

STATISTICAL RETHINKING WINTER 2020/2021  
HOMEWORK, WEEK 7

There are only two problems this week, because the models take a little while to run. Be sure to run the models from the relevant part of Chapter 12 first. That will give you almost all of the model structure you need.

1. In the Trolley data—`data(Trolley)`—we saw how education level (modeled as an ordered category) is associated with responses. Is this association causal? One plausible confound is that education is also associated with age, through a causal process: People are older when they finish school than when they begin it.

Reconsider the Trolley data in this light. Draw a DAG that represents hypothetical causal relationships among response, education, and age. Which statical model or models do you need to evaluate the causal influence of education on responses? Fit these models to the trolley data. What do you conclude about the causal relationships among these three variables?

2. Consider one more variable in the Trolley data: Gender. Suppose that gender might influence education as well as response directly. Draw the DAG now that includes response, education, age, and gender.

Using only the DAG, is it possible that the inferences from Problem 1 are confounded by gender? If so, define any additional models you need to infer the causal influence of education on response. What do you conclude?