

The Role of Communications in Social Change, and the Expected Impact of the Internet and Its Successor*

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*Abstract: Many profound changes in Western social structure have been associated with advances in communication technology. Such changes are described, and the inference is drawn that those communication technology changes may have enabled or even caused the associated social changes. In predicting the social changes that will result from the general use of the Internet and its successors, it is further suggested that the basic human urge to work cooperatively in small groups will drive global society toward much greater class stratification.*¹

Of all Earth's creatures, we are the communicators: the essence of our lives is communication with others: without communication we aren't human. So it isn't surprising that all of the major changes in society, in the way we live together, have come at the same time as innovations in communications. The way we communicate defines human society, and advances or changes in communications are the enabler, and possibly the cause, of present and future social structures. Many people now expect that the Internet will be one of these enablers, and a source of change. They are right, but they don't go far enough, largely, I think, because they don't understand or expect the technical changes of the next ten years. These changes are great enough to be a qualitative change, not just an improvement in the way we communicate. They will cause upheavals. I will give some examples of upheavals in the past, and their associated communications changes, and then project the changes the Internet and its successors will bring.

For almost all of their existence as a species people lived in small groups. Anthropologists call them hunting-gathering camps. They still exist, and have been thoroughly studied. People evolved as individuals in ways that made those camps successful, but also evolved group behaviors that improved the survivability of the camps.² By the time people and their camps were scattered around the world, the camps had arrived at similar ways of working, communicating, and dealing with their problems and opportunities. The resulting societies have some very appealing characteristics:

Camps are egalitarian. There is division of labor across gender lines, but in many cases women and men are allowed to pursue each others' work.³ Otherwise, there is little specialization: there might be someone who is good at making tools or weapons, and does that most of the time, or a shaman, (and those two types are the "geeks") but for the most part, people participate equally in the work and play, according to their abilities and

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skills. People work together, in small groups, to do the things they need to do to survive: to hunt, to weave, to gather, to prepare food. We are programmed to get pleasure from this kind of activity. *There is nothing that gives a human more sustained pleasure than to work together with others, as peers, to do something worthwhile.* It is built in to our natures: it is built in to our genes. It is so important to us, and so pleasurable, that we consider it a leisure-time activity, a way to have fun, as in a quilting bee, or a softball game. And just as with that other intensely pleasurable human function, when our jobs frustrate our ability to enjoy group activity, we become voyeurs: we actually pay to watch other people do it, as in a baseball game, a string quartet, and a cop movie. The idea that this intensely pleasurable activity is a basic human drive, comparable to sex, is central to my argument.

Camps operate by consensus. There is constant conversation among their members, and all of the problems and events of the day are thoroughly discussed. If a major decision is to be made, such as a relocation of the camp, everyone participates, and eventually a consensus is reached. There is plenty of time to reach a decision, and everyone feels he or she has been consulted, and had his or her opinion considered. It is in this setting that humans learned to communicate in their various ways: it was in this setting that language was invented, and grew, and became more complex. Our basic communication skills and styles evolved because they enhanced our performance in work groups, and thus enhanced the survival of the camps. They reached their remarkable sophistication and complexity because the camp whose members communicated best was not only the most productive, but was the camp that reached the best decisions: decisions that were shared; decisions in which every member shared the credit and responsibility for the outcome. In this way, the camp retained its cohesion, and was able to stick together long enough to solve its next problem, and the ones after that.

Because their members derive so much pleasure from peer group activity, camps evolved two other interesting characteristics: first, they are very intolerant of both excellence and incompetence.⁴ Freeloaders are tolerated in good times, but are ruthlessly weeded out when food gets tight. Unusually bright people who allow their excellence to show are also weeded out, usually by exile. Such people pose a threat to the consensual process.⁵ The Japanese, who use consensus widely in parts of their business culture, say, “The blade of grass that sticks up is the one that gets cut off.”

