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The impact of the railroad on American society: a communication perspective of technology

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Resumen: Este manuscrito examina el sistema ferroviario como una combinación de humanos y máquinas en relación simbiótica, y explica cómo el ferrocarril ejerció un importante efecto sobre la vida en América cuando hizo irrelevante el sistema de tiempo físico –natural—que existe en las ciudades y países en los que los relojes iban acordes a las condiciones climáticas. El autor apunta que el ferrocarril es un órgano social, capaz de evolucionar para servir a la demanda, modelando y alterando –pero nunca reemplazando—el contacto entre los humanos, y que continuará para mejorarlo y facilitarlo. Este manuscrito analiza los impactos sociales, transculturales, psicológicos y financieros de la vía férrea en la sociedad norteamericana en los últimos doscientos años. La medida del progreso en los Estados Unidos es equivalente al conjunto de cosas que se han sacrificado.

Palbras clave: Comunicación; Ferrocarril; Sociedad; Tecnología; Tiempo.

Abstract: This manuscript examines the railroad system as a combination of humans and machines that form a symbiosis, and explains how the railroad exerted a huge effect on American life when it made irrelevant the organic – following nature – time system that existed in cities and countries where clocks were set according to weather conditions. The author makes the point that the railroad is an organ of society, that it will evolve to serve the functions we demand, that it has molded and altered – but never replaced – contact between humans, and that it will continue to enhance and facilitate it. This manuscript analyzes the social, cross-cultural, psychological, and financial impact of the railroad on American society in the past two hundred years. The measure of progress in the United States is tantamount to the mass of things that had to be sacrificed to it.

Keywords: Communication; Railroad; Society; Technology; Time.

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Introduction

Communication technology has had an enormous impact on society by altering the nature of relationships among individuals (Zillmannn & Vorderer, 2000) and it always gives rise to unpredicted social consequences (Sproull & Kiesler, 1991). As communication technology extends our vision and our hearing, transportation technology extends our perception of moving. Indeed, we can travel at a higher speed and longer distance. The relationships between transportation and society, however, are far more complex, numerous, deep, and ancient. This manuscript examines the railroad system as a combination of humans and machines that together form a symbiosis (Lewin, 1951), provides a brief historical section on trains, and explains how the railroad has exerted a huge effect on human life when it made irrelevant the organic – following nature – time system that existed in cities and countries where clocks were set according to weather conditions. Finally, to describe the complex relationships that form the communication network in the rail industry, this manuscript incorporates research on the social, cross-cultural, psychological, and economic and financial impact of the railroad on American society in the past two hundred years.

Review of the Literature

Linked to technology, the word "communication" has had a pervasive use in the realm of transportation, even before it [communication] became transformed into "information movement" in this day and age. There is probably not a more appropriate way to define the power of communication and technology by first studying the rise of the idea of transportation as communication (Polli, 1998). To a large degree, the history of transportation, the act of moving something or someone from one place to another (the term stems from the Latin *trans*, meaning *across*, and *portare*, meaning *carrying*), has been driven by technology. Technology, "a distinct human cultural activity in which human beings exercise freedom and responsibility in response to God by forming and transforming the natural creation, with the aid of tools and procedures, for practical ends or purposes" (Monsma, 1986, p. 19), along with transportation communication, aims to achieve goals thanks to which people can feel the value of the socio-economic and financial structure through the improvement of industrial productivity and living standards.

In the beginning of the 19th century, however, humanity used little transportation because people barely traveled or moved no faster than they had in the previous three thousand years: riding horses and sailing ships were still the principal means of transportation. The application of steam engine to transportation shook everything up. Stephenson's first steam train began to operate in the late 1820's in England (Matellart, 1974), but effective railroad operations in the United States did not begin until around 1840. More importantly, during the Industrial Revolution, the train was a central factor for the expansion of the United States to the West. This is why it is interesting to trace the connection between transportation, communication technology, and society in the United States by looking at the early history of the railroad.

