The Future of Technology
December 15, 2007
2:30 PM
The Philoctetes Center

Levy:	**Francis Levy**
Nersessian:	**Edward Nersessian**
Dyson:	**Esther Dyson**
Kirkpatrick:	**David Kirkpatrick**
Lanier:	**Jaron Lanier**
Meyerson:	**Bernie Meyerson**
Perlin:	**Ken Perlin**
A:	**Speaker from audience**

Levy: I'm Francis Levy, Co-Director of the Philoctetes Center. Dr. Edward Nersessian is the other Co-Director, and welcome to The Future of Technology. I'm now happy to introduce David Kirkpatrick—and I will say something after about Jaron Lanier, one of our panelists tonight who is also a very talented musician. After the roundtable we're going to take a little break and then he's going to play for us.

So David Kirkpatrick, who is he? David Kirkpatrick is Senior Editor for Internet and Technology at *Fortune* magazine and specializes in the computer and technology industries, as well as in the impact of the Internet on business and society. I just have to say that he's also a very excellent poet, and I know him in another venue.

Kirkpatrick: Well, thanks.

Levy: David will moderate this afternoon's panel and introduce our other distinguished guests. Thanks, David.

Kirkpatrick: Thank you, Francis. I've been coming to Philoctetes a lot, and to be moderating a session on something that I know a little bit about—though not nearly as much as our panelists—it's exciting. What we're going to try to do today is kind of an intrinsically futile thing, because predicting the future in general is impossible. Technology has such an unpredictable set of paths. We're going to be postulating things, but I would say that the group of four panelists that we have are unusually suited to talking about technology in the context of an institute which is interested in how many, many different fields interrelate, in particular the relationship of whatever we're talking about to the mind, neuroscience, psychoanalysis, psychology, human behavior. I think you'll find, and I hope that this is also an exhortation to the panelists, that in our discussion today we really will range widely into the human implications of all this, and perhaps the human limits of some of what we would talk about otherwise purely technologically.

So let me just briefly introduce the four panelists, and then we'll start a conversation. Maybe I'll say a few more things before we start.

Starting right here, Ken Perlin is a professor at NYU in the Department of Computer Science, where he founded the Media Research Laboratory. But he's also done, like all these people, a surprising variety of different things. He won an Academy Award for technical achievement for some work he did with digitization in film. Was that when you were with Freedberg, or was that afterwards?

Perlin: I did the work before, I got the award after.

Kirkpatrick: He also has been a featured artist at the Whitney Museum, doing computer graphics. So he's a very broad-minded person for whom the arts are not utterly divorced from technology.

Esther Dyson, a very old friend of mine, is an extremely well known author and pundit, who for years ran one of the most influential conferences in the technology industry, which is where I first met her, in 1992, or 1991, perhaps. She wrote a book called *Release 2.0* about six or seven years ago that was quite influential on how people thought about the Internet at a critical time in its evolution. She's a blogger today and has a blog called *Release 0.9*—she's very proud of that name. But today she's primarily an investor in technology companies and companies related to technology, including one very involved with health which she may mention, and is interested in aerospace, does a conference on that, and has written a lot about that as well.

Jaron Lanier—it's almost impossible to figure out what to say to describe him; he does so many different things. One thing that I particularly like that I ran across as I was preparing today, he's been working on a book, which I guess he's now handed in, which used to be titled *Technology and the Future of the Human Soul*, which I thought was really an apt title for this session, but he said he's changed the name to *The Technology Personhood*, which is also an interesting—

Lanier: —*of Personhood.*

Kirkpatrick: *A Technology Personhood*?

Lanier: No, *The Technology of Personhood*.

Kirkpatrick: *Of Personhood*, my apologies. I didn't write that down. Thank you.

Lanier: But I'll consider the other options there.

Kirkpatrick: I think I actually like the other title better, but that's okay. Jaron is probably most famous for having been really the first virtual reality guy, having coined that term and created a company way back when, which was involved with things like gloves that would give you a way to interact. New kinds of human interface is one of his great, long-standing interests. Even if you look at, say, the Apple iPhone today and the interesting thing they do with the two fingers you can expand—that's probably one of the most revolutionary things about that. That's the kind of thing that's an interface invention. That sort of thinking is really a big part of what Ken thinks about, what Jaron thinks about. That's probably a very primitive example of what they think about. But it's an example of how human interfaces are evolving, and that's something that you guys have talked about a lot. He's currently also a scholar at large for Microsoft's Live Labs, which is a part of Microsoft that tries to understand how cutting edge internet developments relate to Microsoft's product line. And he's—especially relevantly for some of the things we'll

talk about today—a science advisor to Linden Lab, which makes Second Life, the virtual reality world.

Finally, Bernie Meyerson has been at IBM since 1980. He's now Chief Technologist at IBM Systems and Technology Group, and has, as you see in the bio, a lot of patents. He travels all the time; he just came back from two weeks in Asia. Most of what he does today is to serve as IBM's interface with other companies with which it's talking about doing deals. He's negotiated a lot of those deals, including, he was saying earlier, the one that led to IBM building the chip for the Microsoft Xbox, which was one of their more successful partnerships, I think, since that's a pretty hot product.

So anyway, that's a little bit of background on those people. I was just going to quickly summarize some of the things that were in the blurb that I wrote to describe this panel, because I'm an information technology guy. What I try to think about is how computer technology is affecting that industry's evolution, but also media, telecommunications and a lot of other things, but particularly those two. There's a big, big set of changes that we're in the midst of right now, and there's so many different converging industries that it's actually very hard to predict where it's all going. But I think the unifying strand throughout most of the big changes is the Internet, which was kind of a progression of a lot of other technologies, but in the last 15 or 20 years this ability to have a global network that connects everything and everybody increasingly, on a truly global basis, is something fundamentally new that I hope we will explore the implications of at some length in the next hour or so.

So the title Future of Technology—like I said, my bias is Information Technology. As Ken said when I was talking to him on the phone, the air conditioner is a critical technology that changed society. If we didn't have that, we wouldn't have high-rise buildings. We're going to try to stay away from technologies like that, but technically we could get into that given the name of the panel. The other thing is, because technology is so completely interwoven with modern life, it's hard to really talk about the future of technology without talking about the future of how we live. I think if we shed light on that, in the end that will be our greatest success today.

I wanted to just start with Ken, to ask you when you think about where technology is going. I know you also have thoughts about the limits of what's possible given human society's decision-making—talk a little bit about how you see society's views toward technology changing, and what are some of the near-term changes in technology that may cause our lives to be different?

Perlin: Wow, that's a broad question.

Kirkpatrick: You can take it any way you want. I can refine it for you if need be.

Perlin: Okay. Oh, gosh. The thing that I said to you on the phone when we had that great chat yesterday was that the best way, I think, to answer those kinds of questions in the context of any given time of history or any given set of technological changes is to look for patterns in how people generally respond when there are disruptive technologies. I call things disruptive if they push for any sort of significant change in the political sphere, the social sphere, the economic sphere. Entire industries rise and fall based on when an electric motor gets invented or becomes cheap, or an LCD screen, which is what's happening now, or one of the things happening now.

So my view of it is that there is this odd kind of shake-out period where people don't know what to make of things for a while, and then they get very focused on this new thing and it becomes, "Oh my God, there's never been anything like this before and society will never be able to go back." Then what happens is everyone kind of gets used to it, and then we're on to other things. It's really hard to be looking objectively at the things that are making industries rise and fall at the moment, because we have this whole emotional thing going on. It's like everybody's got their iPhone, and the web is rapidly changing from what we thought was going to be this document sharing thing to something that's really more of a conversational chat space. I think it took over a decade before people figured out that everyone just kind of wants to hang out and talk, which is why things like Facebook or MySpace are really taking off. It's tapping into even more fundamental, older human forms of communication that existed before we had writing. I'm just throwing stuff out into the group conversation and you're talking back to me, and we're not thinking too much before we're talking. I think that's part of what's great about it, and people are very alarmist about that, because, "Oh my God, I'm talking in front of millions of people."

But again, just as has happened with previous technologies, there was a time when, in the early days of sound recording, if you made a change to a sound recording to make it sound like someone had said something they'd never said and then you played it on the radio it would be a scandal, because everyone would have thought, "Oh my God, that person said that." Now, what happened? Then of course we have *War of the Worlds* as a perfect example on radio with Orson Wells, and then that happened with photo retouching. Eventually people realized, well if it looks like somebody said something they never said, it was probably some kind of wacky technology intervention or whatever. Then all of the issues about "is that real or not" all moved to other forums that had nothing to do with detecting things technologically, and I think with some of the new things we're still enthralled to what's going to happen when this or that technology becomes undetectable, and everyone thought I said that on my blog? You realize at some point it all matures and people come up with other ways of working out the issues.

So I think to set the tone for all of this I'd like to start out by saying it's really useful not to be exceptionalist about our time too much, or too alarmist about things that people haven't adjusted to yet, because they will, and then it'll all become boring with these things, but then there will be something else everyone's going to get all excited about. So maybe I'll just start things off with that.

Kirkpatrick: That's not a bad way to start things off. So let's go to Bernie. You're with what until recently was the world's largest computer company. Still close, but that was by choice when you sold off the PC company. You make a lot of computers, which is the part that you're most closely affiliated with, the hardware part. Given your work at IBM and your own experience traveling the world, what is it that you see coming in the near future and maybe separately in the more distant future that this group might not expect?

Meyerson: Again, that's like 'meaning of life 42' and we'll just cut it off there. What you're looking at is a bit of a revolution. I have a video that I show which covers this whole subject on the topic of hair. What I'm referring to is if you look at any of the video games that come out nowadays—Playstation 3 is an example—all of the sudden people have hair that moves. It's not like me where you shoot me out of a cannon and it stays in place. This stuff actually flops, it's physical. That doesn't sound like an epiphany until you actually think about what computational

horsepower it takes to make hair move. It's a nightmare. It's a physicist's nightmare to get hair to go. Now the thing is, it's a game. This is on a game that can make hair move. That's basically a super computer in a box, and it's got to fit in the power of a light bulb. Now you go forward just a couple of years, you've squashed it down to the power that's not much beyond what you find in a kid's bedroom.

Now think about what it means when you have a super computer in your pocket, an infinite bandwidth. Well, there's good news and bad news. First of all, you have pervasive access to everywhere, to any imaginable kind of data you want: video, audio, it's unlimited. Take that as a given, that's done, because we can pull that off right now. I could equip everybody in the room with stuff, go outside, it'd be enough computing horsepower to choke.

Now the good news is you can get all the data you want, blog with anybody anywhere in the universe. I don't mean just on earth. We could uplink you and have at it with a space lab. But the flip side of the coin is other people see what you're doing everywhere, anytime, analyze it and know everything there is to know about you that you put out there. And a bunch of things you may not have put out there from the cameras up here, from the cameras in the trains.

Kirkpatrick: You mean things that were put up for you without your knowledge?

