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INVENTIONS OF LOCAL TRANSPORTATION AND THE
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INVENTIONS OF LOCAL TRANSPORTATION AND THE PATTERNS OF CITIES

The air bomber brings the destruction of war to civilians. No longer are the casualties of war confined to combat units. But it is to the cities and not the open country that death is brought by these murderous missiles dropping from the sky. The former cities of Germany laid waste by bombing are a shocking sight as reported by returning visitors.

As one contemplates these ruins, it is easy to observe that if there were no cities there would be no such destruction. If people did not live so close together, the devastation would be less. Why not then spread out our cities and scatter our urban population? Thus modern warfare emphasizes the logical proposal to decentralize our cities.

The atom bomb and the rocket which can travel across the Atlantic Ocean or the Arctic in 15 minutes emphasize the danger to our urban civilian population in another war. One atom bomb of the present type destroys an area of about ten square miles. Twenty such bombs could annihilate the city of Chicago. But the bomb will not remain at its present destructive power. Inventions evolve. Thus the airplane of Wright Brothers, weighing 750 pounds, has evolved into the Stratocruiser of 135,000 pounds.

This imminent danger to our cities has led to the very sensible proposal to prohibit the manufacture of the atom bomb anywhere in the world. We are in the process of making such an agreement now, which it is hoped will be reached within a period of months. But shall we have security with such an agreement? Ten years after the various nations of the world signed the Pact of Paris not to have recourse to war the world was in flames. The League of Nations was of no avail. So we may be ruined by atom bombs in another war even though our future enemies sign an agreement not to employ this weapon. Furthermore, though the atom bomb was not used our cities could be destroyed by the TNT bombs, which are likely to be more destructive in the next world

war, if there is one, than in the last one.

We really ought then it would seem, to break up our cities over, say, 50,000 inhabitants, 200 of them, into 1000 cities of 50,000 each. The task is so huge and the obstacles, financial, political, economic and social, so great that we shall not do so, despite the fact that not doing so could mean the loss of 40,000,000 civilians in another world war. In considering such a plan of action, however, it is well to note that social action which is in accord with social trends is more likely to succeed than planning in opposition to trends.

Now, the trend in the distribution of cities is one of dispersal. Indeed, a century or two hence the urban population may, by wholly natural processes, be spaced in such a way as to afford protection from bombing. Thus the placement and size of urban communities a century hence may be what we would like to have within the next five or ten years to escape the bombing of the next world war.

In considering these trends, the influence of transportation inventions seems to be the determiner of the distribution of cities. Particularly have the inventions of local transportation been the cause of the patterns of cities taking the shape they have assumed. Students of human ecology have not given adequate recognition to the inventions of local transportation. In the study of social change and of the impact of technology on society a very interesting chapter is the influence of the inventions of local transportation on cities. The singling out of this influence may enable us to speed the natural trends in urban dispersal and to secure a measure of protection from bombing that we would not otherwise obtain so soon.

We have been living in cities only about a century and a half. There were a few cities before then, even in ancient times,

but the proportion of the total population living in them must have been very small. Cities, as we know them today, are the creation of the railroad and the factory. They grew up at the junction points of railroads or of railroads and waterways. In them were stores and factories; and, of course, the places of work of those who service the employees of the sellers and manufacturers.

The distribution of residences was determined by the proximity to places of work. In the early cities the only methods of local transportation were based on muscle, except in a few cities like Venice. Donkeys, oxen, and horses were not adequate, hence many workers and shoppers walked. Thus houses were crowded close together. Often the occupants were piled on top of each other in buildings of many stories. The pattern of cities was one of congestion.

The situation was changed with better local transportation. The first electric streetcar was run in 1886. Gradually this faster method replaced the horse-drawn bus and the few horse-drawn rail cars that were found in occasional cities. The streetcar enabled people to live further from their places of work.

However, the effect of the streetcar was not to scatter very much the existing residences of a city. Rather it enabled more people to live in a city, to work in the factories, and to market at the stores. For city populations were growing and needing more or larger stores and factories. Larger establishments were economical and survived. So cities grew in population, and new houses were added to the periphery. Cities continued to be congested, for it was necessary that the stores and factories be near the transportation terminals.

In the course of time, the electric streetcar became faster. It connected towns. The existence of the interurban electric line enabled inhabitants of nearby small towns to work and to shop in the big city. The growth of suburbs was facilitated by local

steam lines, too. As more people worked or traded in the city, the residents who serviced them, together with their families, increased the size of cities still further.

Then came the gasoline driven vehicle, the most important invention yet made for local transportation. The private automobile for the individual family was very fast and permitted the owner to live a considerable distance from his place of work and from the market. The automobile bus served the same purpose and was more flexible in its operation than the streetcar. Cities thus took the pattern of a starfish. The urban population strung out along highways and did not fill up the land between the highways, as the radius of the city became longer. They did not string out evenly, though, for people must live around stores, schools, motion picture theatres, etc. So the little clusters of population, to change the simile, were strung not like beads on a string.

