The foundations of experimental/empirical research methods

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CHAPTER 23: THE FOUNDATIONS OF EXPERIMENTAL/EMPIRICAL RESEARCH METHODS

Dean Garratt

Education and Social Research Institute, Manchester Metropolitan University, UK

Yaojun Li

Department of Sociology, Birmingham University, UK

KEY CONCEPTS

(Dean Garratt)

The foundations of experimental(empirical research methods have a long and chequered past that can be traced to what is often, if somewhat indeterminately, referred to as the period of ‘Enlightenment’. The mystique surrounding the ‘Enlightenment Project’ stems from its nebulous character, which is coloured by complexities of time, place and philosophical tradition. Conceptually, it is difficult to establish as a unitary social, political and/or philosophical movement, and any such attempt would amount to betraying its distinctively rich and diverse philosophical heritage. Over many years, writings have been produced for what have been termed as the ‘French Enlightenment’ (see Jimack, 1996), the ‘Scottish Enlightenment’ (see Stewart, 1996,) and German ‘Aufklärung’ (see Kuehn, 1996). In real terms, none of these were completely isolated from, nor fully integrated with, their respective intellectual contemporaries. Rather, each movement had its own distinctive voice, and thus made its own individual contribution to the Project. Yet, significantly, when taken together all can be seen to share important common ground, where the Enlightenment was perceived to stand for the ‘rejection of traditional authority, especially that of the Church, … [the] bold and constructive attempt to understand and explain man and the universe, and in particular to define man’s place and role in
society, both as it was and as it should be’ (Jimack, 1996: 228). Put simply, the Enlightenment may be conceived as the critical reaction towards, and purposeful examination of, previously accepted ideas from the point of view of reason.

The foremost exponent of ‘reason’, or ‘rationalist thinking’, was Descartes. Philosophically speaking, he paved the way for successive accounts of human knowledge (1637--1649) that were both broad ranging and incredibly complex (see, for example, Cottingham, 1998 for a lucid account of his work). Through the elaboration of a single ‘method’ (Sorrel, 1987), Descartes made a significant contribution to scientific thinking as we know it today. Interestingly, while on the one hand Descartes was often thought of as a rationalist, in seeing knowledge as deriving from the intellect, on the other he was sometimes perceived as a keen experimenter, holding firm to the belief that experiment and observation were important preconditions in the quest for knowledge. As such, critics have argued as to whether his work contains considerable tensions (even contradictions) or interesting complementarities.

In contrast with Descartes, Locke (whose writings were published around 1690--1695) emerged from a different tradition of intellectuals -- known collectively as ‘empiricists’. Formed in Britain, empiricists believed that the source of all knowledge was not human reason but experience. However, while this movement was seen as separate and distinct from that of the ‘rationalists’, Locke’s notion of ideas as ‘whatsoever is the object of the understanding when a man thinks’ (Locke cited in Woolhouse, 1988: 80) and his conception of them as mind-dependent things might be easily viewed as Cartesian (i.e. deriving from Descartes). Moreover, like Descartes, Locke also believed that real knowledge must be certain and that mathematics, in its
ability to provide essential proof and certainty, was the model of knowledge to which all other forms should sensibly aspire (Zaw, 1976). For Locke, then, all knowledge is based on ideas that are derived from experience or combinations of experiences, so that knowledge of social affairs is inextricably bound with our knowledge of physical phenomena. Finally, under the influence of Descartes, Locke also believed strongly in the idea that there is a duality of mind and matter, where the latter stands as a separate reality regardless of whether it is apprehended by the mind (Smith, 1989). This idea is at the heart of modern science where the outside world, viewed as separate from the senses, is to be discovered through systematic research and experimentation.