Brief History of the Railroad

According to many sources in modern countries, transportation on rail tracks has deep historical roots. Railways have apparently existed as far back as the sixth century B.C. In the 16th century, Europeans were making extensive use of rail tracks with vehicles to carry coal and charcoal outside the mines. Humans had to wait until the first two decades of 19th century (in Britain) to see the first mechanically worked railroad. Railroads were introduced in the United States in 1829 (Chadler Jr., 1981; Poor, 1970; Fogel, 1964). The introduction of the railroad system was a crucial occurrence in the 19th century in American history. The railroad system – improving transportation, communication, and technology to such a point that we can call it a revolution – helped settle and expand America's borders further to the west, increased and improved economic development and communication, as well as labor and immigration, introduced new management policies, and advanced technology

(Chadler Jr., 1981). On the other side of the Atlantic Ocean, 1829 was also the year during which Stephenson's "Rocket" was riding for the first time in England, a nation of which the rail network had already reached 430,000 kilometers (Matellart, 1974).

In the New World, however, locomotive technology only achieved a breakthrough in the 1830s. The development of the locomotive, the "Iron Horse" (Comstock, 1971), from the steam engine provided the technology for the rail revolution (Weitzman, 1987), and industrialization provided the basic needs, capital and skills (Licht, 1995). The invention of the steam locomotive radically remodeled the way products and people traveled. Products could be moved at a cheaper rate and at a higher speed thanks to trains and locomotives. Wagons could also transport heavier loads than ships and, not surprisingly, horses. Steam locomotives crossing the plains of Uncle Sam pulled railroad cars that were full of raw materials (White, 1968), and improved the "mail" system by carrying tons of letters, gifts, packages, and official documents from the government. Matellart (1974) continues by saying that "the networks traced by the locomotive as a machine in movement recognized the rigidity of borders, the partitions of an age in which the 'nation' was the motor-force" (p. 19). Peter Drucker even compares the steam engine to the computer when he writes that "the steam engine was to the first Industrial Revolution what the computer has been to the Information Revolution – its trigger, but above all its symbol" (Drucker, 1999, p. 50).

In spite of the drastic change engendered by the locomotive, many small local railroads in the United States were still at the starting point of their operation, most only going a short distance of only a few miles (McKenzie and Richards, 1986). Those small railroads joined together to connect their tracks and form larger companies (Poor, 1970). By 1840, railroads spread out and crisscrossed the state of New York. What came along with the railroad just before it expanded was the telegraph. Until the invention of the telegraph in 1837 by Samuel Morse, transportation and communication were connected: no messages could travel faster than a messenger. The telegraph was accepted by all the cities that had a railroad system because it was used to signal the arrivals and departures of trains and to coordinate the railroad lines efficiently. In 1869, the first transcontinental railroad, a railroad that crossed the entire country and that was mainly built with Chinese labor, was completed. Without the Chinese laborers, there would be no railroad. In turn, without the railroad, there would have been no sea-to sea USA. By the end of the 1880s, additional transcontinental railroads had been established. Trips that once took several weeks now took a couple of days. Railroads tied the country together, brought the Eastern and Western coasts of America's vast continent closer, and accelerated the growth of the United States.

By the beginning of the 20th century, especially during the period from 1900 to circa 1930, the railroad had outstandingly made headway in the United States, had attained an unequal status of power and dominance in inland transport, and had imprint and supremacy on the countryside. Likewise, on other continents, such as South America, there were a lot of independent railroads (Matellart, 1974), whereas Africa discovered the expansion of railways as "the creation of the means for the exploitation of natural resources and human beings in ways that they had never been exploited before" (Fernández-Armesto, 1996, p. 425). The railway was both a way of perceiving the world and a means whereby the world could be ruled.

The Birth of Time Zones: Reflections on Time and Railway

Although time is only accurately determined by the motions of the planets, time and space have become divided and reassembled in different ways according to the needs of each era in history. The time we use today, Eastern Standard Time, was invented by the railroads (Bartky, 1989) one hundred and twenty years ago, precisely in 1883, as individuals needed a conventional time belt for the whole railway system in order to make everything work. Of all the creations in the 19th century, standard time has endured almost constant. It is even the technological invention from the last two centuries that has been the most

significant for humankind. A standard is simply "something set up and established by authority as a rule for the measure of quantity, weight, extent, value or quality" (Gordon, 2001, p. 23). As Lewis Mumford (1934) puts it,

> The spread of rapid transformation occasioned a change in the method of time-keeping itself. Sun time, which varies a minute every eight miles as one travels from east to west, could no longer be observed. Instead of a local time based upon the sun, it was necessary to have a conventional time belt, and to change abruptly by a whole hour when one entered the next time belt (p. 198).

