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Dr. Muller's article, "Technology and Society in the 21st Century," follows.

Technology and Society in the 21st Century

Steven Muller

We all know that we are living in a time of rapid, continuous change. New technology is evolving almost daily, and the tools available to us are ever improving. We are thus empowered beyond the wildest dreams of our forebears. Our ability to structure our environment continues to expand, as does our capacity to cure disease and lengthen life. We are blessed with what technology can do *for* us. We are, however, also becoming aware of what it is doing *to* us. While new tools are—unavoidably—changing us, our adjustment to the changing human condition lags behind our ability to rapidly master the uses of technological evolution. The social impact of these new tools is as profound as the expansion of our physical capacities, but we have simply not yet found the time to understand fully the new society we are creating.

THE CHANGING HUMAN CONDITION

Leisure

Perhaps the greatest and most visible social consequence of the technological revolution is the democratization of leisure. With our new tools, many of us no longer face hard, exhausting physical labor on a daily basis. Instead we have time, aside from work, to use as we please, and not merely to recover from the working day. Thus most of us now have leisure, once available only to an aristocracy supported by servants. Today, being in good physical condition is not a product of hard labor, but rather the product of a whole new fitness industry, which goes far beyond the polo, tennis, or golf games reserved years ago for “the leisure class.” The housewives of three generations ago, who cleaned, shopped, baked, washed, and ironed, did not need aerobics or treadmills; nor did coal miners or manual laborers need jogging or a gym workout.

Contemporary uses of leisure are characterized by at least three behavioral by-products of our new technology. The first is the drastic shrinkage of our attention span and the related need for instant gratification. Today’s tools have accelerated our entire pattern of behavior, and we have become dependent on the speed of technology. Our great-grandparents would not comprehend instant food, one-liners that have replaced anecdotal humor, sound bites that bring us news without content, or the mind-set that embraces the quick and abhors the slow. We are approaching an attitude that regards impatience as a virtue. The good news is that we really can “make every minute count” and accomplish more in a day than our forebears could in a week. The bad news is that our impatience can easily turn to rage—“road rage,” for example.

A second by-product of our revolutionary access to leisure is the risk of boredom, which we find intolerable. True, our ancestors did not like boredom either, but they seem to have been able to relax and enjoy slowly paced leisure when they were not exhausted. Our problem today is that we have become accustomed not only to speed but also to constant stimulation; we want leisure to be filled with a rich assortment of rapid-fire activities and find idleness unbearable.

We are exposed to an entertainment industry unparalleled in terms of both its variety and immediacy. The extent of our compulsive craving for novel diversions is so great that entertainers are now among our society’s most highly paid people. And indeed constant efforts are under way to devise new and ever more extreme ways to gratify our appetite, which keeps pushing the envelope to include more violence and pornography. We have literally become addicted to entertainment, often as either a supplement to, or substitute for, alcohol and drugs.

A third consequence is that our dependence on entertainment produces a complicated alienation from the people we hold dearest to us. Obviously, eye contact is a vital component of human interactive behavior. It leads to familiarity by sight, to the reading of body language, and—when linked to sound—to a sensory comprehension of another person. (Familiarity is a word that derives from and refers to the close knowledge we have of our immediate family.) But modern communications technology allows us to see and hear people that are far away. Those who appear on our TV screens daily or with significant frequency tend quite literally to become familiar to us, even more so than those with whom we share our lives. The fact that such TV personalities are seen by many viewers and that they themselves never see or hear us does not inhibit the sense of acquaintance we develop with them; they may even engender some degree of affection bred by familiarity.

Our ability to communicate freely with others over Internet chat rooms further illustrates the point. The technology enriches and rewards us, but it also tends to dilute our reliance on people with whom we are in physical contact. Chat room participants may legitimately compete with those around us for our time and interest, and again, even our affection. Obviously there is no substitute for true intimacy, but “virtual” acquaintances may lure us away from the exclusivity and significance of a palpable presence.