It is also an invariable rule that camps are not big. This is because it is impossible to maintain consensus in a group much larger than 30 people. It’s been speculated that this has to do with the seven-item limit⁶ of short-term memory, but for whatever reason, there are no large camps. When a camp becomes large enough that consensus can’t be maintained, a group splits away, and sets off on its own; a risky thing to do.

While a camp is a very agreeable place to live, there are a few things that a small group of unspecialized people can’t do very well. Among them are war, trade with distant groups, and agriculture. Because competence in even one of those things gives a group a significant competitive advantage, a social structure was invented that allows more than a

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few people to live together on a permanent basis. This institution is called a tribe. When a competent tribe arrives, the nearby camps are wiped out or absorbed.

A tribe has a clearly-defined hierarchy, division of labor, and very little consensus. Communication has changed profoundly: orders now come down from the top and are ruthlessly enforced. Upward communication -- sometimes even communication among peers -- is discouraged or suppressed. In particular, that major pleasure-giver, the work group, is suppressed, and replaced by work directed by a supervisor. Complex belief systems, such as formal religions, are invented to justify the power structure. It is a huge source of stress: Robert Sapolsky, who made his career studying stress in humans, was really describing the tribe when he said, "Agriculture is a fairly recent human invention, and in many ways it was one of the great stupid moves of all time... Agriculture allowed for the stratification of society and the invention of classes; it allowed for the stockpiling of surplus resources and thus, inevitably, for the unequal stockpiling of them. Thus, it allowed for the invention of poverty... [W]hen humans invented poverty, they came up with a way of subjugating the low-ranking, like nothing ever before seen in the primate world."⁷

When the tribe was invented, communication, the enabling technology for the evolution of human intelligence, was subverted for the purpose of control; and a major source of satisfaction and pleasure, the consensual work group, was destroyed, or at best regarded as a low-class activity. Writing, a technical innovation to code and preserve speech, extended and formalized this control by intensifying the top-down communications model. It allowed a tribe to dominate large areas, through trade, religion and bureaucracy. Written rules and dogma fixed established ideas and practices in place, and made them more severe. By 2500 years ago, even Athens, which we regard as an unusually enlightened society, had more than ten slaves for every citizen. Rome was not different.

Though the Roman Empire had plenty of military assailants, it was, in the end, defeated by Christianity, which allowed the slaves and the underclass to have a voice. Early Christians reverted to a consensus form: they met in small groups, out of necessity, for they were subversives in the eyes of the Roman priesthood and governing class. However, when Christianity won its battle and became the official religion, the top-down model reappeared with a new technology innovation: the church building, large enough to hold a whole community. The religious hierarchy used the weekly Mass to exhort its followers: once a week, through the middle ages, for the first time in history, all social classes were exposed to the same ideas and rhetoric. Through this technology, the church did what the Roman Empire had not been able to do: it formed a common European culture and belief system. The culture transcended language and distance; the Pope was, for a time, the de facto emperor of Europe. He crowned the kings. Through his parish priests and bishops, he had access to both the peasants and the nobility; and through his power to excommunicate and punish, he wielded control at all levels. The enabling technology was the Sunday Mass. When Islam emerged, it used similar technology with the same result. People at all levels, while theoretically free, had to an unprecedented degree lost the right to think and reason for themselves.

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This Holy Roman Empire, which succeeded the Roman Empire, was in turn defeated by the printing press. The press was the enabling technology for the Protestant reformation, because it allowed ordinary people access to the scriptures and to works of dissent and inquiry. It led to the Enlightenment and to the Renaissance, but most important, it led to the Protestant ethic: the idea that each person is personally responsible for the ethical conduct of his or her life. If one has responsibility, one must also have the control necessary to carry out that responsibility. This was the underlying philosophy of the American and French revolutions: communications was their enabler. In the words of Freeman Dyson, “technology drives ethics.”⁸

In the last century, the railroads and the telegraph arrived at the same time. There were two overlapping social effects: first, the railroads allowed city people to visit the countryside, and allowed farmers to bring their goods to the cities. Over the centuries, rural and urban cultures had become different: city people looked down on country people, who were in turn intimidated by the cities and frightened and disgusted by city people’s sinful ways. In the middle 1800s, there began a slow merging of those cultures. It isn’t complete yet, but it resulted in a lot of social turmoil in the late 1800s and early 1900s. The residue of this turmoil is at the center of America’s current conservative-liberal controversy.

