2

Effects of the
Telephone on Patterns
of Human Settlement

2.1 Urban ecology.

2.1.1 The telephone fosters the separation of plant and office. (Type A)

In the mid-19th century, if one walked up to one of the big red brick sheds along the rivers of the North East which housed most American factories, one would have found the offices of the company and its president at the front of the building with the production plant behind. By the 1920s, however, one would have found most corporate headquarters located in Manhattan or in the downtowns of Pittsburgh, Cleveland, Chicago, or some other metropolis and the factories on the outskirts or in smaller manufacturing towns.

Peter Cowan in his book, *The Office,* notes that in New York "a cluster of central offices . . . began to accumulate in the late 1880's or early 1890's . . . In London . . . the building of offices got under way during the first part of the century." (p. 29.) Cowan attributes the character of office activity to three inventions: the telegraph, the typewriter, and the telephone, especially the last two.[1] The company president located himself at the place where most of his most critical communications took place. Before the telephone he had to be near the production line to give his instructions about the quantities, pace, and process of production. Once the telephone network existed, however, he could convey those authoritative commands to his employees at the plant and locate himself at the place where the much more uncertain bargaining with customers, bankers, and suppliers took place.

Thus at the turn of the century the downtowns of American cities changed from loft areas and manufacturing centers to concentrations of white collar workers in office buildings.

We found no evidence of the 19th century anticipations of this evolution, though Bell and the earliest telephone entrepreneurs recognized that perhaps the prime customers for their service were businessmen who would put a pair of phones in their plant and store, or plant and warehouse, or separate plants if

there was more than one, or plant or store and owner's residence.[2] They did not speculate, however, on the long run effects which that might have on urban ecology. After the turn of the century, contemporaries were well aware of what was happening. Herbert Casson wrote in 1911, "The foreman of a Pittsburgh coal company may now stand in his subterranean office and talk to the president of the Steel Trust, who sits on the twenty-first floor of a New York skyscraper."[3]

While quantitatively the separation of corporate offices from manufacturing plants was the most important part of the process of creating a commercial downtown, the same sort of thing was happening in other enterprises besides industry. Before the availability of the telephone, doctors, for example, had to live near their offices to be readily available when needed; typically, in fact, the office was in the doctor's home. The telephone allowed many doctors to separate home and office, and to put the office where it was convenient for the patients to come.[4]

2.1.2 The telephone fosters the growth of downtowns. (Type B)

The process of agglomeration of commercial and professional activities towards a common location led to the growth of the downtowns of American cities. So did a number of the other processes about to be discussed in this section.

2.1.3 The telephone encourages scattering of particular business districts. (Type B)[5]

Before the telephone, businessmen needed to locate close to their business contacts. Every city had a furrier's neighborhood, a hatter's neighborhood, a wool neighborhood, a fishmarket, an egg market, a financial district, a shipper's district, and many others. Businessmen would pay mightily for an office within the few blocks where their trade was centered; their way of doing business was to walk up and down the block and drop in to the places from which one might buy or to whom one might sell. For lunch or coffee, one might drop in to the corner restaurant or tavern where one's colleagues congregated.

Once the telephone was available, businesses could move to cheaper quarters and still keep in touch. A firm could move outwards, as many businesses did, or move up to the 10th or 20th story of one of the new tall buildings. Instead of an urban pattern of a checkerboard of different specialized neighborhoods, the new urban pattern entailed a large downtown containing a miscellany of commercial and marketing activities that needed to be accessible to a variety of clients and customers, a growing set of satellite downtowns, for more convenient shopping and services, and the exiling of

those activities that needed little outside contact (like manufacture) to peripheral locations.

2.1.4 The telephone favors the growth of skyscrapers. (Type B)

Recognition of how the telephone contributed to a revolution in modern architecture, namely the creation of skyscrapers, appears as early as 1902 in an article in *Telephony*.[6] General Carty used the same arguments in 1908.

> It may sound ridiculous to say that Bell and his successors were the fathers of modern commercial architecture—of the skyscraper. But wait a minute. Take the Singer Building, the Flatiron, the Broad Exchange, the Trinity, or any of the giant office buildings. How many messages do you suppose go in and out of those buildings every day. Suppose there was no telephone and every message had to be carried by a personal messenger. How much room do you think the necessary elevators would leave for offices? Such structures would be an economic impossibility.[7]

The pre-history of the skyscraper begins with the elevator in the 1850s; the first Otis elevator was installed in a New York City store in 1857, and with adaption to electric power in the 1880s, the device came into general use.[8] "The need to rebuild Chicago after the 1871 fire, rapid growth, and rising land values encouraged experimentation in construction." In 1884 Jenney erected a 10 story building with a steel skeleton as a frame, the 57 storied Woolworth Building was opened in 1913; "By 1929 American cities had 377 skyscrapers of more than twenty stories."[9]

There were several ways in which the telephone contributed to that development. We have already noted that human messengers would have required too many elevators at the core of the building to make it economic. Furthermore, telephones were useful in skyscraper construction; the superintendent on the ground could use a phone to keep in touch with the workers on the scaffolding. As the building went up, a line was dropped from the upper girders to the ground.

2.1.5 The telephone will lead to the growth of suburbs and to urban sprawl. (Type B)[10]

As the telephone broke down old business neighborhoods and made it possible to move to cheaper quarters, the telephone/tall-building combination offered an option of moving up instead of moving out. One of our initial impressions when we began this study was that the automobile and the telephone were jointly responsible for the vast growth of American suburbia

and exurbia, and for the phenomenon of urban sprawl. There is some truth to that, even though everything we have said so far seems to point to the reverse proposition that the telephone made possible the skyscraper and increased the congestion downtown. Paradoxically, both propositions are true, but to different degrees in different periods. The impact of the phone today and its net impact 70 years ago are almost reverse.

The movement out to residential suburbs began in the decade before the invention of the telephone and thus long before the automobile. The streetcar was the key at the beginning.[11] Today streetcars have vanished; automobiles and telephones now make it possible for metropolitan regions to spread over thousands of square miles.[12]

There were two options open to urban enterprises and residents as neighborhoods broke up, the economics of location changed, and cities grew. One was to move up into the new tall buildings, the other was to move out from the center. Today our attention is focused on the dramatic movement outward, and the resulting urban sprawl. We have tended to lose sight of the duality of the movement; the skyscraper slowed the spread. It helped keep many people downtown and intensified the downtown congestion. Contemporary observers noted this, but in recent decades we have tended to forget it. Burlingame, for example, said in 1940:

> It is evident that the skyscraper and all the vertical congestion of city business centers would have been impossible without the telephone. Whether, in the future, with its new capacities, it will move to destroy the city it helped to build is a question for prophets rather than historians.[13]

He sensed that things were changing. The flight from downtown was already perceptible enough for him to note it, but as a qualification to his description of the process of concentration; both processes have taken place at once throughout the era of the telephone. The telephone is a facilitator used by people with opposite purposes. (Cf. Section 5.2.6.2 for another example of this point.)

2.1.6 The telephone will help create megalopolises.
(Type B)

As Jean Gottmann points out, the telephone has favored a movement toward megalopolis, not antipolis.[14] A megalopolis such as Bos-Wash is not, he stresses, an undifferentiated sprawl of medium density settlement. It is a highly differentiated structure with numerous centers and subcenters having complex interrelations. Other commentators have seen the concept of a megalopolis as meaning the destruction of the great urban cultural centers; Gottman disagrees. A megalopolis, as he describes it, is an enlarged and more complex system of differentiation.