Communication

Having looked at the behavioral consequences of leisure in an age of revolutionary communications technology, two other capabilities of that technology come to mind. One is the powerful combination of image and sound. We have long known that words and images together are more powerful than words or images by themselves. Medieval books were often illuminated by illustrations that enhanced the meaning of the text. Now our evolving technology makes possible a trinity of words, sounds, and images—with enormous power to communicate. A familiar example of this combination is advertising, which is intended to persuade.

All commercial societies use advertising (including political advertising) to some degree. The arrival of radio prompted rapid progress from printed advertisements in newspapers, magazines, and billboards to spoken advertisements, frequently with musical accompaniment. With the advent of television, sight was added to sound, and advertisements became known as commercials. (Because television networks and stations were for-profit enterprises that derived income from payments for air-time by businesses with goods or services to sell, “commercial” was a perfect descriptor for these advertising messages.) The production of these commercials—designed to command attention, attract interest and good will, and persuade—became an art calculated to engender both interest and familiarity. Advertisements have frequently used well-known personalities, repetitive musical themes, texts with rhymes, etc., to communicate the name and utility of a product *and* to convey warmth and comforting closeness as well.

Commercials have brilliantly succeeded not only in engendering audience acceptance and even approval, but also in generating increased public acceptance of (and favorable response to) commercial sponsorship of public entertainment. Today we see the commercial naming of venues of public entertainment such as theaters, stadiums, and concert halls—all of course in return for a substantial payment. The resulting commercialization of public entertainment as well as other public activities is a *fait accompli*. Corporate names now grace university facilities or endowed professorships in recognition of commercial support. Couples about to marry are beginning to seek commercial sponsorship of wedding expenses in return for designating the sponsor as the preferred source of wedding presents. Such successful commercialization of what once were private choices attests to the persuasive effect of image, word, and sound combined, as well as to the power of virtual familiarity.

The similarity of persuasion to teaching suffices to justify the expectation that the trio of words, sounds, and images will become an ever more powerful tool for learning. An auditorium lecture enhanced by illustrations and sound not only has a powerful impact but also can be recorded and played over and over again, right in one's home or office. Beyond this combination of word, sounds, and images is the realm of computer-generated and -enhanced total environments, which provide virtual visits to almost anywhere. It will be possible to take a virtual stroll through the streets of London or Lima, or to take a virtual cruise on the Amazon or the Nile. We may also be able to "visit" the computer-generated Rome of the Caesars or the Athens of Socrates. The learning and teaching potential of such technology is enormous.

Security and Surveillance

Another novel capability of communications technology is enhanced security and access to assistance. Cameras surveil potentially risky locations such as ATM machines, electronic signals can detect shoplifting, portable telephones allow us to call for assistance from anywhere, dogs can be kept from straying from home by invisible electronic fences, and a person's location can be pinpointed with the use of an electronic attachment. We have caller ID to screen callers as well as alarm systems for our homes, offices, and cars. Emergency news can reach us almost instantly.

There is, however, a less attractive side to this, namely, potentially omnipresent surveillance. Once in a computer, information that we want to keep private may not remain so. Miniature cameras and microphones which almost defy detection can be installed anywhere, and a nearly invisible speck on a garment can produce a signal that traces the whereabouts of the wearer. Under normal circumstances thoughts along these lines veer all too easily into paranoia, but there are societies in the world which seek to restrain and rigidly discipline their citizens—and they now possess the technological means to do so.

Quality of Life

Ethical Issues

We are experiencing a revolution in pharmacology. (It is worth noting that the medications we use to reduce anxiety, depression, and hyperactivity could also, and easily, be administered to larger groups of people by those who wish to pacify or immobilize a population.) We have noninvasive techniques to look inside the human body and the instrumentation required to work on internal living tissue and organs. In the most technologically advanced societies the average human life span continues to increase owing to both better nutrition and health care.