This pattern idealizes the structure of the economic city; not necessarily the political city. The political city is a matter of boundary lines drawn by legislative bodies, which are not in recent years identical with economic lines. The political lines lag behind the economic ones.

The outline of this economic urban area is not as compact in design as the shell of a starfish. It is rather as if the prongs of the shell of a starfish were somewhat shattered and broken and the fragments scattered close by. All this area is now customarily called the metropolitan area. The economic city then under the impact of the modern local transportation has become the metropolitan area. The metropolitan area of the automobile age is quite different in shape from the city of the railroad era.

The "economic city" of the automobile age is, as a whole, less closely packed with houses than was the city of the railroad era. So it may be argued that the urban population has been

becoming more scattered for some time, particularly since the automobile and, perhaps, since the electric streetcar. The density of population is less for the whole economic city. There are more open spaces. Some economic cities have many farms within their borders.

But while the modern economic city as a whole is less densely packed than the city was before the automobile and street car, such is not the case with the original area at the center. These earlier cities which depended on muscle for transportation were shaped more like the shell of a clam than the shell of a starfish. The scattering occurs not at the center of the pattern but at some distances out from the center. The center then is no more dispersed than it was before the automobile.

The reason why the original city remains congested is due in part to the slowness of buildings to move. It is easier to break a camp than it is for an owner to move a durable building. Many people have moved from the center out to the suburbs. Their vacant houses have been filled by others. It is a shift of population rather than a depopulation. An owner will sell a building for a loss before he will abandon it and lose all.

To thin out the population as a protection against bombing during wars may then require that the government acquire the land, remove buildings, and prohibit the construction of other buildings thereon. In this case the cost would be on the taxpayer, rather than a loss occurring to the owner. With land values in cities as high as they are, there has been little thinning out by this type of governmental action; even though such action would lead to wider streets, more parks, more air and sunlight. Action of this type would be governmental, not that of "free enterprise." It would be based on planning and collective direction. Government powers somewhat like those of wartime would be needed. Land values do fall in some parts of a city due to population

shifts; but they have not yet fallen very far, not to zero. Though owners do lose, the congestion in buildings remains.

If the process is viewed from the point of view of factories rather than of residences, a variation is noted. Theoretically, if factories move out of a city to a distant location, then an absolute vacancy may be left. For factories are not as easy to sell or to rent as dwellings. If it is good economics for one factory owner to move out where land is cheaper, it will generally be bad economics for another factory to fill the vacancy. Presumably it would be better for the other factory owner to move out to cheaper land too. With the removal of a factory there goes also much of the working population, their families, and those engaged in servicing them.

For a factory to move, though, transportation is needed. While a spur of railroad track may make it possible, small factories or factories making light weight goods can depend much on the auto truck. Trucks and automobiles and buses are forms of local transportation which aid the relocation of factories away from high land values and wages but not too far from a labor supply. The movement of factories from cities then does have possibilities of making a particular area well within a city less densely populated. This process has been taking place on principles of free enterprise without governmental planning and direction.

If the process is viewed from the point of view of stores rather than of factories and residences, it is found also to be different. The success of merchants depends upon shoppers who come to the stores. Hence, subways and elevateds and super-highways are favored by downtown merchants. But many customers do not like to ride crowded subways and elevateds. A surprisingly large number prefer to drive their own automobiles, if the streets

are wide enough and if a store has an adequate free parking lot. Hence neighborhood markets, where there is free parking space, are becoming increasingly popular. The downtown market in the center of the city could hold this trade if the streets could be widened and free parking places provided. But the sums of money needed are so large as to be in most cases prohibitive. Hence there are, short of subways, elevateds, and superhighways, tendencies for markets to be dispersed. Still this process does not lead to many vacant lots, which are the desideratum if the problem is that of escaping bombing. But bombing is expected to be directed toward war factories rather than toward stores.

Markets are of various kinds. Food markets can very well be dispersed. But markets for luxury goods such as fine jewelry, fur coats, rare art, etc. need a very large population to support them. As transportation becomes more frequently used these central markets for luxury goods will be made more accessible. Hence the markets in the center of a city are not likely to be diminished very much as the result of any natural process of evolution.

In the future, there will be air transportation. In general air transportation is, like railroads, for long distances, and hence has the same general effect as railroads. In addition, the larger the city, the more frequent will be air schedules. Hence air transportation of the type in use today encourages the larger cities to greater growth. The scattering of urban population, as has been shown, is a function of local transportation. To what extent is air transport local? It is hardly worthwhile to travel in a plane for distances less than 50 or 75 miles. But with a helicopter, it may be useful for trips of much shorter distances, provided there are adequate landing places on tops of buildings and in vacant land areas, and provided the helicopter will travel along the ground, also, like an automobile. Then, too, helicopters will be faster than automobiles, perhaps two or three times as

fast, and the land distance between two points is about one-six longer than the air distance.

