



# EDC459: Week 1

## What is quantitative social science?

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# Sign In

# Learning Objectives

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What will I learn?

How does this week fit into my course?

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By the end of this week you will:

- Know where to find relevant information for participating in the module, including where to locate module resources and how to prepare for each week's class time.
- Be able to differentiate between quantitative social research approaches and qualitative research approaches and the way they shape our view of the social/human world.
- Be able to describe some of the reasons why quantitative research can be useful, while being cautious around the pitfalls of its methods and methodology.
- Have installed **R** and Rstudio and be able to interact with the console, run scripts, check help documentation, distinguish between environmental object types, and read in data.

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- Help you schedule your independent learning for the rest of the module to fit within the demands of the programme.
- Give you an indication of when quantitative research projects (or components of projects) may be useful, and see how the content of EDC459 fits together with Principles of Social Research I and Principles of Research Design II.
- Introduce you to **R**, a flexible open-source statistical programming language that can be used for quantitative data analysis but also for presenting, reporting, and other purposes.

# Calum Webb

[c.j.webb@sheffield.ac.uk](mailto:c.j.webb@sheffield.ac.uk)

Research on poverty and the child welfare system in the UK using secondary survey and administrative data in **R**. My most recent project has been about how investment in services for children improves their welfare and safety.

For any general enquiries about administration during the module — registration, extensions, assessment submission, attendance, timetable issues, and so on — please contact the Student Experience team [smi@sheffield.ac.uk](mailto:smi@sheffield.ac.uk) who will be happy to help you. Remember, as per the module outline, that module leaders cannot grant extensions.

FULLY EXPECTING ~~to~~ HATE THIS CLASS!



@allison\_horst



# Module design, timetable, and support

- Introductions to important statistical principles and methods in quantitative social science.
  - Intuition over equations.

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  - Intuition over equations.
- 'Hands-on' experience putting these principles into practice in **R** using real-world data.
- Assessment on two small quantitative research projects where the topic is decided by you.

# Module design, timetable, and support

**Time & Location:** Time & Location: 12:00-14:50 in Geography Building, Computer Room B04 (Tuesdays, Week 1-6, 8-11)

**Consultation & Feedback Hours:** 10:00-11:00 Tuesdays (Week 1-12) and 15:00-16:00 Thursdays (Week 1-12). Book through Google Calendar by [clicking here](#).

## Maths and Statistics Help (MASH)

The Maths and Statistics Help (MASH) service on Glossop Road provide 1:1 and group support on learning statistics in **R**. You can book a tutorial by [visiting their webpages](#).

**R for Ultra Beginners** Workshops will usually be running through the first few weeks of the semester!



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And lastly, remember to **ask for help if you need it!** There is no such thing as a stupid question.

# What will we learn?

Week	Topic	Required Reading
1	What is quantitative social science?	Powell, T. C. (2019). 'Can Quantitative Research Solve Social Problems?' & Mehmetoglu & Mittner (2022) Chapter 1, 2 & 3, <i>Applied Statistics Using R</i>
2	Types of quantification	Mehmetoglu & Mittner (2022) Chapter 4, <i>Applied Statistics Using R</i>
3	Relationships between variables	Mehmetoglu & Mittner (2022) Chapter 5, <i>Applied Statistics Using R</i>
4	Inference	Mehmetoglu & Mittner (2022) Chapter 6, <i>Applied Statistics Using R</i>
5	Causality	Goldthorpe, J. H. 'Causation, Statistics and Sociology'
6	Bivariate Linear Regression	Mehmetoglu & Mittner (2022) Chapter 7, <i>Applied Statistics Using R</i>
7	Reading Week	Catch up reading week ( <b>Ready for assessment 1!</b> )
8	Multiple Linear Regression	Mehmetoglu & Mittner (2022) Chapter 8 & 9, <i>Applied Statistics Using R</i>
9	Logistic Regression	Mehmetoglu & Mittner (2022) Chapter 11, <i>Applied Statistics Using R</i>
10	Cluster Analysis	UC Business Analytics <a href="#">R Programming Guide 'k-means Cluster Analysis'</a> ( <a href="#">Available free online</a> ) <a href="#">'Hierarchical Cluster Analysis'</a> ( <a href="#">Available free online</a> )
11	Spatial Analysis	Imai, K. Chapter 5.3 'Quantitative Social Science: An introduction' ( <a href="#">Available online through the library</a> ) ( <b>Ready for assessment 2!</b> )



# Why R?

- R has a **steep learning curve**.
- R, mostly, **does not use menus**.
- R can have **unhelpful error messages**.
- R requires **learning how to code at the same time as learning methods and statistical theory**.



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- R can have **unhelpful error messages**.
- R requires **learning how to code at the same time as learning methods and statistical theory**.
  
- R is **free**.
- R is **flexible**: there are dozens of different ways to do the same thing. No way to use a certain method? You can even program it yourself.
- R promotes **reproducibility** through the use of script.
- R has a **great community** and a lot of **free resources**.

