PATRICK KIDD

Railroaded: The Transcontinentals and the Making of Modern America

by Richard White. New York, NY: W.W. Norton, 2011, 660 pp.

In the broad sweep of American history, the transcontinental railroads have long been hailed for their positive effects, chiefly the ability to reduce what had been a journey of weeks or months across the continent by foot, wagon, or waterborne vessel — or more likely some combination thereof — down to a few days. Not only did the rails over the plains and mountains allow for the movement of people and goods, but they were also conduits for the exchange of ideas. Popular perceptions of the Transcontinental Era, spanning the second half of the 19th century, are still colored by stories of larger than life personalities and heroic engineering feats.

Modern historians have expended time and effort to provide us with a fuller understanding of the transcontinental railroads, an understanding that reveals the political and financial machinations behind the railroads' creation, while also acknowledging the contributions of all those involved — including immigrant laborers. Continuing in this vein, Richard White also asks a straightforward question: Should the transcontinental railroads have been built when and where they were?

In chapters detailing the financial, social, political, and ecological trade-offs, the author lays out a compelling and well-reasoned case that the feverish rush to build across the west caused great and needless upheaval where a more measured, incremental approach would have better served the nation in the long term. For all the investment that the federal government made in the transcontinental lines, the country received poorly maintained railroads and redundant trackage that represented squandered resources. Economic markets were distorted, leading to a series of financial depressions, and corruption seemingly infested everything that the railroads touched.

Much of White's book focuses on the transcontinentals' financial and political back story. Regarding the former, it helps to have a vast understanding of finance and stocks since the author delves into the details of late 19th century banking and financial systems. Ultimately, he shows that although early railroad promoters committed little of their own funds, they were able to reap huge financial rewards by taking advantage of bonds and land grants backed by the federal government and made available under the Pacific Railway Acts of the early 1860s.

Contemporary critics described the transcontinental railroads as monopolistic enterprises that easily pulled the strings of their puppets in local, state, and national legislatures to get laws passed in their favor. White dispels this notion, noting that while railroad barons such as Leland Stanford could, and did, buy their way into Congress, the broader record of political success is mixed. In part this was due to competition by new railroads with transcontinental ambitions. For example, in order to secure a sphere of influence in the west, the Texas & Pacific Railroad often lobbied against the dominant Central Pacific, which had built half of the first transcontinental rail. Attempts to control the press were similarly varied in outcome.

As the rail network extended westward, few people fully understood how the transcontinentals and railroad technology would affect their lives or those of their progeny. The technological limitations of steam locomotives would determine town sites; standard conceptions of time would be challenged; the knowledge needed to

Digital Object Identifier 10.1109/MTS.2014.2352992
Date of publication: 17 September 2014

Patrick Kidd recently completed master's degrees in Urban Planning and Historic Preservation at the University of Pennsylvania. Currently with Amtrak, he works with communities to revitalize their rail stations through historic preservation, rehabilitation, and new construction. He can be reached at arch182itect@aol.com.

manipulate complex mechanical systems would give rise to the professionalization of fields such as engineering; technological advancements would influence the organization of nascent labor organizations; and the ecosystems of the west would be thrown into flux by settlers who arrived en masse by rail.

White points out that trained engineers "…reduced local knowledge [about the land and its particular characteristics] to numbers, a universal language of elevations, grades, curves, and the power that a steam engine could muster... [they] did this to create railroad space." This "railroad space" could be summarized succinctly in charts and tables that any professional could analyze to understand the "connections between infrastructure, movement, and revenue" — and therefore the railroads' bottom lines.

Reducing the characteristics of the land to convenient numbers laid down a foundation for what railroad boosters touted as optimal growth. Depots would be spaced according to how far a farmer could reasonably travel with his harvest in one day, while the locations of major stops with water towers and maintenance facilities were determined by how long a locomotive could travel before it needed servicing. Wherever the railroads established maintenance facilities, which might include structures for fuel storage and mechanical repair, towns developed quickly. Unfortunately, as witnessed during the later introduction of diesel locomotives — less labor intensive than their steam predecessors — many of these towns, as products of the railroad, would fade away just as quickly as they had been created.

> As the rail network extended westward, few people fully understood how the railroads would affect their lives or those of their progeny.

Transcontinental railroads purposely inserted themselves into local markets in an attempt to run them more efficiently and therefore boost profits derived from carrying bulk goods. White cites the example of the Canadian Pacific and its influence on the wheat market of south central Canada. As the principal means of shipping the grain to port, the railroad could mandate uniform production and classification standards. Quality control made the grain sought-after around the world, and it commanded a higher price.

To better organize this new world, the concept of standard time was established in 1883; no longer did local residents have to rely on reliable yet imprecise measurements based on the path of the sun—clocks now gave the exact time to be observed by all in the region. Time that could be precisely measured was also bound to take on more value, since its use could be accurately tallied. The telegraph, whose lines often followed the tracks, allowed for quick, accurate communication and enabled the standardization of time.

