# STATISTICAL RETHINKING 2023
WEEK 3

1. The first two problems are based on the same data. The data in data(foxes) are 116 foxes from 30 different urban groups in England. These fox groups are like street gangs. Group size (groupsize) varies from 2 to 8 individuals. Each group maintains its own (almost exclusive) urban territory. Some territories are larger than others. The area variable encodes this information. Some territories also have more avgfood than others. And food influences the weight of each fox. Assume this DAG:
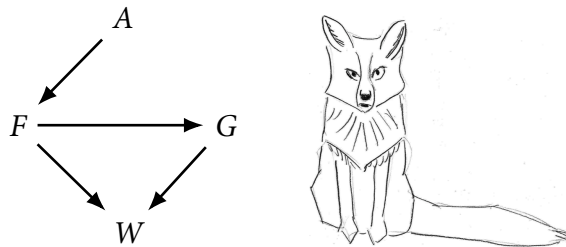
where F is avgfood, G is groupsize, A is area, and W is weight.

Use the backdoor criterion and estimate the total causal influence of A on F. What effect would increasing the area of a territory have on the amount of food inside it?

2. Infer the **total** causal effect of adding food F to a territory on the weight W of foxes. Can you calculate the causal effect by simulating an intervention on food?

3. Infer the **direct** causal effect of adding food F to a territory on the weight W of foxes. In light of your estimates from this problem and the previous one, what do you think is going on with these foxes?

(Optional fourth problem on next page.)

4-OPTIONAL. Suppose there is an unobserved confound that influences F and G, like this:
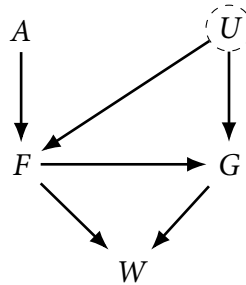
Assuming the DAG above is correct, again estimate both the total and direct causal effects of F on W. What impact does the unobserved confound have?