

Seoul National University: Iniroductory Talk

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Everyone enjoys a birthday party. I remember how my little daughter reacted to her first one, now many years ago. When she had tasted her first birthday cake, and gathered in the brightly wrapped birthday presents brought by her brightly clad young friends, she climbed up in my lap and asked pleadingly, "Daddy, can I have another birthday next week?" When we are young, birthdays are too few and far between; when we get to my age, they come rather too frequently. But at age 20 they come just about often enough. And so this twentieth anniversary is a very pleasant occasion for all of us. I am sure I speak for all my fellow participants in this conference when I thank the Seoul National University and Dr. Kim for inviting us here, and congratulate them on the birthday of their lively communication institute.

But I would like to suggest that Dr. Kim has not only brought us to a pleasant and significant academic occasion; he has brought us together at a historic hour in the chronicle of communication itself. Let me explain what I mean.

Four times in man's long day on earth, the form and style of human communication have changed so fundamentally that they have also changed fundamentally what human beings could know, and consequently what they could be and do.

The first of these was about 25,000 years ago. It came at the time of the perfecting of language and the sophistication of tools. We don't have much left to document this period except the cave paintings, the tiny statues, and the carved bone and sharpened rocks. But those things tell us enough to encourage us to believe that back there in the dawn of history, when man created a subtle and sophisticated form of communication, he was experiencing a sort of prehistoric renaissance that pointed the way toward the world we live in.

The second of these events came with the invention of writing, about 5,000 years ago. This development, in Mesopotamia and Sumaria, created a memory for man, so that he did not have to carry all the past in his head and could use much of his brain for other things. And from this new tool grew books, libraries, cities and schools, the birth of

science, and all the great civilizations around the Mediterranean.

The third event was a long time happening. The Chinese developed good paper and ink 1700 years ago, and by about 700 A.D. were able to print the first book, the Diamond Sutra, from wood blocks. Six or seven centuries later, Koreans took a long step forward from that: they found how to print from single characters shaped from wood or metal. Then a man named Johan Gutenberg adapted the European winepress to this earlier technology, and found himself at the center of a development in Western Europe that far exceeded the strength and vigor anyone had predicted for it. Today it looks to us like a sort of historical explosion. Out of the invention of printing came wide and active participation in politics, education was opened to all people, newspapers and magazines came into being, revolutionary changes began to take place in both business and government, and practical science gave birth to the industrial revolution of the nineteenth century.

Now we wonder whether we are not witnessing the beginning of a fourth chapter in human communication which, like the first three, promises to make a change in all our lives.

No age of history ever begins sharply and clearly at one day and one hour, but when historians write about this period they will probably trace the new chapter in communication history back to three great years in the 1940's:

—In 1945, Arthur Clarke, a British radio engineer, set down in a modest four-page article in the British journal *Wireless World*, the idea of the communication satellite.

—In 1956, John von Neumann, a Princeton mathematician, published a monograph on the theory of the electronic computer. Every modern high-speed computer since that time has followed the path he mapped out.

—And in 1947, at the Bell Telephone Labs in New Jersey, three engineer-physicists, Bardeen, Brattain, and Shockley, invented the transistor. That first small solid-state device looked forward to the chip, to the so-called "thinking" machines, to the robots, and all the other exciting developments in modern micro-electronics.

How new these were, most of us did not realize at the time. Clarke himself marveled over the new electronics. He said:

"If you showed a modern diesel engine, an automobile, a steam turbine, or a helicopter to Benjamin Franklin, Galileo, Leonardo da Vinci, and Archimedes—a list spanning two thousand years in time—not one of these would have had any difficulty in understanding how the machines

worked. Leonardo, in fact, would recognize several from his notebooks...All four men would be amazed at the materials and the workmanship...But once they got over that surprise they would feel quite at home—as long as they did not delve too deeply into the auxiliary control and electrical systems. But now suppose they were confronted by a television set, an electronic computer, a nuclear reactor, a radar installation. Quite apart from the complexity of these devices, the individual elements of which they are composed would be incomprehensible to any man born before this century. Whatever his degree of education or intelligence, he would not possess the mental framework that could accomodate electronic beams, transistors, atomic fission, wave-guides, and cathode-ray tubes.”