The process of dispersal accompanying the private automobile and the autobus will be accentuated by the private helicopter for individual family use and the helicopter bus; but the process will be of the same general nature, as described in previous paragraph. That is, the prongs of the starfish will be greatly elongated and the number of prongs increased. The extent will depend on the extent of use of the helicopter which in turn rests on price and safety. No use of the helicopter comparable to that of the automobile is expected, though, in the visible future. The price will be high for a long time and the roadable helicopter will not be as good a ground vehicle as the automobile.

Hence not so many persons are likely to come into the city by helicopter as by automobile; but they will come from longer distances. Consequently, the trading area around a city will be much larger in the air age than in the automobile age. The trading center of a city will then probably be increased rather than diminished by aircraft.

The actual thinning out of city populations was found to be dependent on the moving outward of factories. Will the airplane encourage factories to be removed away from the cities? The answer depends on the use of cargo planes. At present, planes in the United States carry profitably only the type of goods that go by railroad express or by mail. Bulky, heavy freight of low unit value is not likely to be transported by air. Hence, the influence of aircraft in moving factories is expected to be slight, as far as we can see.

The natural processes of economics and of technology, then, seem to yield the following picture. Whole areas, larger than the present metropolitan areas, will be urbanized, somewhat as the area in a present economic city limit is urbanized, except that there will be very much more space between the com-

munities. These communities will be of all sizes from small villages to large aggregations around a big trading center. The cities of the railroad age will disappear. The central trading areas and the populations immediately around them are not likely to be thinned out very much, though land values in centers with little vacant space may, of course, be lower. On the other hand the factories will be rather widely scattered, except clusters here and there where integration is highly desirable for production. The wider spacing of factories is most important as a defense against bombing, for they are the most likely targets. Hence the natural process will eventually yield some protection to cities. But these changes are very slow, since buildings are of long life, they cost much money, and we are reluctant to move them or to abandon them.

This process of thinning out cities could be speeded greatly if we would agree to submit to governmental authority and to give up some freedom, as we might do under the threat of war. We are not, however, very likely to break up our large cities quickly under governmental direction to any significant degree, because of the cost, the inconvenience, and the loss of advantages inherent in great cities. To discuss how this might be done is beyond the scope of this article. From the foregoing analysis, however, it can be seen that the first and most important step is to get the factories moved out.

An interesting question is how much would be lost if our city populations were so scattered that no city was over 50,000 inhabitants. We would lose the supermarkets of large cities, the ease of making many contacts quickly, and the cultural advantages dependent upon a large population, such as operas museums, etc. These advantages could still be had even if large cities were broken up into smaller ones, provided local transportation was

cheap, fast, and frequent. Thus, a city of 500,000 occupying an area of 100 square miles, might be broken up into 10 cities of 50,000, placed in an area of 10,000 square miles so that they would be about 50 miles apart with the farthest distance between any two cities not more than 140 miles. Now in a city of 500,000 a citizen can ride anywhere in a streetcar for 10 cents, and the schedules are frequent. If helicopters could furnish sufficiently cheap transportation with frequent schedules, there would be no essential difference between a city of 500,000 on 100 square miles and 10 cities of 50,000 on 10,000 square miles. The breaking up of large cities as a defense against bombing and the spacing of the small cities is thus a function of fast, frequent and, above all, cheap local transportation.

In conclusion, then, there are two observations. One is that the natural process toward dispersal of the urban population could be speeded by governmental planning and direction so as to provide more protection against the very real danger of bombing in the next world war. The second observation is that the placement of city populations, residences, and places of work is singularly a function of local transportation as cities themselves are the creation of long-distance transportation, and that any successful planning and direction of the dispersal of city population must rest on local transportation, which must be fast, frequent, and cheap.

Nothing has been said in this article about values other than safety. But it is obvious that the chance to create new cities presents marvelous opportunities for civilized ways of living. Six-or eight-lane highways would lessen the congestion. Free parking space could be provided by stores, factories, restaurants, and even by government. There need to be few high way crossings, thus reducing delay and increasing safety.

Accidents on the highways and streets, especially to children, might be greatly reduced. Landing space downtown for helicopters on the ground or on the tops of buildings could be provided. Dwellings would have yards big enough for helicopters to land, for gardens, and perhaps for fruit trees and animals. There need be no smoke, and hence more sunlight with health-giving ultra-violet rays available. New dwellings planned by architects could take advantage of many new inventions, such as a glass wall on the south side for solar heat in winter and radiant heat from steam pipes in the walls.