More than a century after Locke emerged the French social philosopher Auguste Comte (1798--1857). While it is debatable whether Comte was influenced directly by Locke, it is obvious that his elaboration of a positivist philosophy, as a basis for the practice of modern science, may be viewed as part of an overall empiricist tradition. As Smith suggests ‘positivism provided a powerful statement for the unity of all the sciences and thus for the acceptability and necessity of employing the methods of the natural sciences in the study of social affairs’ (1989: 40). The development of this conceptual framework, sketched by Comte, was influenced as much by the political mood of the moment as his undeniably distinctive philosophical thesis. Influenced by a group of French thinkers known as Encyclopedists (who predated Comte by some 50--75 years), noted for their hostility towards religion, disapproval of authority and rejection of the illusions of metaphysics in philosophy, Comte exalted the virtue of liberty, equality, and an empiricist epistemology; the latter being undoubtedly influenced by the impact of the French revolution. Comte saw the development of modern science as a panacea to a broad range of political and philosophical problems. Politically speaking, it would provide the basis for addressing what was often
perceived as the ‘disintegration’ of society by establishing order, stability and social unity in response to an excessive and pernicious individualism. Philosophically speaking, it would provide the method for securing knowledge about society. By treating the social world in the same way as physical objects were treated by natural scientists, Comte believed that social researchers would develop their own practical mastery of knowledge, and thereby emulate the progress and success of the natural sciences. In meeting these requirements, it might then be possible for the social world to develop its own ‘laws’ of behaviour and in turn, from a utilitarian perspective, secure the preconditions for effective social engineering. This meant that in contrast with Descartes (who believed in the possibility of innate ideas and first principles), all positive knowledge, as certain and indubitable, should be grounded in observations and guided by the boundaries of our sensory experiences.

The legacy of Comtean positivism to the process of social inquiry has revealed a series of interrelated assumptions and methodological commitments. These are, namely, that theory is to be universal rather than specific or context bound and principally concerned with the generation of scientific laws. Such laws are affirmed on predictions derived from the study of social phenomena, whose interrelated variables may be examined independently so as to provide plausible theories and conditionally predictable outcomes. A methodological commitment to researcher neutrality and the disinterested observation of events is included, as a regulative measure, to ensure that facts are free of values, opinions and personal interests. Together, these create a site for the production of disinterested knowledge and concomitant reliance upon mathematics in the process of theory construction (Sparkes, 1992; Popkewitz, 1984).
These points encapsulate the spirit of positivism and demonstrate clearly how the work of Descartes, Locke and the architects of the French Enlightenment had profound influence on Comte. Furthermore, they show how the study of social life deliberately employed the methodology of the natural sciences: a commitment to the discovery of social laws; the development of a methodology based on the observation of experiences and experiments; the separation of facts from values and similarly, the cognising subject from the object of cognition; the reliance upon mathematics in the process of developing tested and proven knowledge (Smith, 1989).

In the years that followed came a forceful critical reaction to the assumptions that informed Comte’s philosophy and, by association, against the entire edifice of empirical/experimental research. The legacy of positivism to contemporary social inquiry engendered an adherence to the strict separation of facts and values and compliance with the commitment to a disinterested science. During the early twentieth century this commitment was rehearsed and reshaped by a group of thinkers known as ‘logical positivists’. For them, as with Comtean positivists, the project of science was predicated on empirical purity and logical reasoning. In keeping with the empiricist tradition of Locke, logical positivists believed that all genuine knowledge (the product of scientific inquiry) could only be based on what is available to our senses i.e. all that we observe. Opinions, values and metaphysical introspection were to be held separate from the process of the disinterested observation of events. Moreover, from within the Cartesian tradition, the concept of logical reasoning was employed as part of the language of an inductive science or the generation of ideas based on theoretical propositions or hypotheses. In this process observation would ultimately determine the falsity or truth of such propositions. All statements about the world commanded empirical verification (free of value judgements) in order for the
‘facts’ to be produced. This meant that all propositions must be proven beyond doubt before knowledge could be certified genuine.

