

Astrid Schwarz: Experiments in Practice

Pickering & Chatto Publishers, London 2014, 272 pp, £60.00,
ISBN: 9781848934856

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Published online: 20 December 2014
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Notwithstanding the fact that a lot, if not most, of science is done outside the laboratory, most literature in the history and philosophy of science, when discussing the experimental method, focus only on experimentation “within the walls of a laboratory” (1). To fill this embarrassing gap, Astrid Schwarz has written an excellent book on field experimentation. The field, however, is a much more messy site than a clean lab. In an introduction to a special issue of *Osiris* on field science, Kuklick and Kohler (1996) list a number of the problems related to science in the field: As scientific rigor is defined by the standards of the laboratory, the field is considered to be “a site of compromised work: field sciences have dealt with problems that resist tidy solutions, and they have not excluded amateur participants” (1). To discuss science in the field, we will have to take account of a methodological tension between laboratory and field standards of evidence and reasoning.

We must see how practitioners deal with the difficulties of bringing some order to phenomena that, far more than those of the laboratory, are multivariate, historically produced, often fleeting, and dauntingly complex and uncontrollable. It may seem astonishing, that any robust knowledge comes of fieldwork. Yet it does, abundantly and regularly. (Kuklick and Kohler 1996, 3)

While laboratories are exclusively scientific domains, the field is public space. Its borders cannot be rigorously guarded and its population is much more heterogeneous, inhabited not only by scientists but also by other people going about other sorts of business.

Field observations are also more personal than laboratory observations. Take for example cases where the field scientist witnesses a singular event. To make such an observation objective, that is, credible and plausible, one cannot rely on the trust-inducing procedures of the laboratory, like reproducibility, and so the credibility of the observer him- or her-self has to be taken into account. But by accounting for the credibility of the

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observer, the observation will not become less personal or less subjective. To gain objectivity, institutions have to be created in order to make these personal observations accountable.

Because the field is an open space in contrast to the laboratory, the field is not only a site of compromised work with respect to keeping up to the standards of the lab, but also in relation to the risks that go along with experimentation. Because these risks cannot be kept safely away from society, behind lead or steel walls, a ‘social contract’ between science and society is needed.

To develop a philosophy of field experimentation to account for the above tensions, Schwarz rightfully goes back to Francis Bacon, who was the originator of experimental philosophy, “an innovative experimentalist inside and outside the walls of the laboratory” (10). Bacon’s notion of an experiment was broader than it is today. Doing experiments is “giving form to experience”: “The experiment is the heuristic tool of an active scientist; it is a planned action in which instances of experience are brought forward, transformed into written experience and finally put on record in theories or entries of higher abstraction such as laws” (24).

While for Bacon these “forms” were merely aphorisms, William Whewell provided a fuller account of “giving form to experience”. Forms connect, mould and interpret sensual impressions according to abstract relations such as space and time, number, or cause (28). “These kinds of connections can also be contemplated independently of those things to which they are applied, that is, they can be conceptualized in isolation from one particular instance of a perceived thing” (28). Today these forms are called “models”, and Morgan and Morrison’s (1999) account of models as mediators, that is, models as instruments of investigation that are partially independent of both theory and data, appears to be very similar to Whewell’s account of the “conceptions of the mind”.

Whewell’s advocated approach of conception by “colligation”, that is, bringing all possible facts in one scheme, is general enough to account also for another type of experimentation beside laboratory experimentation, namely, one that can be thought of as a “field experimentation”: “The notion of the field experiment relies instead on a number of minimal conditions that must be met for an experimental intervention to occur. These are based on agreement among the broader scientific community or within a specific group of scientists and concern the following three questions: what kind of data are to be collected (variable over time and space), how can these measurements be accomplished (destruction by intervention, training of different observers, etc.), and what boundaries are relevant and how should they be conceptualized (what is part of the system and what is not)?” (64).

Whewell’s philosophy provides Schwarz a sufficient foundation for her study of the “field ideal” in opposition to the “lab ideal”. The most important features that distinguishes the field ideal from the lab ideal beside an uncontrolled environment are “individuality”, “uniqueness”, “contingency”, “instability” and “spatial openness”. Another distinction is “the individualizing, value-laden understanding of field objects from that of lab objects as instances of generalizable knowledge” (79).