In modern times, Mumford (1934) continues, the clock has come to play such an important role in society that it is second nature to obey fixed and standard time. Therefore, as explained later, the most tragic consequence of the clock is the expression and the school of thought that "time is money." To achieve this, clocks had to be mass-produced, so that people could coordinate their activities (Schivelbusch, 1987). Nowadays, the American railroads function so perfectly that most people are likely to take good railway service for granted. It is only when a glitch interrupts the railway service that we realize how significant, indispensable, essential, and necessary railroads are in our everyday lives. Before, the measurement of time was taken with the aid of sundials in ancient Egypt about 1500 B.C. (Hawking, 1998; Cowan, 1958). As a matter of fact, humans recognized that the position of the sun in the sky is an indication of the progress of the day. The need for a device to measure time independently of the sun eventually pushed human beings to create other devices, such as sandglasses, waterclocks, and candles (Langone, 2000). Sandglasses and waterclocks used sand and water to measure time, while candles used their decreased height. All three provided a metaphor for time as something that flows continuously, and gave birth to the way human beings perceive time (Hawking, 1998; Priestley, 1964). Later, the Middle Ages, mechanical clocks began to appear. Mechanical clocks stemmed from the obsession with the rigorous order that characterized daily life in medieval monasteries. Driven by a desire to mimic the order of the universe, European monks felt obligated by God to lead equally ordered lives. What better device could individuals have to ensure the precise timing of these bells than a mechanical clock that would accurately and reliably measure time? With the appearance of the pendulum in the 17th century, time was adjusted to correspond with what was considered natural time, that is, the angle of the sun on the horizon. In other words, life still revolved around the light that individuals needed to see (Hawking, 1998).

In talking about the differences between "ancient" time-keeping and "modern" time-keeping, Mumford (1934) contrasts *organic time* (a "time" that patterns itself upon the natural cycle of birth, growth, development, degeneration, and death) and *mechanical time* (a "time" that keeps a consistent rhythm, which can be set by humans at rates that nature cannot follow). Like in the Middle Ages, however, each little town in the United States had its own time, sun time (Bartky, 1989; Kern, 1986) until the end of the 19th century. For instance, when it was noon in New York City, it was 11:55 a.m. in Philadelphia, 11:47 a.m. in Washington, and 11:35 a.m. in Pittsburgh (Gordon, 2001). Gordon (2001) continues his argument by saying that,

> In the days when a trip from New York City to Philadelphia was at the least a long day's journey; the time difference between the two cities simply didn't matter. But when the railroad made it possible to make the journey in a morning, and the telegraph made it possible to communicate nearly instantly, the traveler had to know what time it was at his destination so be could schedule appointments (p. 23).

Often a train would arrive at one station (say 12.13 p.m.) at an earlier time than it had left the previous one (say 12.08 p.m.) (Gordon, 2001). Most railway companies relied on some 100 different, but consistent, time zones. There were no official conventions that set how time should be measured, or when the day would begin and end, or what length an hour might be. Because the railroad system was run by strict schedules that train conductors had to follow and because time zones did not become

necessary in the United States until trains were the first means of transportation to travel across several states in a single day, it was clear that using the same time would be the best option to make life easier for everyone (Schivelbusch, 1987). The problem of keeping track of hundreds of local times was solved by establishing railroad time zones.

Nevertheless, with the vast expansion of the railway and communication networks, the worldwide need for an international time standard became crucial. As a result, on November 18, 1883 (called "the day of two noons") all railroads switched to the same time zones, very close to the same ones we use today (Kern, 1986; Schivelbusch, 1987). This idea came from a chief engineer for the Canadian Pacific Railway, Sir Sandford Fleming, who wanted to know how to schedule trains. As time was calculated in each town by checking the sun, time between places was not accurate. To correct this problem, Fleming developed a system of keeping a standard time over established time zones (Webb, 1993).

By the following year (1884), delegates to the International Meridian Conference asked that the entire planet be divided into twenty-four time zones, each one hour apart. Little by little, this coordinated time system was adopted over all the countries in the world. In the United States, a large part of the countryside abode by railroad time. Within days, almost seventy percent of schools, courts, and local governments adopted railroad time as the official time standard (Blaise, 2001). For the first time in history, major cities like Boston, Washington, New York, Atlanta, and San Francisco shared the same hour and minute (Blaise, 2001). The railroads, however, could not force the American government into following their standard before 1918, when an act of Congress was officially passed. After centuries and centuries, a completely abstract, man-made, uniform, mathematical notion of time was now starting to work its way into our view of the world.