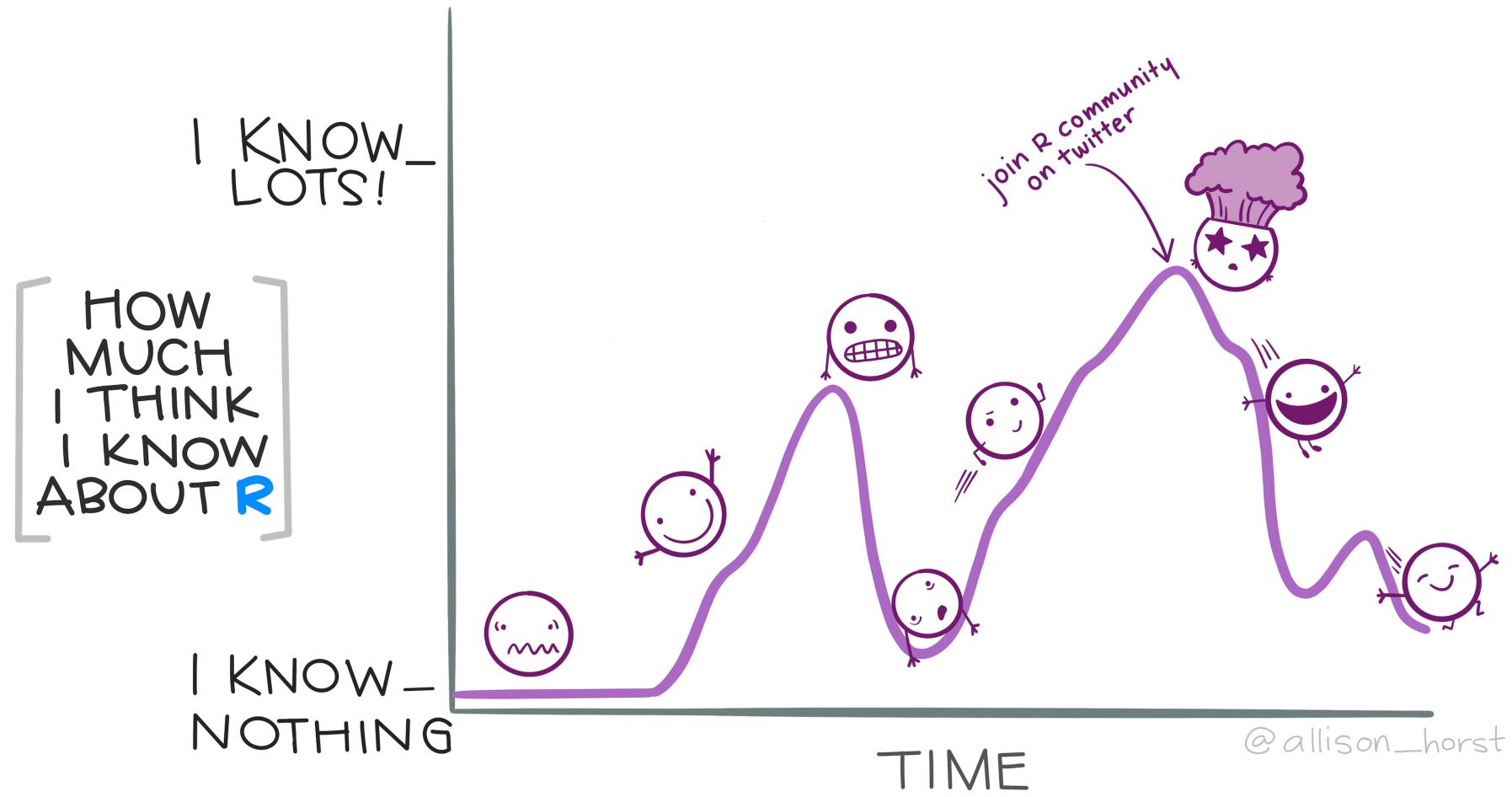


## Base R

```
data$log_income <- log(data$income)
summary(lm(data = subset(data, age > 15), formula = log_income ~ age))
```

## Tidyverse

```
data %>%
  filter(age > 15) %>%
  mutate(log_income = log(income)) %>%
  lm(., formula = log_income ~ age) %>%
  summary(.)
```



## How to use the reading/resource list?

- Probably at least 50% of module conveners effort goes towards putting together a [good quality reading & resource list](#). But not all students use it!



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The reading and resource list for this module includes:

- Detailed information about the topic each week as well as **suggested** or alternative reading. Where possible, free/online resources have been added as options.
- Contains extra resources for:
  - Learning **R**
  - Open data to practice on or use for your assessment



# Additional Resources & Workshops from the University

## Library

Research Skills and Critical Thinking (RSCT) workshops:

- Discovering Information: Getting Started
- Discovering Information: A masterclass

Online resources:

- How to read a journal article
- Active reading for understanding
- Tutorials A-Z

## 301 Skills Centre

- Academic skills refresher
- Reading and note-taking at university
- Managing your time and avoiding distractions
- Study Skills 1-to-1s

## M.A.S.H.

Statistics resources:

- First steps in R
- R/Excel/SPSS for Ultra-Beginners
- 1-to-1 Support

# Academic Misconduct & Integrity

Types of academic misconduct:

- **Plagiarism**

- You must not resubmit already submitted work (self-plagiarism) in assessment, even if that work was used in a different course/institution. You must ensure all sources are adequately and correctly cited.

- **Essay or code buying**

- Self-explanatory: all of your work must be your own.

