SOCIAL ASPECTS OF COMMUNICATION DEVELOPMENT

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Reprinted from the
BELL TELEPHONE QUARTERLY
April, 1932

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A lecture delivered at the Lowell Institute, Boston, Massachusetts, on January 26, 1932

THE gentlemen who have preceded me in this series of lectures have explained to you some of the methods and results of telephone research. This work has laid the foundations of the talking moving picture industry, prepared the way for television, advanced the method of aiding the deaf to hear, produced an artificial larynx and contributed to the advancement of knowledge of electricity, metallurgy, pure mathematics and in many other ways, but these things are incident to the main purpose to which this research is devoted.

That main purpose is to improve electrical communications, particularly the transmission of the human voice. Specifically it is to enable you to be connected by telephone more rapidly and easily to any one of an ever increasing number of people and when you are so connected to have your conversation clearer and more free from imperfections, errors and delays. It is the desire of these scientists to create as nearly as possible a condition in which you can talk to anyone anywhere in the world with the same satisfaction and with the same effect as if you were talking to some one immediately in front of you. To do that the telephone operation must be so good that you use it as naturally as you use your own vocal cords and it must reach anywhere that you desire it to reach.

Towards this ambitious goal telephone research has made tremendous progress in its half century of effort and it has ever widening possibilities ahead for it is one of the fascinations of the effort to add to human knowledge that each advance in-

stead of tending to reduce the possibilities that remain, seems to increase them.

In the charter granted to the American Telephone and Telegraph Company some nine years after Dr. Bell invented the telephone, the following vision of the future was recorded:

> "And it is further declared and certified that the general route of the lines of this association, in addition to those hereinbefore described or designated, will connect one or more points in each and every city, town or place in the State of New York with one or more points in each and every other city, town or place in said State, and in each and every other of the United States, and in Canada and Mexico, and each and every of said cities, towns and places is to be connected with each and every other city, town or place in said States and Countries, and also by cable and other appropriate means with the rest of the known world as may hereafter become necessary or desirable in conducting the business of this association."

That romantic idea was written into the charter at a time when in actual practise there was very little intercommunication between points any distance apart, no telephone communication beyond 250 miles and, of course, none at all overseas.

Yet, although they had no definite knowledge of how their prophecy was to be fulfilled, their faith in the future was largely justified because at present about 92 per cent of the thirty-five million telephones in the world can be reached through any telephone in this country.

The vision that lies ahead is not, therefore, one of possible interconnection with other telephones in the world. In fifty years that prophecy has been largely fulfilled. The vision of the future is one of making telephone connections anywhere and everywhere so convenient and easy that its effect upon humanity will not be gauged by the possibility of people talking anywhere, but by the degree with which that possibility is used.

Some years ago, Dr. Wallace Buttrick, then the head of the General Education Board, said in a discussion of educational

problems, that most graduates of Harvard College were illiterate.

A Harvard man present challenged that statement.

"Dr. Buttrick," he said, "do you mean that in your opinion most of the graduates of Harvard College can not read and write?"

"Oh, no," replied the jovial doctor, "I don't mean that they can't. I mean that they don't."

The difference between the possibility and actuality is likewise an important distinction in the use of the telephone. Technically, the telephone system can be made to reach the whole world. Practically, the task is to increase our telephone systems as fast and as far as the use the public will make of them justifies. There are several limitations on the use that the public will make of them.

The habits of the sun constitute one of the great limitations on world wide telephony. As it shines on only half the world at a time most of the people on one side of the world are asleep at the time those on the other half want to telephone. I remember when we were putting through the experimental calls to Australia. There were several of us talking, one after the other, on the New York end. We were all answered by one gentleman at the Australian end. Finally, I asked him if there was anybody else in Australia who could talk on the telephone. He said there was, but he reminded me that while we were talking at a convenient time of the afternoon in New York, it was half past five in the morning of the next day in Australia and there were not so many people who liked to get up at that time.