In 1902 H.G. Wells forecast centrifugal forces on cities that may lead

"to the complete reduction of all our present congestions."[15] A pedestrian city, he said, "is inexorably limited by a radius of about four miles, and a horse-using city may grow out to seven or eight." With street railways the modern city thrusts "out arms along every available railway line."

> It follows that the available area of a city which can offer a cheap sub-urban journey of thirty miles an hour is a circle with a radius of thirty miles. . . . But thirty miles is only a very moderate estimate of speed. . . . I think, that the available area . . . will have a radius of over one hundred miles. . . . Indeed, it is not too much to say . . . that the vast stretch of country from Washington to Albany will be all of it "available" to the active citizen of New York and Philadelphia.[16]

He anticipates "that New York, Philadelphia, and Chicago will probably, and Hankow almost certainly, reach forty millions." The telephone was one factor Wells listed as fostering this development,[17] for he believed that there is no reason "why a telephone call from any point in such a small country as England to any other should cost more than a post-card."[18] Yet Wells, like Gottmann later, emphasizes that urban sprawl does not mean uniformity of density. Shopping and entertainment centers will continue to make downtowns, while people in some occupations will prefer to move out to the country and work by phone from home.[19]

The *Scientific American* article of 1914 called "Action at a Distance"[20] has similar themes, but with special stress on the picture phone as likely to make dispersion possible. "It is evident," it starts out, "that something will soon have to be done to check the congestion" of the city. "The fundamental difficulty . . . seems to be that it is necessary for individuals to come into close proximity to each other if they are to transact business." The telephone and picturephone, it is argued, will change all that.

2.1.7 The telephone, at one stage, fosters stabilization and differentiation of neighborhoods. (Type B)

We noted above how the telephone had contributed to the break-up of single-trade neighborhoods. But in this, as in so many ways with the telephone, the instrument also had a dual effect, fostering opposite tendencies at different times and in different ways. It tended at an early stage of its development to encourage the stablization of "good" neighborhoods and business districts and their separation from areas of decay.

Phone entrepreneurs, when they were getting started, like cable television entrepreneurs today, could not afford to wire the whole city fully and at once. They preferred to lay their lines where they could expect to recruit many subscribers, i.e., in affluent or business districts. The concentration of potential subscribers within an area was advantageous to the utility before it had achieved universal coverage.

2.1.7.1 Telephone and other utility companies support zoning. (Type A)

Shifting and deteriorating neighborhoods were not good for business. Zoning of a city helped in planning for future services, so the phone companies (along with other utilities) became supporters of the zoning movement.[21] The Department of Commerce's zoning primer of 1923 states: "expensive public services . . . are maintained at great waste in order to get through the blighted districts to the more distant and fashionable locations."[22]

With an insensitivity that reflects the times and would be unthinkable today, Smith and Campbell said:

> It should not be taken for granted that this satisfies the requirements unless there is at least one telephone for every eight inhabitants in an average American city, in which practically everyone is white. Where a large portion of the population belongs to the negro race, or a considerable portion of the population is made up of very poor workers in factories, the requirements will be less. In some cities one telephone to fifteen inhabitants is all that can be expected.[23]

Zoning, along with other efforts at urban planning, became popular around the turn of the century. After the Chicago fire in 1871 building codes were enacted (around 1890) with explicit provisions for fireproofing.[24] Codes dealt with allowable building heights and the location of tall buildings in the city. The idea of a planned city was contained in such books as Robinson's *Improvement of Towns and Cities*[25] and Ebenezer Howard's *Garden Cities of Tomorrow*,[26]first published in 1898. Zoning actually began in New York in 1916.

While the phone company supported the zoning movement in general, on one point it was at odds with the urban planners. Zoning was often used to set height limits, restricting the construction of tall buildings. Such buildings, however, were heavy telephone users. The phone companies opposed height limitations.

2.1.7.2 Telephone companies provide much of the information for urban planning. (Type A)

In the crucial second decade of the century, phone companies were one of the main sources of information for the new urban plans. They collected large amounts of neighborhood data on the population trends in the city, its businesses, and its neighborhoods; the telephone was used as a device for conducting the research.

> The most direct means of approaching citizens on the planning issue was reported in Los Angeles where a battery of phone girls called everyone in the city to secure reactions, while mailing an explanatory folder.[27]

2.1.7.3 The telephone system requires the publication of directories. (Type A)

In the 19th century, well before the invention of the telephone, directories of cities were being published. From the beginning of switched telephone systems it was recognized as important to give subscribers a list of other subscribers. This list was particularly important if subscribers were to be called by number. These listings were originally printed on a card to hang by the phone. By 1897 the national phone directory was a big book, too big in fact to be economic to distribute free to subscribers so the Bell System retreated to publishing and giving out separate local phone books, even though this restriction was a blow to the promotion of toll service.

As telephones became universal among businesses and later, fairly universal among the public, the phone book became the most widely used city directory. It had to be issued often to keep with the growth of the system; it was available everywhere; and it was free. The classified version of the directory was particularly useful for many business purposes. It became the basis for much canvassing and sampling. It incidentally impacted the business of other city directories which had to be sold in competition with the free phone book, but accordingly it forced them to provide more information if they were to survive. For the ordinary citizen the telephone book became the standard means not only to finding phone numbers, but also of finding mailing addresses and business locations.[28]

2.1.7.4 Zoning tends to increase social segregation. (Type B)

A long run effect of zoning that has caused it to be a far less popular panacea among reformers today than it was in the years before World War I, is to sharpen the lines of social segregation in cities. Neighborhoods of the rich are protected for the rich. That was understood at the time, but not then regarded as evil. The New York zoning report wrote that "one purpose of districting regulations is to strengthen and supplement the natural trend toward segregation." Hubbard and Hubbard wrote in 1929 that by distinguishing single family residences from multiple dwellings, zoning has removed "obstacles from an open statement of a socially important classification."[29]

2.1.8 The telephone facilitates the coordination of the urban system. (Type B)

When the telephone was 50 years old, Arthur Pound, in an anniversary volume,[30] used a familar theme, noting how the life of a city could grind down to a crawl if the phones all suddenly stopped working. The trains, the produce dealers, the hospitals would all be in trouble.

Later in this inventory we shall deal with the use of the telephone for the logistics and coordination of a number of special city functions such as police work, fire fighting, and transportation. But the point may be generalized. It is hard to conceive of a metropolis running its myriad functions well without extensive use

of the telephone. Some cities do function with much less use of the phone than we in the United States take for granted. Peking, Calcutta, and Moscow are large cities with very limited telephone service by our standards, yet they function. But it need hardly be doubted that the way they function is severely restricted due to limited use of the telephone and would suffer much more were there no phones at all.

