Systems Thinking

Exploring Data

THE CAUSATION CHECKLIST

There are a number of ways that two variables can be related, without **A** causing **B**

REVERSE CAUSATION

Rather than A causing B, would B causing A make more sense?

A ← B

Example

Winter coat usage (A) correlates with cold weather (B), but cold weather actually causes winter coat usage

CONFOUNDERS

Might some other variable, C, actually be causing both A and B?

C → A, C → B

Example

Basketball performance (A) and shoe size (B) are correlated, but 'height' (C) drives both basketball performance and shoe size

COINCIDENCE

If there's no reasonable connection, could it just be a coincidence?

A ~→

B ~→

Example

From 2000-2009, the amount of cheese eaten per person (A) correlated with the number of people who died by becoming tangled in their own bedsheets (B) ....!

A further consideration ...

MULTIPLE CAUSES

Might A be only one of many causes of B?

A ↘

C → B

D ↗

Example

Having good friends (A) correlates with well-being (B), but many other factors (C, D...etc.) also contribute to well-being

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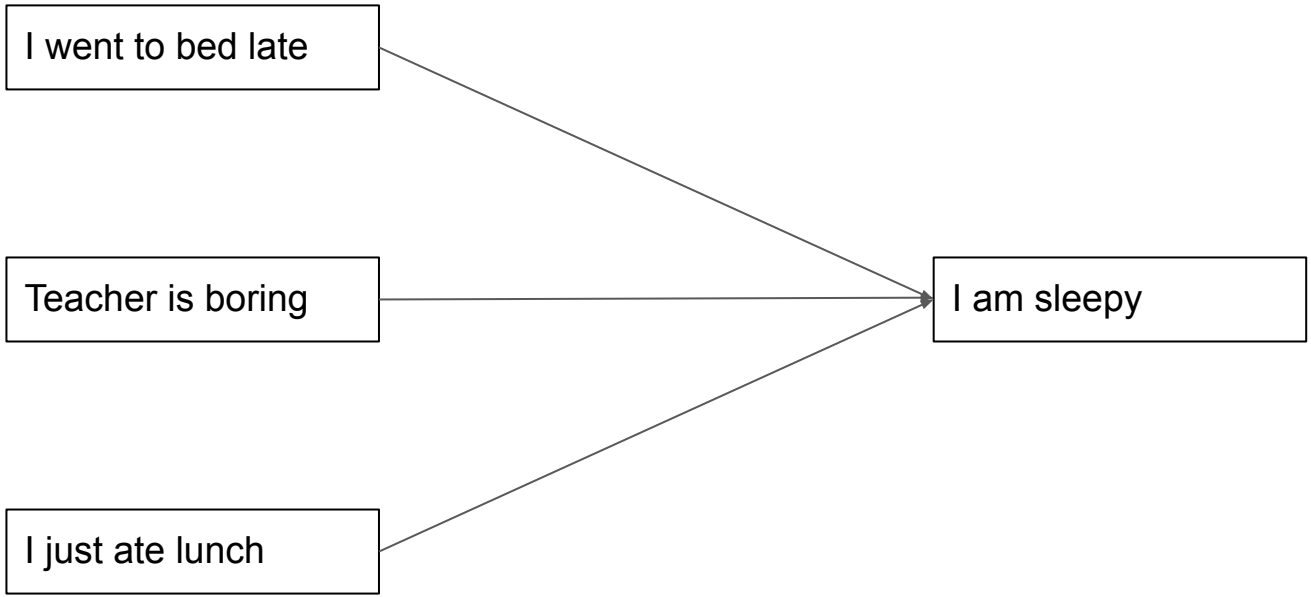
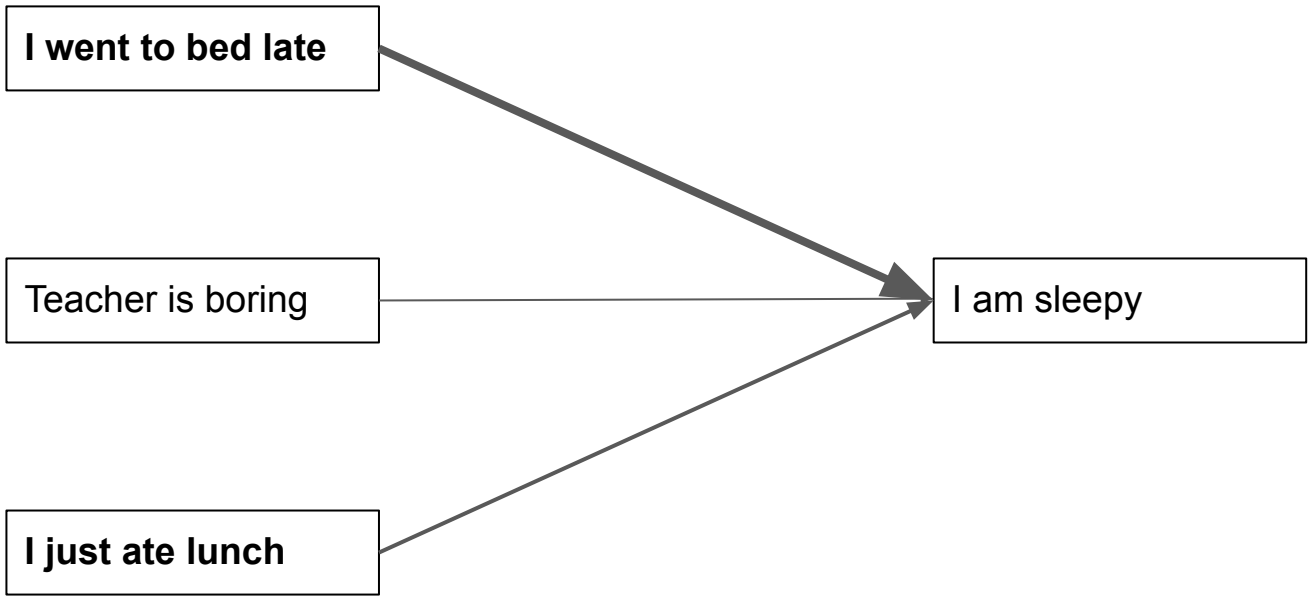
Teacher is boring
I am sleepy


I went to bed late
Teacher is boring
I just ate lunch
I am sleepy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In your groups…

1. **Construct a contingency table for the one explanatory variable associated with your hypothesis.**
2. **Analyze your Chi-squared results**
   - $p > 0.05$: go back to the drawing board
   - $p < 0.05$: make it better
1. **Revise your theory:**
   - Consider “multiple causes” but the other explanatory variable must be related to the original
1. **Do more testing**
   - Build additional contingency tables for these other explanatory variables