Meyerson: You bet. So what starts to happen is you have no privacy. It's not that somebody's spying on you. You just cease to be a private entity, because there are literally tens of thousands of ways society in general can check on you, both the good and the bad and the ugly. It gets interesting.

What's happening, and what I don't think people have fully appreciated yet, is you will become a public persona. You know people say I don't want to go into politics because I don't want to live life under a microscope. Guess what? The folks sitting behind me are on that camera, and we can basically pull that image up, do anything we want with it and broadcast it globally in a matter of a couple of seconds. You are no longer private individuals in the sense that you felt that you were, literally a couple of years ago.

So, it begs the question how far do you want that to go? That's done, that's old news. Now you go to the really next stage and say okay, what's next? And if you want to go to the next level, we had a bunch of kids called Extreme Blue, university kids. We said, "Look, build a company, a product, one product. You've got to pitch it to a venture capitalist, you've got to pitch it in thirty seconds." Here's where I'll stop. Their product was human augmentation, which is a la *The Matrix*, just plug me in. I don't want to learn this stuff, just hook me up. Not only don't they mind not being private, they want to be part of the web.

Kirkpatrick: How old were these people?

Meyerson: They were typically aged twenty to twenty-five. And what stunned me is we had a random group, a random group of about one hundred. Two of the teams, twenty kids, said, "Yeah, this is a great idea." That was their number one idea, from a cold start. We never suggested a thing. Think how far that takes it. We've just gone from everybody's a politician, which may have some truth in that, to I'm going to be a persona plugged in and attached all the

time, on all the time. It's an interesting segue. You're crossing an incredible divide when you get there. So that's all feasible. I'm not sure how well the plug-in works yet. That's got some ways to go.

Kirkpatrick: But something Bill Gates has predicted since his first book was that we would get there, and I think he still believes that.

Meyerson: Yeah. When I was in Singapore last week I sat in a lab, and somebody who had lost a limb was sitting there and doing a damn fine job, frankly, with a set of biosensors, essentially manipulating the limb, not off the residual neural activity in the limb itself, but just motor control through direct brain indicators. So it's coming.

Kirkpatrick: This issue of relying on technology for our behavior is really becoming so routine. I think Google is the way that's easiest to understand that. I'm at the age when it's starting to be easy to forget things, but you don't need to remember a lot of things you used to need to remember if you've got a computer nearby. All you have to do is, "What company did that person work for?" Then you get their name within ten seconds on Google. Or the book that Jaron is working on, or whatever.

By the way, any of you, whenever you hear anything you disagree with, or agree with—

Meyerson: Oh, now you tell them.

Kirkpatrick: Everybody's going to get their chance. We've got a lot of time here.

Perlin: He was embodying exactly the tone of alarmism that I was warning you about.

Kirkpatrick: Now it's Jaron's turn to say whatever he wants to say.

Dyson: And then I can disagree with them all.

Kirkpatrick: Please.

Lanier: I would expect you to. There are so many ways to approach these hugely unbounded topics you've given us. Usually I have a few different spiels that I might use as starting points. I've been very interested on the future of personhood, and what it does to us if we're all assembled into crowds all the time on Facebook-like entities and all that. But, given the location and the legacy of this particular place, I'm going to take a neo-Freudian tact instead, and I'm going to improvise this. This is going to be a brand new spiel, just for this event.

Kirkpatrick: We deserve it, so go right ahead.

Lanier: What I'm thinking about is neoteny as a framework for thinking about Internet culture. I will refer back to the early years of the virtual reality craze in its first incarnation, which was in the early '80s. Back then I used to give these raps about virtual reality, and we were all so excited about these things at that time that it was just this electric experience to think about these things and share wonderment with each other. One of the things I used to think about was a way in which you could imagine the future evolution of virtual reality as being a neotenous process.

Kirkpatrick: What is that?

Lanier: Neoteny. It's extended qualities of the early stages of an organism until outer stages of an organism. For instance, the human species is considered to have a high degree of neoteny, because our babies are born unable to fend for themselves. In order to allow our big brains out through the passage to life from the womb we have to be born a little earlier than we're really ready for, and then that's one aspect of neoteny. It turns out the development of human children takes much longer than it does for other species.

Dyson: Neoteny is Joichi Ito's company name also.

Lanier: Oh, well that's true. Although I thought he pronounced it *neo-tiny* and it was a pun on neoteny.

Kirkpatrick: Well, go back to what you were saying.

Lanier: Here's one of the raps I used to give. Let's imagine that you could think back to your toddler years and you could really remember them. There was a moment that probably existed for you, and I have a little daughter now so I'm able to observe this—I'm beginning to think that the old stuff I used to say might actually have some truth to it. At the time I couldn't have known, of course. Perhaps I still don't. But here's the sort of guess. Let's suppose you're a little kid, and you're just growing up and you're a toddler, and you're starting to understand you can manipulate the world. There's this amazing moment of transformation, which is actually a horrible moment. Prior to this moment you've started to be able to imagine things. You first start to perceive the world and you can conjure it, and there's a funny thing about being able to have an imagination, which this place studies, I guess, which is that a naïve imagination is like being the ultimate superhero, being sort of a god, because imagining is the same as reality, right? I used to come up with these crazy scenarios to give examples, like you're a flying golden platypus a mile across hovering above Manhattan, looking for a good deli or whatever, and you imagine this thing as if it's true.

Then there's this moment in childhood development—it's actually not one moment, it's an extended, horrible moment, which is most of childhood, probably, which is where you discover your personal limits. You experience the ultimate possible demotion from being godlike in your imagination to being this helpless pink thing that wets itself in reality. What could be a greater demotion, what could be a greater fall from grace than to realize your limitations?

Then accepting that state of affairs that you're limited and you have to use your craft and your cunning to get around and in order to do anything is what constitutes the process of becoming an adult, and it's a difficult, ongoing life process. I don't think I've quite made it through. I work on it though, still. In hypothetical, really good virtual reality, which doesn't quite exist yet—in hypothetical eventual really good virtual reality, which many of us are trying to build—certainly Ken and I have talked about these sorts of things a lot and tried to come up with the right gadget strategies and all. But hypothetically, you could have a world that is shared, like the physical world, where things that happen are really co-perceived by people to the same degree they are in the physical world. It's no longer just symbolic exchange like in novels or something, or on the web. But at the same time it's under your control, so it has this kind of concreteness that has the

same fluidity we associate with the internal world of imagination and dreams. So a waking state shared dream, or something like that, that's the notion of an ultimate virtual world. We certainly don't quite have that.

The easier part of the problem is how to get the effect, the shared, immersive world, but the harder part is the software of how we'd actually be able to quickly express what we want to happen in that world. But let's leave aside the technical challenge and whether it's feasible. Those are very interesting questions, but they're complicated questions. Let's suppose it is feasible for a moment. Well, then you could imagine the existence of that sort of technology as being like an extension of childhood into adulthood. Or another way I used to put it is it's the permission to experience childhood within adulthood. These are ideas that are vintage a quarter century ago. This was the rhetoric of early virtual reality. We needed a lot of this rhetoric because what we could deliver was somewhat limited, so the rhetoric was important.

What I have been thinking about lately is looking back on that early rhetoric and reconsidering it in the light of what's actually happened online. This neoteny as a framework actually can apply pretty well for understanding present day internet culture, to the degree anything can serve as a framework, because of course it's a varied and quickly spreading and very hard to capture and understand phenomenon. But I think the first thing is that at that time I had an overly rosy and unrealistically positive view of what childhood was all about. In fact, even with the whole idea of demotion and everything, childhood is actually also quite dark and cruel and mean. I mean it's a mixture of things. But I think if you were going to try to characterize what does the internet feel like, if you look at the style of interactions that happen in blog roles, if you look at the most popular internet-only sites, the Boing Boings of the world, and if you look at the Facebooks and the MySpaces and the Twitters—I could just start making up words and they probably would correspond to a bunch of start-ups. The Blimboos—

Kirkpatrick: Somebody has the URL, you know that. Or they will before this is over.

Lanier: Yeah. So if you look at those things, a very nice way to understand it is to think of it as extended childhood for adulthood. First of all, there's an intense fascination with childlike concepts, things we associate with childhood. They might not necessarily in some absolute sense be childlike from any perspective at all, but for the people who enjoy them—for instance, there's an intense nostalgia for basically the materials of childhood: the TV shows you grew up with, games, silly things, in an endless mashup. Just that framework explains almost all the content on Boing Boing that isn't open culture promotion. It's a remarkably efficient summary. So I've begun to think that that old rhetoric has actually been realized, if you take into account a more realistic nature of childhood.

Kirkpatrick: To add the future spin, you're saying that will be accentuated as time goes on, in your opinion?

Lanier: Oh, I haven't gotten to the future.

Kirkpatrick: Well, get there.

Lanier: I've talked for quite a bit now—.

Kirkpatrick: Okay, we can come back to you. Just tie it in later. That's fine.

Lanier: I'm very happy to talk about the future, but I'm thinking maybe I've done a nice little segment here.

Kirkpatrick: No, it was an interesting set of thoughts. I wanted to just say I'm sure there are not that many people in the audience who've been inside Second Life. I don't want to embarrass anyone—.

Lanier: Yeah, how many people have Second Life avatars?

Dyson: You may be surprised.

Lanier: And how many of them are vaguely sort of like loose babe characters?

Kirkpatrick: How many roughly know what Second Life is?

Lanier: Oh, come on, be honest.

Kirkpatrick: The reason I mention that is that a lot of things Jaron is just describing I think are realized to some degree, or exemplified by Second Life, which is an online virtual world, a 3D space that you can enter as yourself, or as any kind of persona you'd like to adopt, and you really move around inside what feels like real 3D space, although at the moment it isn't really connected to the sort of virtual interface devices that Jaron used to work on. That will happen in the near future. It has audio, directional audio, so you can talk to someone in there and they can talk back to you. The way it really works right now is that typically when you're in this world, the people on either side of you are from Japan over here, Brazil over here, and Norway over here. So in fact you're in this truly global space, which I find especially interesting, although it's not directly related to what you just said. But it is a complete fantasy space in which you can construct anything you'd like. There is certainly a school of thought that this is where a lot of computing is going in the sense that 3D interactions with highly manipulatable spaces will be a bigger deal as time goes on. It's also relevant because IBM, where Bernie works, has made a huge bet that this is a big deal. There's how many thousands of IBM employees that are regularly inside Second Life now?

Meyerson: Well I don't know. If you start looking at any social networks, you'll find tens of thousands, not several hundreds.

Kirkpatrick: I think in IBM there's at least 40,000 who are frequently inside Second Life, and there are probably 5,000 who are there as part of their jobs.

Meyerson: A reasonable number.

Kirkpatrick: Because IBM owns a lot of real estate in there and is doing a lot of work for clients in there, et cetera. So, this has a lot of childhood-like qualities. Anyway, Esther, do you need a question, or shall you just—

Dyson: No, because I actually teed up what I'm going to do quite briefly and quickly, and the first is to talk about Facebook, and disagree slightly with, I think, what you said. Then I'm going to talk about space and the actual experience of weightlessness as opposed to in Second Life, just as a little vignette. Third, I want to talk about genomes, which is the main thing I wanted to talk about. And then fourth, I want to ask a question about virtual reality, to which I'd really like the answer, and it has very little to do with the 3D space and everything to do with the psychological experience.