2.1.9 The change of independent villages into satellites of cities is fostered by the telephone. (Type B)

· Several developments in the first fifteen years of the 20th century undermined the autonomy of small towns and villages and increased commercial concentration in larger centers, bypassing the nearby village. Four of these developments were parcel post, rural free delivery, the automobile, and the telephone. All of these led farmers to do their banking, buying, and selling in larger, more remote centers rather than at the nearest rural village, and indeed led villagers to take their trade to better stocked, more developed centers away from home. Rural free delivery favored the growth of mail order business and reduced the need for farmers to come to the local post office. Parcel post was established by Congress in 1912 over the vigorous opposition of the small town merchants who saw it as a subsidy to Sears Roebuck and as destroying the small-town backbone of American democracy.[31] The significance of the automobile is obvious. So, to some degree, is the impact of the telephone. Many early rural phone systems were just tiny local networks which would have fostered village communication only. But by the second decade of this century such systems were being rapidly interconnected with the national network. We will note in Section 2.2.1 the many advantages the farmer got from being able to telephone to the markets and services of the urban centers, cutting down his dependence on the middleman in the village.

2.2 Rural Life.

A priori reasoning about the diffusion of the telephone in rural areas can lead to two opposite conjectures. Given the isolation of farmers and the profound change the telephone could make in their lives, one might expect that telephones would have spread faster in rural than in urban areas. Given the cost of the miles of wire needed to reach isolated farmsteads, one might expect that telephone service would come more slowly and later to rural than to urban areas. Both assessments are valid and the result is an unstable equilibrium. Which way it comes out at any time or place depends upon a variety of circumstances concerning both demand and supply.

2.2.1 The telephone will be particularly attractive and valuable to farmers. (Type A)

With a telephone in the house, a buggy in the barn, and a rural mail

box at the gate, the problem of how to keep the boys and girls on the farm is solved,[32]

said a 1905 article in *Telephony,* one of many praising the phone for its usefulness to farmers.

About every six months *Telephony* would run such a paean to the telephone and how it had transformed farm life from a desperate struggle with loneliness and hardship into a tolerable career.[33] The main themes were:

2.2.1.1 The telephone will abolish loneliness, particularly for the farmer's wife. (Type B)

A city woman who moved to the country wrote an article in 1912, called "The Teeming Country", denying the notion of rural loneliness, mostly because of the telephone.

> Now when I open the telephone to see if the line is busy, and catch this scrap of conversation, ". . . but they do get so black when they're old and Joel says it'll be three weeks before they're big enough to dig," I say with as spontaneous an impulse as though I had never lived in a lonely stone canyon of a street: "Oh Miss Maria, if you'll put a few drops of lemon juice in the water you boil them in, they'll be as white and mealy as new ones."
>
> There is no pause of horrified resentment at my instrusion. A friendly voice says, "That you, Mrs. F---? Much obliged. I'll try it. Don't forget 'bout th' church supper tonight!"[34]

The party line was often used for group chatter, in the fashion of CB radio today.

2.2.1.2 The telephone will provide security despite isolation. (Type A)

Hendrick in 1914 wrote:

> Many a lonely farmer's wife or daughter, on the approach of a suspi-cious-looking character, has rushed to the telephone and called up the neighbors; so that now tramps notoriously avoid houses that shelter the protecting wires.[35]

In the section on the telephone in emergencies (5), we shall discuss the telephone and fire, crime, and illness. Each of these uses of the phone appears also in the discussion of farm telephones, with the security problems accentuated by the extra dimension of remoteness. There are stories of a farmer's barn saved from fire, or of his child's life saved because of the speed with which help could be called.

2.2.1.3 The telephone will bring prompt weather warnings. (Type A)[36]

A 1905 article in *Telephony* predicted that "almost every American Farmer will receive the daily weather bulletin in his home before noon of the day it is issued."[37] Like any of the other functions we are noting here, this one was partly taken over by the radio after the mid 1920s, but in the previous 15 years the telephone was for the farmer what radio became. It warned him of approaching storms or cold snaps,[38] and indeed it still does.

2.2.1.4 The telephone is useful for rural community organization. (Type A)

In many places, every evening at about 7:00 the farmers on a party line would pick up their phones and have a community meeting[39] The main news of the day would be read. Problems would be discussed and plans laid for joint activity.[40] Indeed setting up the phone system itself was often a cooperative activity.

2.2.1.5 The telephone enables farmers to get prompt and accurate market information. (Type A)

"Through the telephone," wrote Wilbur Wheeler Bassett,

> it seems inevitable that the farmer will assume a new economic position. Keeping in touch with the market, he is able to dispose of produce directly to the city dealer or to the consumer without the assistance of any middlemen. Fluctuations in the market will be felt immediately by the producer, and he will be able to prevent any advantage being taken of him. He may talk to his town buyer and to his city broker the same hour and sell his produce at the top of the market.[41]

He illustrated his point by a story of phoneless broomcorn growers in southern Illinois who were selling their product for $60 a ton when the market price had risen to four times that, while farmers who had phones got the market price.[42]

As in innumerable other magazine articles, Burton Hendrick reports how a farmer in Vermont avoided getting too low a price for his apples by calling the market.

> This one telephone conversation netted him $250. . . . In the old days the Kansas farmer used to carry his grain into market by wagon. He would usually hang about all day dickering with middlemen. These agile gentlemen always had him at a disadvantage. Unless he disposed of his load that day, he either had to carry it back to the farm, or stay in town, sometimes for several days, until he had disposed of it. Now he sells his product by wire, and carts it to market only when sold.[43]

A 1906 *Telephony* article claimed that by enabling farmers to take advantage of fluctuations in the grain and livestock markets, the phone "added many a dollar to the yearly profit. The price of farm lands has increased wherever rural lines have been extended."[44]

A similar point was made with the opposite value judgment in France in 1908. Paris papers blamed the farmers' use of the telephone for the rise in the price of meat in the city.[45]

2.2.1.6 The rural operator provides many community services. (Type A)

The helpful and all knowing rural operator is the heroine of both fiction and popular articles. She kept track of the movements and needs of her customers. The city-born author of "The Teeming Country"[46] recalls her first rural phone call; she asked for the grocer and the operator informed her he was home eating dinner.

Operators frequently provided information services, such as weather reports, times of meetings, latest news, etc.[47]

2.2.2 The telephone will stem the flight from the farms. (Type B)

From all the above-listed benefits that the phone would bring to rural life the conclusion was sometimes drawn, as above (2.2.1) that the migration off the land to the cities would stop.[48]

Could a prediction be more wrong! In 1905, 34% of the American work force were farmers. By now it is 3%.

But in another light perhaps the analysis is not so wrong. Did the telephone, along with the automobile, electricity, radio, and television, stem the pace of a movement that was largely determined by agricultural economics? The techniques of production, wages on the farm and in the city, and the price of the product may be what determines how many farmers are farming. Today however, with cars and paved roads most farmers could live in town and commute to the fields. If many farmers still prefer to live on their farmsteads how much is that due to the fact that in his farm home he can now have electric lights, a freezer, a TV, a telephone, and virtually any other convenience of urban life. Perhaps *ceteris paribus* the telephone has stemmed the flight from the farm even if it has not stopped it; there is no way we can be sure.

2.2.3 The spread of telephones in the countryside.

From all the considerations just noted it is clear that the telephone had much to offer farmers, but as we have already noted, getting service to them could be expensive and difficult. This balance led to two pairs of opposed

propositions that represented the views of major contenders in the telephone business during the first two decades of this century.