- **Collusion**

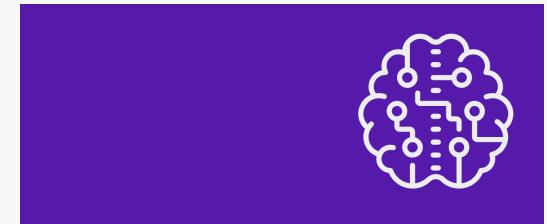
- While I encourage you to work together on the class exercises and challenges, you must not work together on your assessments. I'd encourage you to pick different research topics than your friends so that you can still chat about your assessments without collusion

- **Fabrication**

- You'll be expected to use real data and you must not fabricate data for the purpose of assessment.

- **Generative AI (False Authorship)**

- You must not use generative AI to write any of your code for you or to conduct any analysis used in your assessment.



## Academic Misconduct & AI Module Guidance

Last updated: July, 2025

The general guidance has been updated to fit with this module:  
Module code: EDC459

If ticked, the following sections have been modified to fit better with the module, please review them closely. Note that module convenors may choose to write more general guidance for their module in the guidance summary or general module specific guidance section, rather than breaking their guidance up over good practice areas:

Guidance Summary	<input checked="" type="checkbox"/>
How do I complete my ADE cover sheet?	<input type="checkbox"/>
Good practice: introduction	<input type="checkbox"/>
Good practice: planning	<input type="checkbox"/>
Good practice: working with literature	<input type="checkbox"/>
Good practice: writing code	<input type="checkbox"/>
Good practice: quantitative research	<input type="checkbox"/>
Good practice: qualitative research	<input type="checkbox"/>
Good practice: academic writing	<input type="checkbox"/>
Other general module specific guidance	<input type="checkbox"/>

Generative AI Guidance Available on the Blackboard Pages under Assessment Information

# TellUS and Student Feedback

The university is committed to **acting on student feedback**. Here are some examples of how the module has been developed based on student feedback in the past:

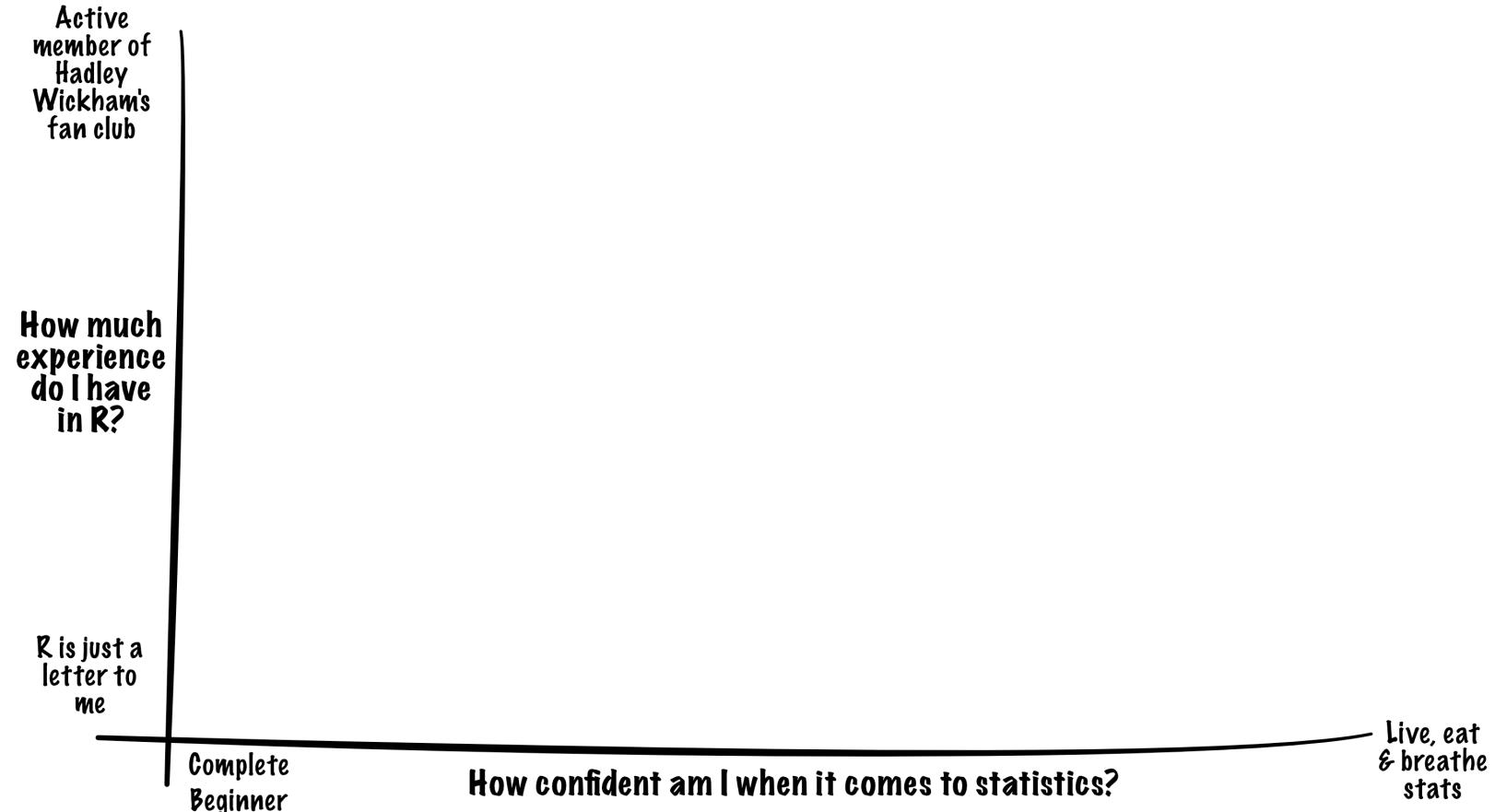
- Past students wanted answer sheets to be added to the R exercises so that they could get immediate feedback on whether they had interpreted the question correctly. **These have been added to all of the weekly R exercise folders.**
- Past students wanted there to be more of a bridge between the worksheets and being able to do your own analysis as expected in the assessments. **Each week a challenge has been added that requires you to apply your learning in a slightly less guided way, to help prepare you for the assessment.**
- Past students wanted more guidance on how to complete the assessments. **There are now two videos with detailed assessment guidance and a walkthrough for completing the first assessment.**
- Students wanted rapid feedback on their understanding. **Knowledge checks have been added throughout the module.**
- Students wanted more guidance on how they could and couldn't use generative AI in a way that wouldn't cause concerns about academic misconduct. **AI guidance was developed with specific reference to writing code and doing quantitative research.**