First of all, I think what's interesting about Facebook is not that it's a real time conversation, but it's sort of something else. I owe this precise notion to another guy, but if you look at one of the great urges of humankind or of any living thing, it's to spread your genes and your DNA and to have sex and have your genes be all over the place. What Facebook and other things are allowing you to do is to spread your virtual genes. It's your name, your presence, your photos, all over the place, not necessarily in conversation, but just to multiply your presence. It's really intriguing stuff. You could argue that it ranges from bizarre or novel to obsessive and weird. How much is learned behavior, how much is it something that's innate that we just weren't able to do before? It's really intriguing to watch how people like to spread themselves everywhere.

Kirkpatrick: Can I just quickly define Facebook for those who might not know it?

Dyson: Yes, sure.

Kirkpatrick: Facebook is what they call a 'social network.' Individuals have their own homepage, in effect, with a lot of data about themselves, and there's all kinds of different communication tools, but basically the service's software projects data about you to other people in the service, which is basically where Esther's taking this.

Dyson: Yes. So how many of you are on Facebook? Okay. You didn't even need to tell them.

Kirkpatrick: No, a lot of them didn't raise their hands.

Dyson: Some of them didn't.

Lanier: My cat is on it.

Dyson: Your cat? Good. And of course it's not just Facebook. It's all these other things, whether you post your photos on Flickr or you broadcast your activities on Twitter or whatever. The other intriguing thing about privacy, I would argue, is that we're talking about something different. It's not privacy or lack of privacy. What Facebook is teaching us, and I mean Facebook generically, beyond the projection of self, is control of the information. Yeah, there are video cameras watching me, but I'm also getting into the habit of being able to—even though people are projecting about me everywhere, and I think you just get relaxed about that. It's not like being a politician, unless you are truly famous. But you begin to expect to say well, this person can see this and that person can see that.

I had an interesting experience—a very nice segue—three weeks ago I took my stepmother on a weightless flight. It was really nice. I have a complicated family history. I'm sure you'd all be interested. I bonded with my stepmother; it was really great. The experience of weightlessness,

for what it's worth, does not feel strange at all. It feels normal and familiar, and when it's over you want it back, precisely because it didn't feel special. You want to know, why can't I just jump up in the air and float around here? But as we were chatting as this thing was over I was thinking this was really so nice I'd love to post the pictures of me and my stepmother on Flickr. But then my mother will see them, and that will upset her. So it's not really privacy, it's control. It's designing information access the way you want it. That's what people are learning.

My big point is to talk a little bit about the sequencing of genomes, and here I'm going to do what David's been trying to do, which is explain what it is I'm talking about.

Kirkpatrick: And why it's relevant to this.

Dyson: And why it's relevant, yeah. Two full disclosures: I'm a member of something called The Personal Genome Project, which means that I am posting my entire, almost entire genome, which of course is just a meaningless sequence of letters, and also my health records, which are much more meaningful, up on the internet for anybody to see. There are ten of us doing that, and we joined esteemed people such as Craig Venter and James Watson. The purpose of this is not, or so we kid ourselves, self-aggrandizement, but rather to prove that it's not dangerous. My genome is not something that if it's up there people can stick pins into it and cause me harm. I'm not disclosing anything that's secret or private, and other people's mileage may vary. I'm not suggesting that everybody should do this. But the genome itself isn't inherently that interesting. It's going to get a lot more interesting ten years from now when there will be millions of genomes that people have looked at and have been able to associate with diseases, perhaps character flaws, perhaps innate kindness, who knows what else. Combinations of genes, not single genes, by and large. Again, the more interesting part is the health records, which were much harder to get, incidentally. I just gave blood to get my genome. My health records were a real struggle.

Second, I'm involved in a company called 23andMe, which offers a somewhat, let's say less complete service that will sequence, I think it's 500,000 snips, a single nucleotide variation, whatever. You'll get this data, and 23andMe will also help you to understand it. Most of it, of course, is still not meaningless, but its meaning is not known. What makes it interesting—honestly, there may be fourteen interesting medical things. We're not marketing it as a healthcare thing. We're marketing it as a self-exploration thing. It's most interesting when you say, oh, gee, I really resemble my mother, or, look, little Susie is just like big Bertha. What you want to do is get families to do it, which of course is great for marketing as well, because four people spend four times as much as one person. It's again, like a lot of what we're talking about here, fairly self-involved, almost narcissistic, but at the same time really interesting. I've now invited the twenty-five people in my family to do it, and they seem to all be signing up. There are some questions about the ex-husbands and so forth.

The questions that this raises are a couple. First of all, this stuff is really dangerous if you don't understand statistics, and most people don't. A single gene, a single gene variation, is not destiny. Five or six genes interact. We may know three of the genes; there may be four others that we're not aware of that actually influence something or other. What you find out is not just are you going to get such and such a disease, but how good are you at metabolizing a certain kind of drug? Which particular kind of cancer do you have and therefore what might be the best

treatment for it? And, of course all the other interesting things that are not really medical, like what kind of muscles you have, do you have hemangiomas, which are these little sort of blood, birthmark thingies.

Then the other question that really intrigues me is if you look at your genome and you discover that you could probably live ten years longer if you ate more broccoli and exercised more, or didn't smoke, will it make it easier to do so? If you find out you have a tendency to alcoholism, which you probably knew already because of your parents, does it mean you're going to say, oh, well, I might as well just get on with it and become a drunk, or does it mean you're going to get better at controlling your alcohol intake and then actually fight back? Does the more specific knowledge make it easier? I could probably look at many people in this room without even knowing their genomes and give them useful health advice. So what are going to be the implications of this kind of self-knowledge, which I think is inevitable? Then separately we can talk about health insurance and lots of interesting political things. But the basic message here is that I think within, I don't know, twenty or thirty years, it's going to be probably pretty standard to know your genome, and it will also tell you a lot more than it does right now.

My final question is about virtual reality, and it's this. The one that I think we mentioned just in passing is World of Warcraft. It's a wonderful game, and it happens in one of these virtual reality spaces, and there are dragons and all kinds of things, but what's really interesting about it is the social interaction. I had a conference—in fact, my very last conference we had a twenty-three-year-old woman who was talking about it, and then this eight-year-old kid gets up and says, "I'm level 41 and I want to know what it's like at level 51," or something like that. I don't play the game, as you can probably tell. She answered, and the kid was going to sit down and I said, "No, no, no, stay there. So you're eight years old. And you lead raids, you plan campaigns, you collect resources, you design strategies. How do you get all these other people to follow your leadership?" And he said, "Well, it's a lot easier if I don't tell them how old I am."

So there are two really interesting questions. What is the impact of being eight years old and being able to operate like an adult online? It's one thing to be able to watch adult TV—and I mean not just sex TV, but world news—when you're eight. It's something quite different to be able to lead a team when you're eight. The second question, which is a really important business question, is why is World of Warcraft fun, and why is gaining a point of market share for Coca-Cola considered work?

Meyerson: Wow, you really got a lot of stuff in there, Esther.

Kirkpatrick: But I'd say, just having heard all four of you, the kaleidoscopic set of implications of technological change I think are on display, which is why it is a hard topic. But I wanted—do you have something simple to disagree with him about?

Perlin: No.

Kirkpatrick: No?

Perlin: I have something to disagree with him about, but it's not simple.

Lanier: I was joking anyway.

Perlin: Alright, this whole notion that technology will change *everything*, which is pretty much what I started out saying, is not the case, and then you took the opposite position. So I'm thinking, at any moment now, in the middle of this conversation, I could pull out a gun and shoot you dead. I have the technological capability of doing that. In fact, when you think about it, for thousands of years I've been able to, across a room, shoot you dead. I could use an arrow, I could throw a knife. Technologically, the problem is solved: you're dead. Why don't I do that? It has nothing to do with technological limitations. Everybody here has locks on your door, and everybody knows that the locks on your door are not keeping people out. They're not designed to keep people out in any definitive way. They're there to sort of be the symbolic marker that if you break this lock you've broken the social contract, and so now I've got an entire group of people that I've never even met who are going to stand behind me to hunt you down and take you to court and throw you in prison for breaking that lock and taking my stuff.

I think that the important analogy here is it's never the technology. It's always a group social contract. Yes, technology will allow us, if we so choose, to dismantle privacy. But if we don't choose to dismantle privacy, and my belief is the reason we wouldn't choose to dismantle privacy is heavily informed by the way we evolved as a species over a very large period of time, and got to a place, maybe within the last 10,000 years, where we're pretty much what we were in the late Cro-Magnon. We love our kids better than everyone else's kids, and when you're in love with someone they're prettier than anybody else, and there are all these things that we just know. People are religious without absolutely any justification other than, "Well, I'm religious. You gonna do something about it?" Most people feel that way. Not the same religion, which is kind of interesting. We're just full of all of these human imperatives that predate any particular technology, and then we just evolve social contracts to enforce those imperatives. I just don't see anything happening that's going to stop us from being people.

Meyerson: You've made an interesting point, but you're stopping the discussion sort of midstream.

Perlin: Okay.

Meyerson: When you point out what a capability is brought to you by technology, that's not the alarmist part. The alarmist part is if you then assume that this will dismantle privacy. What you have to do, because technology is moving at a pace that's essentially still accelerating, you have to actually look at the consequences of its capabilities and essentially proactively say, okay, I could tell where you are pretty much 24/7 365 from now on, period. Now, you either accept that and live with it, or you decide that you want to maintain the social contract, which is, "I am entitled to my privacy."

Perlin: Or you don't go around killing each other all the time.

Meyerson: Well, same idea. Right. The key, though, is then understanding what do you do in the context of this new capability that enables you to maintain your privacy while still maintaining this social contract, which is that you don't go around killing each other. It's a very, very delicate balance. For instance, if you know an individual is dangerous and you want to track this, they should not be in certain avocations. Don't let this person near kids. Okay. The problem is we do have a technological capability to track this individual, or track all individuals for that matter, but

you just want to make sure this one individual stays away from kids. So how do you share the information, for instance, about the prohibitions on this one individual globally, or even the suspicions, without broadcasting that negative information worldwide, and perhaps indicting this person forever, where there may not be certitude.

Levy: Isn't the point that technology is somehow fractured solitudinous consciousness? Isn't that a revolutionary thing? It just struck me when you were saying that. Isn't it really a bit dramatic?

Perlin: I'm sorry, I don't understand.

Levy: A fractured solitudinous consciousness—that we, the human being, essentially has never been so un-alone in one sense, because of this—

Kirkpatrick: Okay, wait, Esther has a strong opinion about this.

