RADICAL STATISTICS

Radical Statistics Annual General Meeting
24 February, 2018
London

Minutes & reports

1. Present: John Bibby, Marion Birch, Paul Bivand, Dave Byrne, Shirley Coleman, Stefanie Doeber, Jeff Evans, Diana Kornbrot, David Lamb, Alison Macfarlane, Eileen Magnello, Maurice Marchant, Kevin McConway, Mike Parker, Janet Shapiro, Humphrey Southall, Andrew Williams, Alistair Cairns (minutes).

2. Acceptance of previous AGM minutes, which are available on the website.

3. Radical Statistics Editors report – Roy Carr-Hill
   Roy is actively filling the role.
   Three copies were produced in the past year.
   There are several people interested in joining and helping. Alistair is to contact and set up initial meeting. Add Beth Shaw ('17)

4. Troika report – Andrew Williams (*appended*)
   Andrew is sole active member present and performing so over the past year. He is stepping down. Roger Cook will continue, Seb Stevens may continue.
   John B will help liaise with 2019 conference organisers and the Troika.
   Troika's role is somewhat ill-defined, however demands are made as if the role is an all encompassing and managing expectations remains an issue. This has led to frustration.
   A less anarchic structure could help define roles. Alison M will make suggestions on how to proceed. Recruitment may be, as ever, required to help young or new people get involved.
   Andrew and others thanked.

5. Treasurer's report – David Lamb (*appended*)
   In the 12 month period an overspend took place of roughly £2,500. This is somewhat a cash flow issue since two conferences' bills were paid since London needed booking early.
   Expenses for the journal have increased – printing colour graphs is more expensive.
   Reserves leave a healthy balance and the finances are healthy overall.

A suggestion is made that RS could take a loss at conferences, but get more people in as new members, especially students.
David thanked.

6. Membership report – Alistair Cairns (*appended*)
Membership remains stable, even increasing slightly.
More 'promotional' materials could be brought to conferences.

7. Conference organisers report – Marion Birch & Diana Kornbrot
The conference organisers thank Troika and administrator for support.
Timings for what should be done when would be helpful (AC to circulate).
Some feel a local arrangement organiser would be a helpful role.
The whole team thanked.

8. 2019 Conference – Stephanie Doeber
Liverpool is approved for 2019. Stephanie D will start out as coordinator; more assistance will be required. Theme might be 'deprivation' related. Several sub-themes discussed.
AC to set up CONF19@ alias.

9. Essay competition -
Dave Byrne offers to explore reviving this.
AC to set up essay@ alias.

10. Website/social media report – Robin Rice

11. JISC mail report – Alison Macfarlane

12. RS2020 book report – Jeff Evans & Humphrey Southall
Report made during conference.

13. The academic institutional boycott of Israel working group
This is reported in most recent issue of the journal.

14. Any other business
Janet S reports that former Troika member and auditor Geoffrey Rendle has died recently.

Meeting closes.

Troika report 2017

Since the 2017 conference, Maurice Marchant has left the troika and Roger Cook and Seb Stevens joined. However, Seb has subsequently stood down and Andrew's term on the troika ends at this annual general meeting. The Troika has met regularly on Skype to discuss issues raised by Radical Statistics group members and to keep abreast of Radical Statistics group matters.

The Troika wishes to record its thanks to Alistair, our administrator, for all the time and effort that he puts in to keep Radical Statistics group active.

Annual conference 2018

The Troika supported the organisers in the planning of the 2018 conference, and we are pleased that Stefanie Doebler has offered to organise the 2019 conference in Liverpool We are keen to identify people to support Stefanie with the conference.

RadStats Journal

We have continued to support Roy Carr-Hill in his role editing the journal, and appreciate his work on the journal.

RadStats book(s)

We have been pleased to hear, during the conference. about the continued development of one of the books and thank the team of Humphrey Southall, Jeff Evans and John Bibby [additional names] for masterminding this task.

Membership of the Troika

Although, Andrew contacted members again this year, it continued to be a challenge to find volunteers. We were delighted that Roger and Seb joined the troika last year, but come to the AGM with a depleted troika. The Radical Statistics group cannot continue in its current form without volunteers. Last year we stated that 'if people fail to volunteer in 2017, we recommend a review be undertaken to consider if and how the Radical Statistics group might continue.' We feel this review is now critical. Is the Radical Statistics group continuing to fulfil its intended purpose in the 21st century? How else could the group function to succeed in its intentions? Radical statistics are still needed, but how can we continue to support and encourage them?

Members of the Troika:

Andrew Williams

Roger Cook

February 2018

Radical Statistics
2017 AGM

NET WORTH
As at 31st December 2017

	2017	2016	2015	2014	2013	2012	2011	2010	2009
BANK BALANCES									
Current Account	£11,066.43	£13,571.36	£14,275.16	£11,320.95	£13,055.55	£10,505.08	£9,260.65	£7,224.70	£4,314.00
14 Day Deposit	£3,577.15	£3,573.71	£3,570.32	£3,568.66	£3,565.32	£3,561.98	£3,558.64	£3,555.31	£3,551.98
14 Day Deposit (Health)	£4,884.54	£4,880.61	£4,875.99	£4,873.72	£4,869.16	£4,864.61	£4,860.04	£4,855.49	£4,848.64
TOTAL	£19,528.12	£22,025.68	£22,721.47	£19,763.33	£21,490.03	£18,931.67	£17,679.33	£15,635.50	£12,714.62
INCREASE IN NET WORTH									
bank balances at 1st Jan	£22,025.68	£22,721.47	£19,763.33	£21,490.03	£18,931.67	£17,679.33	£15,635.50	£12,714.62	£10,569.52
bank balances at 31st Dec	£19,528.12	£22,025.68	£22,721.47	£19,763.33	£21,490.03	£18,931.67	£17,679.33	£15,635.50	£12,714.62
Net Income for Year	**-£2,497.56**	**-£695.79**	£2,958.14	-£1,726.70	£2,558.36	£1,252.34	£2,043.83	£2,920.88	£2,145.10

David Lamb, Treasurer

I have checked the accounts and found them in order

Martin Rathfelder 14.2.18
Manchester

Membership Report for 2017 AGM

Alistair Cairns, Administrator

As of February 2018, membership within Radical Statistics consists of:

	2017	2016	2015	2014
Low waged/Student	50	47	44	43
Standard	186	189	189	197
Institutional	26	26	26	27
Outside UK	12	11	6	6
Gratis *	11	11	3	3
Total	293	291	277	276

** An additional five copies are sent to the Legal Deposits Libraries.*
Five independent/radical bookshops in UK receive copies to sell, with no payment expected.
Editors, authors & essay competition winners and graphic artist each receive two copies (one additional if already member).

