



## **Inventing American Broadcasting, 1899-1922**

Review Author[s]:  
Carolyn Marvin

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China relations. Randall Stross's primary training was in Chinese history at Stanford; he received solid language instruction there and in China. He is now teaching in the business school at San Jose State University.

This work has an important purpose—to tell the story of a series of American and Chinese "agriculturalists," proponents and practitioners of the transfer and dissemination of agricultural science and technology in China from the 1890s to the war in the Pacific in 1937. Their purpose, to improve China's crop productivity and soil use, was laudable, but the overall results were dismal. Stross does an excellent job of describing and analyzing the series of efforts in this nearly half century of endeavor, mainly those of the Americans. His chapters are well organized, his prose is lively and cogent, and his overall hypothesis is evident without being pushy. That hypothesis is that the Americans and the U.S.-trained Chinese alike had such a narrow view of agricultural development, as solely a product of technological improvement, that they failed to understand the wider political and social context; that context needed drastic restructuring (as brought about by the Communist regime after 1949) before the technological changes achieved in laboratories and on campuses could have any noticeable effect on society as a whole.

Several features of this work are worth emphasizing. One is the deft characterization of individuals such as Frank Meyer of the U.S. Department of Agriculture, who labored for years early in the century collecting specimens; Joseph Bailie, a quixotic character full of schemes, who among other projects created an agriculture department at the U.S. mission-established University of Nanking in 1914; John Reisner, who by the 1920s had turned that department into a successful School of Agriculture and Forestry, one of the major units of the university; J. Lossing Buck, foremost mover and shaker of the University of Nanking agricultural school establishment in the 1930s; and Shen Zonghan, the "star pupil" of U.S. training, who became head of an impressive Chinese government-supported set of agricultural science institutions in the mid 1930s. Most of these men were energetic and entrepreneurial in spirit and effective empire builders; many were also excellent scientists. However, they all had the nar-

row technological focus that overlooked the real obstacles preventing effective public application of their research. The book's last two chapters focus on Buck and Shen, respectively, and are especially well done.

Another feature of this work is the obviously crucial role of Cornell University, both in providing U.S. faculty to serve in China and in training Chinese agricultural scientists; Cornell's archives are a major source. Also evident (in retrospect) is the obtrusive manner in which outside forces, including the USDA, Christian missions, the cotton millowners association, and the Rockefeller Foundation (whose archives are another major source), shaped and sometimes dictated the research agenda for Chinese agricultural science, for example, putting immense stress on improving cotton strains in the 1920s while neglecting rice. Moreover, U.S. institutions often behaved in China in what would today be seen as a cavalier manner. In its early work there the USDA totally avoided contact with Chinese officials and scholars; and the University of Nanking was institutionally chauvinistic in staking out its claim to be the exclusive missionary agriculture school and in refusing cooperation with appropriate Chinese schools, trying to hog the Rockefeller and other outside funding for itself.

This work is well grounded in both published and multiarchival sources, English and Chinese. The only significant bibliographical omission I noted was the works of Michael Hunt, which would help to provide the context of early endeavors in Manchuria after 1900. Although I am a China historian and rate this book very highly on its contributions in that field, I have no doubt that historians of science and technology will also find it stimulating and valuable. I recommend it highly.

DANIEL H. BAYS

**Susan J. Douglas.** *Inventing American Broadcasting, 1899–1922.* (Johns Hopkins Studies in the History of Technology.) xxix + 363 pp., illus., bibl., index. Baltimore/London: Johns Hopkins University Press, 1987.

*Inventing American Broadcasting* begins and ends with the radio craze of the early 1920s, a cultural and economic phenomenon treated by the contemporary popular press as if it had come from nowhere. In between, the author argues that the radio

boom was the surface of a complex architecture, already two decades old, that had conferred on early American broadcasting its fundamental shape and direction. This is the fullest narrative to date of the beginnings of American radio, seen as the institutional and cultural precipitate of interests and groups in flux during the early twentieth century. A careful, well-written history with admirable scholarly strengths, it raises important questions about popular and scholarly perceptions of how technology happens to us.

In Susan Douglas's account, radio emerged out of the interests and activities of actors related to one another in shifting alliances, each set of actors occupying roughly the focus of a chapter. The *dramatis personae* include key inventors, the U.S. Navy, corporate manufacturers, the press, and amateur operators. How these groups attempted to capitalize on wireless provides the conflict that is the dramatic focus of this narrative. Douglas's major thesis is that the monopolistic model of radio management developed by the navy during the war survived in radio's postwar structure, providing a managerial and regulatory template of centralization and consolidation that outlived contemporary bickering over who would capture the system.

The author focuses on technology, business, and the press as key arenas in which institutions and individuals contended for control of radio. For the sake of increasing radio's cultural reflecting power, she attempts to draw media history, characteristically treated in isolation, into the central historical narrative of the period and culture to which it belongs. That effort will make this an attractive text for classes in the history of technology, communications history, and American studies.