Dyson: I think we're sort of forgetting history before 1950 or something. Back in 1800 I don't think anybody had any privacy at all. If you were rich, you had a chambermaid who took out your chamber pot. You had people who dressed you. You were rarely alone because you had people taking care of you. And if you were poor, you lived with eight other people and the dog all in one room. The only form of privacy you had was private thoughts, and to some extent that's still what we have. In the early 20th century we had a new form of solitude. This is probably not until the 1950s—the notion that upper middle class children should have their own bedrooms was a kind of new idea. So it changes over time, and what we think is so natural in fact was quite new and novel not that long ago.

Meyerson: But their length scales changed by factors of 10^{10}. In other words, now it's global. You literally have no global privacy, as opposed to personal space.

Dyson: Well, you do. You have privacy by obscurity. What's interesting is that technology enables you to breech that.

Meyerson: And you have to figure out how will you basically mitigate against that.

Dyson: Maybe you don't want to.

Meyerson: That's your choice, though.

Dyson: You go into your little village and everybody cares about you.

Perlin: In support of what you said before, and sort of sticking to my same mantra here, I just thought what happened in the last few weeks with Facebook and Beacon was just so lovely. It was great.

Kirkpatrick: You might want to quickly say what it was.

Perlin: We all got to see history being made and everything being laid bare. In that, Facebook always had this ability. It was one of the great things that you could go ahead and talk about—here's my stuff—and I could share my stuff, and this is what I buy with my friends.

Everybody got a choice to reveal things about what I like, what I don't like, the music I bought and everything. And then the founders of Facebook, they so got it wrong.

Dyson: They made a mistake.

Perlin: They just said, oh, I get it. You actually aren't interested in privacy anymore. So we're going to proactively decide for you that every time you buy something your friends know what you bought. Because of course, that's what you want. Then all these people—I love the one that they mentioned in *The Times* where the woman suddenly saw that her sister had bought the interactive Harry Potter game, and she was thinking, "My sister doesn't even like Harry Potter," and she called her sister and said, "Are you getting me the Harry Potter game for Christmas?" It was just a complete disaster because she didn't want to know that this was happening. It goes back to what you say—it's the social contract. It's not about technology. The social contract in this case was yeah, yeah, yeah, I'm enjoying the shared fantasy of openness, but I want control of my openness, not you. And I'm going to leave your whole make-believe social utopia if you don't respect it.

Kirkpatrick: Well, but could I just say Facebook is a constrained universe by definition. In the actual world, given that today any of us could have a video camera on our shoulders at all times and video the faces of anyone of this room, and software more or less now exists that could recognize any of those faces at any time, that I could feed that video freely, at my will, into a database that was open to the public, and we could basically track anyone's behavior, and that cannot be stopped. I think that's sort of what Bernie said—.

Perlin: Yes, of course it can be stopped.

Kirkpatrick: It can be stopped potentially by law.

Dyson: Just as shooting a gun can be stopped.

Perlin: Of course it can be stopped. But it's not stopped technologically.

Kirkpatrick: How could it be stopped, Esther? I'd like you to explain it.

Dyson: You could make laws against it. We would have to have a collective will to do that. But just as you can stop him shooting people, and maybe you don't even need a policeman standing here, maybe you're going to bring him up not to shoot people.

Kirkpatrick: But it's harder and harder to enforce such a law given that the price of the storage and the price of processing and the camera gets so trivially low as time goes forward.

Dyson: It's pretty cheap to put arsenic in your drink.

Perlin: Steve Mann walks around saying he's a cyborg, and everyone thinks he's a charming nut and says, oh, it's kind of cool. Then they stopped him at the border because he was wearing all this cool equipment and maybe he's a refugee from *Star Trek: the Next Generation* or something, and it's really kind of interesting and he's raising questions and he's being a performance artist.

But if you got thousands of people doing that, at that point the social contract would wake up and start saying, I'm going to start talking about legislature.

Kirkpatrick: Okay, that may be true, but the fact is right now we're at a point, as Bernie points out, where the social contract hasn't caught up to the technological capabilities. That's all that I'm saying.

Meyerson: Right, it's not a question of it won't. Do you know Jeff Jonas?

Dyson: Yeah, sure.

Meyerson: Okay, then you understand where I'm going with this. Jeff actually realized here's the problem, we have all this data. You want to share it for the "good of society."

Dyson: No, here's the opportunity, he said.

Meyerson: Right. He said, okay, I've got to figure out a way to share the data without revealing that I have this wealth of information about these individuals in my employ. But I do want to compare them here, because say we've had a rash of thefts or assaults. I want to see if there are twenty-three companies where this one individual, curiously, was at all twenty-three of these companies during a period of time there were multiple assaults on other people that were unsolved. But how do you share that without revealing all sorts of personal data? Jeff came up with a really incredibly elegant way, as you're aware, of taking the data, hashing it in such a manner that it was completely anonymized, but nonetheless you could compare the anonymized records of all these people among the companies. Cleverly, what he did was—first of all, he arranged that you turn this pig into sausage. The good news is you cannot run the sausage backwards through the grinder and make the pig. So there's no way of figuring out who it was. The only thing you do is you find out that, let's say, suddenly twenty-three companies find there is one common record. Now if there's one common record, we go back to what you were saying: this maybe is the mechanism for the contract.

You then have to have an agreement that in the event that you have a sort of meaningful hit you're going to sit down with a very small team of people. You have, by social contract, agreed it's okay to share that data among this small group because there are people being assaulted and killed and you will find this individual by doing that. That's where it gets very interesting in society because that's not even legislative. It's really almost a whole new form of social contract, but you've got to have a mechanism, because technology moves fast enough that the laws will not catch up. We already can do what I described, and there's nothing out there yet. Maybe in the future there will be.

Dyson: Here's another really simple example of this kind of thing. In the Netherlands there's labor unions, blah, blah, blah, they're very strong. Yet, at the same time there's a lot of theft and there's a lot of video cameras, and the labor unions don't like the video cameras, because they show when people aren't working. So what they did was each video camera would be divided into three streams that needed to be put together in order for the image to be seen. The video cameras would run along merrily. A computer would be stolen, and then the head of the union,

the police and the employer would all agree and then they would run the video for those. So there are technological plus contract solutions to all this stuff, too.

Lanier: I have a thought on something Esther said about thinking of evolutionary psychology as a way of understanding Facebook. Evolutionary psychology is part of the vanguard that's sinking the Freudian approach, I suppose, so it might not be held in the warmest regard around here.

Dyson: Freudianism is just part of the evolution.

Lanier: Yeah. So here's the thing: this is the sort of difference between memes and genes, that one big difference is that genes are selected within organisms, and if you have a sufficiently mixed and atomized world, like a Facebook, or most of what happens online, not quite all, you don't have the organism stage. And without the organism stage you don't really have higher level selection. You have this mush that sort of averages out, in my sense. I'll say the sort of thing that gets me in a lot of trouble in Silicon Valley, which is that's why we have so much mediocrity and crap online right now, because we don't really have the organism stage. There's the blog world but there isn't the novel. There's the Wikipedia article, but there really isn't the essay. I mean there is, of course, but this is the—

Dyson: But the particular means are identified with a person. I mean the blog role is a person, and then—

Lanier: The thing is there's no longer a scarcity of personhood. When you have these millions and millions of people, that kind of personhood, where there's just a little speck of the person mixed in with a bunch of others, in a way I think you might be right that what is motivating those people on various levels that they might be aware of or not might be best understood as a sort of evolutionary psychology dynamic. I want to get myself out there. But I think it's sort of a false bargain for them, because they might have that sensation that they're doing it, but in fact they become lost in this gray mush.

Dyson: Right. And what they really want is to be reassembled in somebody's head.

Lanier: What they would like is for all the pieces to be reassembled like the videotapes in the Netherlands. I don't think it happens very often. Anyway, the thing I would point out is that the important issue about privacy ultimately is a differential of power. If you have differential access to information, that gives you a differential in power, then that's really what's important. Google will show you everything in the world except their search engine. You don't get to see inside that. Why? Oh, because that's where the money is. So even as a lot of things are opened up, there are a lot of other things being closed off.

Dyson: Asymmetry.

Lanier: Yeah, sure Linux is open, but not our search engine. All of the sudden there are these walls like you've never seen walls in all history around certain little things. We have huge new asymmetries of access to information, which of course are where the fortunes are created, because that's how capitalism works: differential access to information creates wealth, unless you blow it, like some of us do because we're too interested in other things. I think the interesting question about the future social contract is really which information differentials we

accept, and right now the trend, which is one I'm arguing against, is that cultural efforts, music and so forth, ideas and all that, should not be subject to much differential access and should become part of a big mush, which I think is a mistake because we lose the computational step of being an organism before you're selected, if you want to use a neo-Darwinian framework.

But the central routing tools that move all that information around are sort of ultra secret—they're the sacred fortresses that cannot be penetrated. I think that priority is making a lot of money, and I'm sort of screwing with my own mortgage to question it. It's our game in Silicon Valley at the moment. But in the long term I think there's going to have to be a re-alignment. I think there has to be some differential access to information, just in order for there to be information processing. You can't have a big averaging mush in order to fight entropy.

Perlin: An aspect you didn't talk about is almost two years ago I remember going through that experience of learning about the MySpace page of Lily Allen, which was just even then exponentially exploding. She was this twenty-year-old singer/songwriter who couldn't get her record label to put her record out, so she just put four songs against their wishes on her MySpace page, and within a few weeks she had like 50,000 MySpace friends. It just grew and grew and grew, and they said, "Oh my God," and they rushed the record out. I remember playing this for my thirteen-year-old niece, and then checking back with her, and a week later all of her friends had bought the album, or had linked to it, and this is before the album came out. By that summer she was the number one star in England. Then, of course, she eventually made it here. I remember thinking this was part of the gray mush, what she was using.

Lanier: Well, no, actually—

Perlin: She wasn't actually using—she was using that equal access to power and letting people vote with their feet. That was something I thought was great.

Lanier: But I want to point out a distinction for me between Facebook and MySpace, because I like MySpace a lot more than Facebook. The reason why is that MySpace still conveys the weirdness of the early web in the Web 2.0 context, where MySpace pages are weird, eccentric, a lot of them don't work, a lot of them are broken, but you get a feeling for the person. There's a transition in design philosophy between the two, where MySpace is still centered around people, and every time you visit a page you're in for better or for worse, and you get enough of a sense of the person that you can learn to distrust what's there. But Facebook feels like the new AOL or something. It's like fitting the world into this bland database.

Perlin: Okay, Jaron, I agree, but I don't want the point to get lost, which is what happened when the marketplace ended up not requiring a bottleneck of access to power and information. Somebody actually could use that level playing field on a really large, large scale.

Lanier: Can I just make one cautionary point? I love that story, and I love other similar stories. I should point out that in the early days of the internet, which we're still in, things are working now that won't work so well in the future. For instance, there was a famous case—I forget her name—but there was a woman who just put up a web page early on saying, "I got in a lot of credit card debt. Would you send me a dollar please?" She got out of her debt based on nothing but the novelty of being the first person to have tried it. I believe in this sort of thing and I think

it'll continue, but we're also in the early blush where the novelty effect is amplifying it. I don't think it's enough in the long term.

