# "Railroad Time" (1991)[1]

*William Cronon*

Compared with earlier transport systems——lakes, rivers, and canals, on the one hand, and rural roads, on the other——railroads exhibited several key innovations. For one, they broke much more radically with geography. Railroad engineers certainly had to consider any environmental factors that might affect a line's operating costs——the relative steepness of topographic gradients, the bearing load of subsoil structures, the bridgeability of watercourses, and so on. Still, their chief task was to draw the straightest possible line between market centers that might contribute traffic to the road. The same principle applied to nonrail transport systems as well, but the railroads came closer to realizing it than any of their water-based competitors.

As a result, the boosters' geographical determinism affected railroads only indirectly, as a kind of cost-benefit analysis that engineers performed in selecting from among a nearly infinite set of possible routes. Railroads did follow existing rivers and valleys to reach existing harbors and towns——but not because of mysterious environmental forces. Such places usually offered the largest concentrations of prospective customers for freight and passenger traffic. Railroad engineers sought above all to route their lines through country that promised high market demand and low operating cost. Nineteenth-century rhetoric might present the railroad, network as "natural," but it was actually the most artificial transportation system yet constructed on land.

The railroads' liberation from geography took many subtle forms. Aside from being able to go virtually anyplace where potential demand was great enough, they could also operate quite independently of the climatic factors that had bedeviled earlier forms of transportation. Farmers who used a railroad like the Galena and Chicago Union probably regarded its invulnerability to mud as its single greatest attraction. No longer did trade and travel have to stop during wet seasons of the year.

The railroads also alleviated many of the worst effects of winter. The period from November to April had always been the dullest season of the business year, when trade ground to a virtual halt for farmers and merchants alike. With the railroad, rural farmers could travel to urban markets whenever they had the need and funds to do so, even in the deep cold of February. Chicagoans no longer had to wait for months on end to view the latest fashions from New York. As one railroad promoter wryly remarked, "It is against the policy of Americans to remain locked up by ice one half of the year." The railroads could not break the wheel of the seasons entirely: the fall harvest, for instance, remained a particularly active time for travel, straining all forms of transportation. But they did reduce the seasonal economic cycles that followed the rising and falling curves of temperature and precipitation.

Just as the railroad changed the ways people experienced the seasons of the year, so too did it begin to change their relationship to the hours of the day. No earlier invention had so fundamentally altered people's expectations of how long it took to travel between two distant points on the on the continent, for no earlier form of transportation had ever moved people so

[1] William Cronon, "Railroad Time," from Nature's Metropolis: Chicago and the Great West (New York: W. W. Norton, 1991), 74-81.

quickly. In prerailroad days, before the Michigan Southern made its triumphal entrance into Chicago on February 20, 1852, the trip from New York took well over two weeks; shortly thereafter, it took less than two days. Even more striking was the accelerated flow of *information* after the arrival of the telegraph in 1848: messages that had once taken weeks to travel between Chicago and the East Coast now took minutes and seconds. Railroad and telegraph systems would expand in tandem, often following the same routes, and together they shrank the whole perceptual universe of North America. Because people experience distance more in hours than in miles, New York, Chicago, and the Great West quite literally grew closer as the lines of wire and rail proliferated among them.

Conversely, time accelerated and became more valuable the greater the distance one could travel in any given period. Once farmers had access to a railroad, most no longer thought it worth their while to spend a week or more driving a team of horses over bad roads to sell their crops in Chicago. More than twice as much wheat came to Chicago in 1852 via the Galena and Chicago Union than came in farmers' wagons, the latter having fallen by half in just the previous year. In 1860, Chicago received almost a hundred times more wheat by rail than by wagon; ten years later, no one even bothered to keep statistics on the latter. Beneath these seemingly straightforward commodity movements lay a much subtler cultural change: farmers now valued their time too much to contemplate making extended wagon journeys of the sort they had taken for granted just ten or twenty years earlier. As one Chicagoan later remembered, the railroad relieved "the farmers at every stopping place from their long and tedious journeys by team, enabling them to utilize their own labor, and the services of their teams, in improving their farms, and adding every season to the amount of grain sown," thereby increasing the pace of agricultural improvement throughout the hinterland landscape.