Douglas sees the press as a historical agent maneuvering to accomplish its own ends, and as the place where enduring aspects of radio's cultural image were constructed. She argues that the popular press rendered commercial and military struggles for control of radio invisible by focusing on the formulaic romance of heroic inventors and operators and by ratifying slick corporate visions of progress. To explain why the press opposed radio regulation while supporting the regulation of other "trusts", Douglas hypothesizes that the press acted out of self-interest, choosing orderly control of the airwaves by a few corporations

over the prospect of either government censorship or the unpredictable effects of competitive news gathering by amateurs. The evidence does not make clear, however, how cohesive press opposition was or how constant, or how widespread were perceptions of imminent censorship and unpredictable competition in news gathering. Certainly wire services had reason to worry about developments in competitive news gathering. But their client newspapers, which often perceived themselves as trapped in economic subservience to the wire services, had different interests.

The never-quite-proved hypothesis of the unity of press self-interest and its practical effect on industry structure raises certain questions in a study that does not regard technology as a simple surface. Behind the inventor-heroes and the remarkable machines, stock characters in a drama of technological determinism the author wishes to avoid, a variety of institutional and cultural cross-purposes reveal themselves. The press, however, remains a simple surface, descriptively incomplete and historically elusive. What is needed is a way of understanding "the press" as a system of actors who are as visible and differentiated as others in this drama. The actions and interests of a variegated "press" of wire services, of newspapers of different sizes and regional interests, and of professional hierarchies, bureaucracies, and networks remain to be identified and incorporated into the larger pattern of events and persons.

Media theorists have made much of the argument that media set the terms of culture, but this conclusion has often been easier to assert than to demonstrate in convincing detail. The implied arguments that the press would have served the public better with a narrative closer to one that contemporary historians regard as faithful, and that other alternatives might have won the day but for the press, come close to substituting media determinism for technological determinism. The press's portrayal of new technologies—as full of democratic promise and proffering a rupture with the usual order of organized society—is as familiar a tale in its way as the one sketched here, in which utopias glimpsed through new technologies are lost and community is destroyed by the institutions of organized society. As historians of science and technology increasingly address how technology negotiates with the "public" upon

whom it is visited, they will find it necessary to wrestle with questions about the mythosocial functions of journalism in industrial society. *Inventing American Broadcasting* does wrestle with such questions and others. It offers a scholarly and lucidly written account of factors of major importance in the early organization of radio in the United States.

CAROLYN MARVIN

**George David Smith.** *From Monopoly to Competition: The Transformation of Alcoa, 1888–1986.* xxxii + 554 pp., illus., figs., apps., index. Cambridge/New York/New Rochelle, N.Y.: Cambridge University Press, 1988.

George David Smith's history of Alcoa is a business biography that includes all aspects of the corporate experience—technology, labor, public and government relations, production, marketing, and management. This work originated in a study of Alcoa's corporate culture, which was viewed by top management as an impediment to change in the 1980s. To understand that culture Smith found it necessary to go back to the founding of the company; a complete history of Alcoa emerged.

The key factors that shaped the evolution of Alcoa, from Charles Martin Hall's discovery of an economical process for smelting aluminum in 1886 to World War II, were the monopoly status of the firm and the novelty of the metal. To make aluminum a common and widely used material, Alcoa made enormous investments in a tightly integrated operation that included mining the bauxite ore, refining it to alumina, smelting it to aluminum using company-owned hydroelectric facilities, processing the resulting ingots into final products, and developing new uses for the metal. These operations were administered by a small group of owner-managers, who dominated the company for over sixty years. Though setting the overall corporate strategy, executives allowed local conditions and personalities to determine policies in many areas. This was possible because the mission of Alcoa was clear to everyone. All Alcoans knew that the heart of the business was the production of aluminum metal, in which the company had enormous economies of scale and such a high investment that no competitors entered the business between the expiration

of the Hall patents in 1909 and the end of World War II, when the U.S. government sold its wartime plants to Reynolds and Kaiser. At the other end of the business Alcoa had done an excellent job of developing new alloys, especially for aircraft, and new uses for aluminum. However, the corporate culture viewed these activities primarily as ways to increase the demand for the metal.

In the postwar era, Alcoa successfully weathered one change in its environment—the coming of competition in aluminum, both nationally and internationally. A key development in this period was the rigid container sheet that formed the basis for all-aluminum beverage containers, an enormous new market. The book ends in the middle of a second transformation, a shift in focus away from increasing aluminum output, which had become a commodity, and toward developing materials for particular market niches. Instead of being *the* aluminum company, Alcoa would become a materials manufacturer with the emphasis on a diverse range of products. To make this transformation Alcoa has had to make dramatic changes in virtually every aspect of its organization and culture.

To tell the Alcoa story Smith compares its experience to general models of corporate evolution that are taught in business schools. Over time the peculiar features of Alcoa yielded to the inexorable forces of bureaucracy and routinization. For most of the century, the story is one of progress toward the idealized rational company; but before that perfection was attained, outside forces intervened to render the elaborate structures of the past ineffective. When Alcoa was the aluminum industry, the internal and external stories were the same, but in the era of global competition the two diverge and have followed different paths.

JOHN KENLY SMITH, JR.

#### ■ Philosophy and Sociology of Science

**Robert D'Amico.** *Historicism and Knowledge.* xiv + 174 pp., index. New York/London: Routledge, 1989. \$35, Can\$45.50 (cloth); \$12.95, Can\$17 (paper).

Robert D'Amico aims to defend historicism, suspect because of its long association with skepticism and relativism. He defines historicism as the thesis that any