Dyson: Yeah. Anecdotes aren't trends, they're anecdotes.

Lanier: Exactly.

Dyson: And they're really cool. But just on MySpace versus Facebook, I think it's a matter of taste, and that's why I think they both exist. MySpace, you get a feel for what the person wants to project, not necessarily for the person.

Lanier: But you can even get a bit of a feel for what they don't want to project, which is what's interesting.

Dyson: Sure, if you're smart. But for better or worse, Facebook is more boring, it's more tethered to the real world, it's more tethered to reality, which may or may not be good. They're just different.

Kirkpatrick: I just wanted to clarify something, because I think when you were saying before your concerns about the nature of content on the web, one thing you didn't mention is advertising, which is something that you've separately spoken a lot about. But you feel that way too much of the content is, by dint of being needed to be supported by advertising, bringing it to a lower common denominator.

Dyson: Well, should we have a law?

Lanier: In any market economy if you want to understand what's really going on you follow the money. People do amazing things for money. Do you know what 'gold farmers' are?

Kirkpatrick: Yeah, sure. Most people here don't. Gold farmers are people who make the objects inside games like World of Warcraft and sell them for real money to other game players, but they are completely virtual objects. It's a very big business, hundreds of millions of dollars in real dollars being generated by that.

Dyson: People also do amazing things for things other than money, and I think that's something that the advertisers miss. People are not spending all this time on MySpace and Facebook for money. They're doing it for attention.

Kirkpatrick: Well, that's your hypothesis. They could be doing it for a lot of different reasons.

Dyson: Well, okay, but attention is a better word for it than money.

Kirkpatrick: Yeah. Well, they're not getting any money, in most cases.

Dyson: Right. Exactly.

Lanier: I certainly won't dispute that. All I want to point out is that the current, the new sort of Web 2.0-ish attitude in Silicon Valley involves a certain kind of social contract that's being

proposed, and under the social contract a lot of the things that we previously charged for, like, recorded music or writing and so forth should no longer be charged for, at least not typically, because they flow around. They generate so much quick publicity, as in Ken's example, that ultimately the authors benefit more. Then this is the open culture idea, and I was very much around at the inception of this idea. There's an amazing history to it. The very first concept of something like the web—well, the very first one was probably E.M. Forster in 1908 in the Machine Stops, but the first one with any technological proposal attached to it was Ted Nelson's, from the '60s and '70s.

Perlin: You're not counting Vannevar Bush.

Lanier: Vannevar Bush didn't quite describe the whole society in how the thing, he was more—

Kirkpatrick: That was in the early '50s—

Dyson: Neither did Ted Nelson. He got it fundamentally wrong.

Lanier: I used to think that. Now I'm starting to think that Ted is as—

Kirkpatrick: You can't throw around these names without defining them.

Lanier: Ted Nelson—oh gosh.

Kirkpatrick: I mean it may take more trouble than it's worth.

Levy: They can Google him.

Kirkpatrick: They could Google him if they had their portable computers here. But we're not to that point yet. Give it another five years and they'll all have a little Google thing on their lap, I'm sure.

Lanier: Ted just had his seventieth birthday celebration, which is astonishing. Depending on how you want to think of history, he's either the first person to describe what he called 'hypermedia,' links to media, or one of the first, and his early conception of it was really interesting because it had an economic model that went with it, and his economic model was that you don't have cut, copy and paste keys on your computer, even though in practice things would have to be copied in order to make this system reliable. From your point of view, each thing exists once, and everything is linked through. If you quote somebody, you're actually linking back to where the quote came from, and every time somebody accesses that original little atom of material, a penny or a fraction of a penny flows back to them, so there's a massive implicit micro payment scheme where anybody could be wealthy if they make something that's referred to a lot, and nothing is copied and nothing is prioritive, and everybody is in the game equally and everybody has an equal chance.

Now that idea of paying for content is widely, widely ridiculed in the Valley. It's considered to have been a mistake, a failure, a path we've learned conclusively should not have been taken and all that. I'm beginning to think we're screwed up and he was right. I actually am beginning to like it more and more.

Kirkpatrick: Well, there actually are also companies emerging that are attempting to monetize things that way.

Lanier: But here's the thing. We have to be honest about tough choices, that sometimes you don't get utopia where everything is perfect in every way, and you have to accept tradeoffs. In fact no, not sometimes. Always. That's life. So let's say one option you have would be exemplified by traditional 20th century American broadcast television with advertising, where anybody can buy a TV, receive the programs and their ads, and the advertising model pays for it. Great. Another model is the BBC in England, where you don't have the ads. I don't want to say that I like one better than the other. I love *Star Trek* and I love *I, Claudius*. I think they're both great. But to get *I, Claudius*, if you care about having *I, Claudius*es in the world, or *The Sopranos*, or anything you have to pay for, which just has a different feeling—it's not designed for the commercial breaks, it's got a more holistic sensibility.

Perlin: Maybe you just like Patrick Stewart.

Lanier: Yeah, you know. But the thing is, in Britain there are police who come to your house if you have a TV and you're not paying the right tax for it. The payment for not getting ads is police.

Kirkpatrick: Yeah, there are people who really pay big fines for this.

Dyson: The different models can coexist. I don't see why we have to have a big moral argument about this.

Lanier: It's not a moral argument. They can coexist, but only if we make them coexist. The open culture movement, which was an incredibly influential political design movement in the Valley, is really challenging it. I find myself being one of the few voices in the Valley itself who is battling. I'm not battling for the abolishment of advertising. I love advertising—hey, keep quiet guys.

Kirkpatrick: We're going to go to audience questions in just a second.

Lanier: Well, your comment has been highly valuable so far. I love New York!

Kirkpatrick: I know.

Lanier: This is so great.

Perlin: Jaron, what do you think about the following refinement of what you said, which is look at Google, look at World of Warcraft, the nature of the service Google provides. The marketplace is drawn naturally toward an ad model, whereas World of Warcraft wants to be a subscription, not an ad model. In other words, with different kinds of content and services, et cetera, people vote with their feet to pay for it different ways.

Lanier: This gets to be a really complicated conversation, but what I want to point out is that you're doing the sort of culture-first interpretation, and you're doing a tech-first interpretation. Of course we all know they interact. I'm sure we're all playing roles to some degree. One of the

interesting things is that particular technology designs give off a natural feeling for what the commerce model should be like, so if you have a World of Warcraft, it would be such a pain in the butt to write another client that could work with it, that it's just not going to happen. So it creates a natural monopoly of entrance, unlike, say, a normal media player, like for audio files or something.

Levy: You said one interesting thing in the midst of this discussion—it's sort of a trade off. You gain some things and you lose some things. We haven't really talked about how technology does things for us. You're really big on interrelationship and Facebook and so forth, but first—and we were discussing this on the phone—you go to Facebook and people meet each other through some of these services. The flirtation between individuals who are seeking romance is taken care of by these particular kinds of computerized intelligences that start to do the work—just like in early word processing we stopped having cursive writing. There's very little cursive writing going on right now, because they word process at a young age. But what are we losing through all this technological advancement? I'm not saying it's bad. But things happen that are trade offs evolutionarily, and so basically speaking certain aspects of human behavior could conceivably be changed or lost due to the fact that you have the advent of a new form of technology taking over—that's what I took it to mean that you were saying in a certain sense.

Lanier: I could really drone on for hours on that topic.

Levy: I wouldn't mind hearing it.

Lanier: I think this also is a way to answer Esther's question about the art, that eight year olds are getting leadership experiences, but they are experiencing them within a world that's simpler, and the question is whether they learn to understand the difference between the two. I think in a way what we're setting up is a requirement for another developmental stage, which is a transition from an early Little Professor personality to an adult realist or something, and that's a new sort of developmental stage. I've noticed in a lot of undergraduate students from the last four or five years who've grown up around internet stuff that they tend to have this quality—I love that they're all bright-eyed, but they haven't tasted darkness in a certain way, and it's like they're inside the web all the time. I almost feel like I want to send them on a wilderness program before they go from high school to college or something.

Levy: That's what I'm talking about.

Meyerson: You talk about an immersive experience, but it's childish to even think of it that way in the context we're doing here. You can read people's facial expressions, you can actually smell fear. The reason I travel is because phones don't work. Computer screens don't work, not for the kind of face-to-face let's get down to brass tacks. It's fascinating, because the closer you get, the worse the web appears against reality. I was at LucasArts at one point watching how they do things. It's virtual reality in some sense. As you know, many of the leaders in the movies are not real people. They're just images that they're projecting at that point. You can only get so close—I think it was about ten feet—before you look at the image and you just know this is virtual. This is not a person. You're watching the minor facial tics on somebody you're talking to who is highly stressed about a subject and you can read more into that small expression, by the

virtue of being there in person, than you will ever see in any web simulation or capability today. And what's even worse, with an avatar you can get rid of the tic.

Kirkpatrick: What's interesting is how many big technology companies are promoting the notion that Telepresence is going to be the solution to travel and energy use. But that's a can of worms.

Dyson: I just want to pick up on one thing, which is this concept of the possibility of loss, or the reality of it. It's sort of a truism that old people have trouble using computers because they're afraid of breaking something, and the kids all just assume there's an undo button for everything. Neither side has it quite right.

Perlin: Old people used to have trouble using the telephone. But those are just different old people. Now we have a new bunch of old people. Surprisingly, I wanted to completely agree with you about something, which was that one of my heroes in human computer interaction, Ben Schneiderman, who's at the University of Maryland—he can be a bit of a curmudgeon—but he said the most wonderful thing. I was talking to him with excitement about some new tele-immersive, virtual reality thing and said, "Look, if we succeed, people are not going to have to get on those stupid airplanes and fly everywhere."

And then he stopped me dead. He said, "People don't go to conferences to have conversations." He said, "People go through all that trouble and get on the airplane because of the danger that they might touch each other." And I was like, whoa. It's like our brains still work that way. Certain things don't wake up unless you know you might touch each other. I found myself just suddenly thinking, he's right.

Kirkpatrick: Yeah.

Perlin: That's not going to get replaced.

Kirkpatrick: It can be augmented, but it will not be—

Lanier: That said, I believe that we technologically will get there, and that'll create another huge transformation of all the things we're talking about. But that's another topic.

A: I want to go back to the topic of virtual worlds and Second Life, because it's been something that's been fascinating me for a few years. I actually recently in my old age went to law school, and I was at New York Law School. I graduated a couple of years ago. There's a very innovative group there running something called the Institute for Information, Law and Policy. In 2003 I was involved with putting on a conference there called "The State of Play: Law, Games and Virtual Worlds."

We then had one the next year, and they continue to do it in conjunction with Yale and Harvard information groups. Linden Labs has been a big sponsor, and the CEO came. I got exposed to Second Life then. And it was multidisciplinary, not just law. It was social psychologists and practitioners and game developers and designers: a whole really interesting group of people, and we talked about the law of the game and the law in the game. As Second Life has evolved with a lot more going on, there's intellectual property issues, but specifically legal issues now. You talk about making money from EverQuest or World of Warcraft, where millions of dollars are being

made in the real world. You now have lawsuits being brought for violence, for fraud. There's a recent lawsuit in the Brooklyn District Court, in the real world court, for a fraud action within Second Life. And you have tax issues now—

Meyerson: And it won't be the last either.