The telegraph and the railroads enabled each other: you can’t run an efficient railroad without communications, and you can’t have a telegraph system without a right-of-way for your wires. But as a byproduct, the telegraph also provided instant news: newspapers in California and New York and London had the same stories at the same time. Abe Lincoln managed the Union forces from Washington, promoting and firing his generals based on dispatches: it was a major factor in the North’s success, and a major enabler for the modern army. Suddenly, people began to act as though they were part of a global whole: Americans, fifty years later, were well-enough informed to be willing to participate in the First World War.

The telegraph enabled modern nations: Germany and Italy became stable, integrated nations in the wake of the telegraph’s invention. It enabled modern armies and globalization; and it also enabled the personal mobility that in turn enabled rapid economic and market development, because the telegraph, and its do-it-yourself version, the telephone, allowed families to remain families. With people moving back and forth between the cities and the countryside, following jobs and opportunity, news of family crises and events was minutes away. People could retain a sense of family and connectedness even though scattered around the world.

In the late 1920s, radio broadcasting arrived. Its cultural impact was awesome. Even before national networks arrived, American announcers wanted to work in the big Northeastern markets, so they spent their evenings studying the *NBC Pronunciation Handbook*. Regional accents began to disappear, to flatten, so that, though one could still place a person in space and class by his accent, it became easy for people to understand one another. When I was a little boy growing up in Tennessee, it wasn’t easy at all: we didn’t just have a cute Southern accent; we were really hard to understand (and so, we all

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agreed, were the Yankees!). This took place all at the same time, not only in America, but in England, France, Germany and Italy, to name a few.

Radio burst on people like an explosion. Before radio, people's exposure to rhetoric (and rhetoric, by the way, is the art of persuasion),⁹ was the occasional visiting politician or revival preacher, traveling salesmen, and the weekly church sermon. Suddenly people were exposed not only to advertising rhetoric, but to political and religious rhetoric from extraordinarily skilled orators. They had few defenses. If you wanted the radio's entertainment, you took the radio's ads. And you also took rabble-rousers like Father Coughlin, demagogues like Hitler and Mussolini, and charismatic leaders like Roosevelt and Churchill. A skilled demagogue in the 1930s, when radio became almost universal, could and did organize opinion and action in an unprecedented way. It still worked in the 1980s: the Ayatollah Khomeini organized his revolution, not by direct broadcasting, but by its underground analogue: cassette tapes prepared in France and distributed in Iran.

In the 1950s, in America, we got commercial television. On television, we got sports, entertainment, and ads. Poor people, and most poor people are minorities, watched television and understood something important: ordinary people, not rich people, not kings and princes, but people very little different from themselves, were being offered products and services that they themselves could not afford in their wildest dreams. And as a direct result, their outrage grew until we got the civil rights movement of the 50s and 60s. It isn't an accident that South Africa was the last major nation to have television: the social impact of the medium is immense: and it isn't the content that does it, it's the ads.

So here we go again: the Internet has surprised us. It surprised us, and it will disrupt us, because, unlike those earlier innovations, it emerged fully-functional and ready for use. This bears some explaining.