Radstats Annual Conference 24 Feb, 2018: Organiser's Report

The 2018 conference was held in London at St. Luke's centre. Attendance was moderate but enthusiastic. We would like to thank all the presenters and the Social Team and the Troika for their invaluable contributions and support. The full programme is shown at the end.

Workshops

There were four workshops, all with lively discussions.
There were more than 40 attendees.

Workshop 1 Citizen's wealth funds and universal basic income

Sarah Magnusson magnusson.sara@live.se

Mechanisms needed for: implementation, management, future protection against theft by government and capital/ financial consultants; ensuring democratic control. Particularly discussing local initiatives where PFI or oil money had produced local benefit (Scotland), investments, if not just having more money to play with.

1. How is it supposed to be funded? Government borrow for investment and then hand over to local control? This is because government can borrow, but local councils can't. Reiterate than not by general taxation, but via special scrip/levy tax.
2. How to move on? Big national debate. Already had presentation to LibDems, one planned for Labour front bench, even conservatives offering.

A written constitution, which we do not have?
Future funds based on initiative, N2 + Aus. Also pushing for a 1% wealth tax, and whether further wealth tax should be policy.

Workshop 2 Measuring socioeconomic inequalities in reproductive health

Alison Macfarlane A.J.Macfarlane@city.ac.uk

There was much interest and useful discussion

Workshop 3 Statistics in the age of alternative facts: the statistician's role

Diana Kornbrot d.e.kornbrot@herts.ac.uk

Wide ranging discussion with following issues raised

- Climate change
- Taxation
- Interpretation of alternative facts. Guidance from statisticians/radstats? Reality checks. Checks of stakeholders and conflicts of interest
- Media communication. Demystifying figures. Giving concrete examples. Good relationships with journalists. Role of rhetoric. Expertise in interpreting qualitative findings
- Role of data in informing policy
- Storage of databases and rebuilding if necessary.

Workshop 4 Measuring violence: opportunities and threats

Jude Towers j.towers1@lancaster.ac.uk

Starting from Jude Towers talk on 'Inequality and intimate partner violence against women', the workshop initially focussed on issues around data on violence, which we returned to at a number of points throughout the workshop. The issues we discussed in terms of data and defining violence included:

- Data collection methods (Crime Survey for England and Wales); use of computer assisted self-interviewing (CASI) without any support from the interviewer for module on Intimate Violence, limiting respondents to those with sufficient computer literacy and by age. We also discussed how this could be the result of oversensitivity over asking about GBV. Unlike other self-complete modules in the crime survey which allow interview to assist, the Intimate Violence module does not allow interviewer assistance because of the nature of the acts being surveyed.
- Changing definitions; the definitions used in police recorded crime change periodically. Most recently this has included the new crime of 'coercive or controlling behaviour in an intimate or family relationship' which is defined by two or more incidents by a current or ex-intimate partner or other family member. This is a particularly significant change, as the data have gone from reporting incidents (like hospital episodes) to an ongoing situation (like general practice records) and there will be no way of telling whether the data refer to two incidents or dozens.
- What is violence and what should be recorded; does violence just mean physical abuse or also emotional, financial, sexual, etc? Should the data record the nature of the incident, or the harm caused by it, both physical and emotional? If so, how do you consistently define harm? Are health and social care even recording data on violence? What about violence in older couples e.g. where one partner has dementia? An aging population means that these forms of violence may become more common, although it is unlikely to be what people picture when they think of intimate partner abuse.
- Policy driving data, or data driving policy; we also briefly mentioned how changes in policy (especially around funding) impacts on what is reported and what gets classified as violence or not.

Beyond these matters we discussed a few broader topics:

- Political motivation; when there isn't political motivation, however high quality the data are they will not be sufficient. So, is focussing on data quality a distraction?
- Communication; how can the statistics be communicated to bring about change. Data currently need to be communicated carefully to prevent the media manipulating the 'story'. However, there are some media outlets who produce good and accurate articles on research.
- Sustainable Development Goal 5 (Gender Equality) has set international targets to reduce/eliminate gender equality including specific targets in relation to gender based violence. However, the Sustainable Development Goals don't appear to have had significant political impact in the UK. As a UN initiative, the four countries of the UK are combined, which will mask differences between the devolved nations.
- Analyses need to take into account the complexity of the different types of violence and the different causes. Qualitative Comparative Analysis (QCA) may be a fruitful method for analysing intersectionality.
- Professionalisation of the police and academic collaboration; from April 2018 it will be mandatory for police officers to hold or be in the process of obtaining an undergraduate degree; higher degrees are being linked to promotion. At the same time police forces are starting to collaborate with universities to develop evidence based policing. These reflect the increasing recognition by the police that in order to

maintain a service under funding cut regimes they need to become more pro-active and less reactive – EBP is seen as key to this. In addition, there is widespread recognition by police that their role is expanding into areas they would not formerly have dealt with because of cuts in public sector spending - especially mental health. Examples of these collaborations include the N8 Policing Research Partnership (https://n8prp.org.uk/) in the North of England and PenCLAHRCs evidence based policing work (https://penclahrc.exposure.co/evidence-based-policing) in the South West of England.

Diana Kornbrot
Marion Birch

Programme

9.30 Arrival & Registration
10.00 Welcome

Plenary Session 1 Chair: Andrew Williams
10.10– 10.30
Data in Society: Challenging Statistics in an Age of Globalisation. A Progress Report on the Rad Stats collection
Jeff Evans, Sally Ruane & Humphrey Southall, Radical Statistics

10.30–10.55
The people's stake: Can Citizen's wealth funds solve the inequality crisis?
Dr Stewart Lansley, University of Bristol & City, University of London
10.55 – 11.20
Socioeconomic inequalities in stillbirth rates in Europe: measuring the gap using routine data from the Euro-Peristat Project.
Alison Macfarlane
11:20 – 11:40 Coffee/Tea break
11:40 – 12.40 **Workshops I & 2**
***1*. Citizen's wealth funds and universal basic income**
***2.* Measuring socioeconomic inequalities in reproductive health**

