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Does the History of Technology Have a Paradigm?

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My remarks this morning are titled, "Does the history of technology have a paradigm?" My answer to this question is "yes." By the time I finish, I hope you will understand why I asked myself this question, why I think it might be a good question with which to start this symposium.

Like many people in this room today, I was not trained to be an historian of technology. I began my graduate work in the fall of 1962, in the Program for the History of Science, at the University of California, Berkeley. One year later, in the fall of 1963, I took a seminar with the faculty member who was then the head of the program—Thomas S. Kuhn. The first thing we read was his just published magisterial work, *The Structure of Scientific Revolutions*.

That book blew my mind. It is not nearly as influential today as it was then, but I still use the tools it taught me to think with. One of those tools is the idea of a paradigm. Kuhn believed that all mature scientific fields have paradigms: conceptual and instrumental frameworks that are accepted by the entire disciplinary community.

I have long believed that all mature disciplines, not just the sciences, have paradigms. Thus, when Roe invited speakers to think about the past, present and future of the history of technology, I began to think, for the first time, about what paradigm dominated the history of science in the early 1960's, when I was a graduate student, and what about it caused me to jump ship into the history of technology in the mid-1970's, when I was a tenured faculty member.

So here, in a set of what might be called working instructions, is what I understood to be the early 1960's paradigm for being a "good" historian of science: the history of science is the history of scientific ideas; its goal should be to demonstrate how the scientific method gets people

closer to the truth; thus, the history of science should be useful to the philosophy of science, a branch science, a branch of epistemology; focus your research on the published and unpublished writings of scientists; do not study the history of a science you do not understand; avoid Marxist interpretation: too materialistic, too deterministic; also avoid the social history of science and the history of technology, leave those to the "dummies" who do not know science.

By the time I finished writing and defending my dissertation, in the spring of 1969, I knew that I was not happy with this paradigm: reading the published writings of dozens of scientists turned out to be a bore; teasing out the causal connections between one man's (they were all men!) set of ideas and another was a tenuous enterprise, at best (I couldn't even be certain of where my own ideas had come from, let alone those of someone old enough to be my great-grandfather, living in a time, place and social circumstances so different from my own).

By the spring of 1969, I had been teaching at what was then called the State University of New York at Stony Brook for two years. Those of you who were also teaching at that time—and even those of you who weren't, will surely know that the academic year 1968-1969 was an exceptionally tumultuous time on American college campuses: rebellion was in the air and on the ground, not just for students but also for faculty. In a moment of pedagogical rebellion, the Faculty Senate at Stony Brook voted to develop a series of innovative freshman seminars, for the fall semester, in which faculty members would model "how to learn" by teaching a course on a subject they knew nothing about. This was called "experiential learning."

Yes!, I said, in a moment of personal rebellion: I am going to teach a course on something I knew nothing about: technological determinism, precisely what my graduate studies had taught me NOT to practice because it was materialistic, deterministic, Marxist and "only for dummies."

I was living in Manhattan in the summer of 1969, so, realizing that I would have to have something for the students to read, at least at the beginning of the course, I headed for the card catalogue room (yes! card catalogues had their own rooms!) of the Research Branch of the New York Library. I remember pulling out the *TE* tray, finding a separator card labelled "Technology: Bibliographies"—then finding, to my astonishment—Eugene Ferguson's extraordinary book, *A Bibliography of the History of Technology*, which had been published just a year earlier (yes, in those days bibliographies sometimes came between hard covers!). Further down the tray I found another separator labelled "Technology and Social Change;" perusing that tray taught me that most of the books in that category were written by archeologists and anthropologists. However, I did find, almost at the end of the tray, one historical work that would turn out to provide the

reading that my students liked the best: Lynn White*, Medieval Technology and Social Change,* published in 1963.

I loved teaching that freshman seminar; I got the best student evaluations I ever had at Stony Brook for that course. More important, the course motivated me to retrain myself as an historian of technology so that I might develop a research project on technology and social change. The history of stuff seemed much more tantalizing to me than the history of ideas; the primary sources much more challenging to track down; the causal connections over time, I initially thought, much easier to demonstrate. Over the next five or six years—while I got my dissertation published and got tenure—Ferguson's bibliography became my post-graduate syllabus and White's analysis provided a new, more satisfying paradigm for my research. I used his model to start a research project on the relationship between the changes in household technology in the 20th century United States and the changes in U.S. married women's workforce participation.

As soon as I started that project, I realized that I was totally unprepared to pursue it because I had no idea even how to define the word "social" in the phrase "social change" let alone how to do research about it. So I began reading sociology textbooks as well as the secondary literature in one of its sub-disciplines: the sociology of the family. In the spring of 1971, a colleague who was aware of what I was reading, suggested that the two of us co-teach a course called "Social Science Perspectives on Women" in Stony Brook's just starting up Women's Studies Program. That colleague was a Marxist economist; she introduced me to the writings of Marxist feminist scholars who were thinking about housework in a way that startled me: as a very peculiar form of work done by slightly more than half the human population who engage in it from a very young age and for the better part of all seven days of the week…entirely without compensation.

Thus, because of their focus on the conditions of labor and the social consequences of class, Marxist historians, who had been so completely derided by my graduate school instructors, ended up providing me with one of the crucial insights that subsequently guided my research.

Knowing where that insight came to me from, helps me to articulate what I believe is the paradigm that has dominated the last half century of scholarship in the history of technology, the paradigm that I initially discovered in Lynn White's book, which was first called "contextualism" by, I believe, Mel Kranzberg. A "good" historian of technology considers the field to be a branch of social history; its goal should be to help people understand the reciprocal relationship between

changes in technology and, as White expressed it, "the social formations" in which people are embedded in any given place and time, in any given context. A "good" historian of technology recognizes that reciprocal relations between complex entities—such as technological systems and social formations—are too complex to be deterministic, also too complex to be labelled inherently as Kranzberg also put it, "good, bad or neutral." Some primary sources must be objects or systems of objects; a good historian of technology makes every effort not just to understand but also to explain how these objects and systems work. Finally, pay attention to and join forces with all social scientists, most especially Marxists, who continue to be concerned about the material conditions in which people live, and work with the technologies you are exploring.

I believe that this contextualist paradigm has been, to use another Kuhnian term, the "normal science" of our field for at least 50 years. I also believe that it is still going strong, even as we widen our geographical focus and learn to utilize all kinds of new research methodologies. I heard it (sometimes in incipient form) in numerous papers that I heard at our most recent meeting in Los Angeles and I've also read it (in full blown form) in several recent books that won the Edelstein Prize: Pam Long's *Engineering the Eternal City*, Bill Rankin's *After the Map*, Chris Jones' *Routes of Power* and Eden Medina's *Cybernetic Revolutionaries*.

After reading *Medieval Technology and Social Change*, the next book in which I encountered the contextualist paradigm, which really sealed the history of technology deal for me, was Roe Smith's *Harper's Ferry Armory and the New Technology*—which carries the perfect subtitle for the end to my tribute to Roe: *The Challenge of Change.*