A: —with people making money. You have IRS and tax issues. You have things like the stuff that Julian DeBelle, I think is his name, has written about with rape in virtual worlds. So you have legal systems—you talk about human contracts. You have legal systems being built within virtual worlds, and some way of mediation or court systems—I'm really not sure. I haven't played in the legal environment within virtual worlds, but this stuff is spilling over now into the real world, into the court system and justice system, into the tax system and intellectual property legal regime. And where these lines get blurred, I'm just curious, and I have to say this: although this is perfect for Jaron, I actually would like to direct it to other members of the panel, because I'd like to hear their thoughts on this sort of blurred line.

Kirkpatrick: Well, quickly, because that was a good comment in itself. It doesn't even have to be a question.

A: Could you say a little bit more about—

Kirkpatrick: Right. She's taking it herself.

A: I don't know the details. I just know I've read about two or three weeks ago about a case that's being brought in the Federal District Court in Brooklyn—that it is a fraud case for an action brought because of fraud in Second Life. That's all.

Dyson: Okay, I have a comment. I've spent a lot of time in Russia, and other places where the concept of intellectual property as opposed to private property was totally weird, was already a pretty edgy topic. So yeah, fraud means if you deprive somebody of something they value. It doesn't matter whether it's a rock—

A: Well, fraud is misrepresentation.

Dyson: Okay, so misrepresentation of how much the rock is worth, whether it's a real rock or a virtual rock. The moment you have money, real money, or game money that's exchangeable into real money—

Kirkpatrick: Which is the case in Second Life, by the way—

Dyson: Exactly. So I just don't see it as being quite that weird. It's certainly worth taking note of, but the moment you have things people value, rights to those things, those rights can be alienated. They can be misrepresented. They can be reassigned.

Kirkpatrick: What's interesting is that it goes to Ken's point. We will have a lot of new arenas in which to figure out where we ought to apply changes in social norms and law. And it's happening at a very rapid pace that we're being forced to reconsider these notions.

Perlin: In complete support of what you guys are saying, and to translate it so that it's not that weird, to explain why it's not that weird—when you said gold farmers making virtual objects and making money I heard this murmur like "Wow, that's weird." Then what I'm thinking is Steven Spielberg goes and makes a movie. It's a virtual object. You're certain that when you spend your 11 or 12 bucks you go into that, you get nothing. Nothing. Except a virtual experience that goes in your eyes and ears, and when you're done you've lost that money. It's a pure virtual experience. Yet if someone in China starts duplicating that movie before it comes out he can sue them for fraud, even though it's a virtual object. It's not that different.

Dyson: Okay, but the one thing you get when you come out of that movie is you have a propensity to buy licensed objects. And that's actually really interesting.

Perlin: Right. But what I'm saying is that's within the same line of—

Lanier: A very brief answer to the question. The way I want to answer your question is I want to point out that different designs of online experiences seem to bring out different levels of good and bad behavior from people. I'm particularly interested that there are a couple that seem to be really bad, like response roles on blogs really make people into jerks, so it seems. One of the topics I'm really interested in, that I view as an empirical project, is understanding which of these designs seem to bring out better behavior, so it's an opportunity to try to create civility through design.

Kirkpatrick: It's interesting as a journalist—you know, I read some of your writing. You've mentioned this kind of thing quite a bit in what you've written. As a journalist it's fascinating, because almost no matter what you write today, if there are comments at the bottom, at least half will be pejorative insults toward you or toward the people you're writing about. They're almost thoughtless, inane comments. This is routine on the internet today, and yet many media, like *Fortune*, which does it less than many others, but the comments are now presented in a space that is essentially almost equivalent to the original copy, which is produced by someone highly paid and disciplined, and then you have this bullshit. It's another case where we have not evolved the norms to adapt to what's technologically possible, and we need better blogging software, perhaps, or something.

A: Apropos of all bullshit, and a lot of information on the internet being misunderstood or being given a lot of credibility, but then people take it serious, I was really struck by your comment that having the technology is kind of like having a gun. Do you use a gun? No, you don't use a gun. But you are saying childhood isn't really such an innocent time after all—there's the dark side. This week along with the Facebook story was the story of an adolescent who killed herself because of an incident on the internet, where a mother, because she was so disturbed that her daughter was being rejected by this girl, started—I don't know what it was—some form of an email to this young, thirteen-year-old girl, using the persona of 'Josh.' This is an adult mother. This girl fell in love with 'Josh.' They had a passionate email correspondence, and then 'Josh' wrote to her and said, "I don't like you anymore. You're not a nice person. You shouldn't be around anymore. You don't treat your friends well." And this girl picked herself up and hung herself in the closet. The mother who sent these emails has had absolutely no legal action taken against her. There is nothing in the courts apparently for this kind of thing to be going on. The people live on the same block, four houses down.

Kirkpatrick: She has suffered social exclusion in her town, I believe, from what I've heard about it.

A: Yeah, well social exclusion—

Kirkpatrick: No I know, it's not sufficient.

A: That's how I guess politicians and the heads of companies are—

Kirkpatrick: But then again, what did she really do? That's hard to define.

Dyson: Okay, this is the problem: you can be rude to somebody in the street and they go and they kill themselves. The internet is not at fault. It's definitely a tool.

Perlin: I'd just like to preface it by saying it's a very tragic thing. This is horrible, what happened to this kid. Yet at the same time, that's the story of *Dangerous Liaisons*, which was written several hundred years ago. It's precisely the same thing. It was just written letters.

Dyson: Or *Romeo & Juliet*.

Perlin: It's not about the medium of which physical way you do the fraudulent written communication. This kind of crime, social crime, whatever we want to call it, has been going on for centuries. This isn't even a new spin on this terrible thing.

Lanier: I'm going to disagree slightly with my co-panelists and say that I think there's a question about the ethics of the level of anonymity we support in these designs.

Perlin: Fair enough, yeah.

Lanier: I think that the girl who hung herself deserved more access to information to have a better sense of what she was dealing with, and there are various ways that could happen. That doesn't have to be absolute loss of anonymity, and yet I think the balance is too weighted against reality right now.

Dyson: That wasn't anonymity. That was fraud. And someone said fraud is deception. This was deception. A woman was passing herself of as a sexy teenage boy. It's evil. But I don't think this woman intended for the girl to kill herself. So we should talk about this, but it's not a new phenomenon.

Perlin: But a lot of evil is just people being really, really stupid.

Lanier: Well we have to presume they have evil in their nature.

Perlin: That shouldn't get them off the hook for it, but it's not about the recent technologies.

Kirkpatrick: Yeah, but a number of the things we're discussing here are about where the borderline becomes gray between what we consider to be the real world and the technologically mediated world.

Meyerson: You have lowered the barrier to be able to create frauds on an almost unimaginable scale, to the point that an idiot could trip over it. That's the problem. It's not that you couldn't do it before. It's that now you can be a moron and do it, and the really bad news is the morons in the past couldn't pull it off. The morons today are likely to pull it off.

Levy: Right. You don't have to write—

Meyerson: Thank you. So what you've just done is you have handed them a better gun that a moron can use, and the morons will use them. And the problem you've got is society has not caught up with the morons. It's very difficult.

Kirkpatrick: Do you think it will?

Meyerson: I'm not even sure it should. There's an incredibly fine line between breaking the anonymity that you are entitled to and protecting those who need it. And you start messing with that, you've got to first figure out who needs it, which is an incredibly intrusive process. Then you've got to go protect them. So this is a huge challenge. I don't pretend to have the answer other than that yes, you are accountable for the actions that this person took. That accountability needs to be in place, because you have put out there an infinite collection of easily used weapons.

Dyson: Let me ask you a really specific question: do you believe that this woman broke the social contract?

A: Definitely.

A: One of the things that had bothered me is the information that people can pick up on your medical records and things like that in advance. That will leave you with the problem of, well, this guy's going to cost a billion dollars, or a million dollars, in medical procedures and things like that. We're not going to insure him. We're just not going to insure him. That's one of the things. Another thing is you get all kinds of information that is put on your health records, and they say, well, this guy is going to die at a certain point in time, and you know what it is. You can check it. I don't want to get involved in that kind of thing. I'm afraid to. You know, I'll speculate that I'm going to live a long time, and I don't want to know anything that's going to interfere with it. But, yes, the medical records of people are kind of sacrosanct. It's more of an Orwellian world here where everybody knows exactly what you're going to eat and when you're going to die, whether you're going to commit a crime. Do we send people to jail because the information that we have indicates that he's going to be a murderer or he's going to be a kidnapper, or things like that? It's kind of unsettling.

Kirkpatrick: Do you want to say anything about that?

Dyson: Yeah, I'd like to take half an hour and respond, but I'll take two minutes. First of all, this is not happening widely. It's widely feared. Second, we do need to figure out what we want to do about paying for healthcare. Separately from anything about the internet, it's becoming—we are rationing healthcare right now. We're rationing it in a very obscure, opaque way, partly by how much money you have, partly by who you know, partly by who your employer might be and what kind of insurance you get. The market is not clear, and it's unfair, but it's not even clear

how it is unfair. So that's the current situation. The fact that we know more and more about health records and we're getting better and better at predicting outcomes means that the unfairness is becoming more visible. I hope that that's going to lead to us making some kind of collective decision, otherwise known as legislation, on how we're going to pay for healthcare.

But I would also say that if I were a health insurer, I would much rather know when your parents died, how much you weigh and how old you are than anything else. Pre-existing conditions is obviously helpful. But it's much, much more complicated. Records that are electronic are probably safer than paper records. Records that are electronic, you can see who accessed them, you can see where they went. I personally had a doctor come to my office to give me an AIDS test, which I got in order to get a Russian visa. This doctor said, "Wow, I don't know you, but my boyfriend knows your name and he's really excited because he's in the computer industry." I wondered if she told her boyfriend the names of everybody she tested.

Kirkpatrick: Yeah, that's interesting.

A: Thank you.

A: I had a sort of 'what can we do' question first, and then a comment. As you said, it is New York: we all have opinions. Some of us, eh? I see a convergence of games and virtual reality and any number of things, but I'm not sure that we're technologically at the place yet where we can bring all these together. If you go to the web it's still an incredibly flat medium. It's mostly face pages. You add some chat rooms, you add some video, but it's really a collection. In games you have a different thing where you have the beginnings of a lived experience. I haven't been on Second Life. Imagine for example a psychotherapist interaction—I'm wondering if people have gotten to the point where they create an avatar with artificial intelligence so that you have an avatar with whom you can interact where you've actually got enough computing capacity to create artificial intelligence so that if the person comes in and talks about OCD the avatar can actually teach him about that. But right now I think most of these things are very rule bound, and they're fairly narrow sets of rules. It's not clear to me that they're driven by the artificial intelligence level of things, and I wondered if you folks could comment about where the technology is. And then I'll make some provocative comments.