Time, distance, and cost were further quantified in the setting of tariffs for the movement of goods, but as White notes, this process led to confusion. Bulk goods were favored over others and short hauls often cost more than long hauls; thus, it might be cheaper to ship the same good halfway across the country rather than just a few dozen miles down the line. As additional transcontinentals were built and began to compete against one another, this relationship between the value of time and distance only became more distorted.

The second half of the 19th century — the height of the Industrial Revolution — is considered a great age of technological advancement. Large manufacturers such as the Baldwin Locomotive Works of Philadelphia were recognized as leaders in the development of engines and locomotives, which were composed of hundreds of parts designed by skilled engineers who often had formally studied mechanics and other sciences.

But not all of the technological advancements were executed by professionals. Small changes made by those on the front lines — mechanics and others who learned their skills on the job — could contribute to improved technologies and methods of work. The author writes, "Mechanics tinkered with locomotives. They redesigned them and on some roads manufactured their own… Innovators collaborated and disseminated along 'an informal but effective network of technical experts.' Master mechanics and the workers under them created a 'pool of techniques' and innovation that the original builders of locomotives in eastern factories often tapped." This informal system was eventually replaced as the ranks of professional engineers grew at the dawn of the 20th century and patents were recognized and enforced.

The adoption of new technologies presented challenges for the railroads, as exemplified by the introduction of automatic air brakes in the 1870s. Prior to air brakes, brakemen had to walk along the roofs of multiple cars to apply the manual brakes on each one. Traversing a moving train was dangerous at any time, but especially when the weather took a turn for the worse. George Westinghouse's invention of automatic airbrakes allowed the engineer to stop the entire train with the pull of a lever from the locomotive.

While a great idea in theory and practice, the installation of automatic air brakes was a financial burden. Since railroads interchanged cars, ideally all rolling stock would have to be retrofitted in order to function together. This would take decades to achieve, and in the interim, workers had to sort out the cars by brake system, using up time and money in the process. Automatic airbrakes would not become widely used until the federal government mandated railroad safety standards in 1893. Railroad workers were also suspect of new technologies such as airbrakes and automatic couplers: they reduced the

number of people needed for what had been labor intensive manual tasks and required advanced skills to understand and operate. Going forward, railroad unions were often hesitant to back new technologies unless improvements to worker safety were clearly demonstrated.

For all the technological advances they represented, the transcontinentals also wrought unanticipated ecological and social change to the western landscape. Many of these problems, such as the overgrazing of grasslands in the arid western plains or the decimation of bison herds, are better understood with the benefit of hindsight, although some late 19th century commentators recognized the problems as they were unfolding. In the former, the railroads allowed thousands of cattle to be shuttled around from one region to another during their lifecycle. Prime grasslands were burdened with more animals than they could naturally accommodate, which quickly led to the degradation of the land.

In the latter, the railroads made possible the rapid westward movement of settlers and sportsmen who hunted the bison not so much for sustenance but as a way to obtain hides and rid the area of an obstacle to cattle grazing. The loss of bison would in turn have ripple effects through the American Indian tribes that depended on the animals for protein, hides, and other products. As White notes, "The railroads seemed unable to achieve a balance between too much and too little. They enabled farmers and miners to produce far more cattle, wheat, and silver than the world needed." Unregulated growth was "dumb growth" that would only cause problems by distorting economic markets.

In attempting to focus on the ways in which the transcontinental railroads and associated technologies impacted Americans in the late 19th century, I have glossed over the content of large sections of *Railroaded*. Richard White provides insight and detail into a variety of topics, including how the growth of the railroads influenced and affected nascent corporate structures, the anti-monopolist movement, financial markets, and the development of labor organizations. He takes great pains to untangle the complicated relationship, one of benefits and losses, between the government and railroads. Closing each chapter, White also treats the reader to vignettes of railroad folks — station masters, laborers, family members — whose personal stories help to humanize a period of our history often described in superlatives.

BOOK REVIEW

DAVID MATHER

The Color Revolution

by Regina Blaszczyk. Cambridge, MA: M.I.T. Press, 2012, 368 pp.

If you've ever delighted in seeing ridiculous new color names for clothing, furniture, or other products, you're already familiar with an enduring mystery of color theory that touches far-reaching philosophical questions: how color names relate to our visual perceptions. This conundrum surfaces in contemporary American society as a complicated mix of science, industry, and poetry that accompanies such concoctions as Neon Sorbet or Metallic Creamsicle. Even when marveling at the absurdity of these labels, we accept the obvious truth that language is governed by a high degree of arbitrariness. Increasingly whimsical naming of hues is one facet in the sweeping history of business and industrial interests around coloration in last 150 years, as chronicled in Regina Blaszczyk's *The Color Revolution*.

The main theme threaded through this scholarly cultural treatment is the emergence, from the mid-19th century to the mid-20th century, of a newly

Digital Object Identifier 10.1109/MTS.2014.2352993
Date of publication: 17 September 2014

David Mather is the Andrew W. Mellon Postdoctoral Fellow in the Department of Architecture at the Massachusetts Institute of Technology. He is currently completing a book-length study of visual movement in early Italian futurism. Email: mather@mit.edu.