The contradictory conclusions that stemmed from these opposing considerations can be stated in two pairs of propositions, one pair representing the philosophy of the Bell System at that time, the other pair representing the philosophy of the independents. On the matter of the speed of phone system penetration in the countryside, the Bell System was bearish, concentrating its efforts in the main metropolitan centers. The independents bet on a rural market. On the matter of what kind of phone system a rural area needed, the Bell System insisted on a high quality interconnected phone system everywhere, while many independents settled for second class, low cost systems limited to the local exchange area.

2.2.3.1   Speed of penetration.

2.2.3.1.1   The telephone will spread in the countryside fast. (Type A)

2.2.3.1.2   The telephone will spread in the countryside slowly. (Type A)

In fact, the speed of diffusion of the telephone in the countryside shows interesting reversals. Until Bell patents expired in 1893, the system used its limited capital to grow, fanning out from the network already established, i.e., mainly spreading out from the northeast and mainly in urban areas. The period from 1894 was one of rapid growth and competition as independents sought to strike roots, particularly in the western and rural areas that had not yet been pre-empted. In prosperous rural areas the growth of farm telephones was astonishing. Early in the century Iowa led the nation in penetration. Between 1902 and 1907 rural phones increased from 267,000 to 1,465,000.[49] In 1907, 160,000 out of 220,000 farms in Iowa (73%) had telephones.[50]

On the other hand, in poor rural areas, as in parts of the south, telephone penetration remained very low.

But the spread of farm telephones peaked in the 1920's.[51] There were more telephones on farms in 1920 than in 1940![52] There are a number of hidden facts behind that extraordinary figure. In the first place there was was the Depression. Telephone growth in general was checked in the thirties; but except on farms there was no such dramatic decline as a fall below the 1920 level. The second explanation is the flight from the farms; the number of farms declined from 6,517,500 in 1920 to 6,349,800 in 1940.[53] A third factor was the arrival of radio in the 1920s; having a telephone became less important to farmers once they could learn about the weather, market prices, and the world from the radio.

So even though there had been a "veritable telephone crusade among the farmers of the Middle West"[54] in the 1910s, a plateau had been reached and the poorer, more isolated farmers remained the last major population group without telephone service, until Rural Electrification Administration loans at 2% became available in 1949 for rural telephone cooperatives.

In Germany, phones were first introduced in 1877 by Bismark to serve rural villages that could not afford a telegraph operator, but after 1880 most phone growth there was urban.

2.2.3.2   Character of the rural phone system.

2.2.3.2.1   Rural areas need a special kind of low-cost phone system. (Type A)

2.2.3.2.2   Rural areas need a standard interconnected phone system. (Type A)

In the U.S. one of the secrets of the remarkable rural telephone growth of the first two decades of the century (which brought rural penetration rates up to and beyond urban rates in many states) was that the systems installed were extremely simple and cheap. The rural independents did not maintain the quality standards insisted upon by the Bell System.[55] Such primitive systems used party lines; the transmission was sometimes carried by fence wires; the poles and wires were often strung and maintained by the farmers themselves. In some villages the functions of the operator were performed by a housewife or storekeeper alongside of their regular duties. What was installed was in effect a large intercom, and at first mostly not interconnected with other systems, so the only calls that could be made were within the system.[56]

At issue during this period was the question of whether that was all that farmers needed or could pay for. Between such a system and a professionally manned, interconnected, amortized system the cost difference was an order of magnitude. It will be recalled that many systems' costs went up combinatorially with size (Section 1.2.1). So one could make a case that the marginal cost for going from a rudimentary mutual system to becoming a part of the national telephone network was not worth it to the farmer—and many small phone systems made that case.

In the end, however, Theodore Vail's philosophy and the Bell System won out. He argued that the future lay with high quality, therefore high cost, interconnected and properly amortized systems. And so it turned out. Rural systems, if well organized, grew and soon the customers demanded to be interconnected at least with the nearby market cities, and once the system had such capability, why not with the national network? So maturity eventually

resulted in the merger of the interconnected rural systems into the Bell System.[57]

One further factor pushing in that direction was the electrification of the country. Poorly designed, low cost systems, particularly those with ground return, were prone to electrical interference. They could function reasonably when they did not run into strong electrical currents, but that became a rare situation.

Nonetheless, the burst of autonomous local telephone activity by rural co-ops and entrepreneurs played an important transitional role in the development of the American telephone system.[58] Nothing like that happened in most European countries, where the government regarded telephone development as their monopoly and did not give freedom to local initiatives.

2.2.4 The telephone will reduce the difference between rural and urban life. (Type C)

A quarter of a century before the invention of the telephone, Karl Marx forecast that as part of the revolution he anticipated, industrial development would end the separation of society's rural and urban sectors. The specific impacts of the telephone that we have just noted go in that direction, making life on the farm more urbane and less isolated from town. As Basset put it: "The telephone . . . destroys the barrier between city and country. Henceforth the country is but a vast suburb."[59]

FOOTNOTES

[1] Peter Cowan. *The Office*. New York; American Elsevier, 1969, p. 30.

[2] The first long-distance line from Boston to Lowell was successful partially because factory owners in Boston wished to talk to their plants in Lowell.

[3] Herbert Casson. The Social Value of the Telephone. *The Independent,* Oct. 26, 1911, *71*, 901.

[4] Telephone and Doctor, *Literary Digest,* May 18, 1912, *44,* 1037. Cf. Section 5.2.7.4. 5.2.7.4.

[5] See Jean Gottmann. Megalopolis and Antipolis: The Telephone and the Structure of the City. In Pool, *The Social Impact of the Telephone;* Ronald Abler. The Telephone and the Evolution of the American Metropolitan System. In Pool; J. Allen Moyer. Urban Growth and the Development of the Telephone: Some Relationships at the Turn of the Century. In Pool.

[6] Application of the Modern Telephone. *Telephony,* Aug. 1902, *4* (2), 94–95.

[7] In John Kimberly Mumford. This Land of Opportunity, The Nerve Center of Business. *Harper's Weekly,* August 1, 1908, *52* 23.

[8] Charles N. Glaab and A. Theodore Brown. *A History of Urban America.* New York: Macmillian, 1967, pp. 144–5.

9 Glaab and Brown. *A History of Urban America,* p. 280.

10 Cf. Section 9.2.

11 Cf. Moyer. Urban Growth and the Development of the Telephone. In Pool, op. cit; S. B. Warner, Jr., *Streetcar Suburbs.* Cambridge: Harvard University Press, 1962.

12 Early relevant discussions of suburbanization include: Frederick A.C. Perrine, Electrical Engineering and Social Reform *Electrical Engineering,* 1894, *3* (2) 39 (stressing electric street cars); Action at a Distance, *Scientific American* Supplement No. 1985, 17, 1914, *77,* 39 (stressing phone and future picturephone); and Wells, *Anticipations.*

13 Burlingame. *Engines of Democracy,* p. 96; cf. Arthur Page, Social Aspects of Communication Development. In Page (Ed.) *Modern Communication.* Boston: Houghton Mifflin, 1932. He notes the relation of the phone to both the skyscraper and suburb, and says it "allows us to congregate where we wish to" (p. 20).