There is also the handicap of language, for while the telephone can translate the numbers you dial into language, it can not translate English into Chinese nor Persian into Spanish.

The question before the communication business is not what can we do technically, but what can we do that the people want and will use? We like to look upon our activities as a benefit to mankind and measure our progress in those terms. What

good does modern communication do to humanity? It is some aspects of that question that I would like to suggest.

Up to the time of the invention of the telegraph, communication was, generally speaking, tied to transportation. A message had to be carried by a man and it could go no faster than he could go. It is true that semaphores, beacons, smoke signals and carrier pigeons were used, but the very limited amount of their use indicates the severe limits of their effectiveness. In spite of them it is still generally true to say that from the beginnings of history until the invention of the steamboat and the locomotive, man, horse, and sail provided the maximum speed of communication. The Romans, the Incas, and Kubla Kahn all had highly organized communication systems, as did the Persians. In one sense these are the ancestors of the modern post office and telegraph and telephone systems. In another sense they are not at all. The runners of the Incas, the Romans and the great Kahn were an essential part of the machinery by which a small ruling class kept large populations in subjection. These communications were largely made up of the military and political information necessary for the conquerors to maintain this rule over the populace.

Modern communication is chiefly useful so that large populations may know themselves by constant intercourse and thereby improve their economic status and their ability to govern themselves. The underlying purpose of the two systems is exactly the opposite. One gave inside news exclusively to the few. The other is to enable every one to have the same news at the same time and to have equal facilities for personal communication. One tended towards exclusive power, the other tends towards equalization of opportunity. Communications are now one of the great agencies of democracy. In their origin they served the opposite purpose. I believe that the change began with an event not directly within the field of communications.

In a civilization like that of the Romans, the written word

was used as a record and to some extent for communication. But the great mass of people being unable to read and write, were restricted to such messages as they could carry themselves or some messenger could remember for them. There was no substantial change in this condition until the invention of the printing press. That gave the written word, the printed word, a new status for the inevitable result of the printing press was that the mass of the people gradually began to learn to read and write.

That was the necessary foundation for the establishment of any general post office system with a modern purpose. While the messenger services conducted by the Persians, Chinese and the Romans might be called a postal service, they were not of the same character as the modern postal service—a cheap, rapid and inviolate delivery of written messages for the masses. That kind of a post office, which is a democratic agency, had to wait for the infusion of learning which was based upon the spread of the printed word. The change in point of view did not come suddenly. Queen Elizabeth prohibited the carriage of letters abroad except by the master of the posts because she wanted to be able to censor all foreign communication. Cromwell applied the same idea to all of England.

The first post office in what is now the United States was organized under a royal patent granted to Thomas Neale in 1691 authorizing him to settle and establish within the chief parts of their Majesties' colonies and plantations in America an office or offices for the receiving and dispatching of letters and packets and to receive same and deliver the same. Post riders were dispatched between Portsmouth, N. H., and Virginia weekly except during the winter, when the trips were made fortnightly.

By the time of the Revolution the immense importance to a self-governing country of a general, regular and inviolate communication system was well recognized and the articles of confederation provided for interstate mails. The Constitution gave Congress very wide powers under which to establish a

comprehensive post office, and on the earnest recommendation of Washington this power was immediately used. The post office was to be one of the main ties that would bind the scattered population together.

In Washington's first annual message in which he strongly urged a comprehensive postal law, his arguments for it were based chiefly upon the fact that a well operated post office would encourage a knowledge of the laws and the proceedings of the government. The sociological value of general popular intercourse by mail was not generally grasped at the time for in the society in which he moved in the new republic, there were few people compared to the present who had occasion to use the mail except on rare occasions.

But the general use of the post office grew very rapidly. Communication by steamboat and rail added to its speed. None the less communication was still tied to transportation. Communication, or at least a part of it, took on a separate existence with the invention of the telegraph.