We don't have too good a record for predicting communication futures. Clarke himself said that his satellite, which was on paper in 1945, would probably not come into use for 50 years—say, in 1995. Actually, as we all know, the first Sputnik was in orbit just 12 years later, in 1957. And a historian wryly imagined what might have happened if, in 1450, a Royal Commission had been assembled to decide what the Government should do about Gutenberg's new invention. They would have decided with only a moment's hesitation, he said, that “no funds should be committed. It is a very ingenious device,” they would probably have said, “but of little practical use because so few people can read.”

The recent pace of development in communication has been awesome. In October, 1957, we had one small satellite that transmitted a message consisting essentially of “beep, beep”. Twenty-five years later we had 25,000 satellites, of all kinds, carrying as much information as all the libraries in the world.

In 1970 it was estimated that the number of multiplications that would cost 12.5 million dollars for a man to do with paper and pencil, would cost only about 2.5 million if the man were permitted to use a hand calculator, and something in the neighborhood of 50 dollars if done with the fastest computer available in 1970. Today, 1970 computers are looked upon as electronic turtles.

Speed of information transfer is therefore at the heart of the new events we are coming more and more to see as the fourth great chapter in communication history, the Fourth Age of Information as historians are beginning to call it. Speed of technological development, speed of operation. Whatever we name the New Age it is going to mean that:

1. More information will flow.
2. It will flow faster.
3. It will come farther away.
4. It will be a source of power, comparable to natural resources, industry, and military

resources. It will offer this kind of power, I mean to say, to people who can gain quick access to it, and store and process it efficiently.

What do we mean, practically, by information coming faster? When Nelson was preparing to fight the battle of Trafalgar, it took 11 minutes for his sailors—11 minutes—to raise the flags that carried the admiral's message to the fleet: "England expects every man will do his duty."

In contrast to that, I remember that I sat once in London with some friends, and for fun we tried to calculate how long it would take, under ideal conditions, to transfer all the contents of the Bibliotheque Nationale in Paris to the library of the British Museum in London. There were some ifs in our calculations: we had to estimate just how much information there was in the Bibliotheque Nationale; we had to assume that all the books and manuscripts would be put into computers before the transfer began; and that we would have enough computer circuits at hand. Given those caveats, however, the job could probably be done in somewhere between 7 and 17 minutes, or roughly as long as it took to send a one-sentence message to the fleet at Trafalgar.

What do we mean when we say that more information will flow? Here are a few simple examples. In the 14th century the largest library in the world was the Sorbonne, which was supposed to have 1338 books. Now half a dozen libraries have over 8 million books each, and school or community libraries in small cities or villages are considered deficient if they do not have more than 1338 books. In 50 years the number of books sold per year in the United States has increased by 600 per cent. Telephone conversations between Europe and the United States increased in number by about 50 per cent per year between 1978 and 1980 alone, and the total number of telephone conversations per year in my country increased by a factor of 100 between 1970 and 1980.

George R. White, chief engineer of the Xerox company, did some rather fancy mathematics and came up with the conclusion that the average human's cerebral store of information probably increased one order of magnitude—10 times—after printing, and another order of magnitude after the electronic developments of last century and this one. Two zeroes: 100 times greater. Meanwhile, he estimated, the total amount of information *available* to man from printed and electronic sources increased *two orders* of magnitude after printing, *another two orders* after electronic communication. *Four zeroes*: ten thousand times.

It isn't necessary to fight with White's calculations. Suppose he is wrong by one order

of magnitude, so that only 1,000 rather than 10,000 times as much information is available to us now as was available before printing. Given a thousand times as much information, what is Mr. Average Citizen to do with it? Will he sample the available feast—and be frustrated by realizing how much he is still not getting? Will he give all waking hours to information—and still be frustrated? or will he curse the fourth Age of Information, and tune in Charlie's Angels on the telly?

