

In-person session 8

March 6, 2025

PMAP 8521: Program evaluation
Andrew Young School of Policy Studies

Plan for today

Matching and IPW

Models vs. designs

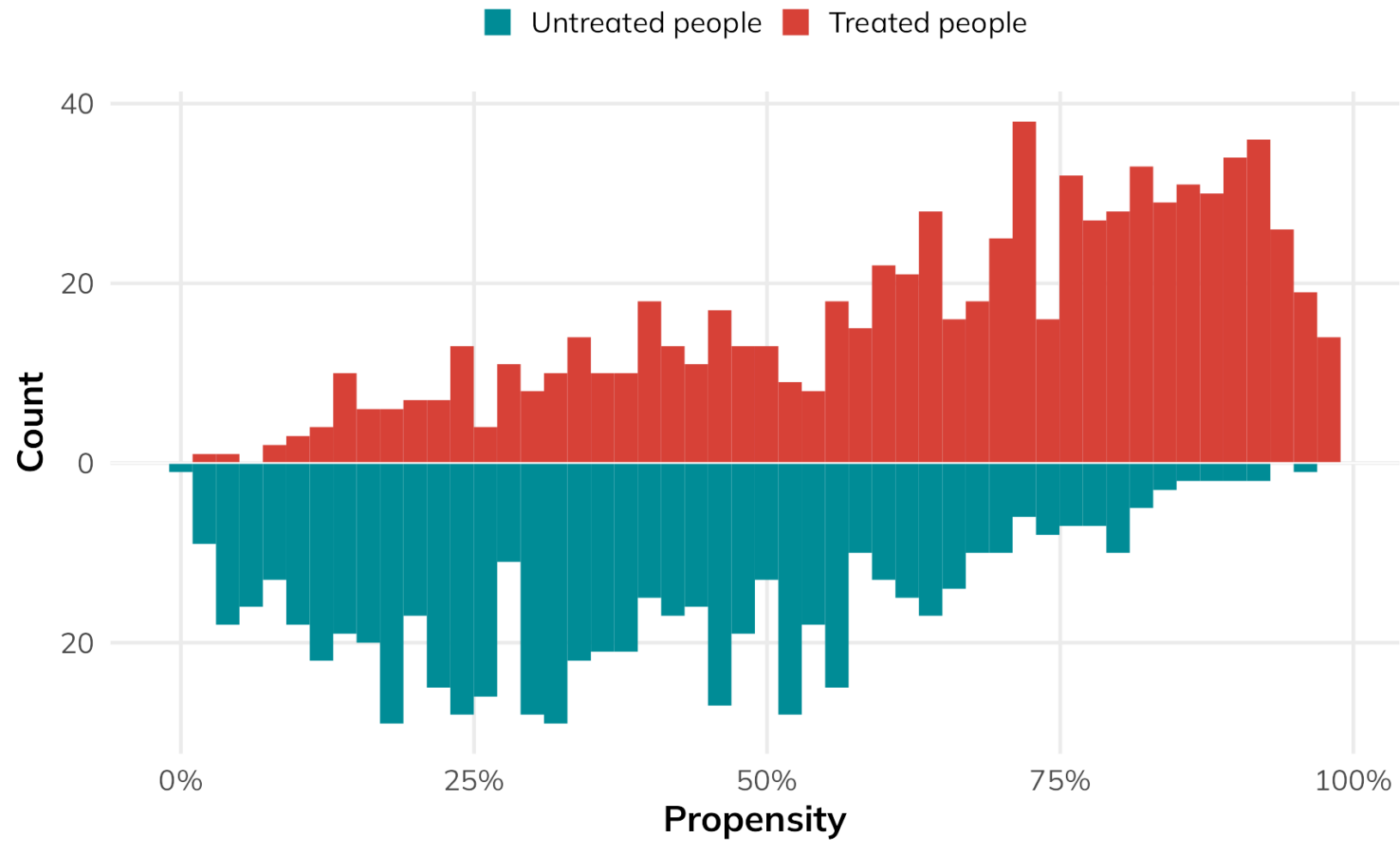
Interactions and regression

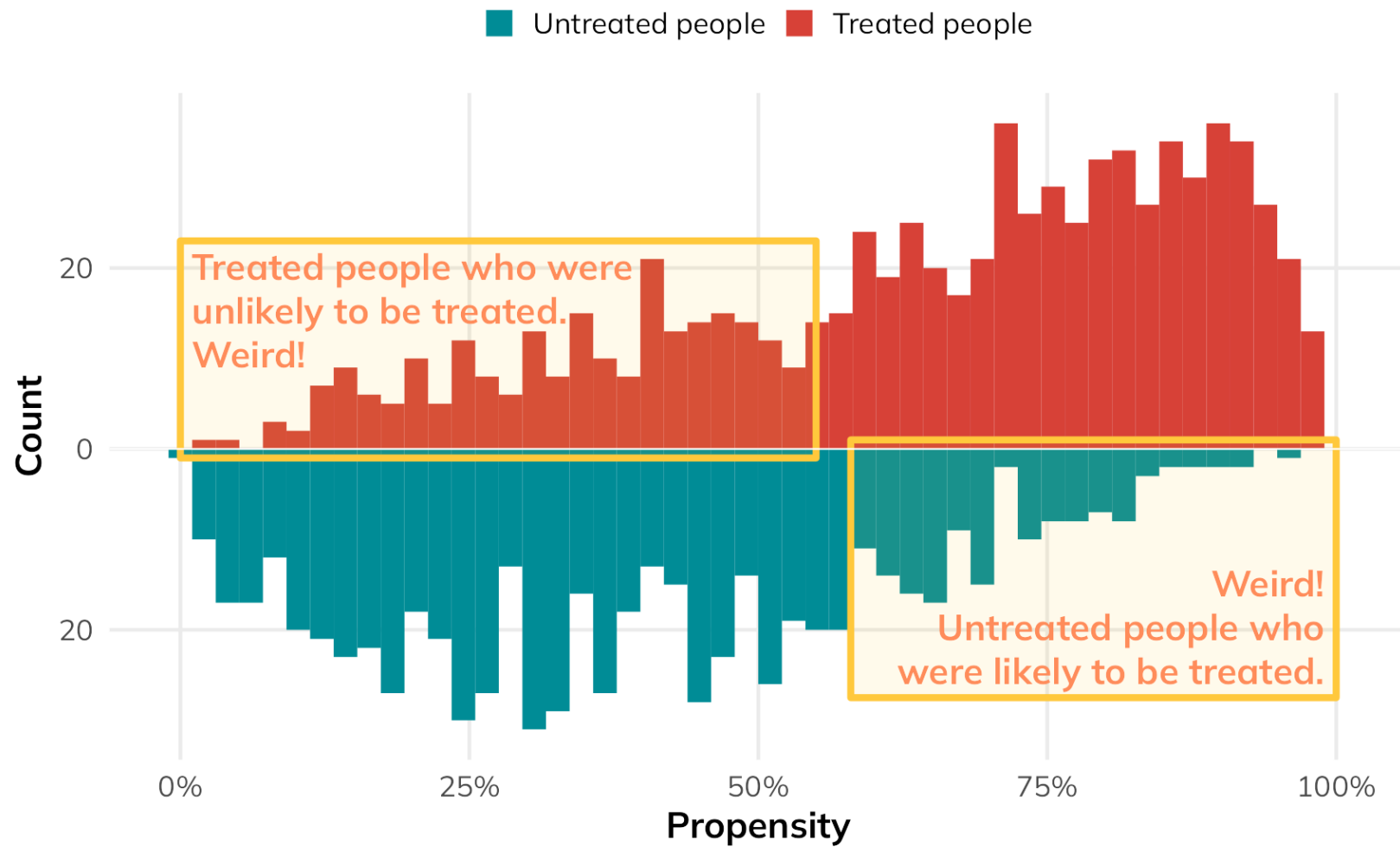
Simple diff-in-diff

Matching and IPW

**Can you talk more about
propensity scores and
"weirdness" weights?**

Lecture slide







**Why not just control for confounders
instead of doing the whole
matching/IPW dance?**

**Do you have to use
logistic regression + OLS for IPW?**

No!