The work of a surprisingly small number of men of which Benjamin Franklin was one, made up the basis of knowledge of electricity up to the beginnings of the nineteenth century. Many people had worked in electricity but the essential contributions to the development of electrical communications were from a surprisingly small number of sources. The next steps, as is often the case, were made almost simultaneously in two places. Michael Faraday, one of the most distinguished members of the Royal Society in London, and Joseph Henry, a school teacher in a small academy in Albany, each without the knowledge of the other, contributed the scientific knowledge necessary for the invention of the telegraph. Neither was utilitarian minded and neither envisaged a public telegraph system. That came from the brain of a painter, Samuel F. B. Morse. With his application of Henry's and Faraday's science, fast communication began to be released from transportation.

As war dramatizes whatever it touches it is perhaps fair to contrast certain military events before and after the release of communications from transportation.

The United States declared war against Great Britain on June 18, 1812 chiefly on account of British activities under the so-called Orders in Council. In order to smooth the situation the British rescinded these Orders eight days after we declared war, but of course without knowledge of our declaration, just as our Congress had no intimation of their intentions. The peace that concluded this war was signed December 24, 1814, and the largest battle of the war took place at New Orleans on January 8, 1815. In contrast to this—at the end of the world war several million men in arms opposite each other ceased firing on the stroke of eleven.

Andrew Jackson's inaugural message in 1831 took 15 hours to reach New York and that speed was due to the extraordinary enterprise of the Courier and Enquirer. Seventeen years later, in 1848, Philip Hone, a New York merchant, wrote in his diary:

> " The Milwaukee Sentinel contains the following article—a most wonderful illustration of the magical performance of the lightening post, the last miracle of the scientific triumphs of the present age: At nine o'clock yesterday morning we had, by telegraph the news and markets from New York, distant fourteen hundred miles, up to three o'clock of the preceding afternoon. This is, indeed, a startling fact and may well make us pause and wonder at the agency which has brought it about." Hone comments, " I was once nine days on my voyage from New York to Albany."

The effect of the telegraph on the dissemination of news and on the conduct of politics would occur to every one, but I am not sure that the revolution in commerce created by instantaneous news would occur to every one so readily.

The Business Historical Society has given me copies of various New England merchants' letters in the days prior to the telegraph and cable. They are letters of instructions to captains and supercargoes of vessels. They are nearly all vague and indefinite, because the merchant had no idea of what the

prevailing price of his goods would be when they reached Canton, Tabago, Manila, nor what would be the price of the tea, molasses, hemp that the ship was to bring back. And if the captain of the ship sold his cargo well in Manila and bought hemp at what was a good price in Boston when he left, he could only hope that it would likewise be a good price when he got back. There is one letter from Canton from a captain of a Boston ship in which he says "The advices from England by the July mail do not warrant the prices previously demanded here for black teas." The letter was written on October 3d. He was bargaining on the basis of information from Britain three months old and the price he finally paid for it would not be known to William Appleton and Company in Boston, for whom he was acting, for several months more. Moreover, while he waited to bargain he had to hold his ship and crew idle, and while he was bargaining he had no idea what was happening to the price of tea in Boston and London.

The commercial situation between Baltimore, Philadelphia and New York on the one hand, and Cincinnati, St. Louis, New Orleans and Milwaukee on the other, would be only relatively better than that between Boston and Canton.

It was not surprising, therefore, that the printing of the New York markets of Monday in Milwaukee on Tuesday morning was an event of importance.

The old trading without knowledge involved tremendous risks. Risk is expensive and the public ultimately pays the expense. We are disposed to criticize our present distribution methods. Perhaps we should do better than we do with the facilities for instantaneous reports from all markets. But what is possible now would seem the millennium of safety to the William Appleton and Companies of the thirties.