As railroads decreased the cost of distance and increased the value of time, they also raised people's expectations about the regularity and reliability of transportation services. Earlier forms of western transport had involved single vehicles carrying small loads. The individuals or firms that ran them operated on a limited scale and had little ability to predict local demand or avert potential delays caused by weather, accidents, or other hazards. As a result, canal boats, steamships, and road vehicles had trouble keeping regular schedules. As one frustrated eastern traveler reported of his western journey in 1851, "For a boat to lie at her wharf hours after the time set for starting, and by innumerable stops to prolong her trip a day or two beyond the promised time, is an event of common occurrence." Because people had no choice but to tolerate such delays, they had to plan very loose schedules for when they might be able to conduct business, receive shipments, or complete a trip. With so erratic a transportation system, one could not place a very high value on one's own time. "Indeed," the same traveler reported, "*time* does not yet seem to enter as an element into Western thought. It answers about as well to do a thing next week as this; to wait a day or two for a boat, as to meet it at the hour appointed; and so on through all the details of life."

Because railroads ran more quickly and reliably, and could carry more people and goods over greater distances, they changed this irregular sense of time. Trains too could be delayed. But whereas earlier western stage and steamship operators had measured their service by how many trips they made in the course of a *week*, railroads measured the same service in terms of the scheduled trips they made in a *day*. On this scale, a train delayed by several hours was very late

indeed, a fact that suggests how railroads changed people's ability to schedule and predict their use of time. The long-term consequence was to move timekeeping into the realm of the mechanical clock, away from the various natural cycles which had formerly marked the flow of time.

Distinctions that had once been crucial in dividing the days and months of the year——separating night from day, wet times from dry, hot times from cold, good weather from bad——gradually became less important to travel even if they did not disappear altogether. No longer did one have to stop traveling and find lodging for the night when the sun went down; no longer did one have to delay a journey until ice disappeared from rivers or lakes; no longer did one have to fear snowstorms as a life-threatening hazard on the open road. When one boarded a train, one entered a world separated from the outside by its own peculiar environment and sense of time. Train passengers had less and less need to interact physically with the landscapes through which they were passing. They became spectators who could enjoy watching the world go by instead of working their way across it on foot or horseback. Unless an accident occurred——and railroad accidents, like those of steamboats, entailed horrors of a sort never before seen——the train promised what its passengers increasingly came to expect: the safety and clockwork regularity of an artificial universe.

The most dramatic proof that this new universe had extended its influence to the outside world came in 1883, when the major railroad companies imposed on North America new, "standard" times to replace the hundreds of "local" times which had previously been used to set clocks throughout the country. Before the invention of standard time, clocks were set according to the rules of astronomy: noon was the moment when the sun stood highest in the midday sky. By this strict astronomical definition every locale had a different noon, depending on the line of longitude it occupied. When clocks read noon in Chicago, it was 11:50 A.M. in St. Louis, 11:38 A.M. in St. Paul, 11:27 A.M. in Omaha, and 12:18 P.M. in Detroit, with every possible variation in between. For companies trying to operate trains between these various points, the different local times were a scheduling nightmare. Railroads around the country set their clocks by no fewer than –fifty-three different standards——and thereby created a deadly risk for everyone who rode them. Two trains running on the same tracks at the same moment but with clocks showing different times could well find themselves unexpectedly occupying the same space, with disastrous consequences.

And so, on November 18, 1883, the railroad companies carved up the continent into four time zones, in each of which all clocks would be set to exactly the same time. At noon, Chicago jewelers moved their clocks back by nine minutes and thirty-three seconds in order to match the local time of the ninetieth meridian. The *Chicago Tribune* likened the event to Joshua's having made the sun stand still, and announced, "The railroads of this country demonstrated yesterday that the hand of time can be moved backward about as easily as Columbus demonstrated that an egg can be made to stand on end." Although the U.S. government would not officially acknowledge the change until 1918, everyone else quickly abandoned local sun time and set clocks by railroad time instead. Railroad schedules thus redefined the hours of the day: sunrise over Chicago would henceforth come ten minutes sooner, and the noonday sun would hang a little lower in the sky.