# A quick tour of the Blackboard Ultra Course page

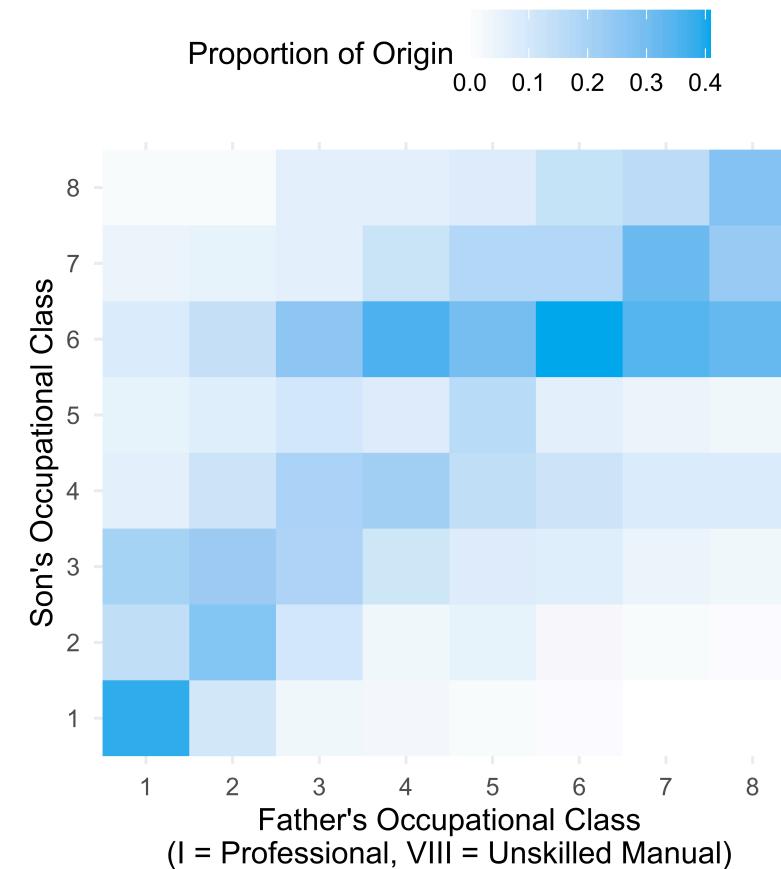


## Exercise: Who are you?



# What is quantitative social science?

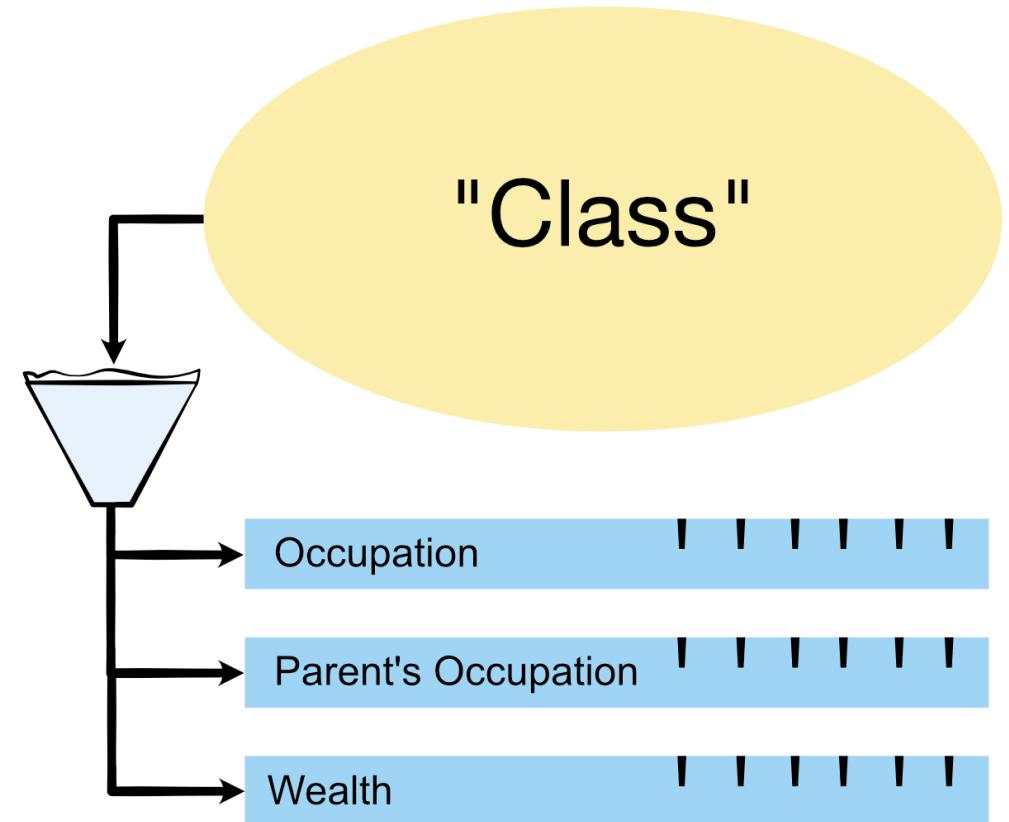
- The identification of **social patterns** through the quantification of data.
- **Operationalising** a concept so that it can be measured (on a numeric scale or codified with finite classifications).
- Checking the **validity** and **reliability** of that concept.
- Designing studies with **samples** that allow us to make **generalisations** about populations of interest, and/or claims about **causality**.
- **Collecting data** that can be organised, **explored** and **analysed** using a wide range of statistical methods.
- Make use of standardised, "**objective**" tools for collecting data, doing analysis, and answering research questions.