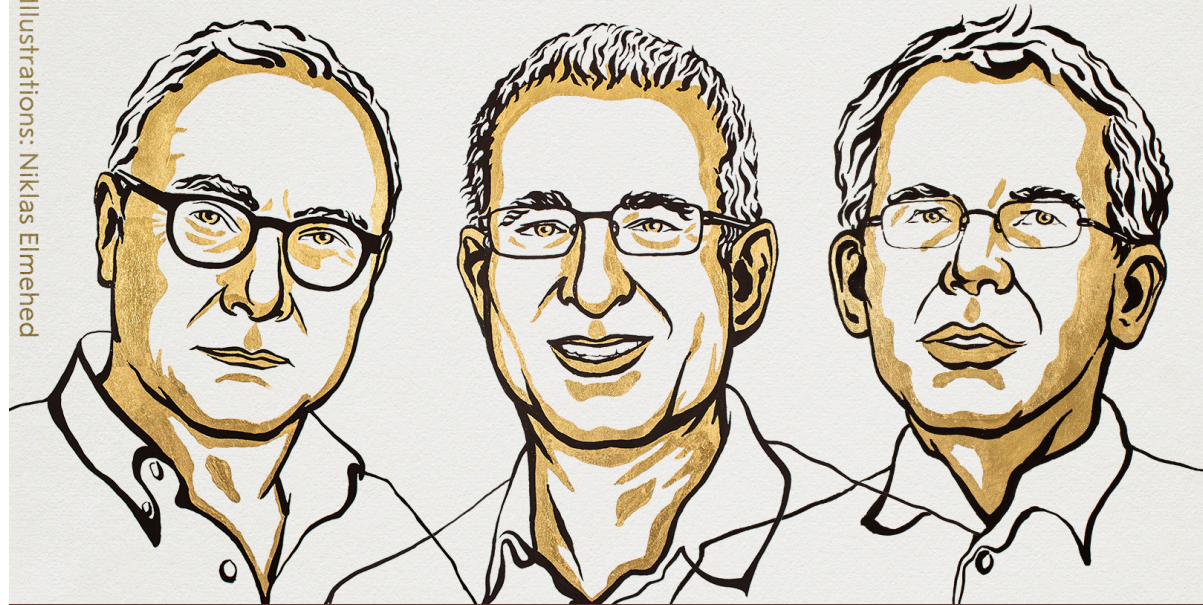
**Which should we use?
Matching or IPW?**

**Can you walk through an example of
IPW and matching in class?**

Models vs. designs

THE SVERIGES RIKSBANK PRIZE
IN ECONOMIC SCIENCES IN MEMORY
OF ALFRED NOBEL 2021

Illustrations: Niklas Elmehed



David
Card

"for his empirical
contributions to labour
economics"

Joshua
D. Angrist

"for their methodological
contributions to the analysis
of causal relationships"