The prospect for continuing progress in human health and the extension of life span is brilliant, but how far and how fast will our knowledge carry us? The mapping of the human genome and the ability to manipulate the cell have opened the door to a continuing revolution in medicine whose ultimate reach remains unknown.

Part of this progress involves ethical questions (as well as related financial issues), which challenge us profoundly and disturbingly. The ethical questions primarily revolve around our ability to create and modify life itself. To what extent can or should we treat the human embryo as a source of life, a commercial commodity, or a research tool? As health care can do ever more to prolong life, should it also terminate life in certain circumstances? Should the cloning of human beings be forbidden or allowed? To what degree should human organs, tissue, cells, or blood be treated as commercial commodities, subject to patent or sale? Is there a right to receive health care?

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The related financial issues, at least, are reasonably easy to identify. The already enormous costs of medical research, instrumentation, and health care delivery will continue to rise. The only other certainty is that these costs cannot be borne solely by the beneficiaries of this progress, but rather will continue to be a major financial burden on society as a whole. Our tax dollars will enable government to underwrite the research that will produce new medicine and new treatments, but the bigger challenge will be the continuing extension of the human life span. In this country, the biblical "three score and ten" is already outdated, and active life into the nineties is no longer exceptional. The longer we live, the more health care we will consume, and the more health care costs will rise.

"Serial" Lifestyles

These considerations bring to mind other consequences of our extended life span. Is it not likely that the age of retirement will rise? But what will we be retiring from? The past presumption that a job would last for a lifetime is obviously obsolete. Both sexes now expect to work, and most of the work is no longer so exhausting that it can only be performed by people in their physical prime. Serial employment is already the norm rather than the exception, and it is almost certainly going to expand beyond the age of 65.

Along with serial careers, our society also appears to be embarked on serial family lives. We tend to have fewer children and live longer after they leave home. We tend to have serial housing instead of one permanent or semi-permanent family home. Serial marriages—in the wake of divorce or the death of a spouse—are no longer uncommon. Our technology has begun to liberate us from an inescapable status quo and has made family life mobile, both mentally and physically. Most of us no longer live and work in the community in which we were born. We change jobs, housing, communities, friends, and sexual partners. We are on the one hand no longer tied to our roots, but on the other hand rootless, and no longer sustained by unchangeable, familiar circumstances.

Choice

We are increasingly more able to be our lone selves, which is simultaneously a curse and a blessing. Technology has also given us unprecedented opportunities to gratify our individual tastes and preferences. But this new range of freedom carries with it a significant degree of personal isolation. Technology has made it possible to individualize mass consumption. With a simple earpiece and a small, lightweight cassette or receiver, we can listen to whatever we choose, wherever we are, even with lots of people around, without the need to involve others. We have public transportation, but we prefer the car, which we most often drive alone. If we are hungry, we can "grab a bite" from a variety of fast-food vendors and eat alone. More than ever, we are "the lonely crowd" of David Riesman's 1950 book.

Politics

The word crowd brings to mind the impact of technology on the larger structure of human society. That impact is both so pervasive and preliminary as to defy full consideration. The extreme diligence with which we follow the transformation of the economy and the commercialization of new technology contrasts radically with the much lower level of attention we pay to other societal changes. There are, however, at least two aspects of societal change that raise questions of such magnitude as to tempt comments, premature as they surely are.

The first of these changes involves the political system of the United States—our government of the people, for the people, by the people. Our system is rooted in the Constitution, which established representative government by calling on us to elect a president and legislators to make and enforce laws. The Federalist Papers make clear the intent that we will choose people in whose judgment and integrity we trust so that complicated issues can be resolved in our best interest by our chosen representatives. As the constitutional system evolved and political parties emerged, opposing candidates would express their views on issues of the day and the people could vote for candidates whose positions they preferred. Thus the electorate was informed as to the issues but did not resolve them.

Elected officials tended to represent the views of the majority of the people. Obviously, they also attempted to test the views of their constituents on major issues. A constructive interchange developed in which views were raised, candidates could advocate their stances, the public could react, candidates could revise their positions, and voters could revise their views. In the end, the election also involved something of a popular mandate supporting the views of the elected candidate.