Data from Goodman, 1979 via Glass, 1954. Social Mobility in Britain.  
Data from 1949.

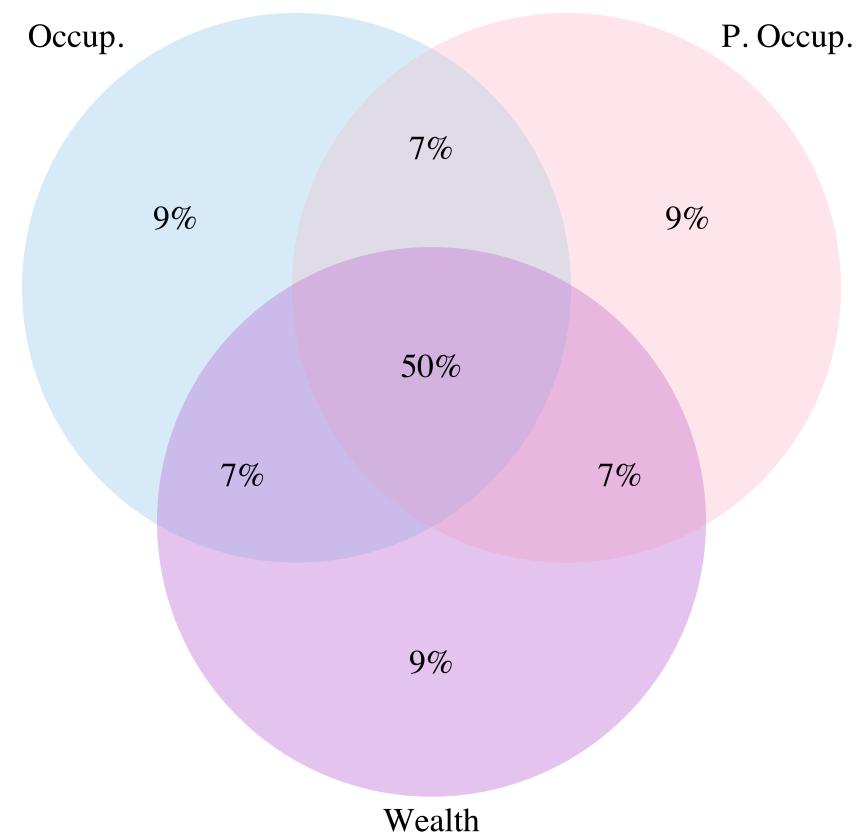
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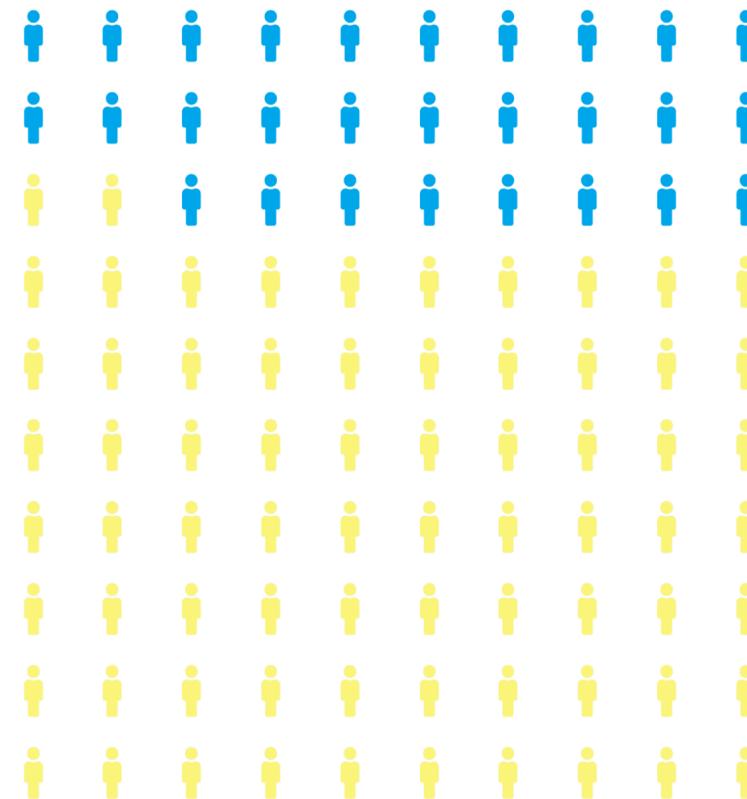
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$$\hat{Destination} = 3 + 0.46 \cdot Origin$$

