

# Quantitative Methods in Geographic Research

Welcome and Introduction

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Aug 20, 2025

# Outline

- Introductions
- Course Motivation and Overview
- Syllabus and Logistics

# Introductions

- Name/Preferred Name (if different)
- Major & Year
- I (don't) know what you did last summer!

A place you visited?

A dish you ate?

A hobby you picked up?

- You have \$1 million and one-way ticket. Where would you want to settle for the next 5 years?

# About Me

- ‘Sophomore’ Assistant Professor
- Health and Medical Geographer

Lots of GIS + (Spatial) Statistics

- First name pronounced as ‘*Maroon*’ with a ‘V’
- Last name pronounced as ‘*Go-yell*’
- You can call me Varun, Dr. Goel, Dr. G, Professor V

# My research

- Global Environmental Health (Asia, Africa)

Climate Change and Health

Human-Environment Interactions

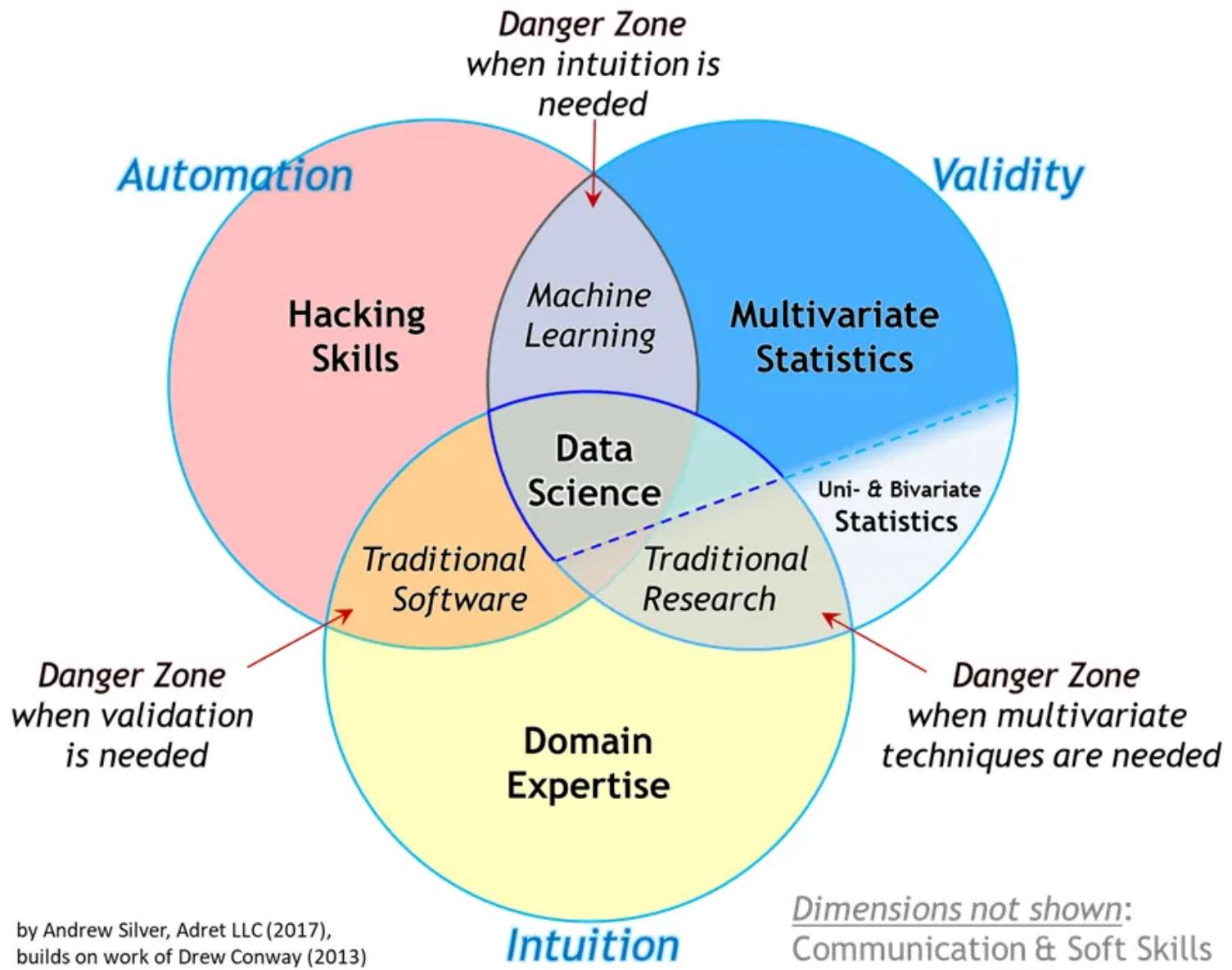
- Infectious Disease Ecology

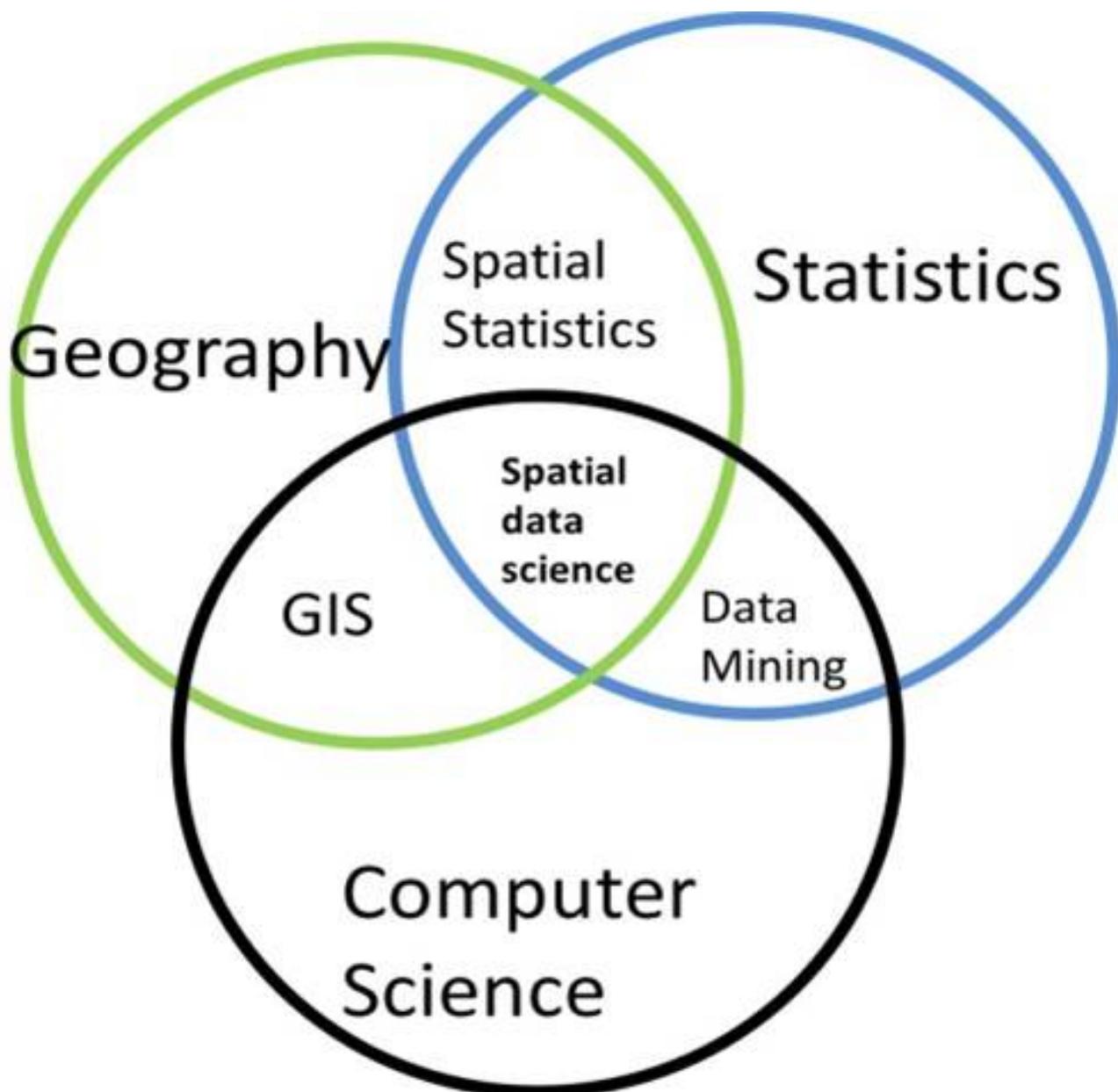
Malaria, Diarrhea, HIV, others

- Evaluation of Health interventions

- Applied Statistics

# What is this course about?

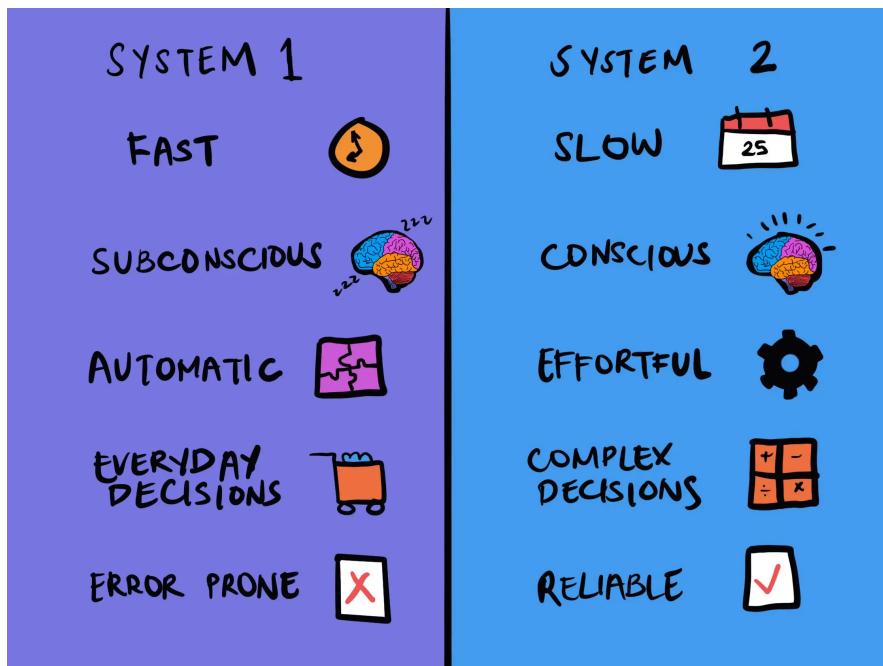




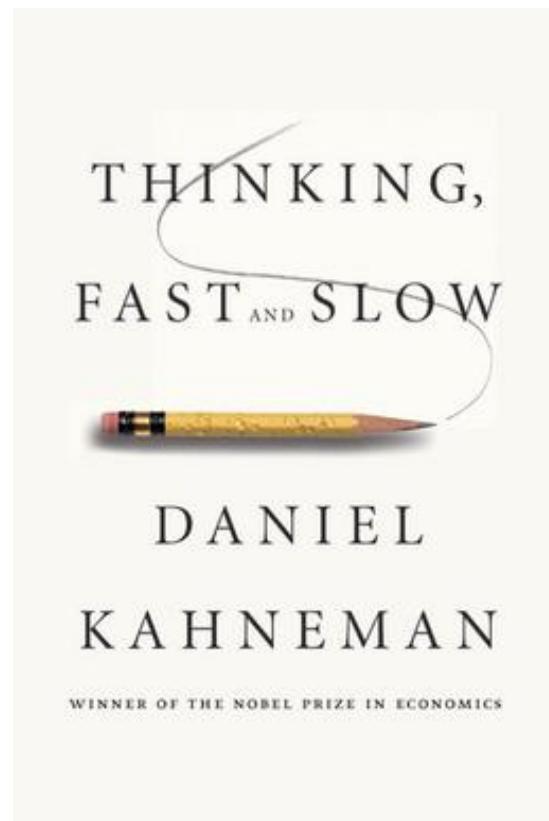
# Quantitative Methods in Geography

- Statistics
- Research methods/design
- GIS
- Spatial Analysis
- Programming
- Science Communication