Communicative Impacts of the Railroad on American Society

It goes without saying that, over the past two hundred years, the railroad has created change equivalent to that over the past several millennia. Up to now, the railroad has played an important role in developing modern civilization, and has contributed greatly to bettering humankind and making human existence more convenient. When the railroad appeared in 1829, it was seen as a product without precedent, as a magic tool that would forever change the economy, society, politics (Drucker, 1999), culture, and psycho-emotional impact of individuals. The western world was now witnessing the biggest boom in history – the railroad boom, a genuinely revolutionary element of the Industrial Revolution (Drucker, 1999). In a similar fashion, what changed travel by train into a mass transit system was not any particular technological development, but an act of Congress that asked for every public railway to run trains, on a daily basis, and at strict times – of departure and arrival – spread across a given schedule, to enable American citizens to travel to and from their places of work at a very cheap rate. We can say that the shape and the outlook of Uncle Sam today stems from the railroad system. Therefore, it becomes crucial to examine the railroad to ascertain the effects of its social, cross-cultural, psychological, and economic and financial impact on American citizens. Let us begin with the social impact of the railroad.

Social Impact of the Railroad

The last two hundred years have seen a significant increase in the use of technology for purposes of social improvement. Yet "even when the technology is predicted properly, it is rare that anyone truly understands its real impact, how it will be used" (Norman, 1993, p. 186). By "impact," the author means "influence on the behavior of individuals." By "social" impact, the author refers to Norman (1993) when he says that it constitutes "the effects upon the lives, living patterns, and work habits of people; the impact upon society and culture" (p. 186). Social impact, and therefore social change, leads to profound repercus-

sions and becomes a dimension of all our activities from childhood to old age. In fact, the innovations that we are witnessing represent a deep pattern of change in society that occurs regularly in history. While history never repeats itself, the elements of the system change remain consistent and stable. By extension, the study of social change is almost as diverse as the study of society: we must have an experiential model of society to understand the "what is changing" and be aware that any pattern of social life should be examined over time.

Overall, railroads have had a deep, beneficial social impact upon the country. This technology was the truly revolutionary element of the Industrial Revolution, for not only did it create a new economic dimension, but it also rapidly remodeled the mental geography. Now human beings mastered distance, they had true mobility, and the horizons of ordinary people expanded. Thinkers and critics at that time immediately realized that a fundamental change in mentality had occurred (Drucker, 1999). The fate of the train, symbol of "dromocratic" [or speed] (Virilio, 1986) revolution of transport, was also related to the construction of the "industrial nation-state" and the national upper classes such as the bourgeoisie (Matellart, 1974). The railroad weakened the aristocracy and the established social structure, and led to the starting point of an organized stock market. Truly, the birth of a newly connected nation engendered a new kind of American society, ambitious in its scale and demands (Rothstein, 1999).

In a similar vein, not only as the railroad demonstrated that we, as human beings, are extremely adaptable to the conditions in which we find ourselves (Morrisett, 1996), but it has also changed individual social interactions, the nature of public interaction, and the notion of public space (Polli, 1998). Indeed, the introduction of the railroad seventeen decades ago can be credited with breaking new ground in the way people viewed other people and profoundly changing the way they communicated with one another. It has put human beings on the course to universal accessibility: the creed and ultimate goal of human communication. One benefit of "taking" the train to improve human relations and connections with large groups of people is clearly illustrated in political campaigns. History has recorded that, by traveling in several states during his political campaign, Harry Truman reached many people when he made speeches at train stations.

Furthermore, the railroad has influenced the way Americans talk. Phrases like "on the right track" or "to blow off steam" stem directly from the locomotive. One railroad-related phrase, however, that will always be associated with the acceleration of life in society is "time is money." Clocks were institutionally and legally set by synchronized systems of time zones, established by the railroad system that enabled people to function in a coordinated way. Standardizing time challenged nature, democracy, work, and industrialization. From this standardization of time, the phrase "corporate America" meant everything. Indeed, at the societal level, this adoption of fixed and rigid time zones led many Americans to live in cities, to work in industry, and to be connected via trade and long-distance travel. More importantly, time technology turned human existence into a rigorous schedule and made individuals part of a societal machine that used money as lubricant.