14 Gottmann. Megalopolis and Antipolis; Gottmann.

15 Wells. *Anticipations,* p. 51,

16 Wells. *Anticipations,* pp. 52–53.

17 Wells. *Anticipations,* p. 65.

18 Wells. *Anticipations,* p. 58.

19 Wells. *Anticipations,* p. 66.

20 Action at a Distance, *Scientific American* Supplement 1985, Jan. 17, 1914, *77,* p. 39.

21 Telephone, electric light, gas, and trolley companies report that zoning is making it possible for them to eliminate much of their guesswork a to what services they must provide ahead for, said John Nolen in *City Planning (2nd ed.). New York; Appleton, 1929,* shortly after zoning was enacted in New York. Hubbard and Hubbard wrote: "The utility companies as a rule may be counted favorable to zoning. The general attitude of the telephone companies has been expressed in favor of the stability brought about by zoning." H. V. Hubbard and T.K. Hubbard, *Our Cities Today and Tomorrow.* Cambridge: Harvard University Press, 1929, p. 176.

22 Hubbard and Hubbard. *Our Cities Today and Tomorrow,* op. cit., p. 282.

23 Arthur B. Smith and William L. Campbell. *Automatic Telephony,* New York: McGraw–Hill, 1915, p. 379.

24 In the early years there was considerable concern about telephone wires and safety. The *American Architect and Building News* had a section in each issue on new inventions. It did not note the telephone in 1876, but by 1881 there had been ten references to the telephone in the magazine; four of these concerned safety. There was particular concern about the proliferation of overhead wires (Cf. section 6.2.).

25 Charles Malford Robinson. *Improvement of Towns and Cities,* New York: G. P. Putnam and Sons, 1901.

26 Ebenezer Howard. *Garden Cities of Tomorrow.* Louden: Faber and Faber, 1945.

27 Hubbard and Hubbard. *Our Cities Today and Tomorrow,* p. 93.

28 Cf. President's Research Committee on Social Trends, *Recent Social Trends in the United States.* New York: McGraw-Hill, 1933, pp. 197ff.

29 Hubbard and Hubbard. *Our Cities Today and Tomorrow,* p. 185.

30 Arthur Pound. *The Telephone Idea: Fifty Years After.* New York: Greenberg, 1926.

[31] Theodore K. Noss. *Resistance to Social Innovations.* Chicago: University of Chicago, Dept. of Sociology, 1944.

[32] In Ithiel de Sola Pool, et al, *The Telephone's First Century—and Beyond,* Thomas Y. Crowell Company, New York, 1977, p. 11.

[33] E.g. Rural Telephones. *Telephony,* Oct. 1901, 2 (4); Farmer's Telephones, *Telephony,* April, 1902, *3* (4), 117; The Rural Telephone. Sept. 1902, *4* (3), 144–5; Rural Telephones. July, 1904, *10* (1), 34; The Telephone in the Country. *Telephony,* July, 1905, *10* (1), 52; The Farm Telephone. *Telephony,* Jan. 1908, *16* (1), 23; Value of Rural Telephones. *Telephony,* Aug., 1906, *12* (2), 117. See also Telephones in Rural Districts. *Board of Agriculture Journal,* July 1911, *18* 326–8; Wilbur Wheeler Bassett. Telephones in the Country. Reprinted in Ray Brousseau, *Looking Forward.* New York: American Heritage, 1970.

[34] The Teeming Country, from Point of View. *Scribner's Magazine,* April, 1912, *51,* 506–7.

[35] Hendrick. Telephones for the Millions, *McClures Magazine,* Oct. 1914, *44,* 51–52. Cf. Rural Telephones Down South, *Telephony,* April 1908, *15* (4) 269.

[36] Cf. section 5.2.4.

[37] The Telephone in Government Service, *Telephony,* June 1905, *9* (6), 507.

[38] Weather Forecasts to Farmers by Telephone, *Telephony.* July 1904, *8.* (1) 32: Hendrick. Telephones for the Millions. p. 53.

[39] Hendrick. *op. cit.*

[40] Rural Electrification Administration. *Rural Telephone Service.* Washington, D. C.: U.S. Government Printing Office, 1960, p. 3.

[41] W. W. Bassett. Telephones in the Country. Reprinted without citation of source in Ray Brousseau. *Looking forward* (a compendium of articles from the turn of the century). New York: American Heritage Press. 1970, p. 81. See also The Telephone in Rural Districts. *Board of Agriculture Journal,* no author (England). 1911 *18,* 326-8.

[42] Bassett. Telephones in the Country, p.81

[43] Hendricks. Telephones for the Millions, pp 52-53.

[44] Value of Rural Telephones, *Telephony,* Aug. 1906, 117. This point is repeated with reference to Canada in *12* (2), *Telephony,* Mar. 1907, *13* (3), 183.

[45] Telephones Help the Farmer, *Telephony,* April 1908,*15* (4), 243.

[46] The Teeming Country, pp. 506-7.

[47] Rural Electrification Administration, *Rural Telephone Service;*
News Service By Telephone, *Telephony,* Nov. 1906,*12* (5), 297.

[48] Cf. Back to the Land— and the Telephone, *The Spectator,* (London), April 7, 1906., pp. 530-31. Rider Haggard proposed a new remedy for rural depopulation by putting "a telephone in every cottage."

[49] Spread of the Rural Telephone Movement, *Scientific American,* 1911, *104,* 162.

[50] Hendricks. Telephones for the Millions, p. 51.

[51] The peak year for the number of mutual telephone systems was 1927. (Rural Electrification Administration, *Rural Telephone Service.*)

[52] REA. *Rural Telephone Services.*

[53] *U.S. Department of Agriculture, Crop Reporting Board, Statistical Reporting Service, Number of Farms 1910-1959—Land and Farms 1950-1959 By States.* Washington D.C.: U.S. Government Printing Office, June 1962, no. 316.

54 Casson. The Social Value of the Telephone p. 905.

55 REA. *Rural Telephone Service;*Vail, Public Utilities and Public Policies. *Atlantic Monthly*, Vol. 3, pp. 315-319, March 1913.In February 1910 an article on The Telephone and the Investor in *American Review of Reviews, 41,* 246 compared a cooperative exchange in Grand Rapids with a Bell exchange. The former charged $.25 a month to residential subscribers; the latter $3.00. Such low rates by rural independents were possible because they typically had under 100 subscribers on a system.

56 For description of such systems see Cheap Telephone System for Farmers, *Scientific American,* 1900, 2 (4) *82,* 196; Rural Telephones, *Telephony,* Oct. 1901 pp. 150-151; Farmers' Telephones, *Telephony,* Apr. 1902,*3* (4), 117; The Rural Telephone, *Telephony,* Sept. 1902, *4* (3) 77 144-51; Telephones in Rural Districts, *Board of Agriculture Journal (England), 1911, 18,* 326-8.

57 The rapid growth of independents did force a change of policy on the Bell System. The original policy of the System had been only to lease phones, not to sell them; to lease them only to companies which joined the system; and to restrict the growth of other companies by declining to interconnect with them. After the expiration of the Bell patents, however, phones became available from rival sources to independent phone companies. In 1907, therefore, Vail reversed the policy and allowed Western Electric phones to be sold to other companies; indeed, by gradually lifting the ban on interconnection, he encouraged independents to develop relatively unprofitable rural areas. For the Vail 1907 memo, see Walker Report, vol. 1, Report on Engineering and Research Departments of the Bell System, 1937, Appendix I; Federal Communications Commission, *Investigation of the Telephone Industry in the United States.*

58 The percent of telephones in the U.S. not connected with the Bell System decreased from 37% *in 1900 to 8% in 1918:*

59 Brousseau. Looking Forward, *Header.* p. 81

3

The Phone and the Economy

3.1 Industrial organization.

3.1.1 The telephone will foster management from a distance. (Type A)

We pick up here from the point made above (2.1.1) that the phone fostered the separation of plant and office. In general it made it feasible to conduct operations that were scattered over dispersed geographic locations. The *Scientific American* made that point about the phone in 1914 in an article called "Action at a Distance."