# Statistics



Source: [The Decision Lab](#)

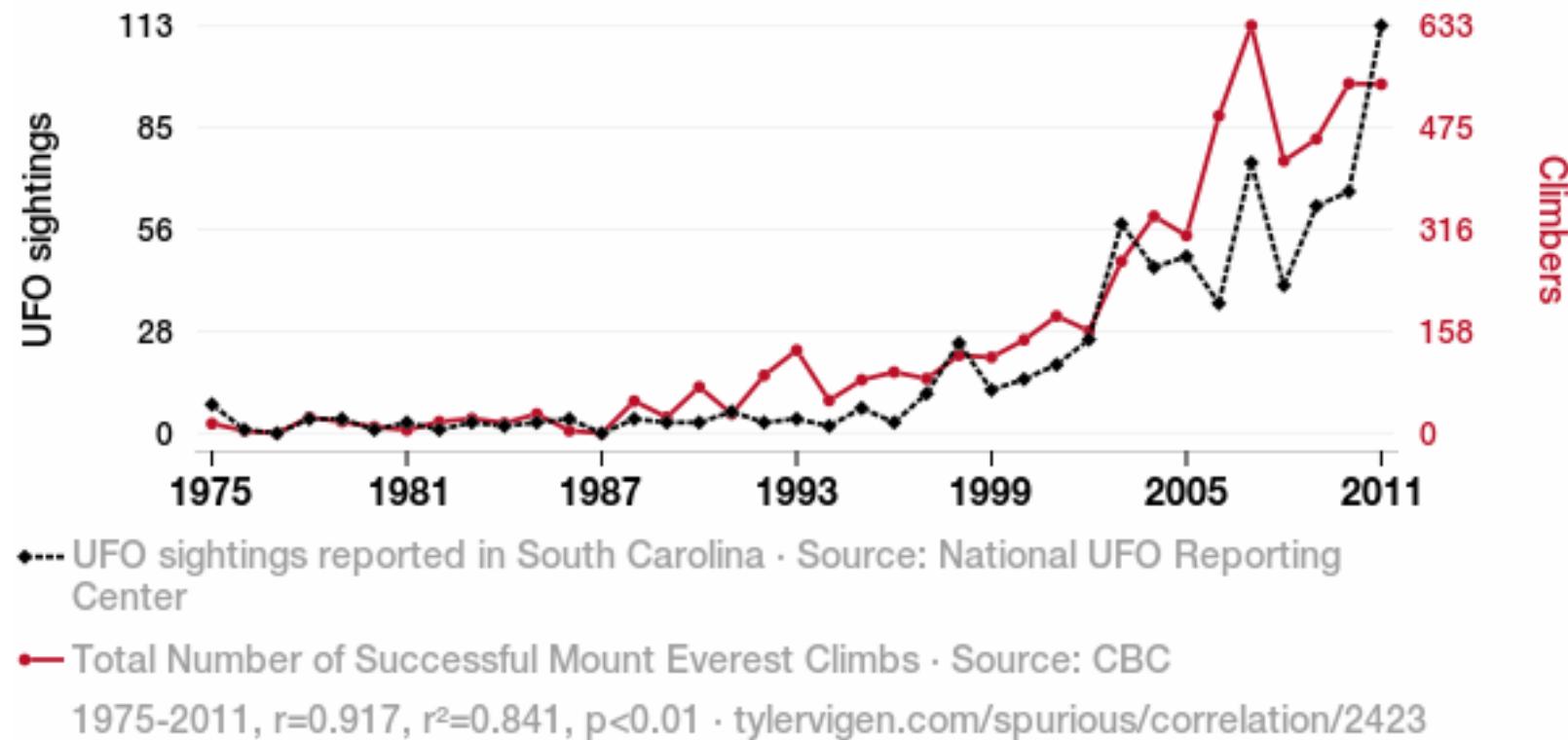


# Research Design

## UFO sightings in South Carolina

correlates with

## Total Number of Successful Mount Everest Climbs



Source: Tyler Vigen

# Better and Reliable Science Communication

THEY STUDIED  
DISHONESTY. WAS THEIR  
WORK A LIE?