Until 1984, when the telephone industry worldwide began to be deregulated, it was literally illegal for anyone but the telephone company to improve his or her telephone or data service. If you invented a new kind of telephone and connected it, the telephone company would take it away from you. If you did it twice, they might call the police. For this reason, the service stayed essentially the same for over 60 years.¹⁰

Meanwhile, driven by the fear of nuclear catastrophe, the United States Government examined its national telecommunications network. They realized that the voice telephone network, because it is hierarchical and uses dedicated lines and switching centers, is vulnerable to destruction or sabotage. As we all know, the new parallel network, which is non-hierarchical and uses packet switching (and thus quasi-random routing), was made available for public access and became the Internet.

So as it happened, at about the same time the voice telephone industry's monopoly ended, the Internet was in place and available for public access. But because there had been essentially no change in telephone service for sixty or seventy years (except to make it

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harder for the user and easier for the telephone company), the 1980s antitrust suit against the Bell System did more than break the monopoly: it decriminalized innovation. Instead of the twenty-five years or so it usually takes to find acceptance of a new technology, the Internet was accepted immediately, and instead of being happy with this wonderful new tool, people instantly began to complain about the Internet's slow speeds and lack of capacity. They are still doing that, and they will still be doing that thirty years from now, when both speed and capacity will be orders of magnitude greater than they are now.

The Internet is already driving profound changes in retail¹¹ and politics,¹² and learned books on its social effects are beginning to appear.¹³ I believe that none of them goes far enough, because they are based on the Internet as it exists today and not as it will be. This is partly, I suppose, because they're not written by technologists, so their authors have to work with what they know. I believe that their predictions fall well short of the events we will actually see, because even though innovation was illegal for sixty years, imagination was not. It took no time for people to understand the new medium and put it to use. It has already enabled some major social changes, some of which may surprise you. And though I have no pretensions to being a social scientist, I, just as you, do have a clear idea of the direction technology will take and the speed with which it will move. I will spend the rest of my time venturing some predictions about what will happen:

First, the Internet is becoming, for many people, an electronic social fabric. It isn't quite a fabric yet, because a fabric, to use the word literally, has a close weave. But it is a Web, or a Net (for those are also its names), and the holes are beginning to fill. It will be a fabric that transcends borders, and cultures, and belief systems, and to a degree, languages. It is the ultimate educational tool, and as such, it is self-organizing.

In 1997, the Chancellor of my university happened to say that the freshmen in his Freshman Seminar were asking questions that the seniors had asked the year before. He went on to say that the freshmen regarded the seniors, only three years older, as old fogies who were hopelessly out of touch with the times. I flew to Missouri and blew a bunch of freshmen to dinner, to find out for myself.

I found to my surprise that the freshman woman from Cape Girardeau, down in the Missouri Bootheel, was just as hip as the nuclear physics major from St. Louis, and that, with one exception, everybody was fully apprised of current social and political issues. They had a global perspective. They weren't cynical, but they were excellent critical thinkers. The exception was a freshman who had been home schooled and who had had no access to the Internet. He was nice, he was an Eagle Scout, he was smart, and he was socially unaware. With that exception, these freshmen were people who had grown up with computers and the Internet. The seniors, three years older, had not.

These people are street-smart, if you please. They have chatted with people who would terrify their parents. They have been exposed to a range of ideas and cultures that would make a historian envious. They have been hit on by adults masquerading as children, and

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by men masquerading as girls. They have developed a serious resistance to rhetoric, and they are not going to be had.

At the same time, people who find something worthwhile to do together have a wonderful tool to use for cooperative ventures. Freeman Dyson mentions Penny Sackett's project for locating planets around stars in our and adjacent galaxies.¹⁴ She was able to organize an international effort to do very important work in practically no time and for a couple of hundred thousand dollars. It would have taken years and tens of millions of dollars to do it conventionally. She was able to do it because she could organize it informally, out of sight of the bureaucracy; it's just a bunch of people working together. This process has now become mainstream in the scientific community, and is thoroughly described in a special issue of *Science*, entitled "Distributed Computing"¹⁵. The content of this issue, however, goes far beyond the concept of distributed computing. It describes a level of global cooperation that is truly different from anything that has ever existed on Earth.