12:40 – 13.40 Lunch
Plenary Session 2 Chair: Shirley Coleman
13:40 – 14:05
Inequality and Intimate Partner Violence against Women
Dr Jude Towers, University of Lancaster

14.05 – 14.30
Greentown by numbers: exploring the feasibility of a new low- or zero-carbon town in the UK
Dr Mike Page, University of Hertfordshire

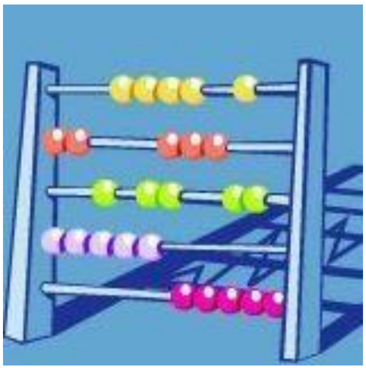
14.30– 14.50 Coffee/Tea break

14:50 – 15.50 **Workshops 3 & 4**
***3.* Statistics in the age of alternative facts: the statistician's role**
***4.* Measuring violence: opportunities and threats**

15:50 – 16:50 Q and A Panel Discussion (speakers & workshop leads)
16:50 Close
17:00 Radical Statistics Annual General Meeting

Radical Statistics Web and Social Media report

By Robin Rice
02.18



Website (radstats.org.uk)

Journals have been regularly posted. Four blog posts were written.

@RadicalStats (twitter)

“Statistics can be used to support campaigns of progressive social change. Social problems should not be disguised by technical language.

RadicalStats has over 1700 followers on Twitter and has tweeted over 1400 times.

Radical Statistics (facebook)

“Mission
Members of Radstats are concerned at the extent to which official statistics reflect governmental rather than social purposes. Our particular concerns are:
* The mystifying use of technical language to disguise social problems as technical ones
* The lack of control by the community over the aims of statistical investigations, the way these are conducted and the use of the information produced
* The power structures within which statistical and research workers are employed and which control the work and how it is used
* The fragmentation of social problems into specialist fields, obscuring connectedness

Radical Statistics has over 650 followers on Facebook.

RADSTATS BOOK: BOOK OUTLINE

Working title: **Data In Society: Challenging Statistics in An Age of Globalisation**. Policy Press. The Editors: Jeff Evans, Sally Ruane, Humphrey Southall

The Introduction to the book will be co-authored by all editors. Each section is being managed by two editors and the section introductions will be written by them unless otherwise indicated.

<u>INTRODUCTION</u>

Jeff Evans, Sally Ruane and Humphrey Southall

<u>SECTION 1: How Data are Changing</u>

Section Editors: Jeff Evans and Humphrey Southall

Introduction to Section

Administrative data: The creation of Big Data by Harvey Goldstein

Until recently, big datasets existed within private and Governmental organisations, but were typically designed and managed for internal purposes and for limited research activities. Within Government, these datasets would typically contain information on the same individuals, for example on their health, tax, education and employment status. With the advent of widespread internet connectivity it became apparent that by linking such datasets, it would become possible to have a wide range of information about individuals that could lead to better service provision and research. Thus for example, the Health and Social Care information Service (now known as NHS digital) has responsibility for linking together hospital and primary care (general practice) records and there are now many other examples throughout Government. The Digital Economy Bill recently signed into law (by the time of publication of the book) (http://services.parliament.uk/bills/2016-17/digitaleconomy.html) sets out the UK Government commitment to data sharing via the linking of data across departments and also to share data with the UK Statistics Authority through ONS, who in turn can carry out data linkage and pass on suitably anonymised data to the research community. Somewhat surprisingly, health and adult social care appear to be excluded from this latter sharing requirement. ONS will also be able to request data from the private sector.

It is the ability to carry out data linkage that is the key to exploitation of big data and this chapter will be devoted to some of the key concerns that this raises. I shall deal with technical issues such as data quality and the importance of probabilistically based record linkage and also the issues surrounding data release and the tensions between confidentiality requirements and fitness for research. I will also look at some of the political and commercial interests involved and the potential threat of ‘data privatisation’. By this I mean the increasing involvement of commercial companies in the provision of IT services that acquire and store administrative data, and in the development (and private appropriation) by such companies of the technical expertise required. I will also look at the provision by such companies of services that link and analyse the data, and become capable of providing both the public sector and the private sector with both the linked data and data analyses.

‘A Survey Shows ...’ by Roy Carr-Hill

Social surveys are claimed as ideal for producing information on populations, based on representative samples, and for using clearly defined indicators for relevant concepts. Thus, data from household surveys have increasingly been used as a basis for social policy. But they are generally inappropriate for obtaining information about the poorest, and therefore for policies concerned with tackling poverty and deprivation. This because they omit certain groups *by design*: the homeless; those in institutions; and mobile, nomadic or pastoralist populations; *in practice*, they typically under-represent those in fragile, disjointed or multiple occupancy households, those in urban slums and those in areas deemed as insecure. These sub-groups constitute a pretty comprehensive, ostensive definition of the ‘poorest’. A comparison between citizen-led volunteer surveys and contemporaneous Demographic and Health Surveys in Kenya, Tanzania and Uganda confirm that the international standardized surveys badly undercount poverty in urban areas and to a lesser extent in rural areas where there are significant numbers of pastoralists.

The sources of worldwide estimates of the missing populations are briefly described, with those for the UK discussed in greater detail. At least 700 million of the poorest of the poor are omitted worldwide; and in the UK about half a million of the poorest are missing from survey sample frames. In the UK, this biases the analysis of income inequalities and affects the validity of formulae developed for the geographical allocation of resources to education, health and social care.

There are additional pitfalls with surveys. It is more straightforward to elicit expressed (self-reported) rather than revealed (observed) behaviours or preferences, though self-reporting can often be seen as an exercise in self-justification. Advertisers typically use selective or self-selected samples to push their product; which can often be revealed under critical scrutiny as unrepresentative. The UK government neglects to correct self-reported alcohol consumption with the 40% lower rate of sales reported by its own HMRC in developing recommended consumption limits. Importantly it has also failed to update its much criticised methods for surveying immigrants and emigrants. Our media make very little attempt to check the reliability of the sources upon which they draw.

