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Essay review

Observations on observations

Lorraine Daston and Elizabeth Lunbeck (eds.) *Histories of Scientific Observations*. Chicago and London: The University of Chicago Press, 2011. Pp. 460. ISBN 978-0-226-13678-3. $27.50 (paperback).

This is a very professional book. The excellent articles range widely and are well contextualized; some contributors are experts in particular fields of science, others on particular countries and periods. Thanks to the Max Planck Institute in Berlin, they have been able to work collaboratively. The volume is skilfully edited, with useful cross references, and it is generously illustrated. The concise introduction raises some key issues, and the three general chronological essays guide us from medieval observations to the communities of observers in the seventeenth century. Fifteen skilful case studies then take us to the twentieth, via an intriguing variety of disciplines, including political economy, psychiatry and natural history.

In this essay review I will first summarize some of the findings of the chronological chapters and of the case studies as here grouped. I will then consider what the cases show about the various disciplines involved. I end by asking how one could take the discussion further.

The introduction by the editors notes that we have lacked a history of 'observation, conceptualized as an epistemic category in its own right' (p. 2), in spite of its importance for the history of science. Yes indeed, though we also lack extended histories of 'experiment' – for in both cases, most of the literature is philosophical and/or about particular cases. So this book, like Daston and Peter Galison on *Objectivity* (2007), is especially welcome as opening up long historical perspectives. It is, however, with cultural history, as much as with history and philosophy of science, that the introduction claims major connections, especially the work of Michel Foucault and Raymond Williams.

The three chronological 'framing' chapters, by Katherine Park, Gianna Pomata and Lorraine Daston, do indeed reflect Williams's concern with the changing uses of words. They reinforce each other nicely, with a clear collective story. Through the Middle Ages and the Renaissance, most of what we might call observations were called experiences or experiments and were strongly linked with crafts. Observations, so called, related to the heavens, the weather and health; they were cumulated in historical series in the hope of revealing cycles and improving predictions. This latter tradition was attributed by Pliny to the Babylonians; it was downplayed by Aristotelians and by ecclesiastics suspicious of judicial astronomy, except where it involved timekeeping and monastic 'observances'.

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From about the year 1500, astronomical observations were more likely to be serial, mathematical and produced by single authors. From the mid-1500s, revivals of empiricism and Hippocratism involved publications of medical observations. Some of these were serial, but most were cases collected into *historia*, a genre which spanned many fields and asserted the independence of the empirical from theory, and of natural histories from natural philosophy. From the later 1500s and through the 1600s, these case histories were more likely to be called observations, and over the same period new social groupings developed mechanisms, sites and disciplines for the collective production, legitimation and ordering of empirical studies. These might still be called experiences or experiments, but the latter term came to be more associated with 'manipulation' – as in Baconian 'experimental histories'. Thus, in summary, was the 'empire of observations' established by the early 1700s.

Of the case studies which follow, the three essays in the first section, on evidence and credibility, respectively concern the colour of seventeenth-century blood (Domenico Meli), parthenogenesis and parapsychology in nineteenth-century Russia (Michael Gordin), and visualizations of Brownian motion (Charlotte Biggs). In Italian iatromechanism, as in the mechanical philosophy more generally, colour seemed unimportant, but for Oxford experimentalists studying respiration in dogs it proved revealing. The Russian professor Nikolai Vagner managed to convince the world that he had indeed found insect larvae generated within an insect larva; he succeeded because his observations were repeated by major authorities, but failed in as much as the authorities branded his discovery a variant of parthenogenesis, so largely erasing his contribution. He had even less success when he used his credit as an observer to claim ocular evidence for spiritualism. For Brownian motion, too, credibility depended partly on theory; Jean Perrin used some of the methods of biological microscopists to investigate a physical phenomenon, and he was stimulated by cinematographic studies which he did not have the means to repeat, but it was the relation of his work to Einstein's theory which rendered crucial what otherwise could have been mere observations.