On the other side of the coin, the railroad, particularly the use of the locomotive, with its steam engine, was not always harmless. Using massive amounts of wood and coal to heat the steam, a lot of fuel was required to run steam locomotives. The exhaust from steam engines was partly made out of hazardous components such as fossil fuels and carbon dioxide from the coal. In the 19th century, one can only imagine how many pollutants were floating above a nation that once was inhabited by people who resembled more environmentalists than polluters. In line with these contentions, by collapsing space and reframing time, time technology has accelerated the tempo of life to such a point that human beings sometimes suffer from it. As technology changes, it goes without saying that there are intermediate times where only unsuitable solutions are taken into account.

Paglia (1998) notes that, modern culture has been obsessed with speed since the invention of the steam-powered locomotive in the early 19th century. Our sense of

space has progressively contracted and collapsed because of our ability to cross huge distances with magical effortlessness. Many chronic stress-related medical complaints are certainly aggravated by this headlong pace, which has disrupted our physical perception of time (p. 275).

Likewise, the preposterous acceleration of life through the equation of time with money has led to a demand for greater power; in turn, power sped the tempo. As a result, nowadays people eat at noon or when it is time to have lunch, not when they are hungry, in the same way that they sleep when it is time to sleep, not when they feel drowsy. The subordination of human existence to "the iron discipline of the rule" (Mumford, 1934) might very well be the creation of the behavior of those who are on the edge, those who go haywire, those who cannot function in the most industrialized and advanced societies. In a similar fashion, as social activities rely more on technology, major systems (societies, cities, large industries, etc.) become more vulnerable to crises caused by malfunctions of or interruptions to the technology. For example, a glitch in the railroad network system can make individuals lose telephone or electrical service. As one can see, not all changes in society brought about by the railroad were good changes. Society is a complex system living on a planet, influenced by the sun's energy. It [society] must obey the laws of nature like any other physical system in the universe. The railroad system also has carried many health-related problems to individuals, such as pollution and other dangers. There was a new demand for sources of energy and fuel.

Cross-cultural Impact of the Railroad

Adequate cross-cultural communication is accomplished with tact. Knowing when and how to be tactful, mindful, or diplomatic requires knowledge of the cultural context. Cross-cultural relations in the United States over the past two centuries have been impacted by technological development and by railroad-related challenges that have reshaped both its meanings and its methods. Since the 19th century, the mushrooming of transportation on rail tracks has increased cross-cultural trade, intercultural contact, the "melting pot" of different races, and more "exposure" to new ethnicities. In line with those contentions, not only has the railroad impacted intercultural relations, but it has also effected our species by helping diffuse DNA in its wagons. Yes, the proliferation of DNA was done via mass transit systems such as trains. By the same token, by importing and exporting cattle and other animals, the railroad has tremendously contributed to new forms of DNA, animal breeding, and animal species.

However, the railroad system was not used as a major vehicle for all cross-cultural changes of the country as much as an opportunity to participate ambitiously and efficiently in a "globalizing" world and to influence international police activities (Pounds, 1985). As such, although nobody doubts that the traditional Hollywood-like concept of the West, which contrasts land and people, has greatly contributed to the progress of technology, trains and locomotives have engendered social and intercultural segregation. Indeed, the railroad has led to globalization, better communication technology, and class differences (i.e., creation of more bourgeois distinctions by creating first-class and second-class train compartments, etc.), but it has fairly contributed to cross-cultural relations because the major goal of the railroad moguls was not to improve relationships between people, cultures, and races, but to tie together industrial empires (especially in the late 1800s and in the early 1900s).

Consequently, the expansion of the locomotive and trains dissolved the heterogeneous and diverse geography of the American countryside and allowed for greater spatial separation along culture, class, race, and ethnic lines. In fact, the phrase "you live on the wrong side of the tracks" reflects the class differences between the rich (living on one side of the rail tracks) and the poor (living on the other side). Similarly, the proliferation of trains brought about the diffusion of families across states, as well as continents and oceans.

