How long to conduct your experiment?

05-26

Andrew Wheeler, PhD
andrew.wheeler@crimede-coder.com

My Background

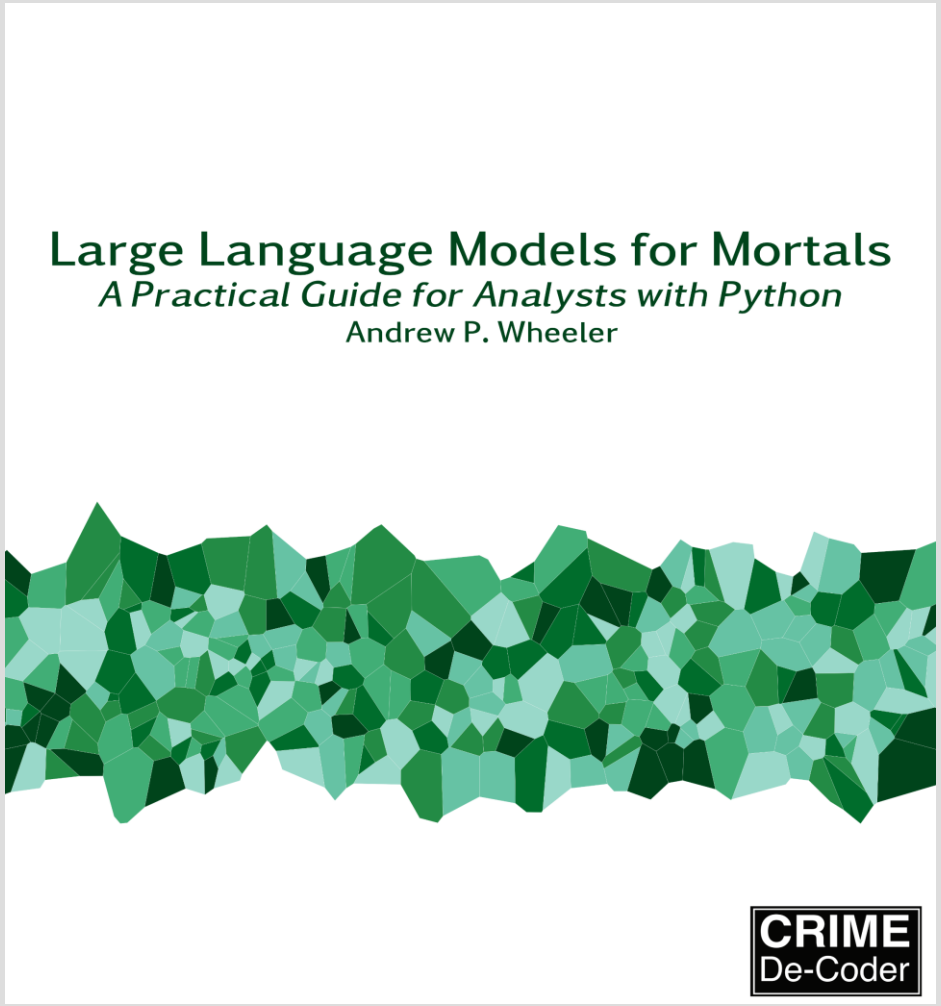
CRIME De-Coder

PhD Criminal Justice

- Statistical Analysis
- Operations Research
- Predictive Modelling
- Policy Analysis

Examples of Prior Work

- Predictive accuracy of violent offender forecasts (Wheeler et al., 2019)
- Cost of crime hotspots (Wheeler & Reuter, 2021)
- Racial bias in officer involved shootings (Wheeler et al., 2017)



Andrew Wheeler, PhD

andrew.wheeler@crimede-coder.com

What is the point?

CRIME De-Coder

Want to see if some intervention is working

- Does targeted patrol at X housing unit reduce crime?
- Did our policy change reduce officer use of force?

Andrew Wheeler, PhD

andrew.wheeler@crimede-coder.com

What is the point?

CRIME De-Coder

Want to see if some intervention is working

- Does targeted patrol at X housing unit reduce crime?
- Did our policy change reduce officer use of force?