The railroads broke with the sun in one other respect as well. All previous forms of land transport had relied on biological sources to power their movement, in the form of food calories consumed by people, horses, or oxen to move vehicles and goods through space. All such energy ultimately derived from the sun, and its use was strictly constrained by the physiological ability of animal metabolisms to convert food into work. Speed of movement had well-defined biological limits, as did the total quantity of work that people or animals could perform in a day: a good-sized man might deliver two to three horsepower-hours in the course of a hard ten-hour day, while a horse might deliver eight to ten horsepower-hours during the same period. The railroad broke this age-old restrictive relationship between biological energy and movement, much as the steamboat had done for water transport several decades earlier. Although early locomotives burned wood, they gradually shifted toward coal, and so ended their reliance on biological energy sources by replacing them with fossil fuel. Locomotives were not more efficient than horses, but they could consume vastly greater quantities of fuel much more quickly, and thus had much higher limits for work, speed, and endurance. Typical locomotives of the 1850s could deliver well over three hundred horsepower. By the Civil War, they could pull enormous loads at better than twenty miles per hour for hours on end——far longer than horses or people could move a tiny fraction of that load at less than half that speed. No longer would solar energy and animal physiology set limits to human movement across the landscape.

The greater speed, distance, volume, and power of railroads enabled them to break free from the economic and environmental constraints of earlier transport systems. Compared with its predecessors, railroad geography rested on differences in degree that people experienced as differences in kind, shifting the human sense of scale in a way that itself became second nature in subtle ways. With the possible exception of great armies, no human organization had ever posed such extensive and elaborate management problems before. The railroads moved immense volumes of goods and people at high speeds on closely timed schedules over great distances, creating a far-flung network in which responsibility for the entire system fell to a small group of managers. Operating such a system required concentrations of private capital greater than ever before. By 1860, total American investment in canals, which had been the largest comparable corporate enterprises, was still less than $200 million after forty years of operation, while railroad investment, more than tripling in the preceding single decade, had already passed $ 1.1 *billion*. Unlike their predecessors, the corporations that ran railroads generally owned the entire operation: lands, rails, locomotives, cars, and stations, not to mention the labor and fuel that kept everything moving. The companies that operated stagecoaches, ships, and canalboats generally paid only their vehicles' operating costs, not the expense of maintaining the right of way, while canal companies and toll roads maintained the right of way without owning or running vehicles themselves. Railroads did both and simultaneously incurred large fuel, labor, and equipment costs. Although such extensive ownership rights conferred great power, with them came truly daunting levels of risk and responsibility as well. Running a railroad meant trying to achieve unprecedented levels of coordination among engineering technologies, management structures, labor practices, freight rates, resource flows, and——not least——natural environments, all spread over thousands of square miles of land.

Control of this sort required techniques for gathering and interpreting information at a level much more detailed than had previously been typical of most business enterprises. The

railroads faced as much of a challenge in processing data as in moving people or freight. For every station, managers had to set rates, maintain schedules, and keep records of what the firm was hauling at how much cost during which period of time, so that in the end the corporate account books would all balance. Managing this accounting problem generated vast new quantities of statistics which themselves helped revolutionize the American economy by making possible increasingly intricate analyses of trade and production. Responsibility for using the new statistics fell into the hands of a new class of managers, engineers, and accountants whose emerging professional skills became essential to the system as a whole. Out of their work would come an increasingly hierarchical power structure which gradually proliferated through the entire economy.

At the most abstract level, the railroads' hierarchies of corporate wealth and managerial power represented a vast new concentration of capital. Whether one understands that word to mean the accumulated surplus value extracted from rail workers, the aggregate financial investments represented by company stock, or the real resources and equipment required to operate trains, it carries one basic implication. As perceived by those who ran it, a railroad was a pool of capital designed to make more capital. Railroads spent money moving goods and passengers in order to earn a profit out of the difference between their receipts and their operating expenses. Actual practice did not always turn out so happily, but this at least was the theory of the enterprise: invested capital would grow or at least earn back costs so that the system as a whole could expand. Because investments and costs were enormous, everything that moved by railroad——and every place through which the railroad ran——became linked to the imperatives of corporate capital. The railroad thus became the chief device for introducing a new capitalist logic to the geography of the Great West.