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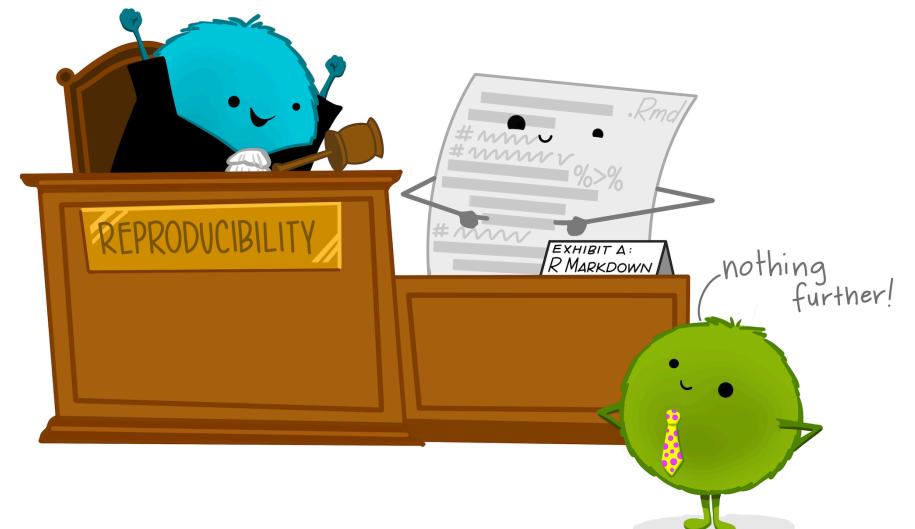


Illustration by Allison Horst

# Positivism



The way we research something reflects (implicitly or explicitly) **how we understand the human world**. You will explore this in much more detail in Principles of Social Research I.

- Quantitative research has a long association with Positivism: the **idea that we can apply the same scientific principles we use to study the natural world to understand the human/social world.**

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- Quantitative research has a long association with Positivism: the **idea that we can apply the same scientific principles we use to study the natural world to understand the human/social world.**
- "**Qualitative and quantitative research methods are now regarded as forming different, but equally vital, aspects of the social science research endeavour.**" Walter, 2006: 25. While quantitative research can be useful for establishing consistent **social patterns** and challenging conventional wisdom, it is limited in developing **social meaning**.

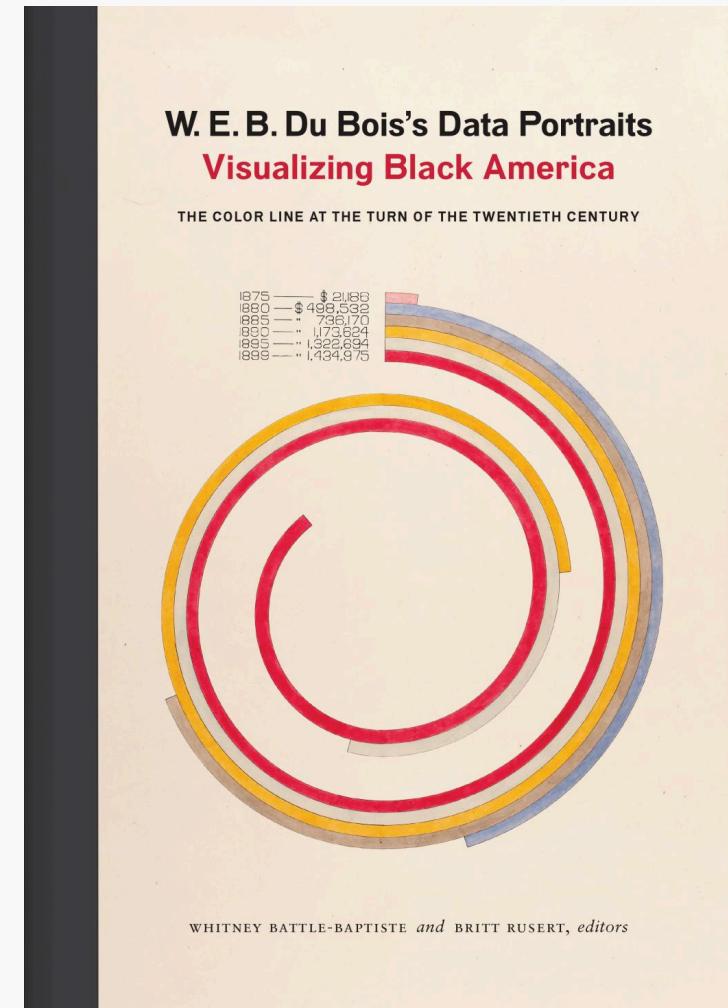
# Beyond Positivism: Pragmatism, social problems, and politics

Can quantitative social research solve social problems?

- Quantitative research as **activism** and **counter-storytelling** epitomised by **W.E.B. Du Bois**.