Essay

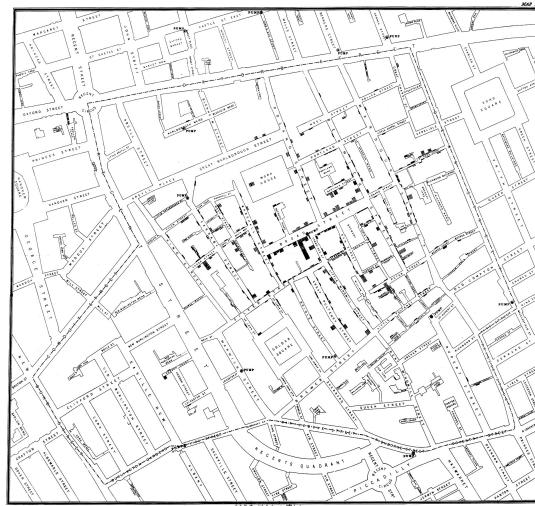
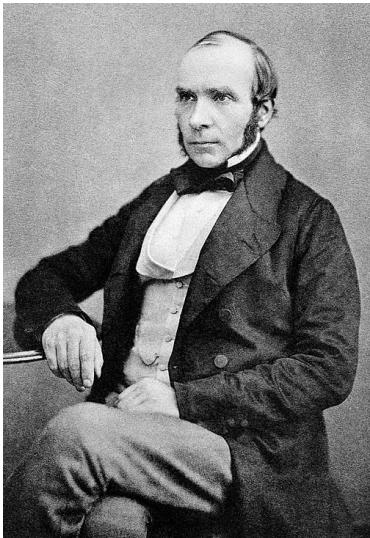
**Why Most Published Research Findings  
Are False**

