

Week 6 Lecture 1:

Forks, pipes, and colliders

EDS 222: Statistics for Environmental Data Science



Urban heat islands



Today's agenda

- DAGs and causal relationships
- Choosing variables
- Your final project



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Density and UHIs

Think-pair-share

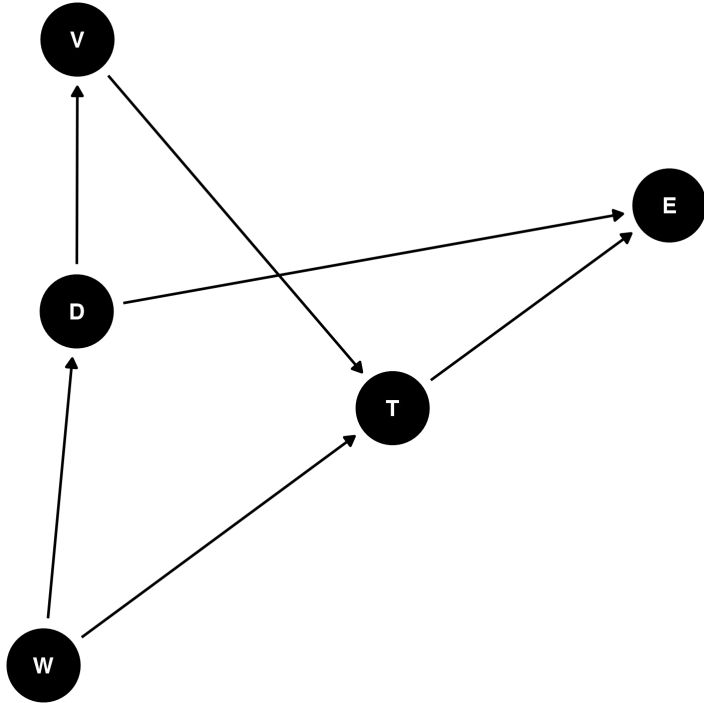
Does urban density increase the urban heat island effect?

1. What **response** variable would you collect?
2. What **predictor** variables are relevant?
3. What **causal relationships** exist between the variables?

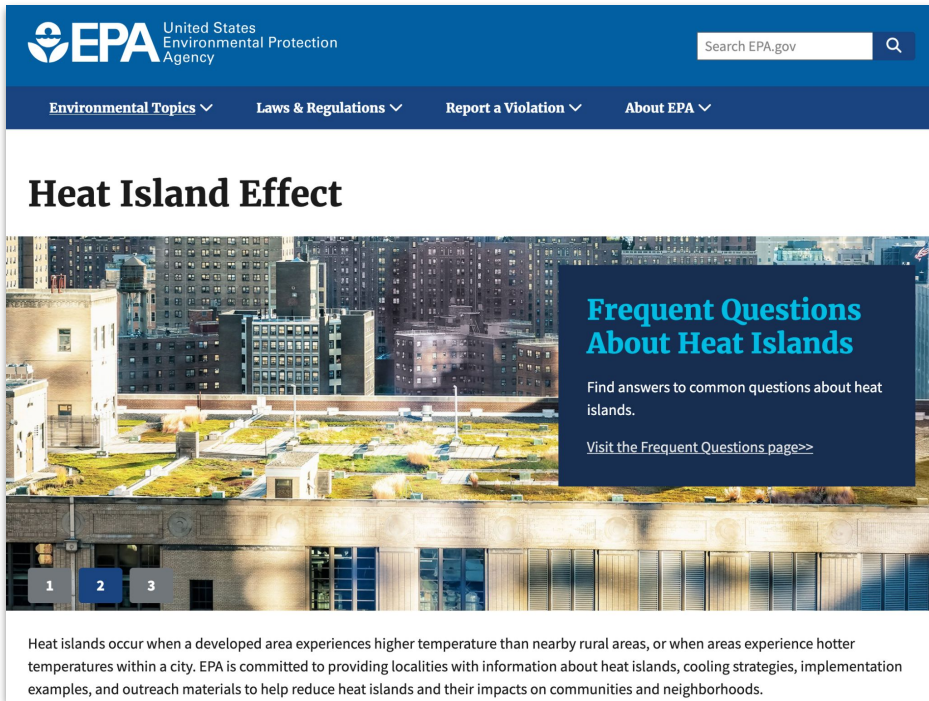
Regression = association

Simple DAGs

State your assumptions



Where do relationships come from?



