

EDITED BY
GEOFF PAYNE AND MALCOLM WILLIAMS

Teaching Quantitative Methods

getting the basics RIGHT



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Teaching Quantitative Methods

‘There is much talk and often hype nowadays about the crisis in quantitative research methods in British social science. It is time for a clear-thinking discussion of the underlying issues and how best to address them through teaching in this area. Payne and Williams’s book represents a highly significant contribution to such a debate and should be essential reading for all of us who have taught quantitative research methods.’

**Alan Bryman, Professor of Organisational and Social Research,
University of Leicester**

‘This is a balanced plea for improving the way we teach social science methods and makes a compelling case for addressing the crisis in quantitative skills and reasoning in contemporary social science education. But this collection does more than make the case. It also provides evidence based approaches to improving the way we teach quantitative social science. This collection is timely and will equip those charged with the task of teaching quantitative methods to deliver.’

**David de Vaus, Executive Dean, Faculty of Social & Behavioural
Sciences, The University of Queensland**

ABOUT THE AUTHORS

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Mark Brown has a background in demography, and over ten years of experience at Manchester University in teaching quantitative methods to undergraduate and postgraduate students in the Social Sciences. His key interests lie in trying to make quantitative approaches more accessible and interesting to students with non-quantitative backgrounds, and he is a strong advocate of teaching with 'real' survey data. To this end he is a regular user of UK Government Survey Data that are made available via the Economic and Social Data Service (ESDS).

Martin Bulmer is a sociologist who took up his first academic appointment in the Department of Social Theory and Institutions at the University of Durham in 1968, and retired in October 2008 from the Department of Sociology at the University of Surrey, where he is now Emeritus Professor of Sociology. For one year during the 1970s he was a statistician in the Office of Population Censuses and Surveys, London, now part of the Office for National Statistics. From 2000 to 2008 he was Director of the ESRC Question Bank, and from 2002 to 2008 he directed the ESRC Survey Link Scheme. Both are now part of the ESRC Survey Resources Network. He edits the journal *Ethnic and Racial Studies*. His most recent publications are *Secondary Analysis of Survey Data* (edited with P. Sturgis and N. Allum, 2009) and *Social Measurement Through Social Surveys: An Applied Approach* (edited with J. Gibbs and L. Hyman, 2010).

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Jackie Carter did a degree in Mathematics with its Applications after which she taught maths to 11–19 year olds. She subsequently obtained a Master's in Computing and PhD (in Geostatistical Methods for Radiation Monitoring data) and has worked with social science data for over fifteen years, primarily aggregate census data and international time series macro-data, with a focus on providing national data services to the academic community from Mimas based at the University of Manchester. Jackie has also worked on delivering national learning and teaching online services, managing an award winning vocational service and co-directing the national learning and teaching repository service, Jorum. She attempts to interweave these two main areas by focusing on how using data can assist in building statistical capacities at the undergraduate and taught post-graduate level.

Matthew David is a lecturer at Brunel University, where he teaches sociology of culture and research methods. He is author (with Carole Sutton) of *Social Research: The Basics* (Sage, 2004) and its expanded second edition – *Social Research: An Introduction* (Sage, 2011). He also edited *Case Study Research* (Sage, 2007) and *Methods of Interpretive Research* (Sage, 2010). His substantive interests are in science, technology and popular culture. He is author of *Knowledge Lost in Information* (with David Zeitlyn and Jane Bex: Office of Humanities Press, 1999), *Science in Society* (Palgrave, 2005) and *Peer to Peer and the Music Industry: The Criminalization of Sharing* (Sage, 2010), along with numerous articles and chapters on power, knowledge and inequality in the digital age.

Jane Falkingham is Professor of Demography and International Social Policy and is currently Director of the ESRC Centre for Population Change and Head of the School of Social Sciences at the University of Southampton. She has taught research methods to undergraduates and post-graduates at Southampton and previously at the LSE. She remains passionate about students acquiring the knowledge base necessary for both understanding and producing the evidence base for informed policy making.

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Review of Best Practice in the Provision of Undergraduate Teaching in Quantitative Methods in the Social Sciences for the ESRC. His teaching interests include American government, contemporary America, mass media, research methods, and service learning.

Geoff Payne teaches social research methods at Newcastle University. He is a former BSA President who, as an advocate of methodological pluralism, has made a number of contributions to the debate about research methods in British sociology. The second edition of his *Key Concepts in Social Research* is due shortly from Sage.

Angela Scott's academic background is in English Literature, in which she holds a Master's degree. Angela's extensive experience as project coordinator within the education sector led to her involvement with the METAL project (Mathematics for Economics: Enhancing Teaching and Learning), and to her overseeing the final two years of its development. Angela's contribution ensured that the resource bank was simple to use and visually stimulating, and also reflected the needs of potential users. Angela is now working on a business sustainability project at Nottingham Trent University.