Social data by Humphrey Southall and Robin Rice

‘Big data’ is often presented as some kind of new technology enabling lots of data to be crunched, but as early as 1890 the U.S. census was using Hollerith machines to generate aggregate counts from tens of millions of individual records. Since then the process has gotten faster, but census reports do not come out dramatically quicker. The real novelty lies in new kinds of data and this is clearest with ‘social data’, assembled through mass participation in social networking. People communicating with one another is obviously not new, and governments could eavesdrop on a small fraction of this by intercepting and reading letters, or bugging phone calls. What is truly new is communication taking place in forms suited to bulk analysis of content, through channels controlled by a few large companies: a quarter of the world’s population use Facebook each month; in China, two-thirds of the population use WeChat.

This chapter is focused not on academic research using social data, mainly from Twitter because it is easily available, to study society, but on the use of social data, especially within Facebook, by advertisers and political movements. It explores the secretive world of bulk behavioural profiling, enabling the individual targeting of marketing and political messages. It discusses the role these have played in recent political changes, including Brexit and Donald Trump’s victory. Are these new methods in themselves politically neutral, or do they favour particular types of message?

The changing occupational landscape of statistical work by Kevin McConway

It never was the case that only statisticians work with statistics, but the professional landscape is becoming more and more diverse. The chapter will look at the work of statisticians and 'data scientists', but also at how journalists, campaigners, politicians and academics such as economists and psychologists work with statistics and shape what the discipline of statistics is and how it is seen.

I consider the following questions. First, *who analyses what data?* For example, to the extent that economists have come to the fore in analysing the results of 'educational performance' surveys like PISA, their modelling methods – and their general theoretical approach perhaps too –have been geared to the analysis of 'productive' skills. Second, *who presents the results to which audiences*? A key example here is the role of journalists, ranging from the multiply defined 'data journalists' who present often quite deep analyses to audiences defined by the intended readership of the media outlets involved, through subeditors who pick out from stories numbers, of dubious relevance, largely to decorate newspaper page designs and fill space.

Third, *who defines what analyses are appropriate*? Here one example is the role that academic psychologists are playing, stemming partly from their prominence in 'the replication crisis', in picking apart statistical methodology, what it means, and how it is understood by their colleagues. This work is arguably having important effects on statistical methodology development in other disciplines. Fourth, *who trains whom in how to work with data?* One example here is the rise in university courses in data science, where often the curriculum in statistical data analysis is developed and taught by computer scientists, who may have different orientation and purpose in these areas from statisticians (and economists, and natural and social scientists). Another is the observation that many, perhaps most, of the leading textbooks and training materials in statistical software, particularly open source software such as R, are written by biologists, ecologists, psychologists, computer scientists, whereas in the past statisticians would have had a greater role. The implications of all these changes will be discussed.

SECTION 2: Counting in a Globalised World

Section Editors: Sally Ruane and Jeff Evans

Introduction

Transnational Organisations and the Globalising of Educational Policy by Jeff Evans and Roy Carr-Hill

International organisations like the OECD, the IEA (International Association for the Evaluation of Educational Achievement) and the EU are increasingly involved in the production of data. Such organisations function as key agencies for change in education and lifelong learning policy, by promoting human capital approaches, and new forms of governance and social regulation. We consider these organisations' uses of conceptual apparatuses, categorisation/ measurement systems, and comparative databases – related to economic development, and to education and training; for example, in their growing role in the assessment of the latter systems' efficiency, at national, regional and local levels. Particularly important in their organisational strategies are the large-scale international performance surveys for school-age pupils, such as OECD's PISA and IEA's TIMSS. The number and range of surveys has recently increased, to include for example, teachers' views on their working conditions (TALIS) and national measurement of adult skills, including attitudes to and reported use of such skills (PIAAC). There are spin-offs, too: for example. PISA for Development is meant to address the problem that, in low income countries, not all 15 year olds are in school, so there is a stream of the activity for the current round (PISA 2019) aimed at interviewing out-of-school 15 year olds.

We focus especially on PIAAC, the Project for the International Assessment of Adult Competencies, which has so far reported results in 33 countries, in 2013 and 2016. It focuses on three domains considered basic for adults living and working in industrial and 'knowledge' economies: namely, literacy, numeracy, and problem solving in technology-rich environments. The default method of survey administration is electronic, and it makes extensive use of adaptive routing of adult respondents which aims to ensure that each respondent is presented with test items that are 'appropriate' for their skills levels. Complex sampling designs are deployed, and Item Response Modelling is used to estimate the adult's skill levels.

The dual approach of this chapter draws on theoretical resources from critical policy studies to locate these surveys in general policy trends and developing globalisation. It also raises methodological issues relevant to the valid interpretation of these studies' results on their own terms.

Counting the Population in Need of International Protection Globally by Brad Blitz, Alessio D'Angelo and Eleonore Kofman

Several international and regional agencies count the number of persons crossing borders and internally displaced within states worldwide. The UNHCR (UN High Commissioner for Refugees) is the most authoritative agency tasked with protecting refugees, asylum seekers, internally displaced people (IDP), and returned refugees, as well as stateless people. In recent years, boosted in particular by conflicts in the Middle East, the number of refugees has grown to 15.1 million in 2015 and people of concern more broadly to 63.5 million. At the same time, states have sought to reduce the number recognised as Convention refugees defined as a person, who 'owing to well-founded fear of persecution for reasons of race, religion, nationality, membership of a particular social group or political opinions, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country' (Convention relating to the Status of Refugees, 1951, modified by 1967 Protocol). They are also seeking to reinterpret their obligations and are introducing limitations on those to be protected; hence numbers also help them to show progress towards these objectives. Thus categorization between levels of protection and the divide between those offered international protection and economic migrants are important.

The quality of data used to advance its programmes also varies notably from one category of protected person to another, thus raising important questions for the management and delivery of protection-related services. While the UNHCR has data on registered refugees for most countries; their data on stateless people and IDPs are incomplete. Moreover, data are not disaggregated by age and gender, and in spite of greater efforts at multilateral cooperation, these datasets do not cover the same populations as those produced by other agencies, including IOM (International Organization for Migration). Hence, there are major differences both in coverage and categorisation of populations which in turn complicates analysis across datasets and undermines critical assessment of interventions.

This chapter reviews the coverage of people of concern as set out in the UNHCR's guidelines and identifies gaps in the datasets used by UN and multilateral agencies tasked with the protection of refugees, IDPs and other people of concern. It suggests that these datasets need to be broadened to include other categories of vulnerable individuals and groups and that further disaggregation is needed.

