox did some really interesting work on this for a product that shipped for awhile, but it hasn't come into the mainstream. As soon as we start having devices that know what they are, you will behave with them differently—in exactly the same way, I would argue, that you differently behave with the family and the other people in your social network that you enumerated.

Cliff Nass: The irony of that is that those clearly defined devices that have a clear role, a clear point of view, clear orientation, ... are in one sense easier to design for, because of the positive feedback that it ensues. If I have a clearly defined device, such as a camera that works like a camera in all the ways cameras should work and does all the logical things, not only will you as a user find it easier to use, but I'll be better able to predict what you're going to do. Therefore, I can further optimize, because I will not only know what the initial state is, I'll know the progression of that interaction.

This is true in voice systems as well. We've been doing studies on things like using a particular voice type to elicit certain voice characteristics. If you have, let's say, a highly accented voice speaking to you in a speech recognizer, we know the types of speech patterns you'll use. We know you'll hyperarticulate. We know you'll speak louder, because we all speak louder when we speak with people who we don't think understand us. Plus, I can leverage that to tune the recognizer to those particular characteristics. By knowing what's going on, you not only can make the user happier, you also get to, in some sense, positively manipulate the user into doing things that you can then further optimize to and therefore further manipulate the user. It's why we can carry on conversations without thinking very hard. It's because there are a lot of basic patterns that we execute quite well.

Bill Buxton: Let me give you an example that goes even deeper than that. BMW and a couple of trucking companies have been developing what is essentially a video camera with a microprocessor that fits in the dashboard of your car and watches you. The sole purpose of this computer is to get a sense of how tired you are, because it actually understands the behavior of your eyes, eyelids, and your glancing in order to alert you if you start to fall asleep at the wheel. Here's a case where a very strong, specialized computational device will be embedded in automobiles that basically can be the difference between life and death. Their

sole purpose is to take a measure of your arousal. Again, it is exactly what Clifford and Byron talk about in their book.

And they're useless for word processing! (audience laughter)

Audience Member: *Within industrial design, design is a process whereby function and form get defined. I wonder to what extent you people feel that we are taking advantage of this model. To what extent should we be addressing the functionality and interface issues at the same time...in other words, dealing with usefulness at the same time and usability?*

Bill Buxton: I think that both the CHI community and the industrial design community need to extend their design briefs in each other's directions. The industrial design usually stops when you get to the glass; industrial designers work in front of the glass, not behind it. They don't typically design the fonts or the icons—they're working on things like the box. Yes, I know there are exceptions, so don't beat me up.

Fifteen years ago, a lot of people doing user interface design and designing computers actually took it upon themselves to change the physical nature of the box, because they understood that it had an effect on performance. That is, to a large extent, one of the lost arts. A limitation that I now see in a lot of CHI research is that we take a priori and accept the fact that there is a keyboard, a mouse, a CRT or an LCD, and a GUI type of interface, and use that as the point of departure and just try to refine that. Now, any industrial designer would say, "No, no, no, let's truly take this notion of form and function and have consistency from the design of the fonts right through to the design of the box (for the function of whatever it might be), and let's not have any of those things a priori. Both sides could try to flow a bit into those opposites and just work a lot more together, but typically they're educated at completely different institutions.

Cliff Nass: Well, I think that there are times when you want to accentuate form



Clifford Nass

PERMISSION TO MAKE DIGITAL OR
HARD COPIES OF ALL OR PART OF THIS
WORK FOR PERSONAL OR CLASSROOM
USE IS GRANTED WITHOUT FEE
PROVIDED THAT COPIES ARE NOT
MADE OR DISTRIBUTED FOR PROFIT OR
COMMERCIAL ADVANTAGE AND THAT
COPIES BEAR THIS NOTICE AND THE
FULL CITATION ON THE FIRST PAGE.
TO COPY OTHERWISE, TO REPUBLISH,
TO POST ON SERVERS OR TO REDIS-
TRIBUTE TO LISTS, REQUIRES PRIOR
SPECIFIC PERMISSION AND/OR A FEE.
© ACM 1072-5220/00/0100 \$5.00

Bill Buxton



over function. I think Bill is right...that thinking literally out of the box, or thinking with the box—not just accepting the screen “as is,” is a great idea. But, even if you were to do that, there are trade-offs between form and function that become interesting. Frank Lloyd Wright houses, for example, are great for form and function, but Frank Lloyd Wright furniture is impossible to sit in. The furniture is quite beautiful, and that’s because he figured people wouldn’t be sitting very much in his houses. So, we can think about when should we worry about the form aspects as opposed to the function aspects, or put better, think of form as making beautiful things function—form being in service of a particular function, namely, making people feel good.

Bill Buxton: The Macintosh came out in 1983; it’s now 1999. Don’t you find it remarkable that at the end of the millennium, the hottest, most progressive, imaginative thing that’s happened is that iMac has colored boxes?

Cliff Nass: But they’re translucent, Bill!

Bill Buxton: ...and they’re translucent... but otherwise, from 10 feet away, they’re completely indistinguishable from anything that existed in 1982. And that’s considered progress and ground-breaking industrial design—give me a break! (audience applause)

Cliff Nass: You’re getting wild applause, Bill!

Richard Anderson: *My final question to both of you is the final question listed in the description of this session that appeared in the advance program. What is keeping us from achieving greater benefit from technology?*

Bill Buxton: Ourselves. It’s not the technology; it’s our own imagination. I think the closer you get to Silicon Valley, the more you confuse the word “invention” with the word “research” and the word “innova-

tion.” Fifty percent of what we do should be to go back and look at and learn from historical precedents and at what’s gone on in the past. The problem is that we think we have to be original—that’s how we show how clever we are. We have to invent things from scratch rather than do scholarship and do research and synthesize.

Right now, for example, everybody is trying to do the uni-stroke alphabets on pen based PDAs. In the process of writing a book that I’ve almost finished, I was working on the chapter on pen-based stuff. I just went to the library, did my homework, and lo and behold, it turns out that the basics of Graffiti—about 30 percent of the alphabet—were invented in 63 BC by a slave of Cicero named Marcus Tullius. His shorthand, notee Tironiana, was used for 1,000 years and was used to record the minutes of the Roman Senate.

What I’m really trying to say is that a lot of the ideas...a lot of the concepts...are out there, and we tend to think that there’s some magic bullet as opposed to the standard, old, traditional things of a combination of research, scholarship, and invention. And that’s us, that’s not the technology. The tools are there to do what needs to be done, and there’s no excuse except ourselves.

Cliff Nass: I’d add patience to that, which is something I alluded to earlier...the tolerance for designs that are worse overall and don’t work as well, but might have an insight embedded in them. We’re so concerned with just making things better overall, whatever better means, that we tend to ignore those things that do one thing well and lots of other things lousy. Learning from things that seem to be failures, learning from things that in many ways aren’t any better and are in some ways worse, would be a good lesson.

Bill Buxton: We should have a quota at CHI that 25 percent of the papers have to be describing failures and why they failed.

Cliff Nass: Absolutely. @