"The twisted logic ran if the black man was inferior he was not oppressed-his place in society was appropriate to his meager talent and intellect. Dr. Du Bois recognized that the keystone in the arch of oppression was the myth of inferiority and he dedicated his brilliant talents to demolish it."

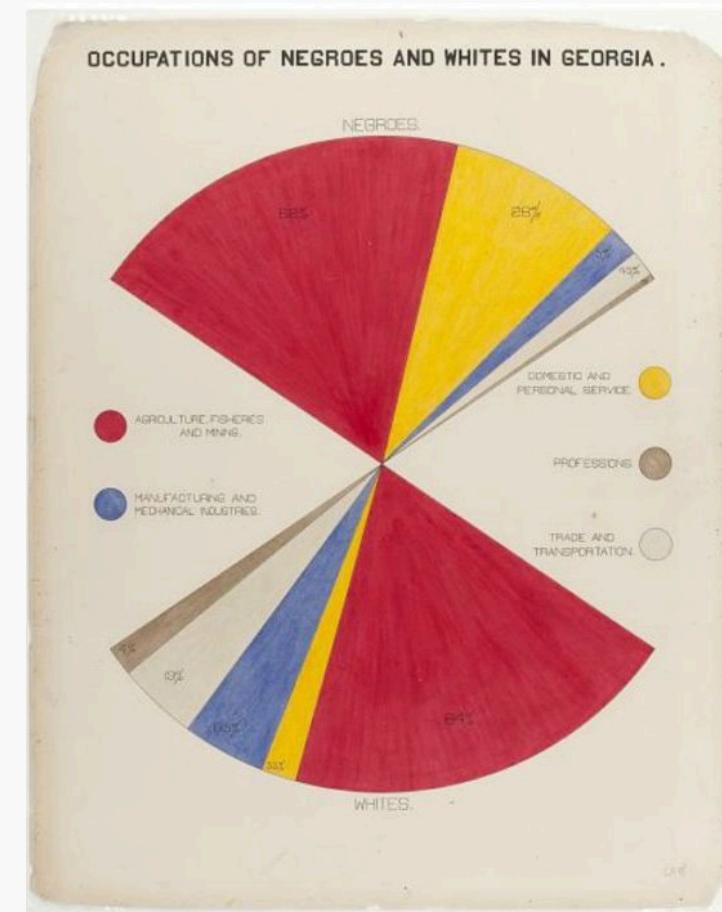
Dr. Martin Luther King Jr., cited in Morris, n.d.



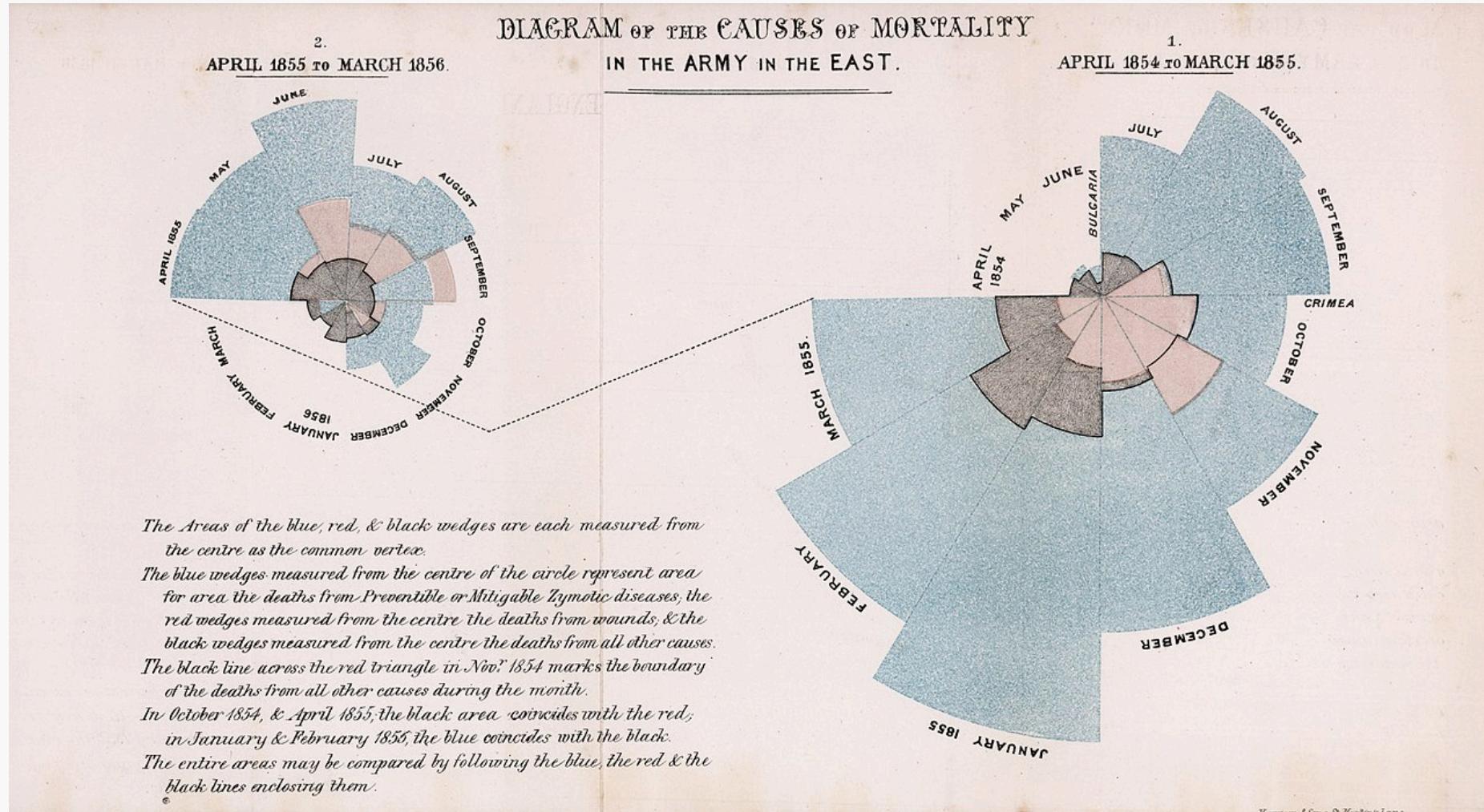
# Beyond Positivism: Pragmatism, social problems, and politics