The section on observational 'techniques' begins with René-Antoine Ferchault de Réaumur keeping frogs around his house, with or without their taffeta trousers, to see how spawn is fertilized (Mary Terrall). Next, Harro Maas discusses what political economists counted as observations, and Jimena Canales shows what various researchers made of the patterns seen, by themselves or by others, when exposed to strobe lights. Lunbeck then considers how 'empathy' was presented by Sándor Ferenczi and then Heinz Kohut as a means of observing psychiatric patients.

The 'new things' observed include 'society' as seen by Frédéric Le Play, more in terms of mutual obligations than of economic transactions (Theodore Porter). Mary Morgan also discusses how economic society might be seen, in this case through questionnaires. And Otniel Dror shows for the study of emotion how empathy gave way to physiological distancing, which relied on measurements, such as of adrenaline, except that extremely emotional subjects could break out of this cage, more or less literally. Kelley Wilder's new object is radiation, as shown in photographs by Henri Becquerel, for whom photographic plates were reagents more than recorders.

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'Observing communities' covers the participants in botanical travels and their audiences at home (Daniela Bleichmar), and the naturalists of Britain during the Napoleonic wars, when restriction on travel and the new commercial importance of kelp helped focus attention on seaweeds (Anne Secord). Andrew Mendelsohn goes further, to discuss how observations could be collected, tabulated and in some sense 'averaged', say to characterize a year or its epidemics.

All these case studies will be read with pleasure, and many will be used for teaching because of the imaginative ways in which they connect observing with contexts. But we might also ask what, in sum, they reveal about the historiographical approach. Selecting authors and topics for such a volume is bound to be heavily contingent, yet it remains striking that the framing chapters mostly refer to medicine (including recipes), astronomy, meteorology and other branches of natural history, but in the following chapters only natural history is carried forward strongly. The modern 'core sciences' are mostly absent; the main groupings discussed are for natural history, political economy, and psychological sciences. This choice is not explained, but appears to presume that measurements and sophisticated experiments can usefully be distanced from observations, so that in pursuing the latter after 1700 we can focus on 'observational sciences' rather than on the mathematical, chemical or physical ones. Once the empire of observation was established, it seems, the remaining general questions largely concerned low-status fields such as natural history, or realms where scientificity was disputed. To my mind, this approach rather hides the changing roles which observations have played in all sciences, whether qualitative or quantitative, and in fields which are theory-driven or analytical, as well as observational.

So let's look at the subjects which are covered. The case studies which include natural history, especially that on botanical exploration, do link back to the framing chapters, but the other 'naturalist' cases focus on reproduction and the difficulties of 'catching' it. Frogs and seaweeds have muscles or fronds whenever you look, but they have sex only annually and briefly; so to study their reproduction, investigators used their own houses to domesticate their subjects, and in some case to perform experiments (the frog trousers).

Such expediencies can indeed be usefully generalized to illustrate the ranges of issues commonly involved in observations: for example, from chance observations to the searching out of specimens, to their collection or domestication. Or that objects of observation can be left alone, manoeuvred or opened up to be better observable, or stimulated to show the desired phenomena. Or that they can be manipulated to show the effects of various agents or factors, whether towards the production of 'experimental histories' or to test hypotheses. In most cases the observations may be direct or via 'scopes' and instruments of various kinds; they may be qualitative or quantitative, comparative or exemplary, reported singly or in series, or variously idealized or averaged. This complex territory might merit more systematic mapping, if only to undermine the common but far too easy contrast between observation and experiment.[1]

1 For discussion of similar issues, see the essays in John V. Pickstone (ed.), *Natural Histories, Analyses and Experimentation: Dissecting the Working Knowledges of Chemistry, Medicine and Biology since 1750*, a special issue of *History of Science* (2011) 49, part 3(164), pp. 235–376. Note especially the article by Bruno

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The psychological studies here are of general interest in reflecting on the human observer as an instrument. Brownian motion, as studied by Perrin, pushed microscopical observation to its limits, but with the comfort that errors would cancel out for phenomena that were irreducibly statistical. But human instruments could also go where no apparatus or analysis then could, for example in discriminating between organic chemicals. They might also, as in the case of empathy, in some sense reproduce the phenomenon *in* the observer, so it could be studied by introspection. In research on emotion, this method was substantially replaced by physiological reductions which allowed 'objective' measurements of, say, adrenaline. But what was its role in psychiatry, envisaged by the ex-neurologist Freud as detached observation of the subject, but by his disciple Ferenczi as a sympathetic human engagement through which the therapist may find a way to a cure? For reflective historians, these questions may connect with the concept of 're-enactment'.[2]

