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Scientific knowledge and where to get it

Instituting Science: The Cultural Production of Scientific Disciplines

Timothy Lenoir

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This book argues that science is a complex social process and that, to understand how knowledge becomes accepted and ‘institutionalised’, it is necessary to understand its historical and cultural context. While this message has been on the ascendent in science studies for the past few decades, the author emphasises a particular slant. Of considerable relevance to readers of *Science and Public Policy*, Timothy Lenoir demonstrates that modern science persistently has relied on the interaction of universities, industry and the state. He shows that explicit policies for acquiring scientific knowledge are not new; nor have serendipitous accidents no further role to play.

The book is organised as a series of case studies, linked by a high-level overview and survey of recent scholarship on how scientific knowledge and its associated disciplines develop. The first three sections discuss the cultural foundations of science and technology. The first chapter surveys and analyses the relationship between scientific theory and experiment. The second deals with the more explicitly and less contentiously cultural phenomenon of scientific disciplines, and how they struggle for authority. The remainder of the book – some two-thirds of its length, in fact – is devoted to the six case studies, spanning 150 years of science. They deal with the social interests behind the organic physics of 1847; the science policy contributing to the formation of Carl Ludwig’s Institute in Leipzig; German optics and vision science during the second half of the nineteenth century; profit-based German biomedical research at the turn of the century; the context of the Haber-Bosch process for ammonia synthesis in the first decades of the century, and how discovery and

development were intermeshed via “many levels of personnel, problems and machines” [p. 239] such as the industrial research laboratories of BASF and sites of theoretical knowledge production at Charlottenburg; and, winding up the book, the development of nuclear magnetic resonance spectrometry in post-second-world-war America (co-written with Christophe Lécuyer).

The chapter on the transformation of physiology institutes in the mid nineteenth century, for example, reveals how they were predicated on a reorientation of German science policy. Natural science at Du Bois-Reymond’s institute founded in 1877 was, for the first time, to be taught to rank-and-file professionals, and not merely to the intellectual elite. Moreover, the institute reorganised disciplinary boundaries by housing several specialisms under the same roof. The trend had begun with the Institute of Carl Ludwig, who “created science that Leipzig needed for its program of modernization” [p. 116] following the 1848 revolution.

The choice of topics reveals the author’s research interests and hints at a minor shortcoming of the book. While each case study is carefully researched and documented at a level of detail useful for scholars and policy analysts, they are unevenly distributed and perhaps unrepresentative of modern science, if indeed any such portrayal of ‘typical’ science is possible. Lenoir works energetically to relate these particular, mainly German, cases to his theme – which they support admirably – yet perhaps seeks to situate and differentiate his ideas too strenuously from those previous historians, philosophers and sociologists of scientific knowledge. The level of engagement swerves from lengthy and broadly based, survey-like introductory sections to the case studies proper.

On the one hand, the book attempts to address many of the important ideas in the sociology and philosophy of scientific knowledge this century; on the other, it illustrates its themes with specific examples. The result is a somewhat disjointed book which, while much more coherent than most conference proceedings, is less so than a typical monograph. Paradoxically, there is the danger of losing sight of the waltz of science, industry and academe as a seamless historical process as Lenoir analyses particular episodes, in widely separated contexts, to make general claims about knowledge creation. Because of this, some of the contextual nature of the process – that he himself wishes to emphasise – is lost.

An example is the chapter on NMR, which adds to the growing literature linking discipline-formation to instrumentation firms and their active, but largely hidden, sub-

cultures. Detailing a fascinating episode in its own right, Lenoir recounts the peculiar context as principally an academic and industrial interplay. Varian Associates, the firm mainly responsible for the development of NMR spectrometry, was founded by members of the Stanford Physics Department who had worked at Sperry Gyroscope during WWII refining the klystron tube, and sought to recreate its atmosphere back in Palo Alto, CA – as the author emphasises, “the weather mattered” for its siting. The founders were also in tune with the post-war mood of Vannevar Bush and his *Science – the Endless Frontier* which called for the transfer of technology from wartime discoveries to universities and to industry. We get a sense of the factors of importance in these local and contingent processes. The author overstates its generality, however (“... a new discipline is invariably linked with a new discipline-specific instrumentarium and training in its use and interpretation . . .” [p. 241]), and the level of explanation is in places insufficient without further background (for example, mentions of gyromagnetic ratio and spin couplings). Lenoir acknowledges that his focus is too limited. “To capture a fuller sense of how universities and industries interact, we must expand the view beyond dyadic relations to look at the networks of knowledge production in a local region” [p. 291]. Nevertheless this is an historical episode well and cogently told, and matched by the five others in the book.

Lenoir weaves the mixture of theory, practical human knowledge and instruments of measurement as the essential theme. More importantly, he relates these factors to the sociologically significant entities of institutions, public and private. With resonances of Thomas Hughes, Lenoir couches his conclusions in more formalised language and draws explicitly on the philosophy and sociology of knowledge for support. But while well worth reading both for its case studies and overarching survey, the whole is, perhaps, less than the sum of its parts.