Basic Assumptions

- You want a counterfactual estimate (does not need to be randomized)
- These estimators are for counting things
- E.g. counts of crime
- E.g. rates of events (clearances, use of force, etc)

Andrew Wheeler, PhD

andrew.wheeler@crimede-coder.com

Longer is better

CRIME De-Coder

Our *treatment effect* can be expressed as some equation:

$$\mathbb{E}[y] = \beta_0 + \beta_1 \cdot \text{treated}$$

- β_1 is the treatment effect

- Example: 10 crimes in control, 5 crimes in treated
- $\mathbb{E}[\text{crime}] = 10 + (-5) \cdot \text{treated}$
- Treatment effect is -5 crimes

Andrew Wheeler, PhD

andrew.wheeler@crimede-coder.com

Longer is better

CRIME De-Coder

Our effect has a standard error

$$\mathbb{E}[\text{crime}] = 10 + (-5) \cdot \text{treated}$$

- Assuming Poisson, standard error is 4
- 95% Confidence interval for the treatment effect is -13 to +3 crimes

Andrew Wheeler, PhD

andrew.wheeler@crimede-coder.com

Longer is better

CRIME De-Coder

Our effect has a standard error

$$\mathbb{E}[\text{crime}] = 10 + (-5) \cdot \text{treated}$$

- Assuming Poisson, standard error is 4
- 95% Confidence interval for the treatment effect is -13 to +3 crimes

$$\mathbb{E}[\text{crime}] = 100 + (-50) \cdot \text{treated}$$

- Standard error for this equation is 12
- 95% Confidence interval for the treatment effect is -74 to -26 crimes

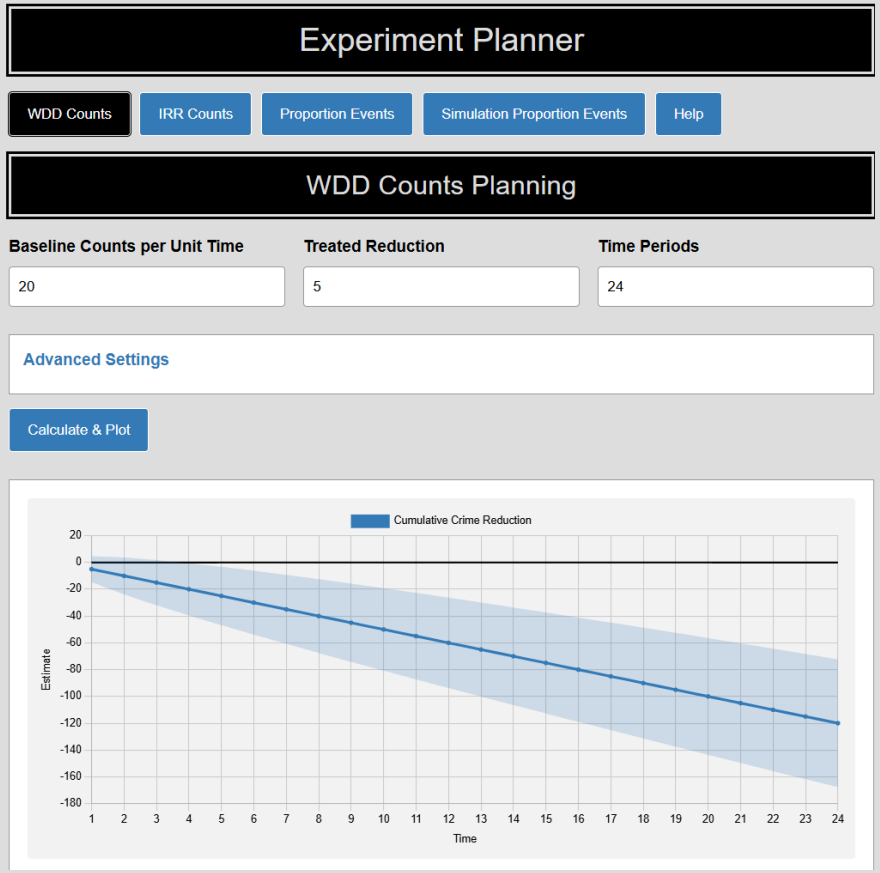
Andrew Wheeler, PhD

andrew.wheeler@crimede-coder.com

How long to plan your experiment?