> A man in charge of many business interests might sit in his study and communicate accurately, rapidly and effectively with them all far more successfully than he could by passing from one office to another, attending one board meeting, another committee meeting and generally endeavoring to convey his own body where he really needs to convey only his own ideas.[1]

The telephone permitted the growth in the size of industrial organizations, and permitted businessmen to control these vast complexes from a distance. Morgan's partner George W. Perkins used a system he called "rapid transit telephony" to call ten to thirty bankers in a row to raise capital.[2] Harriman also used the phone continuously in that way, as we shall see below (3.2.1)

3.1.2 The telephone will favor the growth of large firms. (2) (Type B)

For one thing, the telephone company itself rapidly became a corporate giant. By 1912 telephony was the fourth largest industry in the United States. Not only was AT&T large (as were also its sister organizations in other countries); it was well managed, and one of the fountainheads of modern theories of scientific management.

More important, the existence of a telephone network facilitated the creation of great industrial complexes having activities in many locations.

Indeed that is a better way of describing the process than trying to fit it to the simple categories of centralization or decentralization. Bringing dispersed activity under one management was centralization, but permitting an organization's activities to be geographically separated is decentralization.

Indeed this dual process of concentration and dispersion of power was observed at the time. Casson commented in 1910 that "the telephone arrived in time to prevent big corporations from becoming unwieldly and aristocratic."

By 1937 a classic economic analysis of the relation of communication to centralization and decentralization was published. Ronald Coase's paper "The Nature of the Firm"[3] concluded that communication improvements may either increase or decrease the optimum size of firm, depending upon whether interfirm or intrafirm costs drop more as a result.

3.1.3 Use of the long distance telephone will reduce the authority of field office managers. (Type B)

It was often asserted that the introduction of the long distance phone (and also the telegraph earlier) resulted in field managers being lowered from plenipotentiary agents to errand boys. That point has been made about branch bank managers who used to be partners making decisions for themselves, and now are described as just employees,[4] about ambassadors, and about managers of industrial and commercial field locations. It was also made in an article in *Telephony* in 1906 regarding political field managers: "It has curtailed the functions and responsibilities of a district manager as the cable has those of an ambassador."[5] The point was made regarding all large organizations.

The reduction of the power of field managers is most often perceived as a centralization of power. Westrum, for example, points out that before the telephone, business, government and military instructions to field agents tended to be vague because the chief could not anticipate the circumstances in which they would be carried out.[6] Page in 1932[7] described letters of instructions to ship captains that the Business Historical Society had compiled. "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, Tobago, and Manila."[8] But the new ability of the "boss" at the center to interfere directly in details in the field does not necessarily mean a concentration of power, even if it means a decline in the power of the field agent. Marshall McLuhan describes the same process as decentralization.[9]

> One of the most startling consequences of the telephone was its intro-
> duction of a "seamless web" of interlaced patterns in management and
> decision-making. It is not feasible to exercise delegated authority by tele-

phone. The pyramidal structure . . . cannot withstand the speed of the phone to bypass all hierarchical arrangements. . . . Today the junior executive can get on a first-name basis with seniors in different parts of the country.[10]

3.1.4 The telephone will democratize hierarchic relations. (Type B)

We may continue the McLuhan quote from above.

> If delegated chain-of-command authority won't work by telephone but only by written instruction, what sort of authority does come into play? . . . On the telephone only the authority of knowledge will work.[11]

Both Boettinger[12] and Cherry[13] present the case that the telephone was a democratizing instrument and quote various expressions of concern about that. That general process of democratization in society is something we shall take up in Section 4.8. The special aspect of interest here is the tendency in large organizations for people making phone calls to skip over normal channels of hierarchy to a greater extent than they do in written communications or in appointments. The literature of the period we are studying repeatedly asserts that that happens, as in Casson's statement already quoted about the president of the steel trust talking to a formen in a mine.

3.2 Capital markets.

The impact of the telephone system on finance was at least as great as that on industry. And as in the case of industrial organization the effects came two ways: through the creation of a new giant enterprise, the phone company, and through the use of the phone system by financiers.

3.2.1 The creation of a telephone system will require large scale financing. (Type C)

The telephone industry rapidly became one of the most important fund raisers in the money markets.[14] It secured its first million in capital in 1879. By 1910 it was worth more than 3/4 of a billion dollars; by 1913, $924 million.[15] In 1912, total investment in all companies in the iron and steel industry was $16 per capita, in lumber and timber $13, in illuminating and heating gas $10, and in telephony, fourth, $9 per capita.[16] In that same year the capital cost of the British system was £25,000,000 or $100,000,000.[17]

Ultimately, one of the important features of the telephone industry was

the dominance of AT&T, a single company. Thus unlike other new industries (electric power for example) which consisted of many separate companies, telephony introduced a new and unique element of size into the money markets. Next to government bonds, telephone securities have become a foundation of institutional portfolios. Whatever happens to the prospects of AT&T has ripple effects on financial institutions comparable to those of what happens to the prospects of tax exempt municipals.

AT&T did not always have that primate position. During the two decades when the independents blossomed (1894 until World War I) a major part of the secret of their temporary success was diverse access to funding. The primary limit on the Bell System's growth in 1907, when Vail for the second time, took over as President was capital. By a natural process, given the importance of raising capital, control of the Bell System passed in 1881 from the original innovators, first to financiers under the presidency of Forbes[18] and then in 1907 to the house of Morgan in New York, one of the few organizations in a position to raise the necessary funds.

The ultimate decline and assimilation of the independents was attributable primarily to the technical disadvantage for their subscribers of not being interconnected with the national network. Their financial weakness compared to the Bell System was an important mechanism in the process. As already noted, they tried to undercut the Bell System's prices, and therefore often failed to amortize their investments. When, as a result of technical progress or just of growth, the time came for refinancing, they were often in trouble and frequently had to turn to AT&T for capital and affiliation.

Vail and his co-organizers of AT&T recognized from the start the dependence of their system's growth on capital and, consequently, on sound financing practices. We have no evidence that they aniticpated that the company that they were starting, by its very size, would come to be a major foundation of the nation's pension trusts, universities, and financial institutions.

In other countries one of the main reasons why phone systems have been nationalized is that their managements have not been strong enough to command the capital they needed from the private money market, or the nation's financial system was not developed enough to provide the needed capital domestically. The options of having an undercapitalized, poorly-working phone system, or an internationally capitalized and, therefore, foreign controlled one, both seemed less attractive than a phone system capitalized under the credit of the national treasury.

Thus, one effect of the building of national phone systems has been to create a large demand for capital, and this has strengthened the institutions that could, depending on circumstances, provide the needed capital—the banking system, foreign investors, or the state bureaucracy, as the case might be.