I said that the new Age will bring—is bringing—information from farther away. Only a few decades ago we could hardly have imagined a world in which there were as few dark places as we presently find—a world, for example, in which we can reach practically anyone else on the globe by telephone if we want to; a world in which one of our largest television audiences gathered around a program *from the moon*? Returning to what we said of speed of information, recall that the moon telecast reached us in about one and one half seconds. And recalling what we have said about the *power* of information, remember what Japan has been able to accomplish in the present day without any great supply of natural resources or military resources, but with a plentiful supply of technological information.

This fourth Age of Information, then, holds out to us the challenge to be as creative as we can with the opportunities it offers, and at the same time to avoid the pitfalls it puts in our path.

What are these pitfalls? For one thing, the danger of overload.

Is overload—too much information—a realistic possibility? Toffler thinks so, and makes a great point of it in *Future Shock*.

Can a person *ever* have too much information offered him?

Perhaps you will forgive me if I use for example the case I know best—my own situation. I feel that I must be familiar with about 50 scholarly journals—out of 100,000 now being published, many others of which I probably *should* be familiar with if I only knew them. I should read several hundred new books a year that contain ideas and facts I ought to know. At least four newspapers a day—a local paper, the *New York Times*, the *Wall Street Journal* (which, as you know, is far more than a journal for Wall Street), and at the least one foreign newspaper. I should read a large number of the drafts and preprints that circulate among scholars. I must read and should answer about 50 letters a month from scholars and would-be scholars. That is a start. Well, I can't do it. If for no other reason because I have to teach and research and write in order to make a living.

I simply have more useful information at hand than I can handle.

The cable television in my home has 36 channels, about half of which are in use. How many of them can I cover? I can buy a videocassette recorder and cover two channels at a time, if I wish. That takes care of my first and second choices among channels, leaving only 15 or 16 dark and unused. But I can give, at most, only 2 or 3 hours to television—direct or recorded—on an average day. VTR or no VTR, that is all the television I can realistically expect to see. It is necessary to leave 16 or 17 hours per day per TV channel unsampled or unused.

That is discouraging enough. But look ahead to the day when we shall have 80 channels, as we fully expect to. If we have a VTR that means that only 78 out of 80 will have to go unused at any given time. Suppose I view three hours a day, which is about maximum for me and about average for an American adult. On an average day about 1900 hours of television will be coming into my home, from which I can select three or less. Given 1900 hours from which to select three. Will I assign more time to TV or simply become frustrated?

The problem is, of course, bigger than any individual. National governments will necessarily be managed by individuals and agencies who are overloaded also. For one thing, both governments and individuals, will have to devise quicker reality tests which they can apply to the flow of information that will beat upon their doors and windows. Much of the official information will come from unusual and unofficial sources as, for example, the Khomeini regime in Iran communicated with other countries by open television at the time of the hostage crisis. Officials must decide how much of this information they can trust. Gone will be the traditional period of secrecy when foreign offices were able to consider and study formal notes, to check facts and consider options. Information will come in a hurry and a mass; it must be answered in a hurry and wisely if possible.

Mr. Average Citizen must decide whether to try to cope, or to withdraw. A government must decide how much of the available information it can handle, and how much of it can confidently be passed on to its people.

Perhaps I have talked too much about the potential dangers of this new Age. What I mean to say is that danger walks with opportunity. The challenge which the new Age of Information offers scholars and practitioners is not so much to avoid something as to make use of something. The challenge that looms before this institute in its *next* twenty years, and before all the rest of us who want to contribute to knowledge and use of

communication, is to raise our sights beyond the little fascinating things we typically do as communication researchers and teachers, and face up to some of the really big problems that relate human communication to the future well-being of man. Some of which, I might add, have to do with whether man *has* a future.