Researching the invisible: The challenges of measuring illicit financial flows, including the movement of money between companies and jurisdictions to avoid tax by Richard Murphy

Tax abuse has, to the surprise of many and largely because of public pressure, become one of the most important issues of political concern in many countries. This has resulted in increased interest in three statistical issues. The first is the sum total of the tax gap, which is the difference between the amount of tax that should be paid if all taxpayers complied with the law and the sum actually collected. The second is the sum total of funds deposited in tax havens. The last is the role that multinational corporations (MNC) have played in fuelling both of these totals. This chapter will concentrate on the last of these issues and the role that the practical quest for data on this issue has played in transforming accounting, tax reporting and the prevention of tax abuse through the creation of what is called country-by-country reporting. This requires MNCs to prepare an account of their activities in each jurisdiction in which they operate. The narrative of change, and the drivers that delivered it will be explored, followed by an explanation of the use that might now be made of the data by tax authorities and others, to the extent that it is being made available for public use. The resulting likely decisions made by MNCs regarding changes to their organisational structure and, in particular, the locations that they use to incorporate their subsidiaries and the resulting consequences for the taxes that they pay will be explored, as will the consequent changes in the risk environment for each of these parties. The impact that this might have on competition between those companies that can access tax havens and those, mainly domestic, companies that cannot will be considered. The paper will end by suggesting ways in which further developments in this area could deliver benefits when the aim of many within the political arena is to now reconcile the aims of globalisation and local accountability, which is a task at the heart of country-by-country reporting.

Climate Change and the Construction of Controversy (Author TBC)

Climate change is possibly the defining challenge of our age. It is also essentially about statistics: in essence, climate is ‘average weather’, and, although climate change is not simply about ‘global warming’, rising average temperatures are central to the problems we face. As a result, those who would deny there is a problem have concentrated their attacks on long-run temperature data. These attacks are possible because the methods of measurement cannot possibly be held constant over time: the most recent data, especially for the world’s oceans, come partly from satellites which were not technically possible until relatively recently; the locations where temperatures are recorded have inevitably changed over time, and generally have increased in number; even where the measurement locations have not changed, the areas around them have, through urban growth; and as we go back over longer periods of time, data come not from thermometers but more indirectly. The chapter reviews the sources of temperature data and how they have been brought together by scientists, but then explores how they have been attacked. The attacks are ultimately internally inconsistent, but serve to create an aura of uncertainty for the uninformed around what is in fact settled science.

SECTION 3: The Changing Role of the State

Section Editors: Humphrey Southall and Sally Ruane

Introduction

Privatisation and commercial confidentiality by Sally Ruane and Alison Macfarlane

This chapter will focus principally on the health service in England where, in a UK context, market forces and privatisation are most advanced. The chapter will explore the reduced availability of data when services are privatised by comparing public sector and private sector legal obligations in relation to a range of different reporting activities. This will include: differences in the duties of public and private bodies in relation to Freedom of Information legislation; differences in duties between public and private organisations in relation to reporting inputs and outcomes; and legal obligations to disclose data by public and private service providers in relation to the local authority health overview and scrutiny function. Alongside these comparisons, the chapter will consider instances where public agencies' deference to commercial confidentiality has prevented them from disclosing information to the public and reported incidences of information being withheld under commercial confidentiality. In discussing these matters, a range of different policies entailing private sector involvement in the NHS will provide illustrative material, including the Private Finance Initiative, the use of private hospitals and NHS contracting with independent sector providers.

Social insecurity and the changing role of the (welfare) state: Public perceptions, social attitudes and political action by Christopher Deeming and Ron Johnston

All advanced societies must provide their citizens with protection against risk in order to secure continued economic and political stability. In Britain, we have seen a major shift in attitudes towards the government and its role in social protection over the past 35 years. There is now clear evidence that the British public has become less collectivist in its views on government social security provision for unemployed people. In this chapter, we examine these trends but we also consider what is known about influences on welfare opinions, in terms of:

- the attitudes and perceptions of people in different places and different social groups and how these attitudes have evolved differentially;
- how the public perceive the relative 'deservingness' of different welfare recipients;
- public perceptions of welfare spending and benefit levels, and how this is affected by alternative approaches to presenting data;
- how far patterns of change in public attitudes to welfare relate to, and can be explained by, political and economic cycles and experience both at the individual and societal level, becoming more supportive during and after periods of recession.

Finally, we consider the explanatory power of social science models and theories of change, including thermostatic models of responsiveness that characterize the relationship between opinion, and theories of individualism, solidarity and trust that have attempted to explain or theorize these important changes and developments within society. The chapter draws on our own empirical analyses of the British Social Attitudes Survey data, as well as the growing research literature in this field.

The uneven impact of welfare reform by Christina Beatty and Steve Fothergill

Since 2010, successive UK governments have implemented unprecedented welfare reforms. By 2020, when the reforms will mostly have come to fruition, the reduction in welfare payments is expected to be around £27bn a year – more than one pound in every four previously spent on working age benefits. This chapter will explain the reforms and describe how they impact unevenly on different groups – working age/ retired, in-work/ out-of-work, social housing tenants/ the rest. In particular, the chapter will examine how the reforms are leading to much bigger financial losses in some parts of Britain – older industrial areas, seaside towns and parts of London – than in the most prosperous parts of southern England. The chapter will draw on a wide range of official statistics and research by the authors, published in a number of detailed reports over the last five years which have attracted substantial media coverage and political attention.

Devolution by David Byrne

Following devolution to Scotland and Wales and the re-establishment (for the moment) of the Stormont parliament in Northern Ireland, the UK is no longer a fully unitary state even within the island of Britain. There has been a separate Register Office, also responsible for the Scottish Census, (now merged with the National Archives of Scotland to form National Records of Scotland) since the mid-19th Century and the distinctive character of Scottish Law meant that much legislation even before devolution was Scottish specific which had implications of many areas of Scottish data. Wales in contrast has historically formed the addendum to the expression 'England and Wales' but had now established its own statistics and research resource, whilst Northern Ireland has had separate administration of statistics since the partition of Ireland and has its own Northern Ireland Statistics and Research Agency. The major statistical source which describes differences among the nations of the United Kingdom (and very usefully also gives details on English Regions) is *Regional Trends*, but there is an increasing amount of information available from the devolved governments which enables us to map out differences. This is particularly important given that Scotland and Wales have governments which are broadly social democratic in form, and in many respects this is even true of Northern Ireland, whilst England is governed by a party committed to reducing the scale of the state in society. There are also now radical departures in service provision. Scottish education was always different but there are now four different National Health Services in the UK with very different relationships for example with the private sector. This extends into all areas of service provision other than state benefits which remain constant across the UK despite being a formally devolved power in Northern Ireland since 1920. This chapter will first outline differences in the nature of statistical information across the UK's four nations but then will draw on statistics to illustrate the divergent character of those nations since devolution. It will conclude with a brief and necessarily speculative consideration of the trajectory of the nations post BREXIT, given what statistics can tell us about their social and economic character and political cultures and trajectories.