3.2.2 The phone system will facilitate the conduct of financial transactions. (Type A)

Among all spheres of business, three are most dependent upon communications: transport, the press, and finance. Today these run up the largest bills for communications services, and even before Bell's day, these were the main users of the telegraph and the main leasors of private telegraph lines.

Three reasons why financial institutions are so dependent upon communication facilities are that 1) for them "time means money," 2) the "goods" they deal in are documents, and 3) financiers are businessmen's businessmen. Their activities are outwardly oriented. Their in-house processing activities are relatively trivial; their important activities involve contact with a wide variety of external organizations.

3.2.2.1 The telephone will speed the conduct of finance. (Type A)

In banking, time literally means money. To save one day in the processing of a transfer of $1 million, saves $137.00, assuming only a 5 percent interest rate. Clearly one will process such a transfer by cable or by phone rather than posting a letter.

Bankers and brokers were already using the telegraph for routine transactions when the phone came along. They quickly recognized the extra value of the telephone for those transactions requiring discussion and persuasion. Herbert Casson reported that George W. Perkins of J.P. Morgan, " 'is the only man . . . who can raise twenty millions in twenty minutes.' "[19] According to Burton J. Hendrick, Edward H. Harriman, "once dramatically saved the Erie Railroad from bankruptcy by timely use of a bedside telephone."[20]

3.2.2.2 The telephone will reduce speculative fluctuations. (Type B)

In the theory of a perfect market it is assumed that the buyer and seller have full knowledge, i.e., each buyer and seller should know what is being bid and asked. Where information is imperfect trades may take place in different parts of the market at different prices, and speculation may be profitable.

Rapid telephonic communication served to improve the market and reduce speculation. In Section 2.2.1.5 we noted some examples in agriculture: farmers were enabled to learn the price of their crop in town, and not be dependent on the representations of a travelling agent. Bankers used the telephone in similar ways on a national scale. Casson describes how they used the phone to lessen the impact of the panic of 1907.

At the height of the storm, on a Saturday evening, the New York bankers met in an almost desperate conference. They decided, as an emergency measure of self-protection, not to ship cash to Western banks. At midnight they telephoned this decision to the bankers of Chicago and St. Louis. These men, in turn, conferred by telephone, and on Sunday afternoon called up the bankers of neighboring states. And so the news went from "phone to phone," until by Monday morning all bankers and chief depositors were aware of the situation, and prepared for the team play that prevented any general disaster.[21]

3.3 The labor market.

The telephone also had various effects on labor. It created new jobs, destroyed others, and affected methods of hiring.

3.3.1 The telephone system will open up new job opportunities. (Type B)

Particularly important among the employment opportunities offered by the telphone system were jobs as operators for women. We discuss that topic in Section 9.4.2. Also important were the employment opportunities for technically trained persons, discussed under the heading of education in Section 11.1.1. In addition the phone system offered a reasonably secure and progressive career opportunity to large numbers of employees.

3.3.2 The phone system pioneers in scientific management and labor relations. (Type C)

Because the phone system is such a large employer it must necessarily have a sophisticated hiring, training, and labor management system. The phone company, however, was not the only large employer. Sheer numbers do not distinguish it from the Post Office, Department of Defense, or a few other major institutions. As important as its size was the rapidity of its growth and the uniqueness of its job requirements. Thousands of operators. linesmen, and installers had to be trained every year. Operator turnover was about 30% per annum.[22]

AT&T developed carefully designed and scientifically based techniques of training and personnel management. They also built up a folklore and mythos about the heroism and service of operators and linesmen, reporting outstanding performances in their magazine ads.[23]

3.3.3 Messenger jobs will decline with the development of the telephone. (Type B)

Today we have forgotten how numerous and important messenger boys once were. They were as central in every office as typists are today. They were part

of the passing scene on the streets. The only way to communicate with a person at a distance was to have someone carry the message. Part way it might go by telegraph, but even then the last leg was by messenger boy.

The telephone was immediately recognized to be a threat to messenger boys. A telephone advocate put the accent on the positive and said in 1911 that the spread of the telephone would allow the Western Union messenger boys to stay in school.[24] That was one view of child labor, but others stressed unemployment and loss of earning power.

3.3.4 The development of the telephone is affected by the availability of messenger boys. (Type A)

If the telephone and messenger boys competed, then the converse to the problem of phone competition to messenger boys was to recognize that messenger boys were competition to the phone. In 1879, Sir William Preece, the Chief Engineer of the British Post Office, testified to a special committee of the House of Commons that the telephone had little future in Britain. "There are conditions in America which necessitate the use of such instruments more than here. Here we have a superabundance of messengers. . . . The absence of servants has compelled Americans to adopt communication systems."[25]

3.3.5 Jobs for telegraphers decline with the development of the telephone. (Type B)

The other major occupational group whose jobs were seriously impacted by the telephone were Morse code telegraphers. We shall discuss their situation below. (7.2.2)

3.3.6 Jobs for operators are reduced by automatic dialing. (Type A)

As we have already noted in Section 1.2.1, the introduction of automatic dialing in the U.S. was motivated by the impossible prospective requirement for operators under a growing manual system. The displacement of operators was not sudden, for the telephone monopoly introduced automatic switching equipment gradually. Also, the transition was eased by the large turnover among operators, many of whom were working prior to marriage; and the total system was growing. So the shift was not a crisis, but it was a major transition.

3.3.7 The telephone will increase job mobility. (Type B)

The telephone made it easier for employers and employees to contact each other. Want ads list telephone numbers. Employment agencies phone unemployed workers when an appropriate job comes along. .

That, of course, presumes that the poor have telephones, and so such

practices have become common only in the last couple of decades, since phones in the U.S. have become almost universal. Indeed, the role of the telephone as a job finding device has led social agencies to conclude that the telephone is a necessity, not a luxury, and that the phone bill is a legitimate charge on welfare budgets.

3.3.8 The telephone will reduce the use of hiring halls. (Type B)

Where employment comes and goes day by day, as for longshoremen, some device is needed for swift contact with the labor force. The hiring hall was one such device, and one that strengthened the power of the union, for daily it had workers sitting around together in a group. But rather than idle their day away at the hiring hall, workers would prefer to stay at home and to be phoned. This is increasingly the practice, to the detriment of unions.

3.4 Merchandising.

3.4.1 The telephone will be used for shopping. (Type A)

Today, when there is a great deal of blue sky talk about the replacement of stores by on-line terminal-shopping from the home, it is enlightening to look at actual experience of telephone shopping. There is a great deal of it. Some few housewives do almost all their shopping by phone. Most buyers occasionally order some things over the phone. And let us not forget the wholesale field: in large areas practically all ordering is done by phone; the retailer often has an established relationship with a series of wholesalers, and once a day or once a week he phones in what he needs in order to replenish his supply.