We don't know whether a high technology civilization typically blows itself up or not, and we shall probably never know, except from our own experience, until we can cruise among the other galaxies. But obviously we should be doing everything in our small powers to make the ultimate holocaust as unlikely as possible. What can we do with increased information to make the world, if not what McLuhan called a "Global Village", at least a world of neighbors? One is less likely to blow up his family than someone far away of whom he knows little or nothing.

What should we be studying in these next twenty years? I am not going to tire you with a long list, but let me suggest a few examples.

The Problem of development. A time of great change, such as this promises to be, is the best time to find out how communication can be used to bring about or control change. For example, take the problem of development. For thirty years we have known that effective use of communication is an essential ingredient of development. We have tried the so-called Western model and found that in many places it does not work. We have tried two or three other models and found them inadequate. Now we think we are beginning to find out why some of these paradigms have *not* worked, but we are still uncertain what is the pattern that *will* work. Can we now make some progress in finding that?

The problem of gaps. Gaps between the information-rich and the information-poor seem to be widening rather than narrowing. Between rich and poor countries, educated and less educated classes, informed and uninformed. We may even be facing a generation gap, for in my country, and numerous others, I am sure, young people are beginning to covet their own small computer as they used to covet their own bicycle, and, later, their own automobile. To them, therefore, a kind of communication technology will soon become familiar that is still mysterious to their parents and grandparents. What can we do—for example, with devices like distance teaching and learning—toward closing those gaps?

The problem of overload. Technology itself is moving toward making information easier to obtain—for example, with instruments like videotext which permit a user to call

up what he wants to know about from a much larger database than his newspaper or radio provides. How can we contribute to aspects of this movement—say, toward working out abstracting or summarizing services, toward helping newspapers furnish, on the one hand, more radio-size items and, on the other, more summarizing articles built around a trend or development rather than an event?

The problem of image. What kind of images of other countries are being presented to us? How do they compare with what we would see of those countries if we were to spend some time there? I realize that content analysis now sometimes seems rather old-fashioned, but critical content analysis that is more than item-counting or centimeter measuring will never become old-fashioned. It is essential.

The problem of conflict-resolution. A sub-field, conflict resolution, has now grown up, and communication, as we might expect, has staked out a corner of it. This raises in a demanding way the question of how communication be used to ease, rather than exacerbate, conflict between nations, classes, and organizations. In a time when communication is flexible and changing, what might we contribute to that?

The problem of how communication works. I have been raising rather practical problems; now let me conclude with a more theoretical one. A few weeks ago, I heard a Nobel Prize physicist discuss his own career. He is now working on the nature of quarks. A quark is the present nomination for election as the most basic particle of matter. No one has ever seen a quark; no one ever will see one. In a few years, something *more* basic may well be discovered. The physicist said apologetically that he was afraid he was not doing very practical work. "I don't really care what we can do with quarks," he said. "I am simply trying to find out how the universe works." I submit that research of this kind lies at the root of all the great and useful discoveries of biology, chemistry, and medicine, physics and engineering, mathematics and information, and that it must be a part of every really useful program of communication study. Before we can know how to use communication, we must know as much as we can about how communication works. In 1950 I wrote a paper with that ambitious title: "How Communication Works." Since then, I have written it again and again, always with some changes that I thought improved it or brought it up to date. It has been reprinted in a number of languages, and been subjected to improvements and updating in those languages. I hope that in the next twenty years this institute will have the insights and findings to make it unnecessary to rewrite and revise that paper quite so often as in the past.

Some things like these we must consider when we sit down to plan next year's program. For the present time offers us an unbelievably rich opportunity and challenge.

Something like this must have been in the mind of my friend Edward R. Murrow when he wrote about the new electronics of *his* time these words that have ever since been used for the du Pont Awards at Columbia:

"This instrument can teach," he said. "It can illuminate. It can even inspire. But it can do so only to the extent that humans are determined to use it to those ends. Otherwise, it is merely lights and voices in a box."

This, in the straightforward practical words a great broadcaster, is your challenge and my challenge.