Who owns official statistics? The work of the UK Statistics Authority (Author TBC)

The very origins of the word 'statistics' links them to the state, but should 'official statistics' be simply under the direction of the government of the day, or should they serve some wider definition of the public interest? During the 1980s and 90s, the resurgence of mass unemployment made the national rate a key indicator, whose definition the Thatcher government was accused of manipulating. Labour came to power in 1997 with commitments both specifically on unemployment and generally to create an independent statistical service. This led to the creation of the Statistics Commission in 2000, which was replaced by the UK Statistics Authority in 2008. 'The Authority has a statutory objective of promoting and safeguarding the production and publication of official statistics that 'serve the public good'', which includes 'regulating quality and publicly challenging the misuse of statistics'. Regulating quality includes endorsing certain official statistics as National Statistics.

Professor Rhind was the chair of the Commission from 2003-8, and a member of the Authority until 2014. The chapter briefly reviews the history of these bodies before discussing particular examples of how they have intervened. It concludes by discussing the challenges of maintaining confidence in official statistics in an age of 'fake news' and 'alternative facts'. How far do the public recognise 'National Statistics' as a mark of quality? The government have on several occasions challenged the use of statistics by ministers, but what impact does this have?

SECTION 4: Economic Life

Section Editors: Humphrey Southall and Paul Bivand

Introduction

The Tax Avoidance Industry by Prem Sikka

Tax revenues are an essential requirement for the functioning of the state. In recent years, these have been under considerable attack from corporations as companies seek to appease markets by reporting higher profits and executives seem to collect a bigger performance related remuneration package. Corporations and their executives are aided by a well-oiled tax avoidance industry populated by accountants, lawyers and financial experts whose willingness and ability to 'bend the rules' is highly valued by some. This chapter will explore the current state of tax avoidance and show how mundane accounting practices and techniques facilitate tax avoidance. It will also provide illustrations of how complex corporate structures and intragroup transactions are used to shift corporate to low/no tax jurisdictions in order to minimise taxable profits and tax liabilities at the place of their economic activity.

In a global economy, corporations are mobile but the state's ability to check tax avoidance is hampered by its confinement to a predefined geographical jurisdiction. Rather than co-operating, many states are engaged in tax competition and race-to-the-bottom which presents major challenges. Despite critical court judgements and revelations by whistleblowers, there is little effective retribution against the tax avoidance industry. One possible reason is that the Her Majesty's Revenue and Customs (HMRC), UK's tax authority, itself has been colonised by the tax avoidance industry. The chapter will provide some evidence to support such arguments. The chapter will conclude by suggesting some reforms.

The financial system by Rebecca Boden

In financialised western economies the symbiotic activities of large financial institutions and global corporations constitute and dominate much of our economic and societal life. The scale and complexity of their activities represent a challenge to regulatory control and democratic accountability; many of their activities are of such technical complexity that they are beyond the comprehension of the ordinary citizen. The assertion of the necessity of commercial confidentiality inhibits openness in this system and accounting systems do little to enhance disclosure. In a globalised world, interconnectedness, speed and scale all conspire to make finance a 'dark domain'. Financial institutions are highly mobile and therefore exert significant power over national governments, shopping around for, and even shaping, favourable regulatory regimes. This new reality has major repercussions for states, economies and their citizens. For instance, the 2012 Libor scandal, in which it emerged that traders had been fraudulently fixing the London Interbank Offered Rate (Libor), points to the impact of individual and organisational profit-seeking which can have widespread economic effects.

Such activities are largely invisible to citizens until a scandal emerges or there is a crisis. At such points, financial institutions are often seen as 'too big to fail' and represented as compliant with regulatory regimes. Evident non-compliance or failure is often categorised as an 'outlier' – in the case of Libor, for instance, the problem was ascribed to corrupt individuals.

This chapter focuses on how the formulation of regulatory and accountability regimes for financialised institutions is the product of the operation of hidden power that serves both to obscure their operations and to embed them further in the fabric of globalised economies.

Changes in working life by Darja Reuschke

In many advanced economies, the growth of a diverse self-employed workforce is a striking feature. Most contemporary self-employment is 'new' in the sense that people are not running substantive businesses but work solely on their own account ('solo self-employed'). Working on own accounts is strongly embedded in people's homes or the home is used as a base from which business or personal customers are served in a variety of workplaces. Most available datasets, however, still assume that people have a 'job' in a fixed workplace. This chapter critically reviews existing employment and population datasets, covering the UK and Europe, according to whether and how they capture the diversity of economic life in self-employment. In essence, while some datasets capture the 'multi job holding' reality of contemporary working lives, the workplace geography is largely limited to the 'main job'. The significance of home-based self-employment is therefore largely under-estimated and remains little understood. Survey participants are also often forced to report their longest commute in case of multiple workplaces. The chapter makes suggestions about how data capture of contemporary economic life can be improved and highlights what research and policy would gain from it.

Measuring and evaluating trends in inequality by Stewart Lansley

This sets out longer term and more recent trends in income inequality in the UK. It argues that the 'distribution question` - how the cake is divided - dismissed as 'poisonous` by market theorists, should be central to the policy agenda on economic and social policy. It will examine the wider and domestic forces shaping these trends, including recent changes in national public policy (macroeconomic and tax/benefit changes) and show that public policy since 2010 has become increasingly pro-rich and anti-poor. Present levels of inequality are both socially unjust and bad for the economy. Indeed, this chapter will argue that rising inequality has been a critical factor in the UK's increasingly fragile economy, with its under-investment, weak productivity growth and its increasing tendency towards 'rent-seeking` activity and the extraction, rather than the creation of wealth.