Pete Conrad, the late Apollo 12 astronaut, helped to found a company, Universal Space Networks¹⁶, based on the same principle. This commercial enterprise created a satellite tracking network, using small stations on cheap land around the globe, linked by the Internet. The company created a sophisticated and effective satellite management, monitoring and control infrastructure for a tiny fraction of the cost of the government networks now in place.

These are technical efforts, organized by technical people. *But it is the most subversive thing that has happened in two thousand years: People can work together again, as peers, and do things that make them feel good: things they can be proud of.* The cost of a multinational cooperative effort just became as affordable as a meeting of a local bridge club. Actually, it's cheaper, because you don't have to provide refreshments.

An extremely important set of insights into the process underlying these working groups, and a cookbook for creating them so they work well (and work the first time) is to be found in a 2005 Report in *Science*¹⁷. A commentary¹⁸ on that Report, appearing in the same issue of the magazine, adds some important insights (including some from Asimov's *Foundation Trilogy*¹⁹!).

When a technology undergoes continuous improvement, there is sometimes a point where it becomes *qualitatively* different. People can and will use it to do things they couldn't do with it at all before. That moment is just beginning to arrive on the Internet.

The change is brought about by the availability of very high-bandwidth, cheap, last-mile connections along with increasing capacity in the fiber backbones. In a couple of years, ten-megabit symmetrical connections will become available. When that happens, people will begin to live on the Internet (or whatever its successor is called: Let's call it "The Social Fabric"). By living, I mean conducting most of their social and business interactions. And because the Internet is global, their lives will be global.²⁰

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Its first uses are in large, geographically dispersed businesses and in university settings. Most companies with dedicated enterprise networks are beginning to use multiparty videoconferencing. This allows you to see several real-time, high-quality full-motion images while you carry on a meeting. Unlike current videoconferencing methods, this actually fulfills people's expectations and needs, and people will actually use it effectively. Each participant will have a high-bandwidth, symmetrical channel, with low latency (that is, there is no perceptible round-trip delay: when you make a point, everyone smiles at the same time). At the moment, this is very expensive, except over short distances. The cost will drop rapidly, however, so that it will be affordable in developed nations in a couple of years; and low-latency broadband satellite systems like Swansat²¹ will make it practical to have global conferences in a couple of years more. High-bandwidth low-latency connections will be cheap, and they will be everywhere. 3-D simulation software produces startlingly real images. When this Electronic Social Fabric is more complete, a group of people can work together as closely and compatibly and cheaply as though they were at a quilting bee.

The default social interaction structure of humans in an unconstrained setting is something resembling a cocktail party. In a cocktail party, small groups form spontaneously. A newcomer can walk up to the group, remain on the outskirts, listen for a while, attempt to contribute, perhaps stay and chat for a while, then perhaps move on to another group. In spite of the fluid membership of the groups, there is an enormous amount of interaction, almost all of which is trivial; groups form, exist for a while, then dissipate, like eddies at the base of a waterfall; and like the water that makes up those eddies, the people who make up the group are rarely the same from moment to moment. Occasionally, however, a commonality of interest will emerge, and some members of a group will decide to meet elsewhere, after the party, to carry on social or business affairs. In today's world these interactions are necessarily local or take place at keyboard speed in chat rooms: few people can afford to fly to Aspen every time they have something to talk about. Few people can now afford to set up a videoconference, or even a telephone conference call, to continue an interesting conversation. But a cheap, high-bandwidth, low-latency, global communications network capable of multiparty connections allows these interactions to go on indefinitely, and be composed of people who are, eventually, anywhere on the planet.