By the mid-1950s philosophers began to acknowledge the frailty of this argument in recognizing that no proposition could be totally or completely verified through observation, and certainly not in the absence of an external referent that might adjudicate between truth claims. Recognizing the problems associated with induction and its methodological commitment to the verificationist model, Popper (1990; 1991; 1992) elaborated his own unique thesis. In contrast with his predecessors he suggested that while statements about the world can never be completely verified, they might nevertheless be tested and confirmed through scientific inquiry. For Popper, refutation rather than justification would become the regulatory ideal of modern science. Falsification is thus privileged over verification on the premise that however much favourable evidence there might be to support a proposition, there can never be enough to completely verify any conclusion. More than this he suggested that the utilization of probabilities is equally problematic, since such appeals might be construed as being as much an inductive step as the verificationist model itself. In contrast, useful theories are selected on the basis of the degree of corroboration achieved by the theory. This means that only those with high explanatory power that have survived the most severe tests (those which have genuinely sought to refute rather than verify content), given current levels of knowledge and experience, can be temporarily confirmed.

Confirmation is thus predicated on high corroboration rather than high logical probability, and plausible theories are taken to be those that can withstand a harsh test. Such theories explain things about the world in ways that are persuasive and
credible, and which are supported by high levels of empirical evidence. This adds a qualitative dimension to the process of scientific reasoning, for it goes beyond the simple requirement of assigning credibility to a process of repeated testing. Indeed, repeated tests applied to a theory will not increase its respective content or degree of corroboration, simply because they lead to an increase in probability, which in Popper’s terms is inductive rather than falsificationist. When comparing theories that seek to explain things about the same phenomena, Popper argues that each should be considered in terms of its verisimilitude (truth value) or relative degree of corroboration, neither of which are said to contain inductive nuances. In practice this means that in selecting particular theories we should seek those that contain greater empirical content (evidence to support the theory when tested) and which seem to offer greater precision and universality based on both retrospective and contemporary critical discussion.

This perspective, however, is itself wrought with deep philosophical tensions that ostensibly contain traces of inductive logic. For example, it is questionable whether Popper’s notion of well-corroborated theories (those that have survived severe testing), representing an increase in truth-value, is completely immune to an inductive leap of faith. After all judgments concerning the nature of credible theories involve educated guesswork and speculation about the world, which in turn involve generating ideas that draw upon values and opinions that have predictive overtones. While arguments will undoubtedly continue, it is beyond the scope of this chapter to elaborate and extend the debate -- (for a detailed critical discussion of these issues see O’Hear (1980)).
Implications for research design

(Yaojun Li)

The discussion above carries important implications for empirical social research. As there has been much discussion on qualitative research in other chapters of this volume, we shall focus on the implications for quantitative research.

The first task in a quantitative study is to identify and define research questions that are theoretically aware and empirically testable. To be theoretically aware means that the researcher needs to be familiar with existing research in the area. For instance, ethnic penalty in occupational attainment may be our research question. There is a large body of research findings in the area and we need to know where and how to contribute, i.e., what research hypotheses to formulate and how to formulate them in a way that is amenable to empirical investigations. To do this, we need to ask: What is being debated on ethnic penalties? What evidence is there? What are the shortcomings in existing research and how can we improve on them?

The research question should be specific and measurable, capable of rigorous statistical analysis. For instance, what do we mean by ‘occupational attainment’? Do we mean earning powers or access to different class positions? And how do we know whether or not there exists an ethnic penalty with regard to occupational attainment? There is, of course, no definitive answer to the question, but rigorous analysis can give us solid evidence. As soon as we begin to think in these terms, we see that research questions must be capable of being measured as ‘variables’ in the data sets.