SECTION 5: Inequalities in Health and Well-being

Section Editors: Sally Ruane and Humphrey Southall

Introduction

Key divisions in society by Catherine Bromley

Health inequalities research in the UK has tended to focus its gaze on socio-economic class, think of Engels' remarks upon the premature ageing of working-class people in Manchester in the 1840s. This situation persists today, as evidenced by the disparities in life expectancy and years lived in good health that exist between the most and least socio-economically advantaged groups in society (ScotPHO, 2016; ONS, 2016). Premature mortality goes hand in hand with lives lived in circumstances less than favourable to good health. Health-harming exposures such as air pollution, precarious and unsafe work, and financial insecurity all show clear social gradients in the same direction as those seen for ill-health and mortality. However, it is also increasingly recognised that other markers of social position, including gender and ethnicity, can operate synergistically with, and independently of, class-based divisions to shape health outcomes

This chapter starts with an overview of key analyses of class, ethnicity and gender-based health inequalities in the UK (and beyond, where appropriate). It then uses case studies of smoking and obesity to illustrate how the impact of class, gender and ethnicity on these outcomes is multiply-layered and, consequently, that analyses that do not take this into account are incomplete. The last part of the chapter will highlight some of the statistical challenges that follow from these observations. For example, the difficulties associated with measuring concepts whose meaning are in a state of flux, and the need for sufficiently large samples to enable intersections between divisions to be explored robustly.

ONS. 2016. *Healthy life expectancy at birth and age 65 by upper tier local authority and area deprivation: England, 2012 to 2014.* [Online].
https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandlifeexpectanci

es/bulletins/healthylifeexpectancyatbirthandage65byuppertierlocalauthorityandareadeprivation/englan d2012to2014. [Accessed 24/4/17]

ScotPHO. 2016. *Deaths: deprivation deciles.* [Online]. http://www.scotpho.org.uk/population-dynamics/deaths/data/deprivation-deciles [Accessed 24/4/17]

Promoting Well-Being: The Statistics of Public Health Intervention Strategies by Jan Böhnke, Stephanie Prady and Philip Quinlan

Rolling out interventions to whole populations with the intention of increasing overall health is a key goal of public health practitioners and policy. Using Rose's framework for preventative medicine as an example, moving the general population away from health risks and vulnerabilities is assumed to result in better societal as well as individual health. Such strategies are always controversial, whether it was advice to take aspirin at middle age to reduce the risk of a heart attack, or the currently popular nudge and incentive-based approaches to behaviour change. While discussing developments in related fields of public health, the main area of application for this chapter will be the promotion of well-being. Within that context, the chapter will deal with three aspects of this narrative. The first is the question of statistical significance and statistical relevance. Some of the effects caused by these strategies are very small when looking at the shift of the population towards better well-being. Across all affected individuals in a population, however, a small change in behaviour can result in substantial benefits in terms of overall health and social care costs and productivity. This leads to the second part, which explores the role of this specific statistical argument in debates about societal choices and individual consequences. Should individuals engage in such behaviours even though the potential effects on their specific lives are not immediately visible? The final part of the chapter will deal with unintended consequences of these population strategies. Interventions can interact with the social context, in that those living in social disadvantage tend to have the least well-being, while simultaneously having less access to the resources (such as time, money and autonomy) that would help them take up the intervention. Due to this, shifts of the whole distribution towards better well-being often do not occur and it is even possible that unforeseen risks could lead to some disadvantaged groups ending up in worse health. This argument will underline the value of well-planned studies that include strategies for addressing health inequalities.

Re-engineering health policy research to measure equity impacts by Tim Doran

Although the determinants of health inequality are well known, policy makers have repeatedly failed to address the issue effectively, and many public health interventions unwittingly worsen inequalities because they disproportionately benefit those with greater resources. However, this is not just a policy failure – it is also a scientific failure. The analytical tools used to inform policy lack a substantial perspective on equity, focusing on averages rather than social distributions, leading to inequitable solutions. This is partly due to the dominant methodological approaches used in health services and policy research, but also because the necessary raw material (in terms of appropriate data) and the necessary tools (in terms of computing power) have been lacking. In an age of social division driven by rising inequality, new approaches to policy analysis are urgently required. With the increasing availability of large linked datasets and the computational power to analyse them, we can now begin to address historical methodological shortcomings, 're-engineering' the methods used in health policy research across two key areas:

- Equity IMPACT analysis – quantifying the distribution of both effects and costs by equity-relevant variables (e.g. socio-economic status, ethnicity, gender).
- Equity TRADE-OFF analysis – quantifying trade-offs between improving total health and equity objectives (e.g. reducing the social gradient in health outcomes).

In this chapter, we provide a framework for equity impact assessment and describe novel methodological approaches that will enable researchers to conduct these types of analysis. By developing rigorous methods for measuring the equity impacts of health and social policy interventions – and applying these methods to assess the effectiveness of major public health and healthcare initiatives – we can enable fairer health policy decisions, ultimately leading to better health across society.

Ageing and Pensions: Trends in Life Expectancy and Healthy Life Expectancy for pensions by Jay Ginn and Neil Duncan-Jordan

A recurring theme in right wing thinking is that older people are a burden on the young, absorbing an unfair share of national resources, including spending on state pensions, benefits, NHS and social care. This perspective is presented as a zero-sum game, in which generations must compete for scarce resources, their interests being in conflict ('conflictual ageism'). In contrast, others argue that all generations share the need for a secure income in retirement and sufficient health and social care as they age; that older people's past and current contributions to society are often invisible; and that intergenerational solidarity through families and social institutions promotes the welfare of all ages.

In this chapter, we examine these arguments and the statistics used as evidence, in order to achieve a better understanding of intergenerational relations in a neoliberal climate. We conclude that it is essential to distinguish both inter-cohort differences in the lifecourse, as well as intra-cohort inequalities of income, wealth and life chances that are associated with gender, class and ethnicity.

SECTION 6: Advancing social progress through critical statistical literacy

Section Editors: Jeff Evans and Sally Ruane

Introduction

Teaching and training by Malcolm Williams and Luke Sloan

This chapter will trace the renewal in quantitative methods teaching in the UK. We begin by detailing the 'discovery' of the crisis in quantitative methods in the early 2000s, but will argue that, with the exception of economics and psychology, UK social science has been predominantly qualitative and humanistic for much of its existence despite the UK having some of the best large scale datasets in the world. However, with minor exceptions, the identification of the quantitative deficit in the early 2000's was a new departure. Thus, the term renewal refers more to a renewal of social science, through quantitative methods, than a rediscovery of something lost.

