

The procession of a profession

The Neutron's Children Nuclear Engineers and the Shaping of Identity

Sean F. Johnston
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Reviewed by Audra J. Wolfe

Let no one say that Sean Johnston can't commit to a metaphor. His book, *The Neutron's Children: Nuclear Engineers and the Shaping of Identity*, recounts the history of nuclear engineering in the US, Canada, and the UK as a story of marriage, birth, and childhood development. The neutron "spawned" nuclear workers who were "gestated" in the bellies of wartime industrial plants such as those at Hanford, Washington, and at Chalk River, Ontario, Canada.

Born in a culture of postwar secrecy, nuclear engineering came of age in an era of loosening security restrictions and close partnerships between industry and academia. A series of traumatic experiences—among them Three Mile Island, Chernobyl, and Fukushima—suggests that the profession perhaps suffers from "arrested development, . . . weak communication skills, and poor socialization." One metaphor deserves another: A profession is a strange fruit for a subatomic particle.

Johnston, a professor of science, technology, and society at the University of Glasgow in the UK, has written extensively on the history of professionalization, so he is well qualified to consider the emergence of nuclear engineering as a 20th-century discipline. The focus on working engineers rather than either scientists or managers distinguishes Johnston's account from the small library of books on the history of the atomic bomb and nuclear power. His attention to the experiences of British and Canadian workers instead of just the more famous Americans is another welcome change from the usual approach. Nuclear engineers in all three countries, working in very different social and political environments, strug-

gled to define their particular knowledge base and occupational authority in environments flush with cash but short on experience.

Johnston's account hews closely to sociologist Andrew Abbott's "theory of professions," developed in *The System of Professions: An Essay on the Division of Expert Labor* (University of Chicago Press, 1988). That book describes professionalization as a series of jurisdictional struggles for recognition and status. As Johnston puts it, the central question for the nascent field of nuclear engineering was whether it was "a straightforward extension of existing disciplines, or the seed of a new one." Nuclear engineers' distinct disciplinary identity depended on their interactions with the nuclear reactor, a new technology that presented unique challenges to would-be nuclear experts.

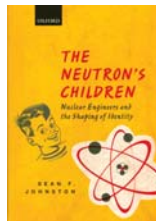
Largely in isolation from one another, atomic workers at several of the early nuclear research facilities used skills derived from chemistry, physics, materials science, and chemical and mechanical engineering to develop ways to generate, sustain, and control nuclear chain reactions. But at least at first, secrecy measures limited nuclear engineers' ability to convert that specialized knowledge into a recognized field. Not until the easing of security measures in the mid 1950s could nuclear engineers establish some of the standard markers of disciplinary identity: university departments, journals, learned societies, standard procedures for training and certification, and so on.

Reactors designed for generating electrical power posed especially daunting challenges. The continuous heat that they required to produce steam was inevitably accompanied by intense levels of radiation, which threatened workers and surrounding communities alike; much of nuclear engineers' sense of professional identity came from their attempts to balance safety with cost. They have not, of course, been uniformly successful at that task. As a student of professional identity, Johnston is more interested in how accidents like Three Mile Island have affected the public's perception of nuclear engineers than in the systems of expertise, risk management, and regu-

lation that have allowed such accidents to occur. The first generation of nuclear engineers projected an image both heroic and terrifying, but lately their successors ("the neutron's grandchildren") have been reduced to the likes of Homer Simpson.

As with most works of genealogy, *The Neutron's Children* has a hard time keeping track of the cousins even a couple of generations down the line. The same "forced marriage" of academic science and industrial engineers that produced nuclear engineering created a range of new disciplinary specialties from radiobiology to nuclear-weapons engineering; the stories of those other "divergent nuclear breeds" fades in the second half of Johnston's telling, as nuclear engineers' expertise crystallized around the reactors rather than their products.

The Neutron's Children will undoubtedly be the standard work on the professionalization of nuclear engineers for some time to come. The larger family history remains to be told.

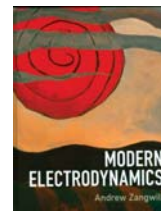


Modern Electrodynamics

Andrew Zangwill
Cambridge U. Press, 2013. \$85.00
(977 pp.). ISBN 978-0-521-89697-9

In *Modern Electrodynamics*, Andrew Zangwill and Cambridge University Press have created a hefty, readable modern textbook on classical electrodynamics aimed at advanced students of the subject. Author and publisher set an ambitious goal, given the formidable competition from existing, well-deserved classics on the subject; the result is a worthy addition to the literature.

Modern Electrodynamics is large: more than 900 pages of text, examples, and hundreds of problems, organized into 24 chapters. Given the imposing size, I was reassured to find at the top of the very first page a quotation attributed to physicist Kenneth Johnson: "A textbook, as opposed to a treatise,



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