Psychological Impact of the Railroad

In addition to the cross-cultural impact, the railroad has psychologically influenced

individuals. In the 19th century, a decisive shift in terms of appropriate behavior occurred, including a new stress upon emotional control that was profoundly related to the development of the "city-slickers" mindset and urban-industrial capitalist society (Kasson, 1991). Truly, the railroad has shown adaptive trends in dealing with humans. It has sensed human emotions and has been able to respond to them; now it patterns its own actions by duplicating human behavior. Therefore, the railroad can demonstrate its own emotional and psychological patterns of behavior, and shape our chemistry with technology, around us and in our lives.

Economic and Financial Impact of the Railroad

Railroads have become key drivers of the world economy. Already in the mid-19th century, steam railways were the dominant form of continental transport (Licht, 1995) in the United States. American railways rapidly developed as the largest and most complex examples of ideal systems that the world was longing for; their geopolitical, economic, business and managerial structures later influenced the growth of large-scale corporate business. The railways' advantages of fast connection, capacity, and economy made them more than just simple tools of industrial and business development (Hindle & Lubar, 1986).

Although railroads were built to open the American west for settlement and agriculture, early thinkers saw the birth of trains as a way for individuals to escape their miserable lives and the tedious aspects of agricultural and industrial work (Licht, 1995). In fact, railroad construction expanded the growth of ironworks and engineering shops. Even in poor areas of the United States, engineering works and coal mines were mushrooming thanks to the opening of numerous steelworks and rolling mills. There was now an expansion of labor and equipment productivity, as well as a rationalization of old networks. Nowadays, however, passenger railroads struggle more as they must compete with airlines by offering more convenient service and solving increased conflict between freight and passenger service, each requiring more rights to rail track use.

Financially speaking, one of the most important standards by which we live today is standard time, established for commercial and financial reasons (Gordon, 2001). Thanks to fixed time, stock markets were standardized in the 19th century and trades mushroomed. Railway networks made it possible to travel for purpose of negotiation to an extent never experienced before. The role that the railway system played in improving finance is often overlooked. Ultimately, railway development helped increase financial output for national and international markets. One other effect that railway networks produced was that of increasing contact (Turnock, 1998) among financial gurus for purposes other than transport or travel.

Discussion

This manuscript has demonstrated that the measure of progress in the United States is tantamount to the mass of things that had to be sacrificed to it. An actual progress always appears in the shape of a "will to power" (Nietzsche, 1967) and a desire to improve society. As a matter of fact, in the 19th century American citizens sacrificed a great deal to the prosperity of a railroad system that would forever change the way they perceive life. The dream of having connections between all 48 continental states was more than a quaint, Jules Verne-esque quixotic story. Besides, this manuscript will hopefully convince readers that the "rail model" (Virilio, 1986) is above all a model of the administration of time, "the iron discipline of the rule" (Mumford, 1934) that fulfilled the need of individuals to have a conventional time belt for the whole railway system in order to make everything tick like "a clockwork orange" (Burguess, 1962). Of all the creations in the 19th century, the "standard time" that we know today has endured almost constant.

Third, the author has made the point that the railroad is an organ of society, that it will evolve to serve the functions we demand, that it has molded and altered – but never replaced – contact between humans, and that it will continue to enhance and facilitate it. The railroad has had such deep impacts on the United States that it has sculpted larger patterns of human activity.

In fact, it has permitted capitalism to infiltrate society, imposed lifestyles, shaped the way we interact with other cultures and races – even diffusing DNA from humans and animals – and created needs that did not exist before. The railroad is rapidly being changed by new technologies. Since technology breeds technology, the range of options and the impacts of the railroad on human existence will continue to expand as even newer technologies are introduced every year that may alter the railroad system in many ways.

Truly, railways, like industries, are breaking new ground every day. Now we can see cameras in subway systems, that being a reminder of the all-seeing eye of the *Panopticon* (Lyon, 1994). Although the panacea-like nature of technology is always a constant that erases any failures or problems of the past, it creates new problems of its own. As mentioned earlier, the railroad has brought about pollution and health-related issues. Entering a new millennium, Americans are inundated with technology in a society – anxious about both its immediate and its long-term future – whose intellectual needs are fulfilled by science and whose material needs are lived up to by technology. In this day and age, network systems, whether railroad systems, subway systems, or even the Internet, require that visions of the future be rapidly malleable, that long-range plans be easily changed, and that we incorporate mechanisms for adjusting to innovation. The society of the future will need a large population of tolerant and psychologically strong individuals. The ultimate question is "can we foresee the future of society?" The answer is a resounding "That's the question."

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