Lanier: I'll try to answer you very briefly on two levels. One is in terms of psychiatric applications of virtual reality. That's a tremendously successful field. Initially I was skeptical, about fifteen or twenty years ago when it was getting going, but the clinical results have been spectacular. The principle areas are PTSD, where the paradigm is that—

Kirkpatrick: What is it? PTSD?

Lanier: Post-Traumatic Stress. The patient relives versions of the traumatic experience with the ability to gradually change the degree of trauma and become acclimated to it. And that's a very well validated system, which is in use in the Veteran's hospitals.

A: But it's nowhere near what we're talking about.

Lanier: No, I understand. To your other question, I'm going to answer in a slightly cynical way, which is that you show me the artificial intelligence that your patient is talking to and I'll show

you the boundaries of the definition of psychology that that patient will be stuck within. Or if you can find a naïve enough patient to buy it, then you can always have AI. It's a very dangerous thing to write a program and say now we have captured what psychology is or should be. I think as a starting point it's dangerous, because you can confine yourself to the models that you use to build the virtual model of the person. I much prefer paradigms where you leave open the question of what people are and what they can be. That's my own bias.

Dyson: I think there's probably a social contract against it. It's probably illegal to have an AI operate as a practicing therapist.

A: Right. So let me make it harder for you then. Let's call it a teacher. All of this stuff is information, and the question is what are the forms and how intelligently can you deliver information?

Meyerson: But there's a big difference between a simulation—

Dyson: You can google for Obsessive Compulsive Disorder and you can get delivered—

A: Right, but that's dead information. It's not interactive in any real sense, is it?

Perlin: No, because there is work that goes on in interactive teaching systems. This is consistent with what everyone said so far. We all have these fantasies from science fiction movies that there is some robot with some kind of simulacrum of the human brain inside of it that's actually using judgment, et cetera. But when you get down to practically trying to get things done, if you don't have that in reality, maybe you want your interactive system that's embodying some artificial intelligence not to falsely look like a human face suggesting incorrectly that it's the same as a person. You actually want that interactive system to accurately reflect the person who it's interacting with. This is really not a person. This is maybe something that's a techno database, answering some of your questions. But I think one of the reasons why people haven't gone strongly in that direction is it's very important when it's serious issues as opposed to entertainment to be as honest as you can about this is what I'm really presenting to you.

Dyson: When I do online banking I really don't want to see a fake teller. I just want to see the numbers and how much money I've got.

Perlin: Yeah. And those systems have failed where it matters. Those puppetry systems have failed because people are like, no, that's not a person.

Lanier: Puppetry?

Perlin: Yeah.

Lanier: Although I should point out that this week there's an unfolding scandal in Russia where an algorithmic simulation of an online available babe is bilking Russian young men out of money, apparently pretty successfully. I heard the average rate was three credit card numbers taken per five minutes by this thing.

Dyson: It sounds so Russian.

Perlin: So you're saying the job is going to be—

Lanier: I think basically the moral of that tale is that young men are easily fooled.

Meyerson: On certain subjects.

Perlin: The real young women are losing job opportunities.

A: To I guess initially stimulate some interest into where I'm going, I think there's an obvious point that's come from the discussion that really hasn't been made. It starts out with the comment about the lawsuits being brought in Second Life, and it's really connected. It's certainly a very important point that you've made, which is that it's not really all about technology. It's about how humans behave and what they desire for the social contract.

The second point that relates to what I'm saying is you talked about what people value and what people come to value. What I'm really saying is that the lawsuits in Second Life are representational of the fact that things that happen there are things that people value, which in effect makes it a real reality, not a virtual reality. In a way the obvious point I want to get to is, is it any different from having a part of the earth that's uninhabited, bringing human beings to that particular place and having them begin to exist?

Dyson: Australia.

A: And then everything about human nature and the need for law comes about. What I'm saying is hasn't what this technology has done is really create new space for human beings to exist, and consequently that space will have to have the normal constructs that then surround human life?

Kirkpatrick: That makes sense. That's a good point.

Perlin: But of course there are some differences, which we all know, which is you don't actually have the opportunity to kill each other. You don't actually have the opportunity to have sex. You don't actually have the opportunity to share a meal in the same room and hand the food over to the other person.

Lanier: But hope springs eternal.

Perlin: Let's get offline and meet, right?

A: I'd like to just make some comment about what I see in the future of technology. What appears to be happening now, and we have to be aware of this, is that we're at a precipice. We'll have the ability soon to engineer evolution, and this is a very, very unique situation we're in right now. There appears to be at least three directions in which we are going. One is of course the people who are doing stuff with DNA, the bio people, who are able to change genes and make new genes. The second direction that is happening is robots and other autonomous agents. We're building all these devices. And the third direction which evolution is taking is the direction of man machine systems, where we're going to have systems that are going to be combinations of man. People are now doing research, for example, in which they try to communicate electrically between your neurons in your brain. So it seems to me that this is a very, very important issue

that we have to concern ourselves with, because whoever is going to control this is going to control the future. Something we have to be very much aware of is how this is going, because this is very important. I'd appreciate some comments on this.

Kirkpatrick: Anyone have any thought on that?

Dyson: Yeah. It's no different from anything else. We have to be very careful about who has power in society, whatever the particular tools of power are. Again, you could have half an hour of answers, but any concentration of power tends to corrupt those who hold it, and then they seduce those who have no power. It happens again and again and again. So it's nothing different.

Meyerson: People have had biological agents that could destroy mass populations for years, and the power was there, but to some extent rationality dictates that if you lose that power you potentially destroy society. Eventually, one would hope, they honestly went through and said, look, biological agents are a really bad idea, and have slowly taken them out the stockpiles. My point is these issues are faced by mankind forever, whether it's the invention of dynamite or people inventing nuclear devices. You hope that society has the feedback mechanism, which is what we live by all these years, where that feedback mechanism, just like we're going to see here, allows technology to leapfrog, because technology outruns society all the time. But society has a feedback to it that then wraps itself around it and builds the necessary ecosystem to control it. And what you're describing is something that will in fact happen, but will be controlled by the same societal forces that keep us from using things to murder each other.

A: You made some very interesting points about the intrusion, the loss of security, loss of privacy. Now I'm sure you're for Bloomberg's idea of being able to guard traffic and keep traffic—without a doubt, that is going to be an intrusion of privacy. There's going to be cameras all over the place that are going to know exactly where you are. Now at least if you sit in your car, unless you have one of these things that you go over every bridge, you somewhat have privacy. Now every single movement of yours is going to be known. This is a good example. And what drives this stuff is economics. Economics and war. The war and the attack on the World Trade Center has tremendously impinged upon our privacy. The government is doing things because—

Lanier: I wanted to go back to the first thing you asked about engineering evolution. I want to make a prediction.

A: Good.

Lanier: Which is that, say, fifty years from now we're going to think of romance as the prior existing form of engineering for evolution, and we're going to appreciate how sophisticated it was and we're going to think that a lot of our new tools of direct gene manipulation and robotics and so forth are not as sophisticated, because we don't currently appreciate what a remarkably sophisticated self engineering scheme we already have for evolution.

Perlin: That's a really good point.

Dyson: That's nice.

A: I'm a blogger and an internet marketing consultant. I certainly agree that we've given up a great deal of our privacy in terms of our medical records and anything you put online, your credit cards. But the other issue is that, when we don't have to, people are still giving away information they don't have to give away. I, for example, because I have a big audience and I'm aware of that, don't say I'm going to this lecture. I'll say later I went there. So I wonder if it's somebody's responsibility somewhere to address the naivety of people not realizing you have to have some boundaries? And children, the eight year olds, we try to protect them within the little communities that they're able to be in, but whose responsibility is it to teach people what they need to know?

Dyson: Their parents.

A: Well, my parents aren't going to teach me. I mean at eight years old, yes. But I mean the rest of us.

Kirkpatrick: Do you mean what they need to know in order to interact with what technology now makes possible, in a sense?

A: Well, to maintain whatever modicum of privacy still exists—

Lanier: I would say the responsibility rests with the prominent bloggers.

Meyerson: Well done. Perfect. Nicely put.

Dyson: And the *Fortune* columnists.

Kirkpatrick: And the *Fortune* columnists, yes.

A: I'm really interested and enlightened about this MySpace and Facebook, but having this audience here, having this panel here, maybe you could speak a little bit about where you think we're going three, four, five years from now, because stepping out of this world of just meeting people online, what will technology do for us and make our lives better three, four, five years from now, getting past this level that you've discussed?

Meyerson: Well, it has stuff that's already here that most people haven't been exposed to. Trivial things, like you have a camera, and it's maybe intrusive and it's in a building, but if you have somebody who's elderly and infirm, if they were to fall down you have programs now that recognize just by video extraction that this person has fallen, this person is unable to move, and someone will help. Now it doesn't do anything. It doesn't record the image. It doesn't in any way intrude on your privacy, but what it does do is it protects the individual who set the system up at very low cost, and it's being deployed at this point somewhat pervasively. It depends on where. You have all sorts of technological aids which leverage the kind of intrusive technologies—potentially intrusive technologies—but we have people who spend their careers protecting you from them becoming intrusive. So simple things like people drowning in swimming pools—it's a ridiculous thing. Why? Because the camera can detect when somebody—well, let's see, their head's underwater for two minutes and they're not moving. That's a bad sign. You know, nobody noticed. Well you can pick this out. Why? Because a

computer doesn't get bored and talk to its girlfriend or boyfriend while sitting on a lifeguard tower. It's paying attention.

So there are things out there where very modest levels of intelligence—this isn't rocket science—enable you to do things that are unimaginable. You can watch a Mongolian broadcast of a television show and get a real time translation, because you have somewhere out there somebody who's written a small translator that actually will put it up in script.

Perlin: One thing that is near enough because it's just happening now so that it's fairly easy to predict, and there are people making businesses right now about this, is—you know, if you think about Google Maps and search capabilities and smart search and iPhones or their equivalent, right now because it's so new the combination of overlaying a virtual world on top of the real physical geographical world is still very, very underutilized. All around everywhere people are trying to think of ways they could offer you services. It's not just the restaurants or this or that, but the people I'm supposed to meet, and am I going to make that train, and all this. None of these things actually have to do with—there are so many of them that don't have to touch on your privacy. They're just tapping into what is the world around me, and it's a richer place. So bringing those two things together, which is just now beginning—as you're pointing out, those things are actually going to get better and better because the bandwidth—. One thing that's not obvious is that as the computer chips get faster it looks like you have better bandwidth, because you're able to compress things. So even though you seem to have limits, your experience as a user is always going to get faster and faster. The point there is that's going to be an enormous impact on the convenience of being in a place like New York.