CRIME De-Coder

- Need to know baseline number of events in treated/control
- Need to estimate *realistically* how much your intervention will work
- Demo of planning app



Andrew Wheeler, PhD

andrew.wheeler@crimede-coder.com

Other scenarios

CRIME De-Coder

Having pre-treated data *can* make the estimator smaller

- Changes estimator to Difference in Difference (for WDD and IRR estimator)

With rates, smaller rates need to monitor for a much longer period of time

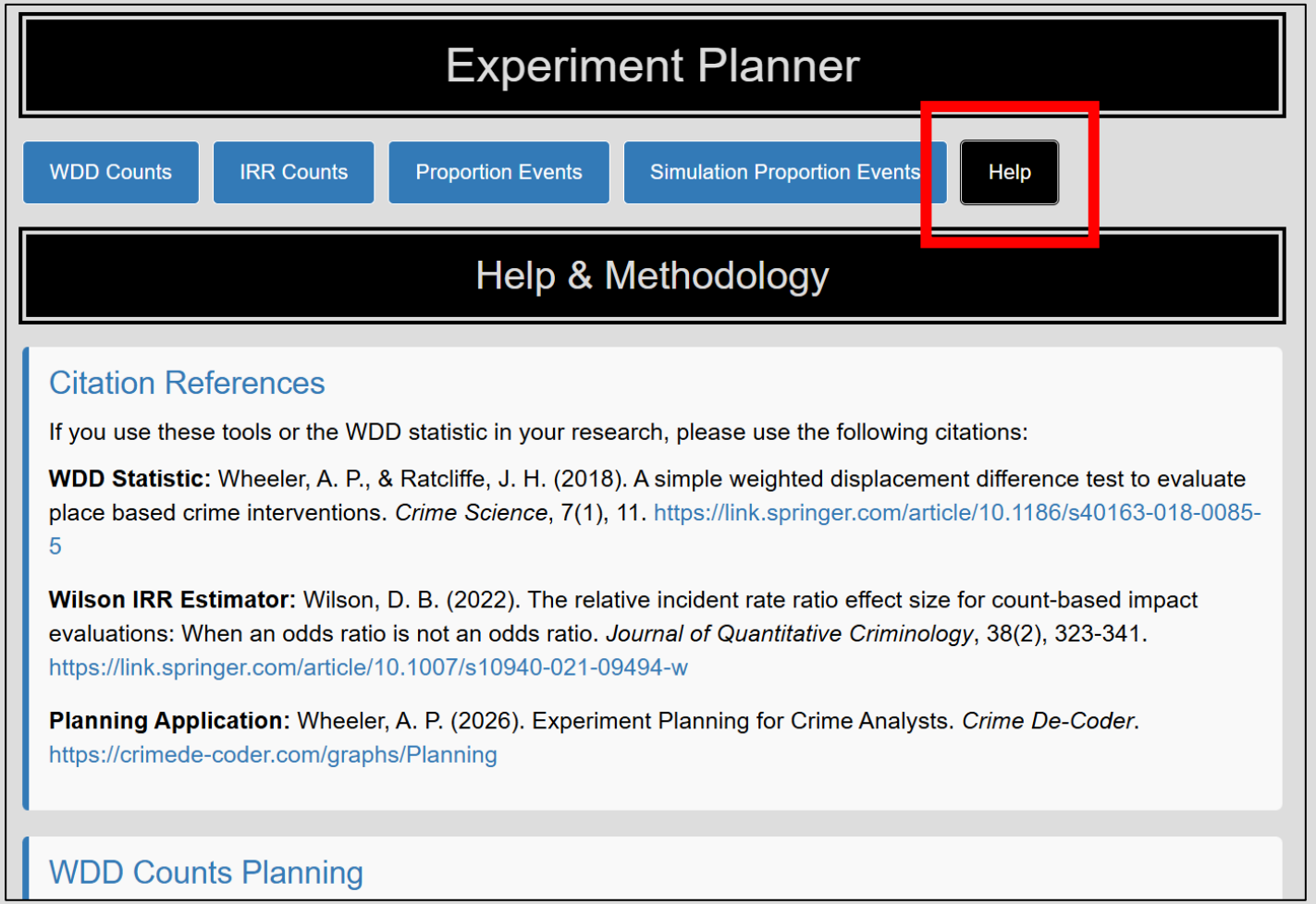
Andrew Wheeler, PhD

andrew.wheeler@crimede-coder.com

Other Resources

CRIME De-Coder

- Help page lists plenty of references
- Bottom of each application generates R code
- YouTube video tutorials
  - WDD
  - IRR
  - Proportion
- Just send me an email! andrew.wheeler@crimede-coder.com



How long to conduct your experiment?

05-26

Contact: andrew.wheeler@crimede-coder.com

Website: crimede-coder.com

CRIME De-Coder