Guido
W. Imbens

THE ROYAL SWEDISH ACADEMY OF SCIENCES

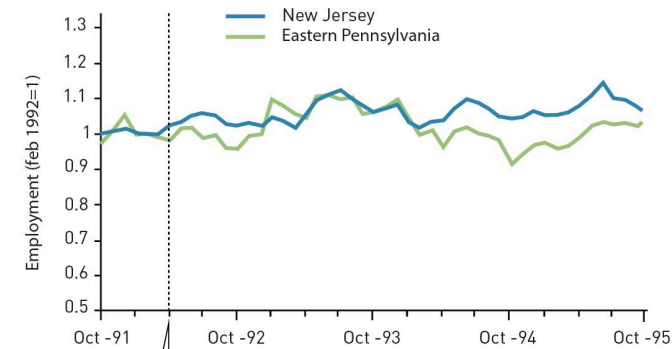
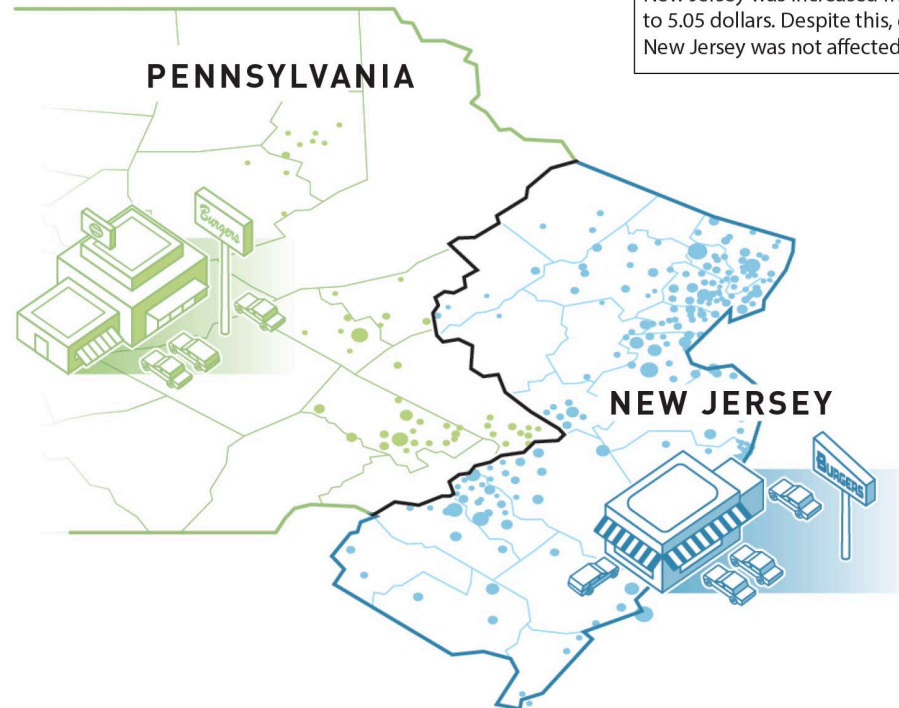


The effect of increasing the minimum wage

Card and Krueger used a natural experiment to study how increasing the minimum wage affects employment.

The researchers identified a treatment group (restaurants in New Jersey) and a control group (restaurants in eastern Pennsylvania) to measure the effect of increasing the minimum wage.

● CONTROL GROUP ● TREATMENT GROUP



1 April 1992: The hourly minimum wage in New Jersey was increased from 4.25 dollars to 5.05 dollars. Despite this, employment in New Jersey was not affected.

Design-based vs. model-based inference

Special situations vs. controlling for stuff

How would you know when it is appropriate to use a quasi-experiment over an RCT?

Identification strategies

The goal of *all* these methods is to isolate (or **identify**) the arrow between treatment → outcome