Rebecca Taylor is the Associate Dean of the Nottingham Business School. She has a PhD in Economics and is engaged in research on international trade as well as developments in economics education. Rebecca is an Associate Director of the Economics Network and has directed a number of HEFCE funded teaching and learning projects, including Mathematics for Economics: Enhancing Teaching and Learning (METAL), Teaching Resources for Undergraduate Economics (TRUE), and Depository of Statistics Resources in Social Sciences (De-STRESS).

Jo Wathan supports the secondary use of government microdata as a member of the Samples of Anonymised Records team (funded under ESRC's Census Programme) and the Government specialist function of the Economic and Social Data Service. She completed a PhD using the Labour Force Survey at the Cathie Marsh Centre for Census and Survey Research in 2000 and has since spent most of her time working at the centre on data and teaching projects. She teaches statistics software and secondary analysis practice at Manchester and provides training on using secondary data in research and teaching under the auspices of the data support services.

Malcolm Williams is Professor and Director of the School of Social Sciences at Cardiff University, which he joined in 2010. Prior to this he was Professor of Social Research Methodology at the University of Plymouth. He is the author/editor of several books on method and methodology, including *Science and Social Science* (Routledge, 2000), *Making Sense of Social Research* (Sage, 2003) and *Philosophical Foundations of Social Research* (Sage, four volume collection, 2006). He is the author of many scientific papers

in areas such as probability theory, objectivity, representation and empirical work in household transitions, the measurement of homelessness and social research pedagogy. He is joint editor of *Methodological Innovations Online*.

Lee Williamson gained her PhD in statistics and demography from the Cathie Marsh Centre for Census and Survey Research (CCSR) (University of Manchester) where she has also worked on various projects. These included providing user support for large-scale government surveys as part of the Economical and Social Data Service (ESDS) and contributing to the development of the Secondary Analysis for Social Sciences (SASS) pilot project for undergraduate students within the University of Manchester. Lee is currently a researcher at the University of St Andrews working on various longitudinal research projects as part of the Longitudinal Studies Centre, Scotland (LSCS).

PREFACE

In *Teaching Quantitative Methods*, we set out to do three things. First, we explore the nature of 'the crisis of numeracy' in contemporary social science, and in particular how this relates to the way the social sciences are taught. Our second step is to present some well-researched, experimental approaches to tackling this issue in the teaching of undergraduates. Finally we reflect on what further changes in practice and what kinds of resources can be made available, not only for those who are currently teaching social research methods but also for anybody concerned with improving the shape and content of the university curriculum.

In other words, this is a book for anyone interested in how empirical social science is carried out and carried forward, not just the specialist lecturer in social research methods. It is a book about how quantitative methods can be better and more extensively taught, but it is not a narrow-minded or narrowly focused attack on other methods of research. It is about the basic skills we should expect from our graduates, not esoteric specialist knowledge.

Academics are notoriously good at defining problems but less good at coming up with answers. Indeed, two things that swiftly emerge here are that we are not dealing with a single problem, and there is no quick fix. As editors and as contributors to this collection, we neither offer a set of prescriptive recipes for classroom practice, nor claim to have found a complete solution to the problem of numeracy in the social sciences. But we do not want to exaggerate the challenge we face, or to spread despondency. Change is already taking place (even since starting on this collection), and there is scope for further innovation. The projects reported in the core of this collection are offered as suggestions and sources of ideas, as works in progress, and we hope as encouragement for further innovation.

Prior to the development of what has recently become a substantial area of policy debate, the origin of this collaboration between the editors lies, as with many research studies, in a casual conversation over a cup of coffee more than a decade ago. Our first small-scale contribution (eventually published as Payne et al., 2004), which attempted to identify the methods of social research that were being used in UK sociology, was supported by the Department of Sociology's Research Development Fund at the University of Plymouth. Subsequent project funding was kindly supplied by the *Higher Education Academy* Subject Network for Sociology, Anthropology and Politics (C-SAP), the British Sociological Association, and the Economic and Social Research Council (ESRC). These projects, together with the efforts of many others, provided the foundation for a programme of work funded by the ESRC on a much larger scale, the outcome of which makes up the bulk of this collection. All of the authors gratefully acknowledge the

financial support they have received, and the contribution made by the many colleagues and students who took part in the research projects. As editors we must also thank our contributors for their forbearance and cooperation, and Jai Seaman at Sage for her support and for guiding the book through to publication.