There is a story rather commonly accepted to the effect that the Rothschild fortune was greatly augmented by the purchase of securities in London the day after the battle of Waterloo was fought, when the Rothschilds had the news of the victory by

special messenger and no one else knew the facts. Whether this case be true or not it is typical of the results of an undemocratic state of communications, in which the men with fastest messengers could be in the position of prophets. And so long as communication was based on a horse race or a boat race or a train race—so long as it was tied to transportation—this condition continued.

For example, let me read you a part of a letter from Jefferson describing what happened when Hamilton touched the dead corpse of credit so that it sprang upon its feet. As you remember his touch consisted of having the United States agree to pay at par the obligations of the Continental Congress and obligations of the different states.

Mr. Jefferson after describing the measures wrote: "This being known sooner within doors than without, and especially to those in distant parts of the Union, the base scramble began. Couriers and relay-horses by land and swift-sailing pilot boats by sea, were flying in all directions. Active partners and agents were associated and employed in every state, town and country neighborhood, and this paper was bought up at five shillings and often at two shillings in the pound, before the holder knew that Congress had already provided for its redemption at par."

Had a modern communication system been in existence then the government could probably have put its credit on its feet without a scandal that created a prejudice impairing that credit from its restoration until Jackson destroyed the United States bank.

Prior to the advent of electrical communications there was a far greater opportunity for men to bet on events the outcome of which they knew with men who did not know the facts, and to call this practise trade and commerce.

By the time the telegraph was established the written word had attained both speed and mass production. Letters formed the main point of communication between people and letters

were delivered as fast as man could deliver them with the aid of steam on shore and at sea. But the telegraph supplemented this with much greater speed for individual messages and also for new items so that the dissemination of news over the country through the papers was, for the first time, practically simultaneous.

The invention of printing, the spread of education and the invention of the telegraph had all greatly increased the value of the written word in communication. The spoken word had remained exactly as it had been in the city states of Greece. Man had still to find his neighbor before he could talk to him and he could reach no more of an audience than the strength of his voice would allow.

But the study of the science of electricity did not stop there. Moreover, scientists began to find out a great deal about sound waves and light waves as well as electricity. I hope no one will think me an iconoclast if I say that philosophy would have been more pleased with the logical sequence of communication development if at this time, or even earlier, the third type of communication waves had been discovered, that is, electrical or radio waves. Sound waves, light waves and radio waves are ideally suited for general communication purposes because they move in every direction from their point of origin, but sound waves and light waves can not travel great distances over the surfaces of the earth. Radio or electrical waves on the other hand, do travel great distances in spite of the curvature of the earth. If man had discovered radio waves when the Lord intended him to do so, then in all probability we would have had radio telegraphy before Morse discovered wire telegraphy. And wire telegraphy would have been recognized to be what it is—an improvement upon radio telegraphy for the purposes of taking a message from one particular point to another. In the same manner had electric waves been understood when they should have been, when Alexander Graham Bell had discovered how to transmit speech waves, that is, sound waves, to electric

waves, he would have had at his command, first, radio broadcasting and after that the next logical discovery would have been the method of carrying speech from one particular point to another along wires. The use of private circuits to carry speech from one person to a particular desired listener would have been acclaimed as a most notable advance. And as this could be done with none of the extraneous noises of interference which characterizes much of radio reception, it would have added to the marvel. The world would then have assessed the discovery of wire telephony even higher than they did in 1876, for the world would have understood very much more what Bell had achieved.

Electric waves predicted mathematically by Maxwell in 1865, experimentally produced in 1888 by Hertz and adapted to commercial uses by Marconi in 1895, provide the most direct use of electricity in communication. The wire telegraph and the wire telephone are additional steps to that fundamental discovery. The discovery of the wire telegraph and the wire telephone came first. When radio came along the public to some degree looked upon it, not as a predecessor as it properly was, but as a successor of wire communication, and failed to realize that these things are of a complementary and not a competitive character.