John P. A. Ioannidis

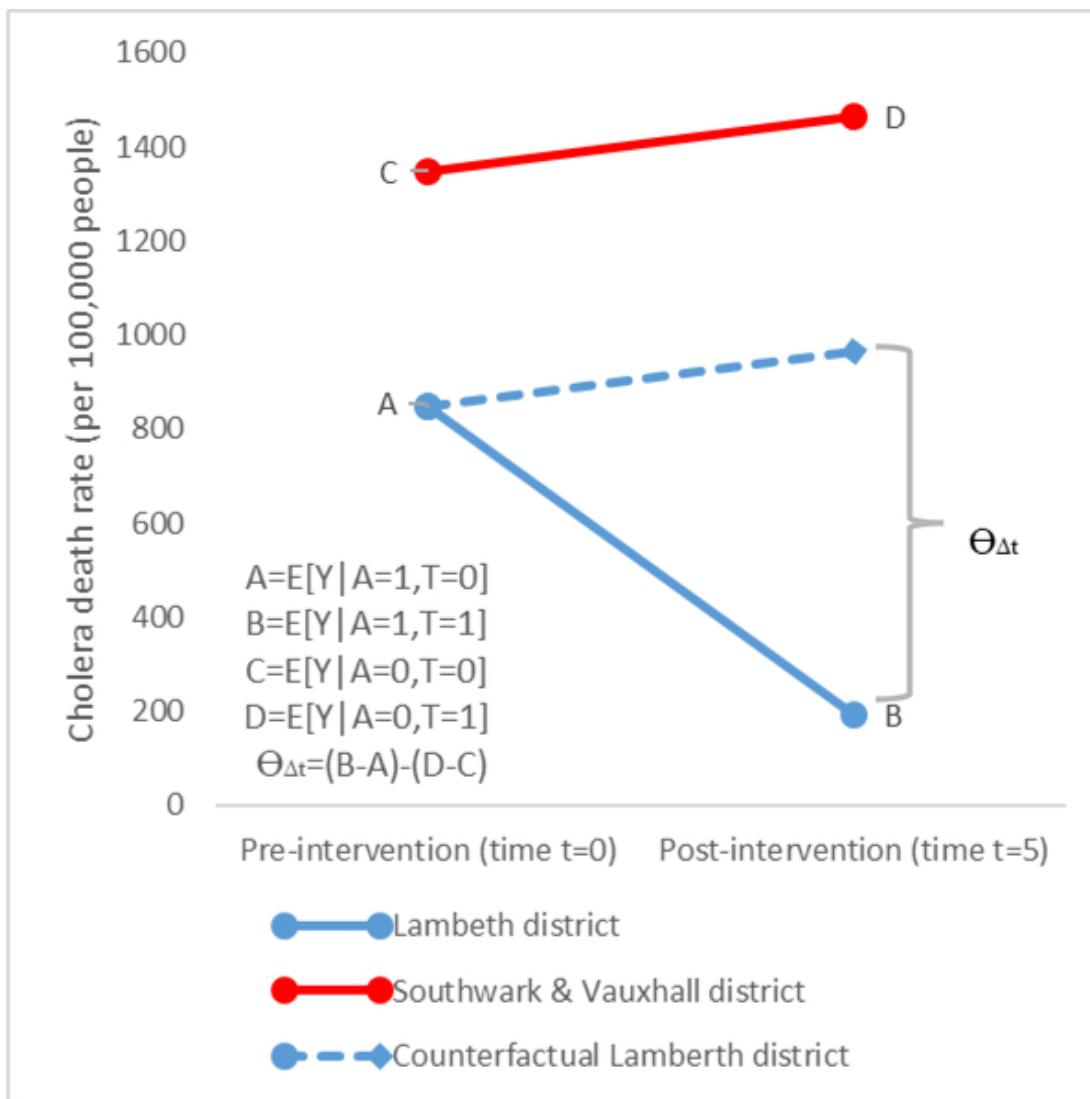
# Example: Jo(h)n Snow and Cholera



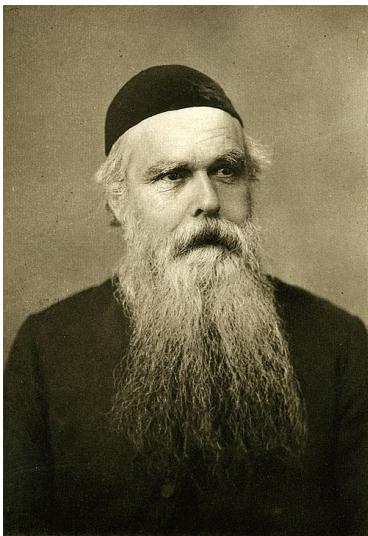
# Example: Jo(h)n Snow and Cholera



# Example: Jo(h)n Snow and Cholera



# Example: Jo(h)n Snow and Cholera



# Example: Jo(h)n Snow and Cholera

TABLE III.

*Shewing the results of the whole Inquiry during the First Seven Weeks of the Epidemic, arranged in Districts.*

Registration Districts.	Number of inhabited houses in 1851.	Population in 1851.	Estimated constant population per house.	"Number of houses, and estimated number of persons, supplied in 1854 with water as under."				Water supply of the houses in which fatal attacks of cholera took place during first seven weeks of epidemic of 1854.				Deaths in first seven weeks of epidemic.			Mortality per 10,000 supplied with water as under.	
				By the Southwark and Vauxhall Co.		By the Lambeth Company.		Southwark and Vauxhall Co.	Lambeth Co.	Thames, canals, or ditches.	Pump-wells.	Supply not ascertained.	Deaths in first seven weeks of epidemic.	Southwark and Vauxhall Co.	Lambeth Co.	
				No. of houses.	Estimated population	No. of houses.	Estimated population									
St. Saviour, Southwark .....	4,600	35,731	7·8	2,631	19,617	1,089	14,201	126	13	10	0	1	150	64·4	9·1	
St. Olave, Southwark .....	2,360	19,375	8·2	2,193	18,638	0	0	91	0	8	0	5	104	48·8	..	
Bermondsey.....	7,007	48,128	6·9	8,402	57,884	268	1,785	266	0	25	0	0	291	45·9	..	
St. George, Southwark .....	6,992	51,824	7·4	3,419	25,039	3,183	23,712	134	20	0	0	3	157	53·5	8·4	
Newington .....	10,458	64,816	6·2	5,224	31,940	5,473	33,531	155	11	0	1	2	169	48·5	3·2	
Lambeth .....	20,447	139,325	6·8	8,077	54,982	11,763	83,786	176	43	8	7	9	243	32·8	4·9	
Wandsworth .....	8,276	50,764	6·1	3,028	18,390	618	3,870	62	1	16	17	0	96	33·7	3·3	
Camberwell .....	9,412	54,667	5·8	4,005	23,472	1,835	10,478	185	9	0	2	1	197	78·8	8·5	
Rotherhithe.....	2,792	17,805	6·4	2,386	14,951	0	0	68	0	35	0	0	103	45·4	..	
Sub-district of Sydenham....	801	4,501	5·6	0	0	unknown.	unknown.	0	1	0	2	1	4	..	..	
Not identified .....	..	..	6·6	411	2,712	25	165	..	..	..	..	..	..	..	..	
Totals.....	73,145	486,936	6·7	39,726	267,625	24,854	171,528	1263	98	102	29	22	1514	47·2	5·7	553