Our new technology has vigorously entered this electoral scenario but has not yet altered the fundamental assumptions of representative government. Voters now become familiar with candidates mostly via the media, and their reactions are instantly sampled. Paid advertisements inundate the electorate with carefully packaged messages. Election expenses have become astronomical, and extraordinary efforts are made to "dumb down" complicated issues for easier consumption by the voters.

Despite these major changes, the fundamentals of representative government are still in place. But how much longer will this be true? Technologically it is already possible to let the people themselves decide major issues by direct vote. This is not a new idea: referenda have been placed before electorates in the past, and "let the people decide" is a popular cry. The problem, however, is not feasibility but propriety. There is a fundamental contrast between the following:

- Governance by those elected to devote their full time and energies to the benign and constructive conduct of public affairs in the best interests of the electorate, and
- Governance by the dictates of an electoral majority whose conclusions—which are largely based on political advertisements—can not be easily altered or even modified.

That contrast makes the difference between the democracy of our Constitution and mobocracy. A representative democracy leaves occasional room for plebiscites, not for government by plebiscite. But the cry for "let the people rule" will be harder to reject when technology can so easily implement mobocracy.

Demographics

Another consideration of how our technology compels changes in our behavior concerns the future of the city. Throughout history, an urban aggregation has surrounded the ruler and the ruler's court. Or it has facilitated commerce by providing markets, the loading and unloading of myriad goods, and a population sufficient in numbers to supply services of all kinds. Past technology produced the gradual growth of cities as services increased, as public sanitation became industrialized, and as a growing population produced an appetite for public entertainment and enlightenment. New technology made vertical construction possible as well, thus expanding residential and commercial growth and public utilities. In the immediate past, however, new technology also produced greatly enhanced transportation by train, car, bus, or even bicycle, as well as the capacity to deliver water, sewage, electricity, etc., over ever more expandable horizontal space, thus permitting the explosive growth of suburbs and "fringe" cities.

Today, the Internet, wireless communication, and satellites enable worldwide human communication, and air transportation is facilitating the movement of both people and goods. At the same time, some people are able to afford homes far from the noise of the city and move to more attractive surroundings. Remoteness from the city thus is often regarded as more of a blessing than a burden. People no longer need to be physically present at a business office; they may instead work at home or wherever they please through increasingly sophisticated communications technology. And just as entertainment and cultural diversion concentrated in the city, the same communications technology which makes a virtual office possible also provides access to sports, stage, concerts, and all other similar pleasures in the comfort of one's home, regardless of distance.

Such considerations do not suggest that the city will disappear, only that its character will continue to change. People who move out of the city tend to be more affluent, whereas those in the inner city are less so. Thus city income from a less affluent population shrinks, city services decay in quality, and city life becomes less satisfactory. A look today at most cities reveals a continuing decline in property tax revenue, public education, policing, and virtually all other public services. Cities have always served the rich and the poor, but the impact of our continuing technological revolution may very likely continue to create a sharper contrast between the haves and the have-nots. This may produce a developing urban crisis, along with racial discord. If these trends are valid, we may need to focus the technological revolution persistently, consciously, and constructively on our cities and their future.

CONCLUSION

Issues concerning what our still-evolving technology not only does for us but also to us strongly suggest that the personal—and particularly the social—consequences of the technological revolution require significantly more consideration and scientific analysis. If science is defined as knowledge gained by systematic study, or more specifically as systematic knowledge of the physical or material world gained through observation and experimentation, then our social science, i.e., analysis and understanding of our own adjustment to technological progress, lags considerably behind our physical science. Our developing tools are reshaping us as we put them to use, and our impatience to be served tends to blind us to their social and human impact. We can not and should not inhibit or delay technological progress, but surely the time has come for equivalent progress in understanding and adjusting to it. We need a much more diligent scientific understanding of the revolution in our human condition produced by our technological revolution.