Societies or the economies, like psyches, were not obviously observable, and they too raised questions about the relations of new knowledge to old wisdom. Were political economy and sociology essentially historical studies of particular societies, or were they, as many proponents claimed, analogous with biology rather than with natural history? If the former, what kinds of observation were profitable: could anyone collect data by using the same categories, even across different societies, or was personal involvement required? Either way, could one then map the aggregates, to make visible what no single individual could see? And did one need such collections of data to reveal underlying structures, or could the elements of the economy be discovered by reflection on the commonplace? Was there room for a dialectic process between data collection and systematic analysis?

To my mind, this whole book raises this same question for the historiography of science. The first section could be seen as a sophisticated rendering of a theme now well accepted as a key component of 'the scientific revolution' – the 'history' of nature, and the wider empiricist projects of *historia*, so well described in previous studies by some of the leading authors in this volume. But the main part of the book, for all its rich documentation, seems essentially an album. If the first scientific revolution is silently substantiated, the second scientific revolution is practically absent; so, oddly, is *Objectivity*. But might not histories of scientific observation, like any other kind of *historia*, provoke and test analysis? We can begin to sketch the possibilities by referring to Foucault – but especially the 'French Foucault' of epistemic discontinuities rather than the later Foucault now more commonly invoked for cultural history.

In this collection, one of Foucault's key historical exemplars, the invention of comparative anatomy *c.*1800, is rendered as 'observation as a way of reasoning' (pp. 104–105) – a notion which makes no further appearance. But comparative anatomy was not the end of an observational road; it was one of the beginnings of a new kind of

J. Strasser and Sorya de Chadarevian, 'The comparative and the exemplary: revisiting the early history of molecular biology', pp. 317–337.

2 See, for example, R.G. Collingwood, *The Idea of History*, London and Oxford: Oxford University Press, 1961, pp. 282–302.

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science. It mattered to Foucault as part of a shift from eighteenth-century tableaux to nineteenth-century systems – anatomical, economic, linguistic or pathological.[3] Or, to speak more carefully, it mattered because, as contemporaries knew, observational 'natural histories' were then being supplemented and to some extent superseded by a range of new analytical sciences. Observations would then function differently because they had to be related to the new *elements* which constituted each new science, just as chemical elements constituted the new chemistry. There was now a tension between observation and what one might call theory, as there had been in quantitative astronomy since antiquity, and in mechanical sciences since the seventeenth century.

That this tension structured much of later science is clear from most of the nineteenth-century studies in this volume, not least when political economy was compared by contemporaries to geology. If some economists thought their science could be built on commonplaces, it was not because commonplaces represented the whole economy but because these would serve to illustrate and test the supposed underlying relations. I have elsewhere suggested that this same tension between surfaces and analysis was perhaps crucial to the wider nineteenth-century stress on objectivity.[4]

Contrary to empiricist claims, we only understand something when we know what it is not, and examine its functional and structural relationships. That insight was crucial to the new comparative sciences, and it might nowadays help foster a more critical historiography of STM. In which case, historical analysis of observation as an epistemic category will require a more sustained attention to its antonyms and its articulations, and, I would say, to the changing configurations of 'science' and related practices, including natural philosophy, measurement, mathematics, analysis and synthesis, as well as observations and *historia*. Have we not learned that for the historiography of science, as in comparative anatomy, geology or political economy, we cannot expect the analytical categories to simply *emerge from* observations – even *for* observations? This admirable book is rich in detailed findings, but perhaps we need a few more questions – across the piste and including the present.

JOHN V. PICKSTONE
University of Manchester

3 Michel Foucault, *The Order of Things: An Archaeology of Knowledge*, London: Tavistock Publications, 1970.

4 John V. Pickstone, 'The disunities of representation', an essay review of Lorraine Daston and Peter Galison, *Objectivity*, New York: Zone Books, 2007, in *BJHS*, (2009) 40, pp. 595–600.

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