Model-based identification

DAGs

Matching

Inverse probability weighting

Design-based identification

Randomized controlled trials

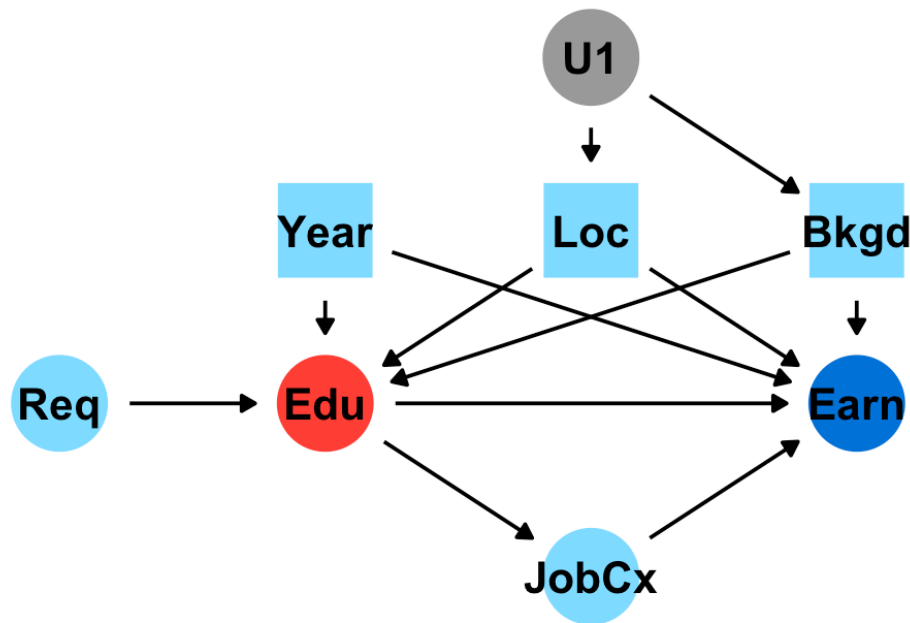
Difference-in-differences

Regression discontinuity

Instrumental variables

Model-based identification

Use a DAG and *do*-calculus to isolate arrow



Core assumption:
selection on observables

Everything that needs to
be adjusted is measurable;
no unobserved confounding

Big assumption!

This is why lots of people don't like DAG-based adjustment



~~Prince~~ Charles King

- Male
- Born in 1948
- Raised in the UK
- Married twice
- Lives in a castle
- Wealthy & famous



Ozzy Osbourne

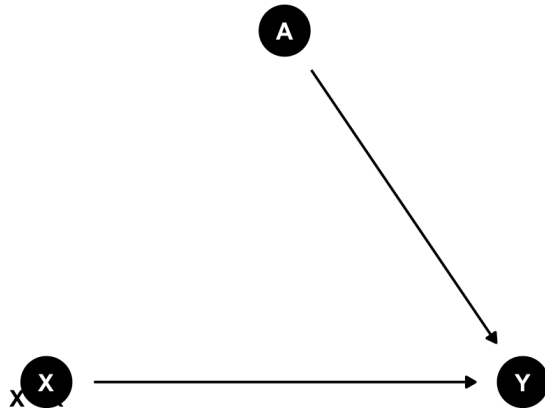
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- Born in 1948
- Raised in the UK
- Married twice
- Lives in a castle
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Design-based identification