Since the early 2000s there have been three phases in this 'renewal', though each has overlapped somewhat. The first phase was marked by several research projects which sought to show the nature and extent of the deficit, both through student experiences and those of teachers. The second was a series of 'one shot' projects which sought to discover new methods of teaching and learning and in particular new ways of engaging students in learning about quantitative methods. These projects culminated in the Q-Step initiative, the third phase and by far the biggest investment ever (at £19.5 million) in the development of UK research methods teaching. Finally, and perhaps more speculatively, we will discuss a few of the teaching and learning strategies employed in the Q-Step Centres and argue that these are both a radical departure from traditional quantitative methods teaching and the best hope we have for long term success in renewing the social sciences.

The public interest work of the Royal Statistical Society by Hetan Shah

The RSS has in recent years become a much more outward facing organisation. This case study will consider the ways in which the RSS has sought to engage more with public debates, and the role of statistics and data within them. This has included work in two overlapping areas. First, to ensure data and statistics are used in the public interest and inform policy making and public discussion. Secondly, to improve the quality of statistical knowledge and skills amongst key professions and the public.

In the first area, the Society produced its Data Manifesto prior to the 2015 and 2017 general elections, which outlined how better data and statistics could strengthen prosperity, policymaking and democracy. It has also engaged in parliamentary work to improve data sharing legislation to enable the ONS to have better access to data from government and the private sector, and to give researchers better access to administrative data. The Society has also worked on developing the idea of a new Data Ethics Council and building partnerships to develop it. Such a Council would consider the ethical challenges arising from digital data, artificial intelligence, data science, the internet of things and algorithms – and ways to manage these in the public interest.

In the second area, the RSS ran a campaign in the 2015 General Election to ask parliamentary candidates to pledge to take statistical training if they were elected. Over 300 pledged to do so, of whom 55 were then elected as MPs. Some did take the training, as did some members of their staff. Similar training has also been offered in Scotland and Wales. The RSS has developed a statistical ambassadors programme, to develop a cadre of statisticians trained to work with the media. This has resulted in giving statisticians a greater voice in the media, and in particular built the capacity of younger statisticians. The Society has also engaged in training journalists, and given awards for good practice in this area for over a decade. And finally the RSS has done considerable work to influence education policy so that statistics has a stronger place in the curriculum.

Data Journalism as Data Activism? Collaborative Data Infrastructures for Changing What Counts by Jonathan Gray and Liliana Bounegru

The past few decades have seen the emergence of a range of different journalistic practices for using and analysing data – from ‘Computer Assisted Reporting’ in the 1950s and 1960s, to ‘precision journalism’ in the 1970s, to ‘data journalism’ in the 2000s (Gray, Bounegru and Chambers, 2012). Accounts of these practices often focus on how journalists use various computational and digital methods to obtain, analyse, explore and narrate structured information from public records and official data. This chapter will look at how at how journalists are not only *using* data from various sources, but also increasingly starting to *create their own data* in order to report on contemporary social, cultural political issues. We explore a number of cases of collaborative and participatory data infrastructures in journalism which – drawing on developments in Science and Technology Studies and the History and Philosophy of Science – we view as socio-technical arrangements to facilitate collaboration around the collection and use of data for reportage. We explore and illustrate different kinds of data practices in journalism in relation to projects on migrant deaths, police killings, knife crime, agricultural subsidies, public spending, lobbying and corruption. These developments represent a shift from using the by-products of officially recognised forms of quantification, towards creating space for public participation, democratic deliberation and ‘data activism’ around what is officially counted and the making of different kinds of ‘data worlds’.

Gray, J., Bounegru, L. and Chambers, L. (2012) *The Data Journalism Handbook*. Sebastopol, CA: O’Reilly Media.

Facilitating Access to Data for Political Decisions and Debate by Jim Ridgway and James Nicholson

A huge amount of data is now available, relevant to decision making and political argument. However, these data are often accessible only to people with reasonably sophisticated skills in data acquisition and exploration; less skilled users must depend on interpretations by others. This is increasingly problematical in a 'post-truth' climate where fake news is created, and where lies are sometimes called 'alternative facts'. This chapter shows how large amounts of evidence relevant to decision making can be made accessible to a broad public.

The Constituency Explorer resulted from a collaboration between the House of Commons Library and Durham University, and was designed to support analysis and decision making ahead of the 2015 UK general election; it was relaunched ahead of the 2017 UK general election. The Constituency Explorer facilitates access to a great deal of data – 150+ variables on each of the 650 parliamentary constituencies in the UK (a pdf document can be downloaded for each constituency: in total, around 14,000 pages). This chapter will show the interface, and will describe some of its features. We will describe the design process (the current CE is the 18th iteration of the original design), and the strategies for public engagement (that include 'gamification' via a quiz accessible to smartphones), and patterns of user engagement.

Exposing the 'funny numbers' of precarious employment: a critical resource for challenging neoliberalism by Keiko Yasukawa et al

In the last two decades, insecure work in universities in many countries has grown exponentially, alongside the rapid marketization of higher education. Reflecting the neoliberal ideal of a flexible workforce, research and teaching at universities is now routinely carried out by precariously-employed employees, and hourly paid lecturing and tutoring now a common feature of many campuses. In Australia, for instance, the bulk of teaching is now carried out by hourly-paid academics. This structural dependence on hourly paid academics poses a reputational problem for universities, and universities respond by obfuscating the statistical evidence. The rates of transferring core university work to hourly-paid workers are widely under-reported and underestimated. This chapter is based on a case study of tracking down the actual head count of the hourly-paid academics and the level of this phenomenon in the Australian higher education sector. Researchers in the past have resorted to lateral thinking and creative detective work to uncover the true dependence on hourly paid labour in the sector. This has had a major impact on the capacity to pursue industrial justice in the sector. The academics' trade union and related groups have used the university-level figures to challenge the advance of academic job insecurity, and are now highlighting the incidence of precarious academic employment nationally, and by discipline, to generate new constituencies for fighting increasing job insecurities in the universities. Our own work has highlighted the multiple and conflicting figures being reported by universities, and the deliberate and systematic underestimation of the actual rate of insecure jobs being reported by government departments. These distortions are discussed as an example of neoliberalism's 'funny numbers' (Porter 2012). The chapter discusses the manipulations expressed in the figures, and reiterates the need for 'barefoot statisticians' among activism-oriented researchers. It highlights contestations over figures, and what lessons this holds for empowering the sector and the wider public to challenge neoliberalism's' corrosive logic and to pursue industrial justice.

Porter, T. (2012). Funny numbers. *Culture Unbound*, *4*, 585-598.

Concluding Chapter

Jeff Evans, Sally Ruane and Humphrey Southall