This brings us to the question of availability and suitability of data. What data can we use for the research? Is it feasible to collect our own data, or, are there existing data
sets with sufficient sample sizes and representativeness that can serve our research purposes? Take the example of ‘ethnic penalty’ again. Social surveys usually do not contain sufficient sizes on minority ethnic groups. However, Samples of Anonymized Records (SARs) from the 1991 and the 2001 UK Censuses each contain over a million records, with 5% and 8% respectively belonging to the minority ethnic groups. The data also contain a lot of socio-economic information which can meet many of our research needs (see Li, 2004). Indeed, social researchers concerned with patterns and/or trends of important social issues find it increasingly necessary to use large-scale national representative data as they simply cannot afford to collect their own data. Fortunately, there are many data sets collected by government agencies and the academic community over the past decades which are free for academic users.¹

Once we have well-formulated research questions and appropriate data sets, we need to know how to use the data to answer our research questions. Data analysis is both a science and an art. Training in social statistics and in the use of computer packages such as SPSS or Stata is needed, as is practice. Depending on the research question at hand, we may need descriptive statistics and/or advanced statistical modeling of various forms.

**STORIES FROM THE FIELD**

I now turn to my story from the field, which seeks to locate itself within a broadly Popperian framework. It provides an empirical test of competing sociological theories. We show how to use large-scale national representative surveys to test theories. The analysis also aims to show how Popper’s idea of falsification is behind much of quantitative sociological research.
Two highly influential theories have been in debate over the class position of professionals and managers in contemporary Britain. They are ‘the employment relationship theory’ (Goldthorpe, 1982; Goldthorpe, 1987; Erikson and Goldthorpe, 1992) and ‘the assets theory’ (Savage et al., 1992; see also Wright, 1997). The first theory holds that the two groups belong to the same social class while the second theory holds that they belong to two different classes.

The employment relationship theory argues that both professionals and managers are members of the ‘service class’, because of the common employment relationship they have with their employing organizations. They are ‘service’ experts who provide specialist knowledge to, or exercise delegated authority on behalf of, their employers. Both kinds of services are prerequisite for the smooth and efficient running of modern organizations. In return for the services, they are compensated with secure employment, attractive remuneration and distinctive prospects of career advancement. Once access to the class is obtained, both groups will have a high degree of career continuity and a very low degree of subsequent long-range downward mobility. Furthermore, professionals will, as a defining characteristic of the service-class career, tend to move into senior management as their careers progress, which will facilitate the professionalization of management and reduce the cultural gap between the two groups. Finally, the distinctive socio-cultural-economic advantages enjoyed by the service class will be shared by their family members and passed onto their children for the intergenerational preservation of class advantages. Overall, the theory holds that the service employment relationship will lead professionals and managers to form a distinctive and increasingly consolidated service class.
The employment relationship theory acknowledges differences within the service class just as within other broadly-defined classes. Differences within the service class lie both between the higher and the lower grades or ‘echelons’ of the class (called Classes ‘I’ and ‘II’), and between the professional and the managerial ‘situses’. The echelon relations represent a social, and the situs relations represent a technical, division of labour. Both echelon and situs effects will manifest themselves in certain aspects of their work and non-work lives, but the differences are of an *intra*-class kind unrelated to their common employment relationship. In other words, the differences among the service-class groupings will be fairly small and comparable to those observed within the other main classes and, as such, will not constitute major divisions of an *inter*-class kind.