Clearly, where we're going is a different kind of place. We are headed toward a society with a very large global intellectual elite, with many of the characteristics, both good and bad, of a leisure class.²² It will be a class in which the elite won't worry much about earning a living, because it will be so easy for them. And because knowledge and relationships are beginning to be the things of value, a dematerialization of society has already begun, so the oversized houses and fancy cars of today's dominant generation have less appeal. People will gain recognition from their peers for their work, and won't need the material trappings of success. Many people will work together, as a wired group, to create important, valuable software and other works of art, and many of the groups will simply contribute them freely to society at large, as the Linux software people have now done.^{23, 24} Do you know that Linux received an art award?²⁵ In this new elite,

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race and background are irrelevant, geographic location is unimportant, and life is sweet. Politics will be very fast and highly democratic, if you happen to be a member of the elite.²⁶

Then there is the other class: those who aren't very smart, or who have personality defects, or who have simply lacked the opportunity and education because of their social or economic class. Intellect, knowledge, education and sheer competence are already replacing color, ethnicity and gender as social definers; but unlike like racial minorities in the 20th century, those in the new underclass have little hope of upward mobility²⁷; and while dematerialization will remove considerable pressure from the environment, it will at the same time cause serious dislocations in consumer goods manufacturing. It will create widespread unemployment, a permanent underclass, and if we do it wrong, it will be a social disaster. We will have class war, and everybody will lose. Class wars are not zero-sum games. Class wars are minus-two sum games. Remember the Khmer Rouge?

If we do it right, we will have a world of unprecedented peace and prosperity, and a new society that will last for two thousand years. The world will be a better place, and we will deserve it.

If we do it wrong, we will have an immense leisure class, living in a utopian world where life is easy and abundantly satisfying, and an even larger supporting class, who, while not living in poverty, will not lead satisfying lives, and will not be fully franchised. We can't return to Victorian times, where everyone knows his place and is glad to be there.²⁸ We have to find a creative solution, and it has to work. That is our challenge, and we must meet it within ten years. If we don't, the world will be a worse place, and we will deserve that, too.

Notes to the Text

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1. Adapted from a talk delivered at Aspen Technology Summit, June 8, 1999.
 2. Boehm, Christopher, "Impact of the Human Egalitarian Syndrome on Darwinian Selection Mechanics," *The American Naturalist*, Volume 150 Supplement (July 1997), pp. S100-S121.
 3. For a discussion of the tribes and camps still embedded in our lives, see Tuck, Edward F. and Earle, Timothy, "Why CEOs Succeed and Why They Fail," *Strategy and Business*, Issue 5 (Fourth Quarter 1996).
 4. Boehm, op. cit.
 5. Note that "Geeks," as defined above, are not perceived as threatening, since they are not part of the social mainstream.
 6. Ebbinghaus, H., *Über das Gedächtnis*, Leipzig, 1885. Binet noticed this at about the same time. Among other things, it's why North American telephone numbers have seven digits.
 7. Sapolsky, Robert M., *Why Zebras Don't Get Ulcers*, W.H. Freeman and Company, New York, 1998, p. 308.
 8. Dyson, Freeman J., *The Sun, the Genome and the Internet*, Oxford University Press, New York, 1999, p. 60.
 9. Biesecker, Barbara A., *Addressing Postmodernity*, University of Alabama Press, Tuscaloosa, 1997.
 10. The really big invention of the 19th century was electrical communications. This eventually came to encompass not only the telegraph, but the telephone, radio, television, and now the Internet. The hero of this piece, the grand inventor, the guy who had the big epiphany, was an artist named Morse. Everything else is a refinement on his insight.

The telegraph got messages from one place to another, instantly. It was expensive, because it was labor-intensive, and the messages couldn't be very long, because they took a long time to send: at first, they went at 15 or 20 words per minute. That's seven bits per second. And the "last mile," from the sender to the telegraph office and from the telegraph office to the recipient, was a kid on a bicycle.

The telephone was a lot more user-friendly. The last mile was a pair of copper wires, and the sender could prepare his own messages in real time. At first, he had the luxury of telling an operator whom he wanted to talk with, but later he had to set up his own connections with a rotary dial. That was the state of affairs in the 1930s, and it is the state of affairs today. Since sixty-odd years has gone by, one would think that service would have improved, but from the subscriber's point of view, it hasn't, except the subscriber does more of the work and pays less for the service.