The screenshot shows the EPA website's header with the logo and navigation links. The main content area features a large image of a city rooftop garden. A dark blue overlay on the right side of the image contains the text 'Frequent Questions About Heat Islands' and a link to 'Visit the Frequent Questions page>>'. Below the image, there is a section titled 'Heat Island Effect' with a paragraph of text.

United States Environmental Protection Agency

Search EPA.gov

Environmental Topics ▾ Laws & Regulations ▾ Report a Violation ▾ About EPA ▾

Heat Island Effect

Frequent Questions About Heat Islands

Find answers to common questions about heat islands.

[Visit the Frequent Questions page>>](#)

1 2 3

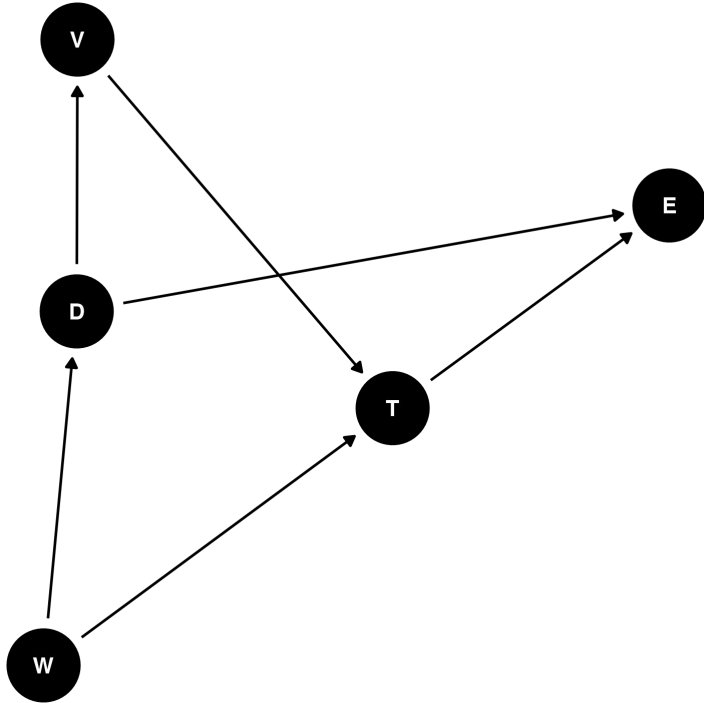
Heat islands occur when a developed area experiences higher temperature than nearby rural areas, or when areas experience hotter temperatures within a city. EPA is committed to providing localities with information about heat islands, cooling strategies, implementation examples, and outreach materials to help reduce heat islands and their impacts on communities and neighborhoods.