However, the teaching of quantitative research methods is never static, nor is the concern about it restricted to the past 10 years. Looking backwards we can find debates, in sociology for example, dating from the 1970s, which were stimulated by leading players such as Bell and Newby, Burgess, Bechhofer, and the former Council for National Academic Awards. Looking forward, the International Benchmarking Exercise, the excellent current work led by the National Centre for Research Methods and by John MacInnes as ESRC Strategic Advisor on undergraduate teaching of quantitative methods (as well as the impact of rapid IT development, Data Archives, and projects such as METAL and Jorum; see Chapters 8–10) will all add to the momentum for continued change. We intend this collection to provide an extra push behind the wheel of enhancing the teaching of quantitative methods and research skills.

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Reference

- Payne, G., Williams, M. and Chamberlain, S. (2004) 'Methodological pluralism in British sociology', *Sociology*, 38 (1):153–64.
All URLs given in the text were accessed and working at the time of writing.

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The 'Crisis of Number': Informed Citizens, Competent Social Scientists

Geoff Payne and Malcolm Williams

Whether we like it or not – and whether our students like it or not – the contemporary world runs on numbers. There is hardly a single issue in public life, in civil society, in the world of employment, business and management, or even within the domestic home, which does not depend on counting, measuring and calculating – and crucially, *reasoning* with number. Both as ordinary members of the public, and as social scientists, we need to acquire better skills in quantitative methods in order to make sense of what a recent Economic and Social Research Council (ESRC) document described as the 'seismic changes' in our modern, diverse and dynamic society, and to tackle the 'increasingly complicated questions about UK economic competitiveness' posed by 'the relentless pressures of globalisation' (ESRC, 2008: 2).

The dramatic demand for greater national capability in quantitative analysis – the 'crisis of number' – can be met in a number of ways by improving education at any point from primary schooling, through to continuing professional development in mid-career. The specially commissioned contributions that make up this collection focus on *basic quantitative methods in undergraduate teaching and learning in the social sciences*, because we see undergraduate education as the pivotal stage for enhancing quantitative skills, and the social sciences are a major source of future analytical expertise. Thus what we offer in this book is an argument, supported by evaluated examples, rather than a 'cookbook' of teaching recipes. Only in the most general sense is this a 'How to Do ...' book.

The chapters come from a network of researchers who have recently completed major projects or reviews in response to ESRC initiatives (see ESRC, 2006). The lesson from these studies is that what undergraduates encounter, and how they react to it, determines their numeracy levels when they come to make career decisions and enter the graduate workforce. In an era when over a third of all young people go through higher education, the

habits of thought and advanced technical skills acquired during a university education have never been more significant. In particular, it is from this body of students that the next generation of postgraduates and future social scientists are selected.

Our argument for improving skills in quantitative methods is based not only on the vocational needs of 'Great Britain Ltd' for technically proficient professionals – although we do accept that this is important – but also on an ideological vision of active and critical citizens in a democratic society. An additional goal is to see the internal intellectual evolution of each of the social sciences. Of course, there are many ways in which such developments in knowledge and understanding can take place: raising the profile of quantitative methods is but one of them. However, this last theme both broadens and balances our case. Our advocacy is not dependent on a narrow view of mass higher education as primarily utilitarian, or economically functional, unlike those of both major British political parties for some time now (e.g. Department for Education and Science, 1987; Department for Education and Employment, 1999). We do not see the pay-off for quantitative methods as being solely what it offers for the job market or for employers: knowledge and skills have value in their own right, a value that is intrinsic to the disciplines themselves, rather than instrumental, and which does not lie simply in the commodification of learning or reduction in intellectual standards as part of a crude performative conception of the contemporary university (Barnett, 2005; Barnett and Coate, 2004).

As part of our commitment to this wider and deeper model of higher education, the central importance we attach to developing quantitative expertise in research methods training does not ignore or denigrate other methods of research and social analysis. On the contrary, we believe that the contribution of quantitative methods, and the problems currently associated with acquiring the necessary skills, can only be appreciated first as part of how students experience research as a whole, and second by seeing how research fits into the rest of the curriculum. Our intention is that by addressing the problems of teaching and learning quantitative methods encountered by social science undergraduates, we can make a case for seeking, and in some concrete ways, achieving a new *balance* and synthesis of analytical tools for understanding today's world. We do not claim that quantitative methods are sufficient *on their own* but equally, without them, the alternative methods of understanding and analysis available to us are similarly inadequate. The particular strength of a comprehensive quantitative approach is not numeracy *per se* but the rigour it introduces from the philosophy of social science to reasoning, the research process, and the relationship between empirical evidence and theoretical statements.