Use a special situation to isolate arrow

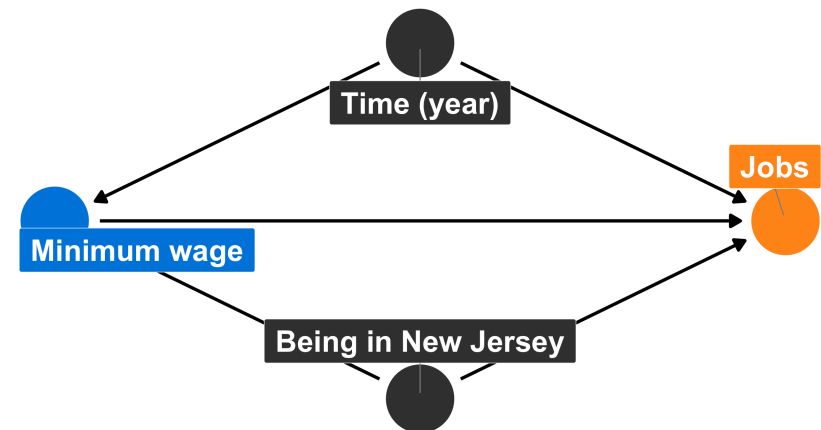
RCTs

Use randomization to remove confounding



Difference-in-differences

Use before/after & treatment/control differences to remove confounding



**Which is better or more credible?
RCTs, quasi experiments,
or DAG-based models?**

THE CAUSALITY CONTINUUM

Differences

Pre-post

Multiple
regression

Matching

Diff-in-diff

Natural
experiments

Regression
discontinuity

RCTs

Correlation

Causation



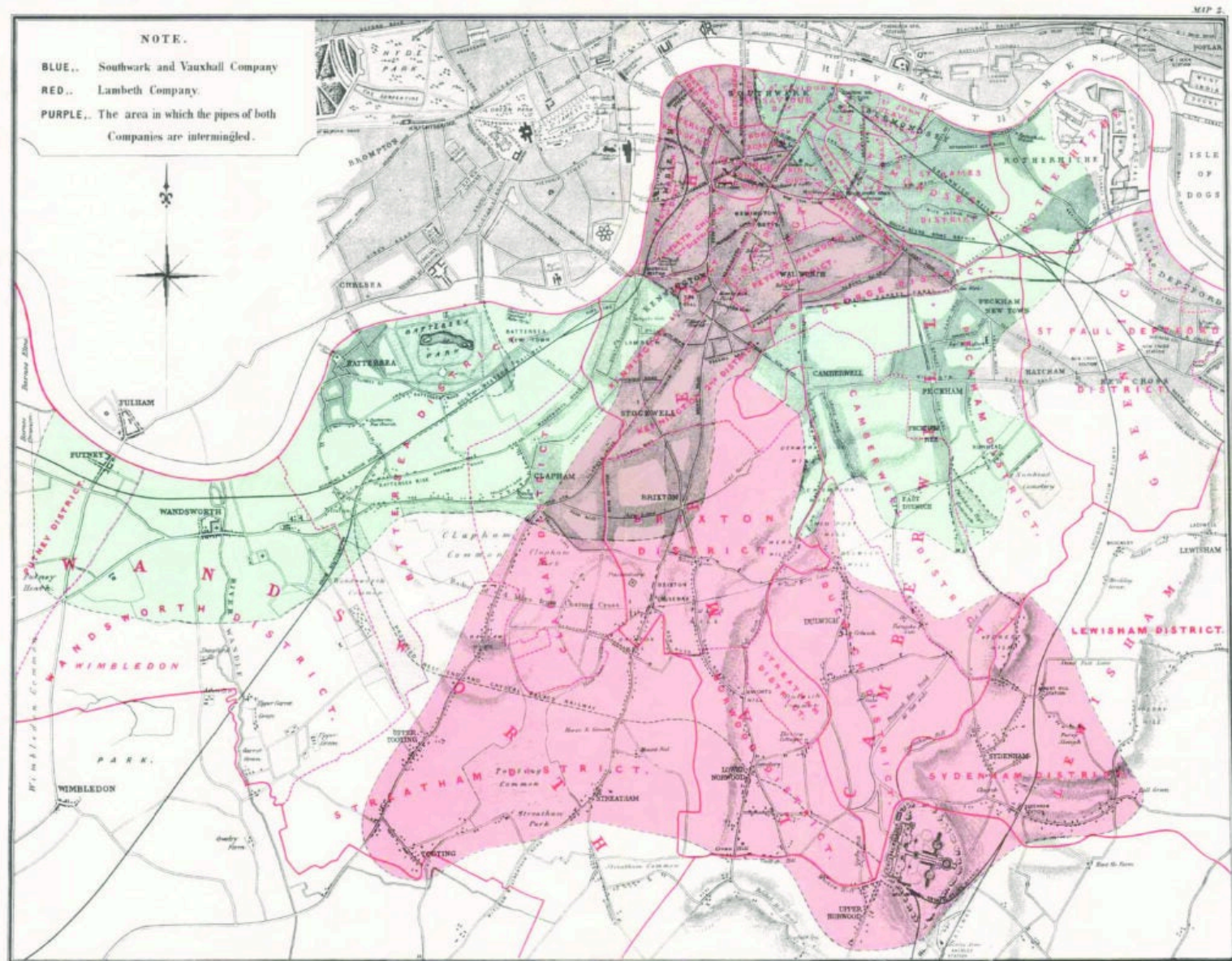
There's no hierarchy!

Interactions and regression

Can we talk more about interaction terms and how to interpret them?

Regression is just fancy averages!