Radio is ideally suited for broadcasting with all that the word broadcasting signifies. Radio waves serve admirably in a one way communication system for the dissemination of news, music and entertainment. They serve also for two way communication over those routes where the cost of wires in relation to the amount of traffic renders wires or cables for the present, commercially unjustifiable. Radio also is the only method of reaching ships at sea and aircraft in flight. But for the millions and millions of two way telephone conversations and telegraph messages between particular points, the wire systems are by far the most practical media.

Since the time of this discovery in 1876 the spoken word has

regained in a large measure the position it had in the time of the Greeks and Romans, that is, it is the most common form of intercourse between individuals at a distance as well as when they are close together. The increase in speed which came to the written word first through the post office and then by the telegraph has been applied to the spoken word in even greater degree. Mankind is now equipped with both facilities. A man may write to another anywhere in this country and have the written message promptly delivered. He can take up his telephone and talk almost instantaneously to anyone anywhere in this country. If he and his correspondent have a great deal of business, he can write on the teletypewriter in his office and have his correspondent's teletypewriter on the other end of the wire type the message in unison with his own. He can even, within the last few months, have his teletypewriter connected by a switchboard to different subscribers just as his telephone is connected through a switchboard. He can send messages by cable or radio and he can talk by a combination of wire and radio telephony to any one of 92 per cent of the telephones that exist in the world. In other words, we have the instruments for talking or writing instantaneously to anyone anywhere at any time. And the wires carry news to newspapers and the wire networks for broadcasting enable us to get a message from any point in this country to practically everybody in it simultaneously.

What use do we make of these facilities?

The post office which does the part of written communications still handled by transportation, delivers about sixteen billion letters a year, that is, sixteen billion personal messages, as they are first class mail. The telegraph companies deliver one-fifth of a billion messages or one to every seventy-five letters. There are about twenty-seven billion telephone messages, or about five telephone messages to every three letters. The voice has become the main method of communication between those who are separated, which is entirely natural, as talk is

the main method of communication between those who are together. The social consequences which have eliminated distance as a barrier to the human voice have been as revolutionary as the elimination of time from the transmission of the written word and is quite as much taken for granted.

These communication facilities are the natural tools of a democracy. To what extent they have increased democracy it is idle to speculate, but they have come with it and are a natural part of it. Knowledge is power and the control of knowledge is power. The control of communications and, therefore, of the knowledge of specific events, is a very important element in power. If that is in the hands of a few autocracy is almost inevitable. If it is in the hands of the many, democracy is possible. And generally speaking, the wide use of public communication is a symptom of democracy. Those countries which are democratic in their social, political and economic structure use the tools of communications to the greatest extent. I said particularly that where communications are available to the many democracy was possible. It is not inevitable for the tools of mankind can not automatically make mankind over. Providing China with railroads and telephones will not make a stable democratic government. To do that the Chinese will have to acquire the knowledge and habits and desires for that kind of government.

There are those who are critical of our modern age and seem to believe that at the present time the tools control the man rather than the man controlling the tools. But I think they say this chiefly because it is easier to blame the machines than it is the people. Our machines do what we tell them to—they add to our powers but they do not direct our purposes.

The ability to have personal contact with other people is the principal source of both pleasure and power for the individual. That increase in power is easily thought of in connection with business. It is true that modern business could not go on in its present form without modern communication. It could not

go on without the telephone. Without the telephone you could not have a skyscraper, for you could not get enough elevators in a skyscraper to carry the messenger boys that would be necessary to deliver the notes and telegrams. The telephone has in this way allowed us to congregate where we wish to congregate. It has also facilitated living in the suburbs and in the country so that it has allowed us to disperse where we have wanted to disperse. Instantaneous communication has had an essential part in increasing the average income in this country for it is an essential part of the improved machine tools and methods of production and distribution.

Modern business is based in varying degrees upon the communication system in which the spoken as well as the written word can be instantaneously projected to any necessary point. It is true as the last two or three years have made painfully apparent, that all these modern tools put together have not eliminated the vicissitudes of human affairs. They are not automatic and as I said before they do not control mankind. They give man the power to do many things he could not do before and to do other things with greater facility, but they do not control the degree nor the direction in which he uses that power.