Du Bois engaged in the continuous systemic collection, analysis, interpretation and dissemination of public health-related data in people of various racial groups [between 1896 and 1897] ... Du Bois' analysis and interpretation of racism led to his summative pronouncement that **systemic inequality was associated with increasing health risks and high mortality rates** ... When he connected the systemic inequality of racism to education, criminal justice, poverty, and employment, Du Bois demonstrated the importance of a multidisciplinary collaborative lens of social epidemiological research. ... Du Bois' recommended interventions and strategies to confront the determinants of health and determinants of death in the 7th Ward would have been well posed for policy development aimed at combating racism and eliminating health disparities.

Jones-Eversley & Dean. (2018). *After 121 Years, It's Time to Recognize W.E.B. Du Bois as a Founding Father of Social Epidemiology*



One of Du Bois' Data Portraits presented at the 1900 Paris Exhibition.



Florence Nightingale's famous 1850s data visualisation showing the impact of the Sanitary Commission on reducing the deaths of front line soldiers in the Crimean War.



**"Whenever I am infuriated, I revenge myself with a new diagram."**

Florence Nightingale (August 1857), cited in Gupta, 2020

"It's worth noting, before getting started, that this material is hard. If you find yourself confused at any point, you are normal. Any sense of confusion you feel is just your brain correctly calibrating to the subject matter. Over time, confusion is replaced by comprehension..."

Richard McElreath. (2020). *Statistical Rethinking: A Bayesian Course with Examples in R and Stan. 2nd Ed.*. Boca Raton, FL: CRC Press. p.193



## Value Objectivity

- Can we ever be free of all bias and political motivation in our research, as historical Positivism promoted (**dispassionate social inquiry**)?
- Would we even enjoy or want to do research if we were? **What would the point be?**

## Methodological Objectivity

- What we *can* do is ensure the methods we use, our data, and the steps we went through are **transparent, replicable, and well-communicated**.
- What do we lose by accepting and making our values explicit but retaining our methodological objectivity? What do we gain? (e.g. see: Indigenous Methodologies in Walter, 2006 and Andersen & Walter, 2013).

**Bifurcation of objectivity:** Jenkins, 2018; Powell, 2020.

# References

- **Battle-Baptiste, W., & Rusert, B. (Eds.). (2018).** WEB Du Bois's data portraits: Visualizing black America. Chronicle Books.
- **Goodman, L. A. (1979).** Simple models for the analysis of association in cross-classifications having ordered categories. *Journal of the American Statistical Association*, 74(367), 537-552.
- **Gupta, S. (2020).** Florence Nightingale understood the power of visualizing science. *ScienceNews*.
- **Jenkins, R. (2018).** Foundations of sociology: Towards a better understanding of the human world. *Macmillan International Higher Education*.
- **Jones-Eversley, S. D., & Dean, L. T. (2018).** After 121 years, it's time to recognize WEB Du Bois as a founding father of social epidemiology. *The Journal of Negro Education*, 87(3), 230-245.
- **Morris, A. (n.d.)** What's in a Name? W. E. B. Du Bois vs. W.E.B. DeBois. *UC Press Blog*.
- **Powell, T. C. (2020).** Can quantitative research solve social problems? Pragmatism and the ethics of social research. *Journal of Business Ethics*, 167(1), 41-48.
- **Walter, M. (2006).** The nature of social science research. *Social research methods: An Australian perspective*, 1-28.
- **Walter, M., & Andersen, C. (2016).** Indigenous statistics: A quantitative research methodology. Routledge.

# Getting set up in R

- Go to the **EDC459 Blackboard page -> Learning Materials -> Week 1**, and follow the tutorial for downloading and installing **R** and Rstudio.
- Use the **visual tour of Rstudio sheet** to familiarise yourself with the software.
- Follow the **"Creating a New R Project and Script" tutorial** to create a new project called "week-1-exercise"

## Week 1 **R** Exercise

- Copy the files in the "**Week 1 R Exercise**" folder in R into your new project directory.
- Open **week-1.R** in Rstudio and follow the tutorial written into the script to take your first steps programming in **R**!
- *You may not have time to finish this entire tutorial before the end of this session, but should complete it during your independent study time.*
- *In your own time, complete the challenge at the end and post about any errors in **R** you experienced on the class discussion board (link on Blackboard)..*