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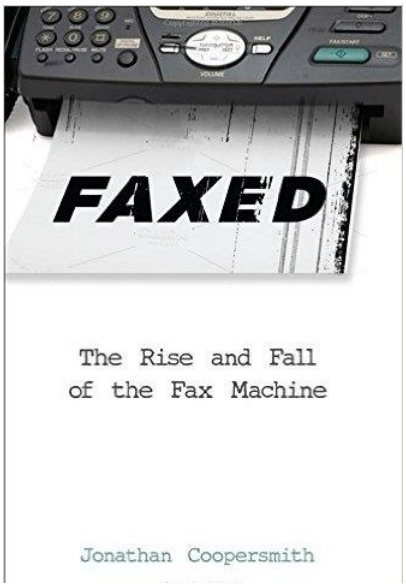
Jonathan Coopersmith, *Faxed: The Rise and Fall of the Fax Machine*. Baltimore: Johns Hopkins University Press, 2015. 320 pp. ISBN 978-1421415918



In 2006, when I started as a new staff member of the Chemical Heritage Foundation (a non-profit in Philadelphia), my check-in procedures included a meeting with the IT administrator. He set me up with an email address, voice mail for my phone, and a fax number. This prompted me to ask: "Where do I receive the incoming fax?" His answer: "In your email inbox." The document sent to my fax number would be automatically converted into PDF and show up in my email inbox as an attachment. I recall thinking this was pretty cool, which was my first encounter with "computer-based faxing," as Jonathan Coopersmith describes in the last chapter of *Faxed*. I believe that CHF still uses this system today.

Two years prior to this, as a third-year graduate student at Johns Hopkins University, I was going through the final stages of preparing my first academic publication in the journal *History and Technology*. As some of you may know, the journal's publisher is Taylor & Francis, based in the United Kingdom. I received an email from the managing editor, with the final page proofs attached as PDF. I was specifically instructed to make the corrections on the printout and "fax" the document to a number in the UK. One evening, I sneaked into my department office to send the forty-page document through their international line. No one ever faulted me for this mischief, but I am sure it resulted in a hefty phone bill for the department.

I have published a few more papers since then, but never since have I been asked to fax page proofs. Clearly, it was the tail-end of an era, or the "fall of the fax machine" described in the book's subtitle. In *Faxed*, Coopersmith traces the entire life-cycle of the technology, from its beginnings in 1842 with Alexander Bain's first patent for the "Electro-Chemical Copying Telegraph" to its gradual demise in the first decades of the 21st century. In a way, fax machines were caught between two major communications technologies of the 20th century: telegraph and digital technology. Framing the story this way leads to the two questions. First, why did it take so long for fax technology to obtain mainstream popularity? Second, how was it able to persist when new digital technology seemed to supersede it altogether? There is no simple and straightforward way to answer these questions, which justifies the 200-plus pages spent on them in this book.

Economics certainly had a lot to do with the rise and fall of fax technology. As the comparative costs of faxing with other early 20th century alternatives (i.e. mail or telegram) show (p. 49), faxing was prohibitively expensive yet technologically premature. It was only with further refinement of the technology, expansion of the market to ensure quantity production, and establishment of a unified standard that fax technology emerged as a viable option in subsequent decades. With these developments before and after World War II, the fax gradually entered the

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mainstream not only in government and business operations, but also as a home appliance. The U.S. military played an important role during these decades, given its specific communications needs, such as transmitting up-to-date weather maps to the field.

The explanatory powers of techno-economics, however, reach only up to a certain point. An important counterpoint is derived from the author's skillful weaving of U.S. and Japanese contexts, comparing and contrasting the social, cultural, and political factors. For the readers of this journal, this comparative history would be of particular interest. The trajectory of fax technology in Japan differed from that of the United States, not only in terms of timeline, but also in its entanglement with the societal fabric. The Japanese encounter with fax technology was not surprising, as Coopersmith notes, perhaps "exemplif[ying] the Japanese approach to modernization" (p. 47). In the mid-1920s, *Mainichi Shimbun* approached American and German engineers to install the first picture telegraphy system in Japan. Then, Nippon Electric took over and, within the next year, developed an indigenous system that transmitted photographs between Tokyo and Osaka. This is a narrative that could be repeated for a number of technologies that Japan had learned since the Meiji period. What was different was that this technology took much better hold in Japan than in the West.

How can one explain the difference? The author resorts to a number of sociocultural factors. That the Japanese used *kanji* characters seemed to be critical (p. 138), as was the nation's non-sequential address system (p. 168), which required trading of maps for first-time visitors. The use of *hanko*, or personal seal, for authorization also proved congenial to the fax's acceptance within Japanese business. All these may make the story of fax machines in Japan sound a lot like another instance of the "Galapagos syndrome," which is a popular phrase used to describe the fate of Japanese cellular phones, or *keitai*. The Japanese *keitai* diverged so much from the global standard that it formed its own ecosystem impenetrable to outsiders, while at the same time discouraging Japanese manufacturers from expanding into the world market. In dealing with fax technology, the Japanese government proved more open to the outside world. On one hand, the fax was squarely within the government's new vision of the early 1970s to propel Japan toward the "information society (*jōhōka shakai*)," which the private sector willingly embraced (p. 139). On the other hand, the government coordinated the establishment of the domestic communications standard to the fax, and subsequently leveraged it into an internationally-accepted G3 standard. One can find parallel stories of the Japanese government performing agile balancing acts of domestic and global coordination in the postwar steel and semiconductor industries.

In the end, the story Coopersmith tells is not too surprising for someone well read in the history of modern technology and industry in Japan. For historians of technology more generally, however, it foregrounds the important lesson that adopting a transnational perspective can bring into light the complex dynamics of technical development and diffusion, something that cannot be seen by focusing on a single country. Also, the story of the "rise and fall of the fax machine" cannot be told through a single theoretical lens—economic, social, or cultural. The most important lesson of *Faxed* is that the real history of technology is inherently messy, and the complicated history captured in this book—which can be admired through the 1,148 footnotes in the back matter—is testimony to that inescapable fact. If you wish to know anything about the history of fax technology, it is highly probable that you will find it in this encyclopedic treatment.

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