But equally important with the business use of the telephone is its social use. It has added safety, comfort, convenience, and a wider range of friendly human contacts to the people's lives. How do you measure the value of hearing a baby's laugh over the telephone? What good is it that you can get a friend for lunch on the spur of occasion? How valuable is it to be thirty seconds from the fire-house even if the fire-house is half a mile from you?

Before the advent of electrical communication a man was apt to confine his human contacts largely to his immediate neighbors, for the simple reason that he could not easily maintain contacts with any one else. A man's neighbors now are more the people of his choice than those who happen to live next door. This may add to his enjoyment and development.

These things are so common that it is hard for us to realize that, taken in the aggregate, they form an immense addition to human comfort and happiness. In saying that, I know that there is no statistical proof possible that people are happier than they used to be, for happiness is not yet a measurable quality. Yet there is one basis on which to gauge the increase in comfort or happiness arising from rapid communications and that is the ever increasing desire of the people for them.

Of course there is occasionally a reaction against increasing power, for with it goes inevitably an increasing sense of responsibility.

We have had instances in this country of voting to abolish the results of science because they tend to increase the necessity for thought. There are other people who dislike the other aspects of modern science because they too increase both opportunity and responsibility. I have heard of a summer colony in this country that is in this state of mind. The inhabitants hold, with O. Henry, against having their retreat damaged by improvements. Tradition is against the telephone. Yet some years ago a new comer joined this colony and brought a telephone with him. Outwardly respecting the traditions of the place he had the line to his house as well screened by trees as possible and he put the instrument in the upstairs hall so that no visitor would be scandalized at its sight. The tradition against the telephone still remains but the gentleman with the telephone has had to take great care in what costume he emerges from his bedroom for at any time of the day or night there may be a neighbor in the hall telephoning.

Years ago I used to hear people complain of the farmers' wives gossiping on the telephone. Yet that was probably by far the most important function of many a rural line, for to keep a woman from going insane from loneliness is far more important than finding a market where pigs sell a half cent higher a pound. The telephone in its social uses saves people, particularly women, an immense amount of time and drudgery.

What do we do with the time we save? I don't know. Again I can't prove that it is usefully, profitably or spiritually employed. But people think, at any rate, that it adds to the fullness and happiness of their lives to save that time and I think there is an instinct in all of us that cries out for the opportunity to experiment with the high art of living without having the experiment entirely controlled by the time and difficulty of making a living.

Temporarily, now and then, the world and the people in it are too much with us, but we, like our ancestors, are an energetic and sanguine people. We want more command over nature, more tools, more appliances, more power, for we believe in ourselves and enjoy being, in so far as we can manage it, the captain of our souls and the masters of our fate.

To those of us who work in the science, art or business of communication, this is the inspiration for our work. We believe in the urge of mankind towards better things. We believe that in removing the limitations of time and space from the words of man we are giving him the ability to make a more effective civilization. And particularly we believe it is important to increase the influence of his brain by facilitating human intercourse for it is by the origination and spread of ideas that progress is made. They are far more important than any material things.

Electrical communication has been used to revolutionize the methods of commerce, to make the news instantaneously common to all men, to restore the influence of the spoken word in politics, to bind this country together with a constantly changing but ever present web of words, and recently by the trans-Atlantic telephone, to make a great change in the conduct of international relations. These and many others are the proof that electrical communication has given man immensely increased power. Whether it is used to make more money or better men, to increase comfort and happiness or the opposite, to make a better or worse civilization, to promote peace or war

depends not on the facilities at his disposal but on man's desires. But being optimists both as to the public's intentions and abilities in the long run, we get a satisfaction from adding to those powers by spreading the word of man instantaneously to the four corners of the country and almost anywhere else he wishes.

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