The reason is, telephone and telegraph companies, until recently, were vertically-integrated monopolies. They were government-sanctioned monopolies in the United States, and in most other countries were government-owned monopolies, and most of in those countries there were domestic manufacturers that made all the equipment the telephone companies used.

If you have a monopoly, you have an unusual view of the world. You want to do everything you can to be more efficient in the way you make or provide your product or service, but you want to avoid changing the product or service at all cost. Because if you change your service, you have to change everything. You have to retool your factories, you have to retrain your employees, and you can't forecast twenty or thirty years into the future any more. So you have to do everything you can to keep your customers from trying to improve your service.

As a result, in the United States and most other countries, innovation in telephone service was forbidden by law. If you cooked up a new and better telephone, and hooked it up to your line, and the

telephone company found out about it, they'd take it away from you. And if you did it twice, they might call the police. The Bell System finally got so far afield, as in alleging that a foam-rubber cuff for the mouthpiece for noisy areas would do "irreparable harm to the network," that they precipitated an anti-trust suit that eventually dismantled their monopoly. This finally took place in 1978: See *USA v. AT&T, Western Electric and Bell Telephone Laboratories, Plaintiff's First Statement of Contention and Proof, Civil Action No. 74-1698*, US District Court for the District of Columbia, November 1, 1978.

11. It's easy to see where retail is going. In Christmas 1998, the early statistics said that retail sales were down. Then, in a couple of weeks, the statisticians said, "Hey, wait a minute! They're up!" The difference was Internet sales, which the retail establishment didn't take very seriously until then. Six months later, if you went to your neighborhood mall, you found a few closed stores, and also found mix of the stores had changed: the individual shops are selling more low-value, impulse items. Look who is there: mostly young people, mostly lower-middle-class. Sales of higher-value, more standard items are moving to the Internet. Notice that new clothes styles are much less tailored, less adapted to body shape: you can buy 'em on line, and wear 'em when they arrive.

The Grand Galleria Mall in the San Fernando Valley, the home of the Valley Girls, the source of Valspeak, was converted to an office complex. Where does a young couple go just to walk around and hold hands? Where is the safe, guarded commons where urban teens can meet after school or on a weekend afternoon? It's gone. And there's no acceptable substitute in sight.

12. When we lived in camps out in the forest, people had other people around them all the time. About the only time a person left the camp alone was to answer a call of nature, or to meet a lover in the nearby bushes. In America, we have a tradition of living on our land, as farming families, which we've brought back to the suburbs with its detached houses, one to a nuclear family. Today, in many families, the kids go out to go to school, and the breadwinner goes out to go to work, but the stay-at-home spouse hardly goes out at all. In many cities, it's now possible to shop for groceries on line, and have them delivered: the groceries are fresh, the quality is good, prices are competitive, and tipping is not allowed. You don't have to drag screaming kids around the grocery store any more. And if both parents work from home, using the Internet or a dedicated connection to their offices, nobody has to leave. The leavening effect of other people is gone. The auditing role of one's peers is gone. If the parents elect to use home schooling, they can effectively insulate their whole family from the rest of society. No one has to leave home at all. In our rural past, someone at least had to go to town to deliver cash crops and get supplies, so there was some enforced social contact: the rest of the world got a look at them once or twice a month. But the dark side of our rural past is that there were some really strange families out there, and a lot of behavior that is completely unacceptable by any standard. With the Internet, a whole extended family, or a commune, or a sect, can stay cooped up for years, earning a good living, participating fully in the economy, and never seeing the light of day.

Another danger of this isolation is more subtle. Internet chat and discourse is, by its nature, relatively private. Society as a whole is deprived of both the insights and the warnings it generates. For example Americans, in particular, have developed the habit of taking extreme political positions or engaging in gross behavior, in the expectation that people will be paying attention and that there will be an offsetting polar reaction, thus preventing serious consequences. There is some danger that those opposing voices may not be heard in the relatively private arena of Internet communication.