Today's agenda

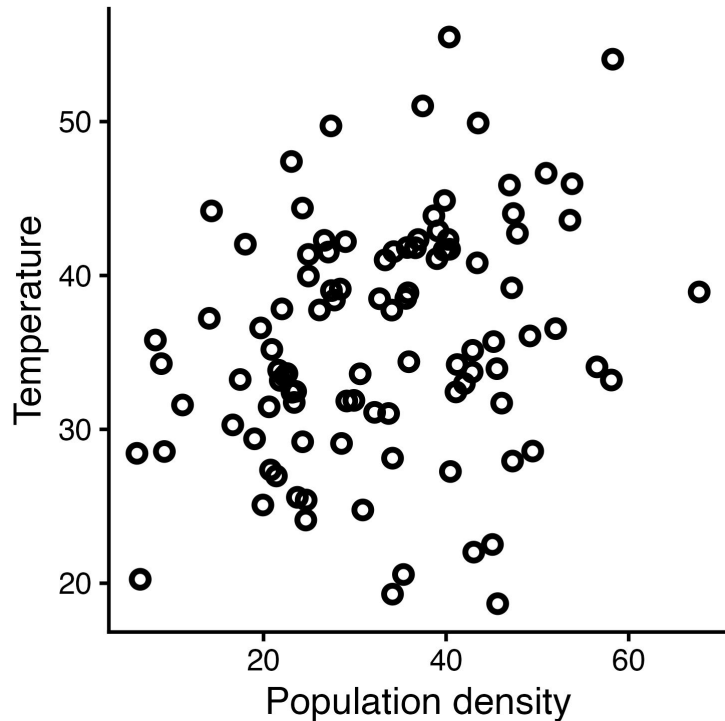
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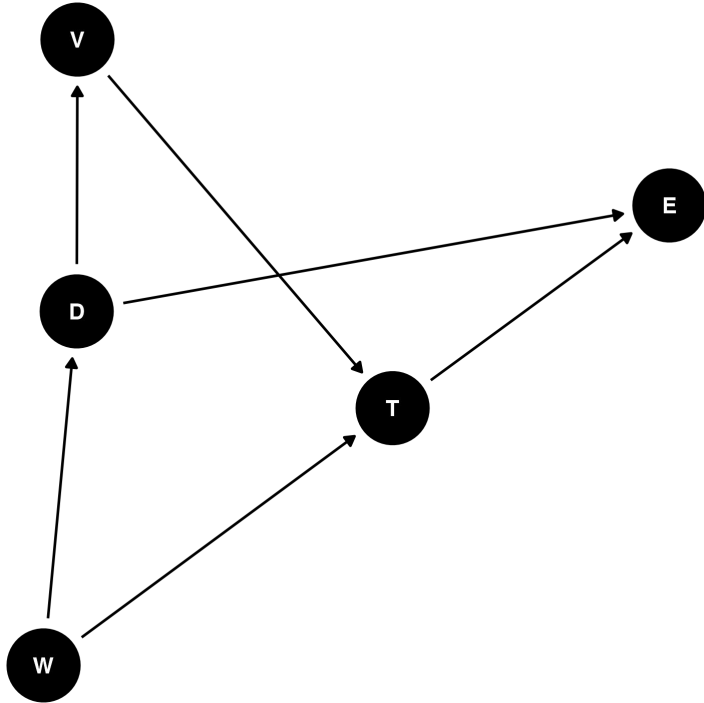
Forks, pipes, and colliders