It is of interest to note that beside the more familiar characteristics of the lab ideal, namely isolation and intervention, Schwarz presents “completeness” as the most challenging (84). A laboratory experiment is designed in such a way that it enables, by systematic variation of any causal factor that is regarded as being relevant, the knowledge whether it is really relevant. Outside the laboratory sorting out the relevant ones, is very difficult. The ones that will be sorted out are the ones that have shown themselves. But this does not mean that causal factors that are dormant for the period of investigation are less relevant.

Irrespective of these distinctions between the field ideal and the lab ideal, Schwarz emphasizes that field observation is far from a passive activity, for it involves “selecting, monitoring and comparing places, reading and inscribing traces, collecting, tagging, and perhaps preserving specimen”, in other words, it involves “an experimental type of observation”, “the difference between observation undertaken in laboratory and in field experiments is a difference in degree of intervention but not a difference in kind” (95–96).

Although the lab ideal is often presented as the official position, Schwarz observes that the actual practice of experimentation has shifted towards the field ideal of experimentation. But this is not only a simple observation, it is the “key argument” of her study of five cases of experimentation: she considers this shift as a “*liberation* of the experiment from the laboratory outwards into the field and further out into society” (emphasis added by the author). These five cases can be considered as representing five different stages of this liberation:

1. Lab situation set up to simulate the field by using an extracted segment of the real world;
2. A simulation of a lab situation in the field;
3. An experiment conducted by nature;
4. An experiment conducted by nature on a built object in the field;
5. Scientific research as an agent of experimental change in society.

These stages of liberation show, however, that Schwarz is actually only discussing field experiments in natural sciences. In social science, going outward into the field means immediately going outward in society, there is no neutral zone between laboratory and society. See for example Harrison and List’s (2004, 1013–1014) taxonomy for experiments in economics, which is based on different factors that determine the field context of an experiment:

- A *conventional lab experiment* is one that employs a standard subject pool of students, an abstract framing, and an imposed set of rules;
- An *artefactual field experiment* is the same as a conventional lab experiment but with a nonstandard subject pool;
- A *framed field experiment* is the same as an artefactual field experiment but with field context in either the commodity, task, or information set that the subjects can use;
- A *natural field experiment* is the same as a framed field experiment but where the environment is one where the subjects naturally undertake these tasks and where the subjects do not know that they are in an experiment.

Going outward, that is, experimentation outside the walls of the laboratory, can be highly risky for society. Bacon, being aware of the risky aspects of science, therefore suggested that science and society should come to an agreement about how far science could go, a “contract” between science and society. As long as experimentation does not go further than the walls of a laboratory, it cannot cause harm to society. But if experimentation is performed outside these walls, a new Baconian contract has to be considered.

Such a Baconian contract, that describes how far one can go, must be an agreement in terms of borders and boundaries. In 1972 at the first UN conference on the human environment, the suggestion was to use the term “boundary” to denote the normative bounds of action and “border” to describe the physical limits. But this suggestion did not catch on and in subsequent years the terms “border” and “boundary” and their normative and descriptive elements have become conflated (125). But not only both terms became

conflated, if one visualize these borders and boundaries as lines, these lines themselves became blurred. It may be better not to see them as lines anymore but as “zones”, such as “trading zones” (Gallison’s term) or as “matching zones” (den Butter and ten Wolde 2014). Both kinds of zones are defined in economic terms, which is not surprising in a time where most social contracts are actually economic contracts.

As one can hopefully see from my attempt to describe the main arguments of the book, Schwarz provides a very rich account of field experimentation. But actually, it is too rich; its carefully built-up but densely written argumentation suffers from this richness, the reader gets easily lost. I would recommend each new reader to start with the last concluding chapter which will prove to be a useful guide. I only found the title of the book somewhat misleading. In the concluding chapter Schwarz explains what “in practice” refers to: (1) the (moral and political) implications of experiments, (2) praxis, that is, how experiments are put into practice, and (3) the role of experiments in the philosophy of science. I, however, expected something else: “in practice” is “in the making”, that is the daily practice of experimentation and everything that such practice entails. Philosophical analysis of experiments in practice implies case-study research, and hence, I had expected to see more case studies of experimental practices. Actually only one, though fascinating, can be found: the hydropower plant Rheinfelden and its bypass channel. But it may be better to see this book as an encouragement to philosophers of science to study more intensively practices of field experimentation because, as Schwarz has shown, these are rich sources for understanding modern science and its role in society.

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