Yet, as important as telephone buying has become, it has by no means displaced the shop. That is not because telephone marketing is immature; it is one of the oldest uses of the telephone. The prospect of the housewife placing her order by telephone was there from the beginning. H. G. Wells in 1902 discussed telephone shopping, but correctly forecast that much shopping would still be done in person: "it will still be natural for shops to be gathered together in some central place."[26]

Around 1905, department stores began to turn to the telephone. Prior to June 1, 1905, only one department store in the U.S. had telephone ordering facilities. Several installed them shortly thereafter, [27] placing phones on each counter.[28] By November 1906, *Telephony* reported that one store had 2,000 telephones in use and received 70,000 messages a day.[29] Some New York stores, as early as 1905, experimented with taking telephone orders at night.[30]

Also noted frequently was the usefulness to farmers of the combination of the phone, parcel post, and RFD for mail order shopping.[31] There were also some more novel but less successful ideas for telephone marketing. A Connecticut

grocery store installed free telephones in the homes of customers to encourage them to order.[32] A Congressman suggested the institution of special low farm-to-kitchen telephone rates, to enable consumers to order direct from the grower without intervention of middlemen.[33]

Indeed, one has the impression that telephone retailing has not developed to the extent that early enthusiasts expected. It has, to some degree, become a luxury service since it does not economize on labor; it requires a salesclerk to converse with the customer, one on one. The economics of mass merchandising have moved in the direction of self-service. Indeed some kinds of telephone shopping were more common in the days before supermarkets, when housewive had a personal relation with a grocer, butcher, and ice man. That trend away from personalized shopping was not anticipated by the early writers on the telephone. Interactive terminals are responsive to the new trend toward reducing labor costs, and so may have a promising future.

3.4.2 The telephone will speed movement of perishable goods. (Type A)

One of the merchandising areas where telephone use was adopted most quickly was in the ordering and distribution of perishable goods. A 1906 article on "The Sociological Effects of the Telephone" describes how oyster barge men were put out of business because retauranteurs could phone their orders directly to the oysters planters.[34]

3.4.3 The telephone will broaden market areas. (Type A)

Particularly with the aid of the yellow pages, the telephone has made it easier to do comparison shopping or to hunt around for exactly the service that one wants. In that way it not only eliminates middlemen or jobbers,[35] but also allows search over a larger area. That became increasingly so with the gradual fall in long distance rates, with direct distance dialing, and with the introduction of "800" numbers.[36]

3.4.4. The telephone will reduce the travels of salesmen. (Type A)

Travelling salesmen continued to call on customers after the phone, but they found that they had to come in person less often, could phone between visits, and for some purposes could prepare for a visit by a phone call.[37]

3.4.5 The telephone will be used for advertising canvassing. (Type A)

We reserve a fuller treatment of this topic for discussion in Section 4.6, where

we deal with the use of the telephone for polling, canvassing, and similar activities. We note it here also because one of the major uses of such canvassing is to sell prodcuts. We shall note that some cultures tolerate such unsolicited calls and others do not.

3.5 The telephone increases productivity. (Type B)

This statement could perhaps be construed as simply a summary of everything we have said in this section on the telephone and the economy, or more accurately it is a statement about a consequence of all those developments. The phone increases productivity by reducing speculative fluctuations, speeding financial transactions, increasing labor mobility, making easier the management of geographically dispersed units, etc. The telephone also increases productivity in a myriad of ways we have not separately listed. It permits coordination of pieces of that complex clockwork which is the economic system. It is used millions of times a day to control production, shipping, recording, and selling. It permits the operation of a complex division of labor. All of that was recognized from early on.

"Suppose that at midday to-morrow, just when the great engine of American business is surging away at top tension, every wire of those millions of miles should without an instant's warning die," asked John Kimberly Mumford in 1908.[38]

FOOTNOTES

[1] Action at a Distance, p. 39.

[2] Aronson. Bell's Electric toy p. 28.

[3] Ronald Coase, The Nature of the Firm, *Economica*, Nov. 1937 4, 389405.

[4] Fritz Redlich (1952) quoted in Ronald M. Westrum. The Historical Impact of Communication Technology on Organization. (Institute for the Study of Social Change,Working Paper no. 56) unpublished manuscript, Purdue University, 1976.

[5] Telephone in Politics, *Telephony*, Dec. 1906 12 (6), 364.

[6] Westrum. *Historical Impact, of Communication Technology on Organization*, p. 7.

[7] Arthur W. Page. Social Aspects of Communication Development, in Page (Ed.), *Modern Communication. Boston: Houghton Mifflin, 1932.*

[8] Page describes episodes in which the Rothschilds after the battle of Waterloo, and speculators in the early years of the U.S. government, made killings by having rapid couriers bring information that others did not have.

[9] Marshall McLuhan. *Understanding Media;* New York.; New American Library, 1964, p. 234.

[10] McLuhan. *Understanding Media*, p. 238.

[11] McLuhan. *Understanding Media*, p. 238.

[12] Henry M. Boettinger, Our Sixth-and-a-half Sense, In Pool, *The Social Impact of the Telephone.*

[13] Cherry. The Telephone System.

[14] Cf. J. Warren Stehman. *The Financial History of the American Telephone and Telegraph Company*. Boston: Houghton Mifflin, 1925.

[15] Albert W. Atwood. Finance, *Harper's Weekly*, 1913, *58*, p. 29–31.

[16] Henry Smith Williams. The Growth of the Telephone. *Science*, 1912, *22*, 105–6.

[17] The Government Telephone in England. *The Literary Digest*,1912, *44*, 153–4.

[18] Forbes became President in 1879 two years before control passed from the Bell family.

[19] J.P. Morgan quoted in Casson. The Social Value of the Telephone, p. 900.

[20] Hendrick. Telephones for the Millions, p. 50.

[21] Casson. The Social Value of the Telephone, p. 901.

[22] Good Points and Bad Points of Telephone Operating as a Trade for Philadelphia Girls *The Survey* Feb. 17, 1914, *31*, 543.

[23] E.g., Lineman's Devotion to His Job, *Literary Digest*, Vol. 48, part 1 1914, pp. 572, 573, 575, 576: Enos A. Mills, Linemen Heroes at the Crest of the Continent *Colliers*, April 19, 1913, *51*, p. 14.

[24] Casson. The Future of the Telephone, pp. 12903–12918.

[25] Cf. Pool et al. Forsight and Hindsight: The Case of the Telephone, In Pool, *The Social Impact of the Telephone*, p. 128; Dilts, p. 11.

[26] Wells. *Anticipations*, p. 61.

[27] The Department Store and the Telephone *Telephony*, Dec. 19, 1908, *16* (19), 639–40.

[28] Ralph Bergengren. The Far-Flung Telephone *World Today*, Dec. 1905, *10*, 69.

[29] The Indispensable Telephone, *Telephony*, Nov. 1906, *12* (15), 296.

[30] Shopping at Night by Telephone, *Telephony*, Sept. 1905, 10 *(3)*, 221.

[31] Cf. Hendricks, Telephones for the Millions, p. 52.

[32] Free Business Telephone, *Telephony*, July 1907, *14* (1), 37.

[33] Lewis. Congressional Record, March 4, 1915, op. cit., p. 847.

[34] The Sociological Effects of the Telephone, *Scientific American*, 1906, *94*, 500.

[35] The Sociological Effects of the Telephone. *Scientific American*, 1906, *94*,500.: also *Telephony*, 6, Dec. 1906, *12*, (6), 353.

[36] 800 numbers are for inbound WATS Lines, where the vendor provides free long distance calling to the customer.

[37] Cf. The Telephone in Modern Business, *Telephony*, Nov. 1901, *2*, (5), 190–91; that article claimed that there was a visible effect on railroad traffic.

[38] Mumford. This land of Opportunity, Application of the Modern Telephone, *Telephony*, Aug, 1902, *4* (2), 94–95, which attributes the U.S. lead in productivity to the telephone.