Some people fear that Internet users will be vulnerable to rhetoric: that a Hitler or a Charles Manson will somehow capture the minds of the educated. As it happens, by historical standards, very little rhetoric, except advertising rhetoric and talk radio, is going on right now in America. Almost everybody who has grown up with television has such strong defenses to persuasion that it just doesn't work anymore. In other nations and cultures, however, the Internet is rightly seen as a threat to the establishment. China's democracy movement is an excellent example. (See Forney, Matt and Brauchli, Marcus, "A Chinese Democracy Party Rises From the Ashes of Tiananmen Square," *The Wall Street Journal*, May 12, 1999).

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13. The Nineties was the decade for new books on the way the Internet will change the world; Manuel Castells actually generated a three volume set totaling almost 1500 pages, on that very subject (Castells, Manuel, *The Information Age*, Blackwell, 1999), and there are at least a dozen more, all by highly-respected and capable people. See also Fukuyama, Francis, "The Great Disruption," *The Atlantic Monthly*, May, 1999, and Weise, Elizabeth, "It's About Time, and Tech," *USA Today*, May 26, 1999. All of these people have made predictions of the future based on information technology as it exists today. Their books and articles are thoughtful, erudite, and believable. But because they can't see clearly where technology is going, they don't see the good things that are coming, and as a result, they don't go far enough.
14. Dyson, Freeman L., *op. cit.*
15. Five articles with an introduction, *Science*, Vol. 308 (6 May 2005), pp. 809-823
16. See <http://www.uspacenetwork.com>.
17. Roger Guimerà et al, "Team Assembly Mechanisms Determine Collaboration Network Structure and Team Performance," *Science*, Vol. 308 (29 April 2005), pp 697-702.
18. Barabási, Albert-László, "Network Theory – the Emergence of the Creative Enterprise," *Science*, Vol. 308 (29 April 2005), pp 639-641.
19. I. Asimov, *Foundation and Empire*, Spectra, New York, 1991.
20. There has been a lot of whining about globalization, and the blame always seems to fall on Pepsi and McDonald's (see Peterson, Jonathan, "Trade's Image Takes Beating Among Public," *Los Angeles Times*, May 31, 1999). But the driver for globalization is not the multinational businesses, it is the people who consume their products, and who want to participate in a global society and to enjoy the variety and excitement of a cosmopolitan environment. Thomas Friedman says that globalization is like the dawn: you might as well enjoy it, because it's coming anyway. (Friedman, Thomas L., *The Lexus and the Olive Tree*, Farrar, Straus and Giroux, 1999.) He thinks it's coming because Toyota is making it happen. I think it's happening because people want it to happen, and if some elitist complains that the world is a poorer place because kids stop starving or leading empty pointless lives, then he has a problem I can't solve.
21. See <http://www.swansat.com>.
22. For the bad part, see Veblen, Thorstein, *The Theory of the Leisure Class*, Penguin Classics, 1994.
23. Luck, Robert W., "Free Software," *IEEE Spectrum*, May, 1999.
24. Linux was created by a big, big group of people working as a consensus. We need to figure out how that happened so we can do it again.
25. Mirapaul, Matthew, "Linux Takes Prize – In an Art Competition," *The New York Times on the Web*, June 4, 1999.
26. Raney, Rebecca Fairley, "Flash Campaigns: Online Activism at Warp Speed," *The New York Times on the Web*, June 3, 1999.
27. Wessel, David, "As Rich-Poor Gap Widens in the U.S., Class Mobility Stalls," *The Wall Street Journal*, May 13, 2005.

28. For a view of that world, read Goldsmith, Oliver, *The Vicar of Wakefield*, Edwd. E. Barrett, London, 1875; available in reprint.