Simple diff-in-diff



1849

Cholera deaths per 100,000

Southwark & Vauxhall: 1,349

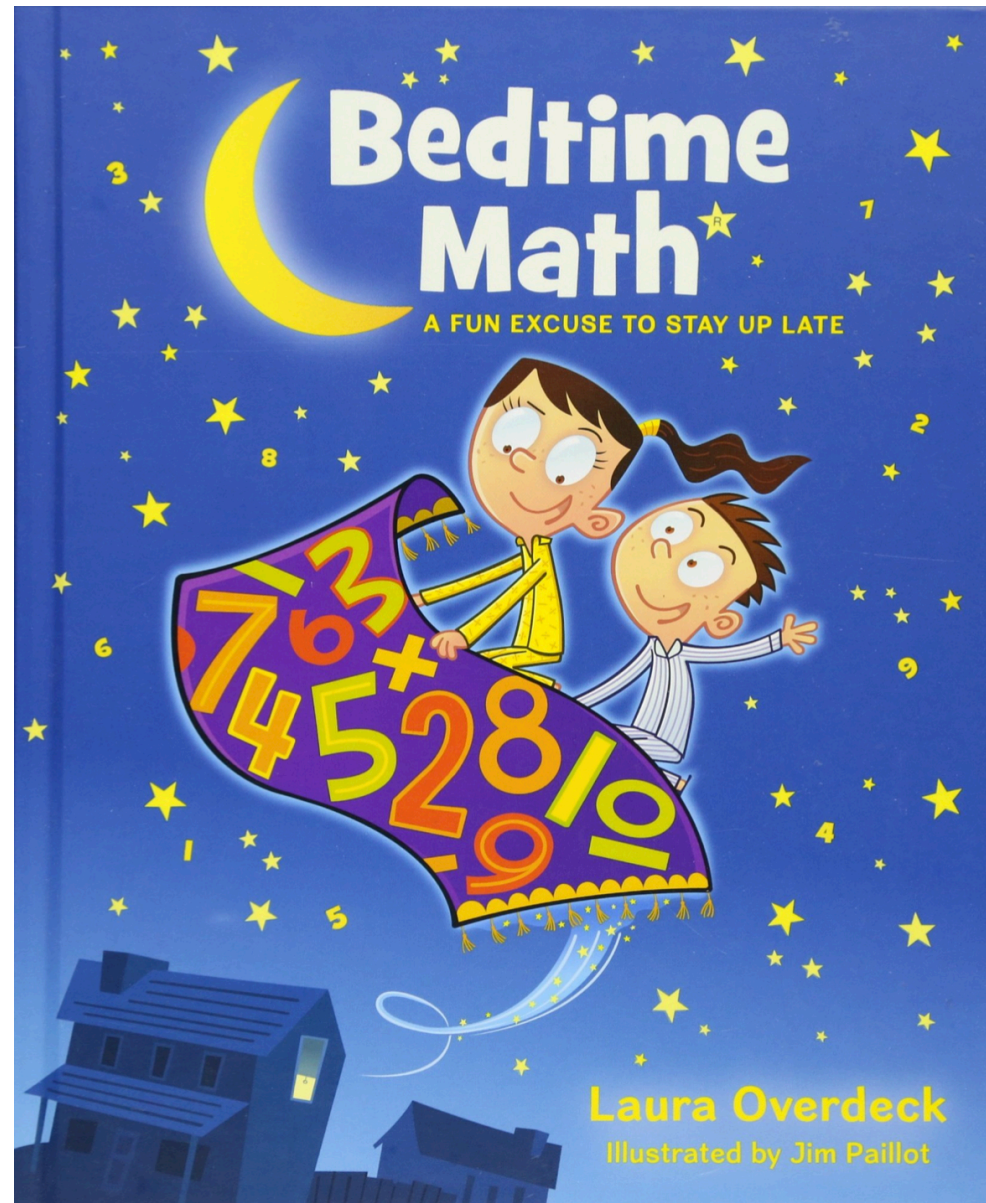
Lambeth: 847

1854

Cholera deaths per 100,000

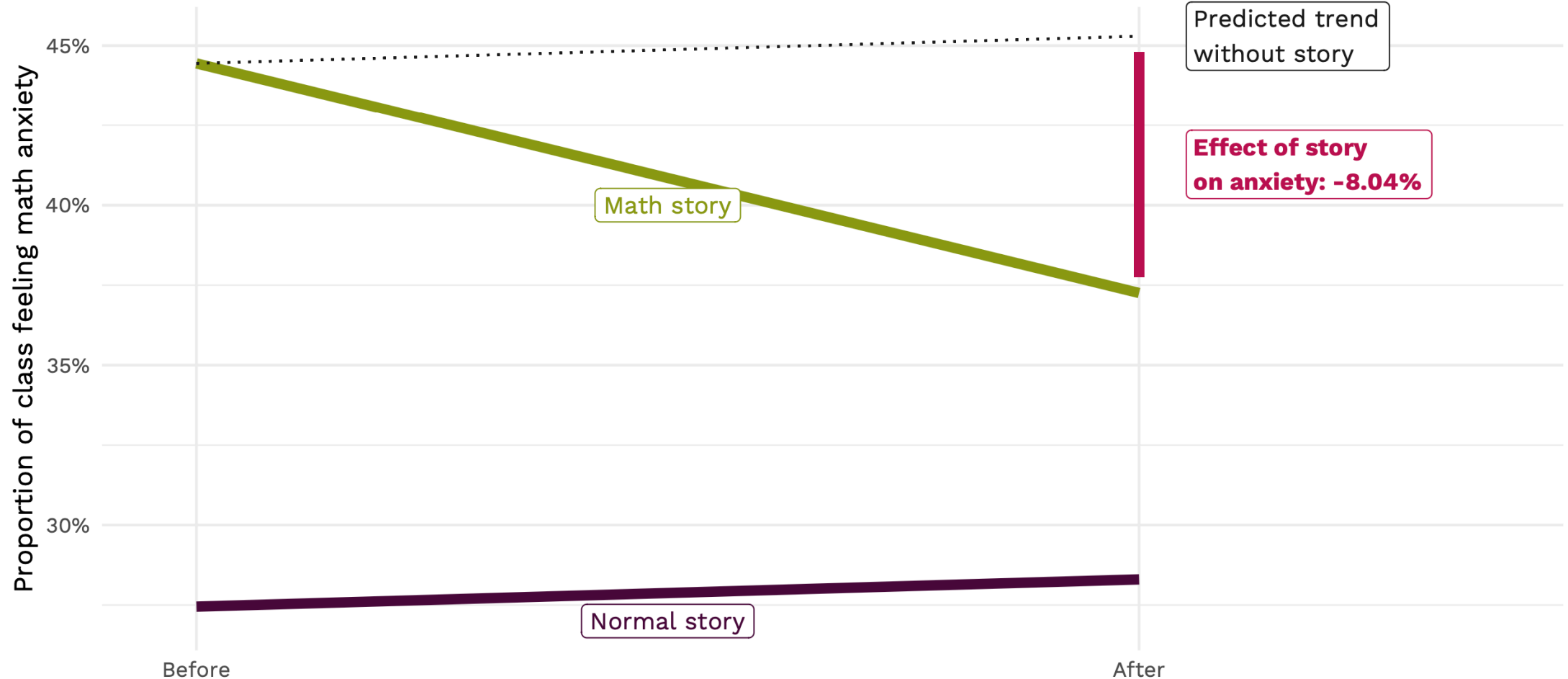
Southwark & Vauxhall: 1,466

Lambeth: 193



Reading a story about math reduces math anxiety

Experiment in four 4th grade classes



When doing your subtracting to get your differences in the matrix, is it better to do the vertical or horizontal subtractions?

Are there situations where one is preferable to the other?

**Why are we learning
two ways to do diff-in-diff?
(2x2 matrix vs. $\tau_m()$)**

What happened to confounding??

**Now we're only looking
at just two "confounders"?**

Should we still control for things?

**Can you walk through an example of
diff-in-diff in class?**