Challenging this is the ‘assets theory’, which seeks to develop a new theoretical perspective to the understanding of middle-class formation and action. The theory argues that underlying professional and managerial careers are two fundamentally different assets: cultural assets possessed by professionals and organizational assets possessed by managers. Cultural assets are objectified in credentials, embodied in the habitus (Bourdieu, 1984), and transferable from one context to another whereas organizational assets are context-specific and non-transferable. As a result, professionals will form a stable and cohesive social collectivity but managers will be marginalized with large numbers subject to long-range downward mobility in their career trajectories. In other words, the professional and managerial relations are *inter-* rather than *intra*- class. The theory further predicts ‘a deepening of the split between professionals and management’ (Savage et al., 1992: 217).
The exponents of the theories have conducted empirical research to support their arguments. However, owing to the different theoretical and methodological frameworks they use, the results they report are rarely comparable. The very fact of the theories being in two analytical paradigms (Kuhn, 1970) also makes their adjudication difficult. In order to test their claims, we must use systematic and rigorous analysis based on most appropriate data and methods. Given that the theories have wide-ranging predictions over the patterns and the trends of professional and managerial class formation, it would be inappropriate to resort to in-depth interviews or focus groups to test their validity, as these techniques are not designed for such purposes. In other words, we must use large-scale national representative surveys, standardized class categories and appropriate statistical methods to discern patterns and trends on the basis of which to make judgments over their respective validity. It is also the case that the theories make claims over many areas of professional and managerial lives. It is not feasible to test all such areas within the space of this chapter but we can still give some illustrations where such a study can be illuminating (see Li, 1997 and 2002 for further discussion). In the remainder of this section, I shall use the General Household Survey (GHS) in the UK for twenty consecutive years (1973-1992) to analyse the patterns and trends of mate selection between professionals and managers, and the distributions of degree-holders in the different groupings of the ‘service-class’ positions, as a means of establishing the class character of the two groups.

The rationale for choosing these two aspects is their direct relevance to the debate between the theories. As Max Weber points out ‘The primary practical manifestations of status with respect to social stratification are conubium [and] commensality’ (1994: 125). By conubium is meant ‘who marries whom’ and by commensality is meant
‘who eats with whom’. If professionals tend to marry professionals rather than managers, they should be regarded as belonging to two status/class groups; otherwise, we can reasonably regard the evidence of ‘status homogamy’ or ‘class endogamy’ between the two groups as grounds for classifying them into the same social positions. In the same vein, if people with the highest levels of cultural capital tend to find themselves in professional rather than managerial positions, we may say that the two groups should, at least from the assets theoretical perspective, be viewed as constituting two social classes.

I shall first explore patterns and trends of conjugal partnership of men and women in Great Britain in the twenty consecutive years from 1973 to 1992 drawing data from the GHS as previously noted. The GHS is a unique source with reliable and representative data on, among other things, marriage patterns and trends in the two decades. The total sample size is 130,573 couples. Our analysis is confined to respondents living in family units of their current marriage. It is noted here that what is revealed in each year is the current class distribution between married partners, not an analysis of the class position of the respondent at the time of marriage. But, on the other hand, it can be argued that the patterns and the trends of professional-managerial marriages over the twenty years constitute the very evidence that serves as the best barometer of the professional-managerial relations crucial for testing the predictions of the competing theories.
The data in Figure 23.1 show that some of the expectations of the assets theory are supported: both male and female professionals had a much higher likelihood than managers of having professional spouses. Around 30 to 34 percent of professional men had professional wives throughout the period (Panel a), but the figure for managerial men was less than 20 percent (Panel b); around 30 percent of professional women had husbands working in professional positions throughout the period (Panel c), but the figure for managers was only between 10 to 15 percent (Panel d). Yet against this we find evidence of increasing managerial ‘attraction’ to professional women (Panel c), and the managerial men were throughout the period at least as likely to have professional as managerial wives (Panel b). Only in Panel (d) for women managers was the expectation of the assets theory fully supported.

