Path Diagrams

Suppose that you write down your beliefs about the world, that sleep causes feelings of stress.

Sleep→Feelings of Stress

In this causal path diagram, how would you represent the following?

All the other "events" in the world that also cause stress but don't influence sleep. I.E. Causal relationship with

Sleep→Feelings of Stress←ϵ

A specific other event that wasn't previously included: Coffee Intake

Coffee

↓

Sleep→   Feelings of Stress   ←ϵ

With what variables does and doesn't coffee have a causal relationship?

Well, because we haven't randomly assigned any of the coffee consumption, it could be related to any or all of the other variables. In particular:
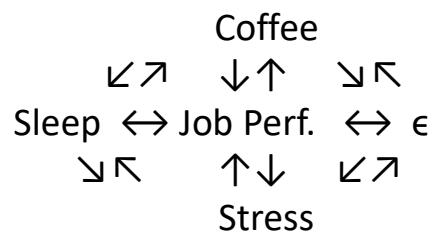
Suppose
1. Perhaps coffee makes people sleep less; or,
2. Perhaps people drink coffee when they can't sleep because their kids, dogs or neighbors have kept them awake at night.
2. Maybe other features of their lives – say, e.g. a 203 assignment – cause people to both feel feelings of stress (please don't! you're going to make it!) and also make them drink coffee?

We would represent this with arrows that connect any of the possible relationships that we think might exist within the system. This, (clumsily, because we're writing it in code) might look like: Reverse causality
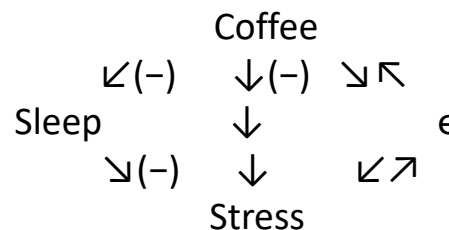

Coffee
↙↗   ↓↑   ↘↖
Sleep ↔ Stress ↔ ε
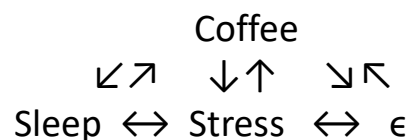
An outcome variable on the RHS: Job Performance

Coffee
↙↗   ↓↑   ↘↖
Sleep ↔ Job Perf. ↔ ε
↘↖   ↑↓   ↙↗
Stress

Basically, this is a death star of confused causal relationships. If we think that just a regression is going to be able to untangle this, we don't stand much of a chance.

Suppose the model that I'm working with looks like the following:

Coffee
↙(−)   ↓(−)   ↘↖
Sleep   ↓   ϵ
↘(−)   ↓   ↙↗
Stress

What would be the consequence of estimating a model that omits "coffee" from the estimating equation?

If just had a model that just looked like stress→sleep, we would **not** estimate the correct causal relationship that exists between stress and sleep …

Without knowing the relative magnitude of the coefficients between coffee→stress and coffee→sleep.

Because Coffee decreases sleep. Decreaed sleep increases stress. But, coffee also directly decreases stress. So, the direction of the bias actually depends on how strong the relationships are between the three variables.

I expect you to place a path diagram as your initial hypothesis or thesis in the intro of your lab and one at the conclusion highlighting any changes to your hypothesis which you derived from your learnings