Nonetheless, even to be active citizens we need to understand a plethora of social phenomena which impinge on our lives: an ageing population or arguments over alternative therapies; benefit payment levels or bullying at school; climate change or crime; devolution or drugs; the environment or education; friendship choices or family sizes; gender discrimination or

genetics; health or housing needs; and income, inequality and immigration, let alone religiosity, sexuality, taxation, unemployment, voting, warfare, xenophobia, youth or zealotry. Without resorting to numbers – sizes of groups, frequencies of occurrence, rates of change, distributions across locations – these cannot be fully comprehended. If we have no intellectual tools to measure interactions and effects we cannot explain which ‘things’ are linked to others, let alone develop interventions aimed at changing complex causal relationships. What do we know about production, productivity, profitability, predicted markets or personnel unless we have the numeracy skills to manage our economy?

While we would eschew a crude recasting of complex human issues into a simplistic numerical form, a lack of basic arithmetic competence is a severe handicap for the individual, and a collective impossibility for a complex technology-based society. If numeracy has become so important for everyday living, how much more so is it vital for today’s social scientists at all levels to be competent in the use of quantitative methods which combine number with argumentation and exposition. It has become essential that we possess a critical awareness of the sources and validity of quantitative information, have the capacity to apply statistical analysis to raw data, and can engage and reason with numerical evidence. Without a strong base of quantitative methods in social research, and a further integration of quantitative research skills acquisition into the curriculum, the social sciences in Britain will continue to fail to realise their potential contribution to the common good, and lose their current high standing in the international academic community.

This has recently been dramatically illustrated by the International Benchmarking Review sponsored by the ESRC, the British Sociological Association and the Heads and Professors of Sociology group (ESRC et al., 2010). Although the international panel of independent experts found that UK sociology ranked second in the world (behind the Americans) it raised doubts about the true extent of claims to international reach and influence. The low levels of quantitative numeracy in UK sociology have inevitably isolated British sociologists not just from international collaboration but have also reduced their capacity even to appreciate the extensive quantitative work produced in other countries and reported in other nations’ sociology journals. Poor quantitative skills can isolate a discipline from the rest of the world, restrict its development and damage its international standing.

If the more obvious characteristics of numeracy in terms of operational skills with number were the only issue, it might be easier to move forward. However, it is fundamental to our good practice of quantitative methods that we see them not simply as technical dexterities, but as part of a logical system of reasoning. Numbers themselves are not more important than the framework of the philosophy of social science that contains them. In the same way, other forms of data and analysis also have their part to play. The chapters in this collection, being based on the one hand on empirical research studies, and on the other hand, drawing on case studies and qualitative data to sustain

our argument, therefore aim to be a more than a technical contribution to the 'crisis of number' debate.

The structure of the book

The contributors to this collection come from a range of social sciences. While the explorations and interventions they have made have chiefly been within their own disciplines, they have also kept in mind the wider ramifications of their work, and some of the chapters, such as Jonathan Parker's comparison of several different countries, or Jackie Carter's updating of the Jorum project, look at the social sciences as a whole. Each of the ESRC-funded projects was free-standing, but the common themes that emerged from them demonstrate the benefit of collecting together the experiences of the project teams. This delivers a wider dissemination of their several 'messages' and opens up the prospect of having a more influential impact than could be achieved by individual reports or articles addressed to and read in separate disciplines.

All of the chapters have been specially written for the book. This introductory chapter and Chapter 2 are intended to give an overview and also to give licence to the editors to express their own personal views – with which not all of the other contributors would necessarily agree! These lead into the next three chapters, each of which is directed at presenting a framework for thinking about teaching quantitative methods.

Jonathan Parker's international survey (Chapter 3) provides breadth, in the form of a comparative international benchmark against which to set our current practices in the UK. He reports on how the Scandinavian/north European model tends towards a more coherent pattern of developing research methods skills, concluding that the key issues are how quantitative skills are integrated with other research methods, and how these methods are spread through the whole of the curriculum. Quantitative methods do not exist in a vacuum. Becoming a graduate who can practise their discipline takes more than that: 'two modules do not turn undergraduates into social scientists'. Disciplines vary, with business studies and economics placing the greatest emphasis on quantitative competence, whereas politics is the social science devoting least time to research methods. In North America, initiatives such as the Integrating Data Analysis project have begun to gain ground, but the issue remains that the individual members of staff who teach methods cannot achieve change on their own: teaching teams as a whole have to be willing to work collectively to introduce changes that will promote student use of research skills. The chapter concludes with some examples and a checklist of questions that anyone teaching or designing modules in research methods should ask of themselves and their colleagues.

Although Chapter 4 is not based on a recent ESRC grant, Martin Bulmer's past involvement with ESRC and other policy projects, major