If we view the evidence from the perspective of the employment relationship theory, the proposition of the professional-managerial integration in family formation holds good. In three of the four panels in the figure, we find not only a large number of professionals and managers married to each other, but also a clear convergence of such intermarriages. Professional men were increasingly more likely to marry managerial women (from less than 4 per cent in 1973 to nearly 15 per cent in 1992, Panel a); managerial men showed no less propensity to marry professional than managerial women (Panel b); and professional women were increasingly found to be married to managerial men (Panel c). Thus, for both men and women, professionals exhibited a constant likelihood of having professional spouses and an increasing likelihood of having managerial spouses while managerial men were as likely to have professional, as they were to have managerial, spouses throughout the period. Overall, the patterning of convergence in three of the four panels suggests more support for the service employment theory than for the assets theory.
Having explored patterns and trends of conjugal partnership, we shall now assess the relative ‘attractiveness’ of the service-class groupings by looking at the occupational orientations of degree holders in these positions. As noted earlier, the employment theory recognizes the echelon and situs differences as representing the social versus the technical division of labour within the class. The assets theory argues, on the other hand, that professionals are the carriers of cultural capital but managers have no cultural capital. As cultural capital is usually measured in terms of educational qualifications, we shall examine where those with the highest levels of cultural capital, namely, with at least a first degree, tend to find themselves. If the assets theory holds true, people with cultural capital will find themselves in professional rather than managerial positions. For the employment relationship theory, its expectation of the professional progression into management will mean increased cultural assets of managers. We again base our analysis on data from the GHS (1973--1992).
The data in Figure 23.2 show the patterns and trends of the distribution of degree holders in British society from 1973 to 1992. The first thing to note is the fairly flat line at the top marked by professional and managerial, or service-class, positions. Around 90 per cent of people with degrees were found in service-class positions throughout the period. The lower lines show the flows of degree-holders to situs
(professional-managerial) and echelon (Classes I and II) positions. Here we see a most interesting phenomenon. Whereas the distances between distributions to the echelons (higher and lower grades within the service class) remained fairly constant, those between the situses (professional and managerial positions) were narrowing all the time, with the result that the much greater situs over echelon difference in 1973 became a much greater echelon over situs difference two decades later. In 1973, two thirds of degree holders were working in professional jobs and only one fifth were found in managerial positions, with a gap of 45.7 percentage points (the gap between Classes I and II was 32.7 points in 1973). Yet as the time went by, the distribution of degree holders to professional positions went down at an average rate of 0.86 per cent, and that to managerial positions went up at a rate of 0.89 per cent, at a convergence rate of 1.75. The patterns and trends give direct and unequivocal evidence to the claims by the employment relationship theory and were completely unexpected by the assets theory.

ANNOTATED BIBLIOGRAPHY


This book is a classic on social mobility and social stratification. The theoretical and methodological developments in the book have influenced mobility studies in Britain and many other countries.


This text provides a lucid commentary on the work of Popper and his falsifiability thesis. It raises critical issues in relation to the tensions that exist between induction and verification.

This is Popper’s seminal thesis on the scientific principle of falsifiability. This idea was responsible for reshaping the aspirations of modern science.


This book offers a direct challenge to the fundamental principle of class formation and class action as contained in Goldthorpe (1987). It proposes a new, assets-based theory and argues for treating professionals and managers as two social classes.


This book provides an insightful commentary on the foundations of empiricism, mapping the evolution of scientific method and subsequent critical reaction.


This book is a comprehensive account of class relations from a Marxist perspective. Its discussion on professional and managerial positions is, however, closely related to Goldthorpe’s treatment of the service class.

This text elaborates the origins of modern, western philosophy, paying particular attention to the vital distinctions between rationalist thinkers (Descartes, Plato) and empiricists (Locke, Berkeley and Hume).

**Notes**

1. The following websites will prove very useful: [http://www.data-archive.ac.uk/](http://www.data-archive.ac.uk/) for ordering data, [http://qb.soc.surrey.ac.uk/](http://qb.soc.surrey.ac.uk/) for question banks and other support, [http://www.ecsr.ac.uk/](http://www.ecsr.ac.uk/) for getting SARs data and related help, and [http://www.esds.ac.uk/](http://www.esds.ac.uk/) for various services concerning the use of large-scale government data sets. For access to international macro and micro data sets, please see [http://www.esds.ac.uk/international/access/](http://www.esds.ac.uk/international/access/).

**References not contained in the Annotated Bibliography above**