Dyson: A very specific example: I was at Google two weeks ago, and you know you can go on Google Maps now and say how do I get from LaGuardia Airport to 247 East 82nd Street, and it will show you how to drive there. You're going to have a second option, and it's going to say take transit, and it will show you how to take transit. This is now working, but apparently not outside Google. In a few months you're going to be able to say, where are the subway trains right now, which one can I catch, what's my connecting time?

Kirkpatrick: Well that'll be useful.

Dyson: It's going to be. But what's interesting is how that's going to change behavior. People who would be willing to take transit if they could actually predict how long it would take, because it's too complicated to compute all the schedules. But Google can do it easily.

Kirkpatrick: It's interesting how much of this conversation has had to do with privacy. I find that fascinating. But two different things that I would respond when I hear a question like that—I mean two really big macro trends that are obviously changing all of our lives whether we realize it or not: number one is the genuinely global deployment of technology and the arrival of computers even in the smallest villages around the world, and computer cafés, internet cafés accessible to anyone on the planet. What does that mean for mutual awareness of our—how is that going to change the economic landscape? I think it is changing it very rapidly as the awareness of the disparities in income start to really sink in around the world. I think that is happening at a very rapid pace because of the mutual visibility that now exists. And I think it also is changing the attitude in the developed parts of the world towards the longstanding

disregard that we have had for the reality of life in the majority of the planet where people are extremely poor. That's one fundamental macro thing that I think is big to look at.

The other that's closely related to that is the deployment of mobile technology to literally everyone on the planet, and the fact that everyone is going to be carrying some kind of mobile device. If you look at the rates of adoption of that kind of thing in India and China and Nigeria and Mozambique and Madagascar, you name it, every country in the world, the deployment of mobile technology is at an astronomical pace. So then you really are bringing every single person on the planet into the communications infrastructure. In fact I mention in this little description that we just recently passed the point where half the population on the planet has a cell phone. That was just within the last few weeks by one company's calculation. It won't be long before it's very close to one hundred percent, and that is a really, really big transformative development, which we can't predict the implications of.

Dyson: But I want to counter with a—it's really easy to see things to get the world connected. It's much harder to change your mentality. I want to tell an anecdote, which I warned against, of a Russian I spoke with just after Yeltsin came into power and they basically deregulated all prices. This is a well-educated person. He was probably a programmer; that's most of the people I know in Russia. He watched CNN and he said to me with great enthusiasm, "This is really wonderful. Our government is going to set free market prices, just like yours."

A: I wanted to ask a question that's more intuitive than intellectual here, and that is that as we spend more of our time looking in computer screens and less of our time, at least in my experience, being out in the wider reality, what's going to happen to our connectiveness with nature? What's going to happen if, as I do, I spend time looking at images on Google Earth instead of being out on a glorious fall morning, even though I know that walking out on that fall morning or walking out in the mountains is a completely different experience and gives me far more? It's really directed to the members of the panel, your immense experience, how do you see that going for us as humans?

Meyerson: I think we both tackled part of that question earlier, which is at the end of the day you have to get out of your damn chair and go see the person. There's that balance you need to strike, because otherwise you sit in front of an incredibly controlled environment. Frankly, you can tailor to your own phobias, which, unfortunately, will leave you even worse in the end. So there is that balance. It's not that one or the other—I don't see the extremes.

A: Can I respond a little bit to that though, because it's an incredibly seductive world, and especially for young people, where we have games like World of Warcraft, which are exactly what you say. You can tailor them, you can have your own avatar, you can begin to exist within that, and you gain a lot of satisfaction within that. So, yes, I agree, life is balance and we know that from the Greeks, right? But that's not what seems to be happening in many cases. That balance is being thrown out by the seductiveness and power of the technology that is being brought to us.

Dyson: I would like to answer you, then maybe we will value nature more, but I think the truth is that just as our physical metabolisms are susceptible to sugar and we eat more and more sugar

even though it makes us sick, our mental metabolisms are susceptible to the empty calories of computer screens and we will make ourselves sick on it. It disturbs me.

Perlin: But the other side of it is I think it's not the Greeks. I think it's what I referred to before. It's our own biological evolution, and kids do find—I've been watching this—kids are learning a lot of socialization and interaction on World of Warcraft, and they're clearly learning something because they're spending a lot of time there. But those same kids, they go out and they run around in the yard also, because they have to move their bodies. Their bodies tell them, and their mind tells them, "I have to move my body." You know it's true: you can set up an environment where all you give a kid is sugar, but as grownups we don't have to only give the kid sugar, and if we actually give them stuff that isn't just sugar they have an internal instinct to run around in the yard.

Kirkpatrick: On the other hand, I don't know how many people saw the article in *The Times* the other day about the re-education camps in South Korea for these very large numbers of young people who are so addicted to the internet, truly, that the government is now investing in these camps, paid for fully by the government, where they're taking large numbers of eighteen to thirty-year-old men, mostly, who are just being forced to go outside because they can't do it for themselves.

Lanier: I don't know how I feel about it: which is augmented reality, which is seeing virtual stuff and real stuff at the same time in the wilderness. There are already some experiments in this, but what will happen is kids will play virtual treasure games and stuff in Yosemite and whatnot, and it'll be both loathsome and wonderful at the same time.

Kirkpatrick: You mean they'll really be at Yosemite?

Lanier: Yeah. And so the thing is that there's going to be—

Dyson: But then it'll get too crowded.

Lanier: Well, what'll happen is there's going to be pseudo wilderness. There's going to be an augmented wilderness, and there already is to a degree, but there will be to a much greater degree. I really have mixed feelings about it, and I can't resolve them.

Perlin: But also, is it fundamentally different from the same tragic trend that happened with television—and before that one could argue a related trend that happened with books—where you're exposed to this amazing world of information, and so kids are going to spend all their time reading or something horrible like that?

Lanier: It won't be as good as books, but it won't be as bad as TV.

Kirkpatrick: Okay, that was a really good question to end with, and the answer is a really interesting way to end. We obviously could have gone forever. We're going to take a couple minute break and then we're going to come back here and Jaron's going to play some wind instruments that he's brought for us.

Lanier: I also am a musician. I play unusual instruments, and we had decided I'd play a little bit here, so I'm just going to do a really brief little show.

Kirkpatrick: Tell us about the instruments too.

Lanier: Yeah, okay. This is an instrument I just came across that had been stored without my having remembered it in a backroom of a little music shop on the Lower East Side that just closed. I used to live here in the '90s and I've been living in California for six or seven years. I just got a call from them saying, oh, we just found this thing of yours, and so I thought great, I'll take it to this event. I was kind of amazed it's still working. This is the first prototype of the computer in human culture, unless you want to count tuniform, which is older. But this is the first functioning object made of multiple parallel similar components. This particular one is from Laos, but there are other similar ones that have been around for about 7,000 years, so far as we can tell.

It's a miniature organ, if you like, and, in fact it's the direct ancestor of the European organ. These were traded across the spice route. The ancient Romans created a giant version of this thing, operated by steam, much too big to actually play manually, so it was operated by an automatic mechanism. That was probably a horrible sounding noise device that accompanied the gore of the coliseum. And that thing, because it was automatic, turned into the early pipe organ, which amazingly was an automatic instrument, not a manual one. I mean it was manual to a degree, but it was always automatic. Then that evolved into the automatic piano, the player piano, of which an amazing example was an improvising player piano that wasn't deterministic—yes, this thing existed. And then that inspired the Jacquard Loom, a programmable Loom for making fabrics, which in turn conceptually inspired the general purpose digital computing machine, and thus we make a living.

A: What is it called?

Lanier: Oh, this is a khaen, K-H-A-E-N.

[PLAYS INSTRUMENT]

Lanier: These are more and more unusual, because they have privacy. They have evaded the internet. These are some flutes that resemble some things played in the backwoods of the Ukraine, or I guess it's Ukraine now. But I bought them off of some Hungarian gypsy boys who had apparently spent the afternoon breaking into cars on the East End of London, and they did not know the name. I have not been able to find any information about them. They are not named.

Levy: They're jo sticks.

Lanier: What?

Levy: They're martial arts weapons. I've used them.

Lanier: You might want to use a different model than this if it every really comes down to it because these are pretty fragile. However, there are martial arts traditions with flutes, and that's a

whole story. There are at least two I know about, and I have a 200-year-old Chinese flute with a concealed dagger. But even more interestingly was the Japanese shakuhachi, which started off as a Buddhist breath meditation instrument and was adopted by the Ronan, the unemployed former Samurai who needed a cover and become flutists and developed a martial art whacking each other with the things, and actually ended up being great musicians. They wrote most of the good classical music for it.

But that is not this instrument:

[PLAYS INSTRUMENT]

A: How did you learn to play that?

A: But you said that the gypsy boys demonstrated that thing for you.

Lanier: Yeah, I have to say, both of these styles are my own styles. I invented the styles. When I play the style in Laos or Northeast Thailand it really strikes the people there as incredibly exotic. It's like taking somebody who's been in a cloistered monastery their whole life and dropping them into Burning Man, I think. They just are completely unable to understand what I'm doing.

And then this one, I'm using a style that's a little bit like a gypsy style I've heard on a single flute. I just made up the double flute technique entirely. I really don't know. The truth is these kids weren't very good at it. They were probably better at breaking into cars. I mean they seemed pretty well dressed.

A: How would the native people play the other instrument?

Lanier: This one?

A: Yes.

Lanier: There are a few different styles on it. There's an almost folksy—it's almost like a banjo, in fact.

[PLAYS INSTRUMENT]

It's kind of like this very simple—the coolest style of this, which I've recreated in a sort of modernist way, accompanies boxing, and there's this really cool thing where there are musicians improvising to boxing. It's really wild, yeah.

Well, this one is barely tuned. I had a hard time getting this working, and I'd prefer to get it better tuned. This is actually not a good instrument. These days a lot of them tune to western scales. There's a lot of variety there. We killed off most of it, unfortunately. Laos didn't take well to the Vietnam War era, unfortunately. But there's still some variety, and you can find different tunings and older tunings. There are a lot of instruments in this family with different shapes and tunings.

A: The interesting thing I found is that in a sense it's like a piano. You have the right hand and the left hand and you're able to play chords simultaneously, or move on chords with one hand and lines on the other, and vice versa.

Lanier: That's true. You can do all that. And you could do that 7,000 years ago.

A: So what's happening? You inject the air in and it goes up through the—

Lanier: Right. Yeah, exactly how it works. There are people who think they know how it works, and there is a guy who did a dissertation, which was a computer model of the inside of this thing, a couple of years ago for a physics degree. I don't know. There's a couple of mysteries about exactly how it works. There are floating reeds inside here, and the mechanism is very simple, One idea of how it works is you cover the hole and suddenly you've tuned this thing to be resonate with the reed, so it sounds where it wouldn't before. But the problem is if you change even little things that shouldn't affect that you screw it up. So it's a more complex mechanism. I had the honor of taking one apart one day with Richard Fineman to try to figure out exactly where it would break, and we never got it. So my current belief is that this is an intuitive technology that's never been fully understood. But I might be wrong about that at this point.

Levy: Thank you very much.

Lanier: Sure, sure.