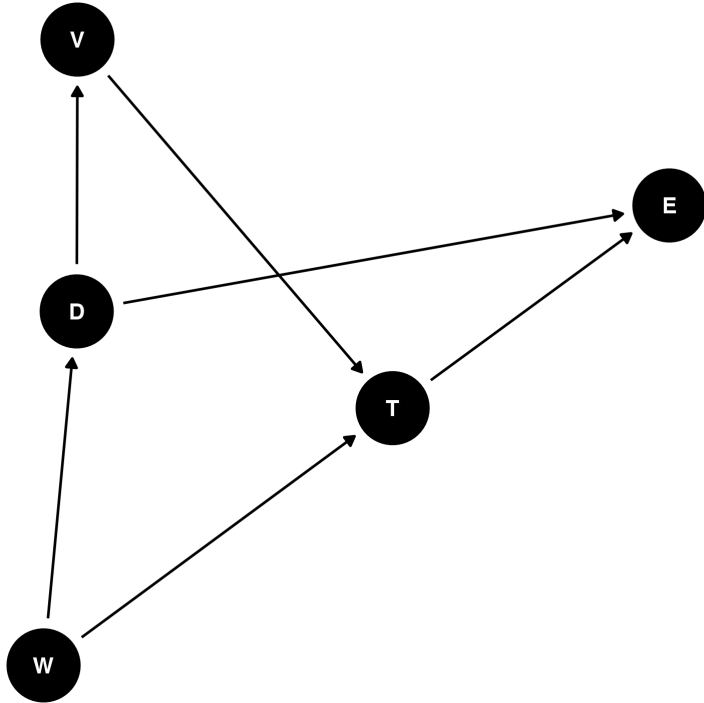
The data generating process



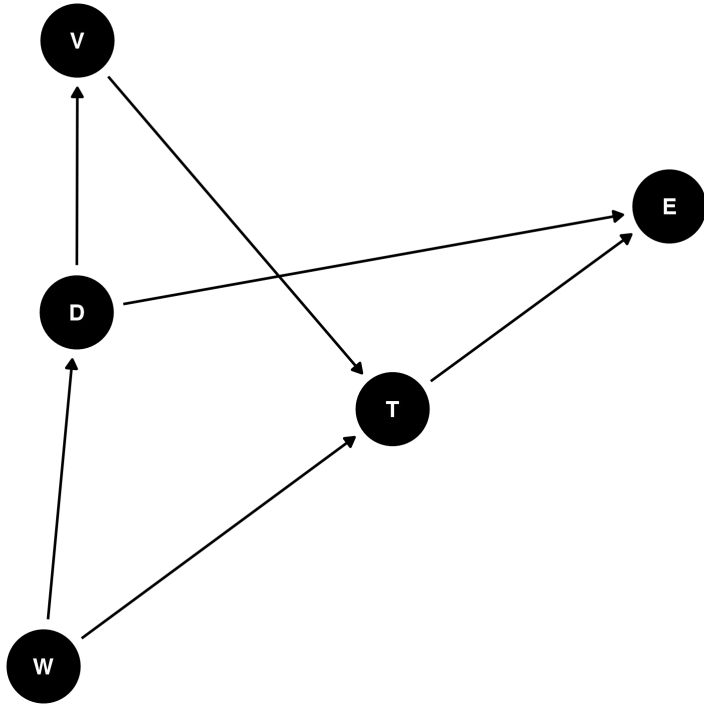
The fork



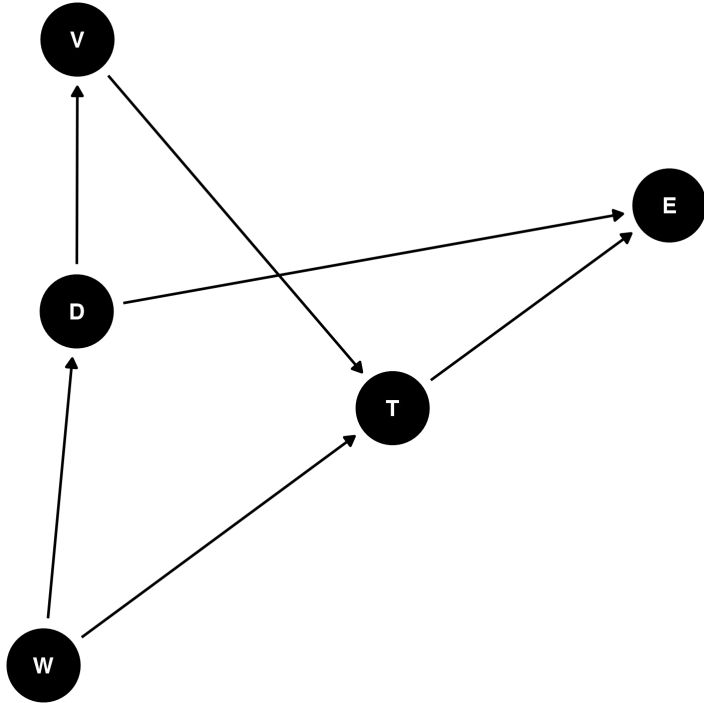
The pipe



The collider



The “backdoor path” rule



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Final project DAG

Consider your final project (8 minutes)

What's the research question?

1. List the variables you have or plan to collect. Include at least 3 predictors.
2. Draw a DAG explaining the relationships between the variables.
3. Are there any confounds? If so, where are the backdoor paths?

Final project DAG

Peer feedback (6 minutes)

Share your DAG with a peer and give each other feedback.

1. Are the causal relationships reasonable? Do any require clarification?
2. Do you agree about the confounds?
3. Together, think of an example of a collider variable. This doesn't have to be in the actual dataset.

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Midterm 2

Midterm preparation

- Practice midterm available through Slack
- Attempt the questions before lab tomorrow
- Tomorrow's quiz: write down one *muddy point* you have about the practice midterm or DAGs