# A simple yet powerful descriptive spatial statistic

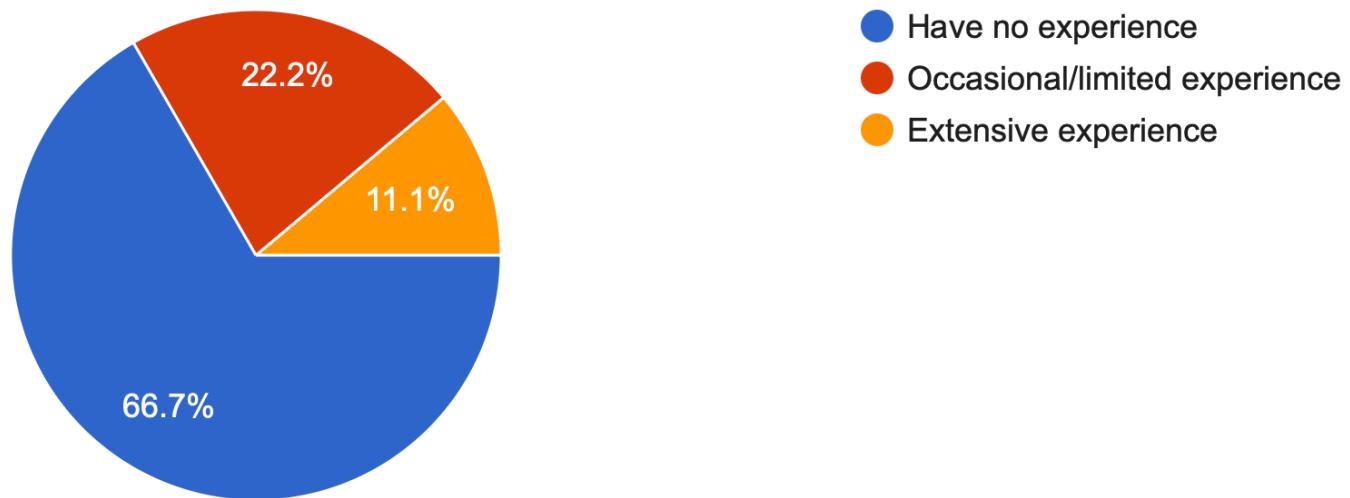


Source: Wikipedia/US Census

# **Logistics**

- Syllabus
- Attendance and Participation. Discussion + Practice > Lecture
- Use of Generative AI.
- Hosting materials. Blackboard v/s Course website
- Asking for Help. Be Proactive

# What is your experience level with R?



# R

- Programming Language written by Statisticians primarily for statistical computing
- Big community and support
- Suitable for Geographic Research

Very strong spatial statistics capabilities

Great data visualization + mapping

Supported by packages (similar to libraries in Python)

# R Studio, Posit Cloud

- R Studio: Integrated Development Environment for R

Makes Dull R more Fun

- Posit Cloud: Rstudio in the cloud

Reduces steep learning curve

Reduces technical issues

- Sign up at <https://posit.cloud/> with your SCHOOL email

# Questions?