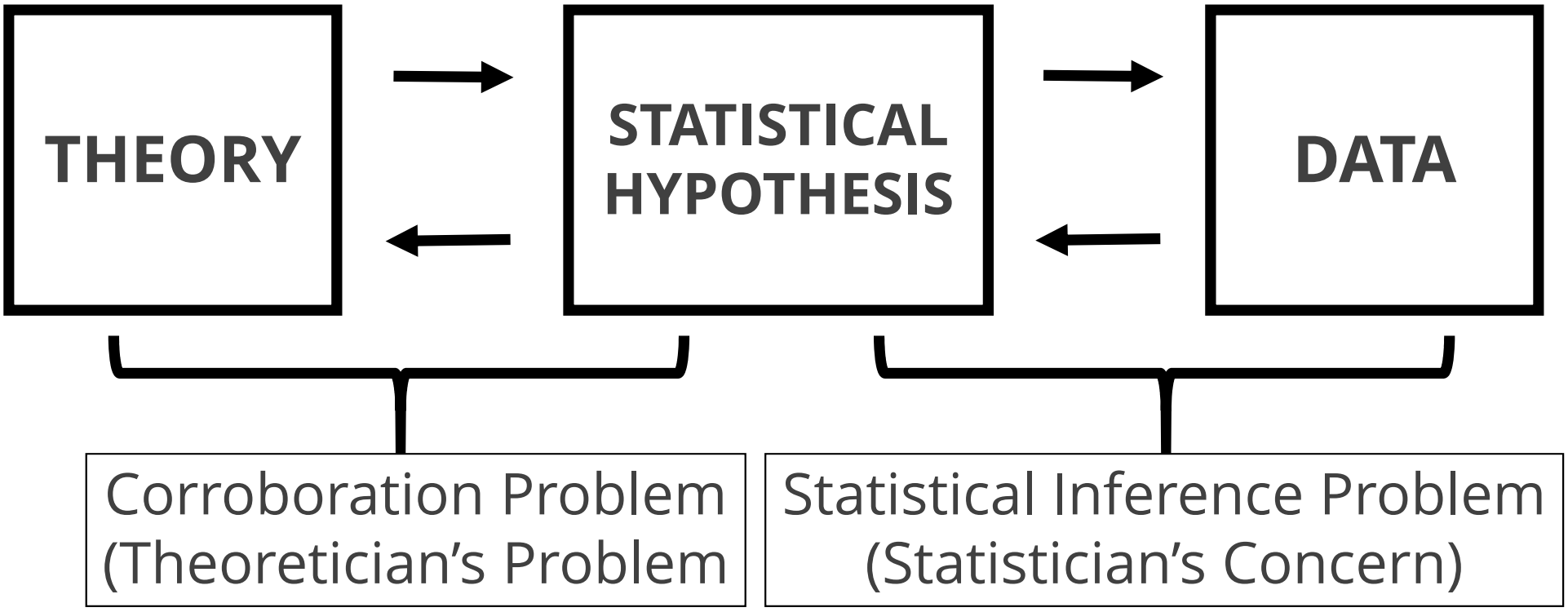
Theory Construction

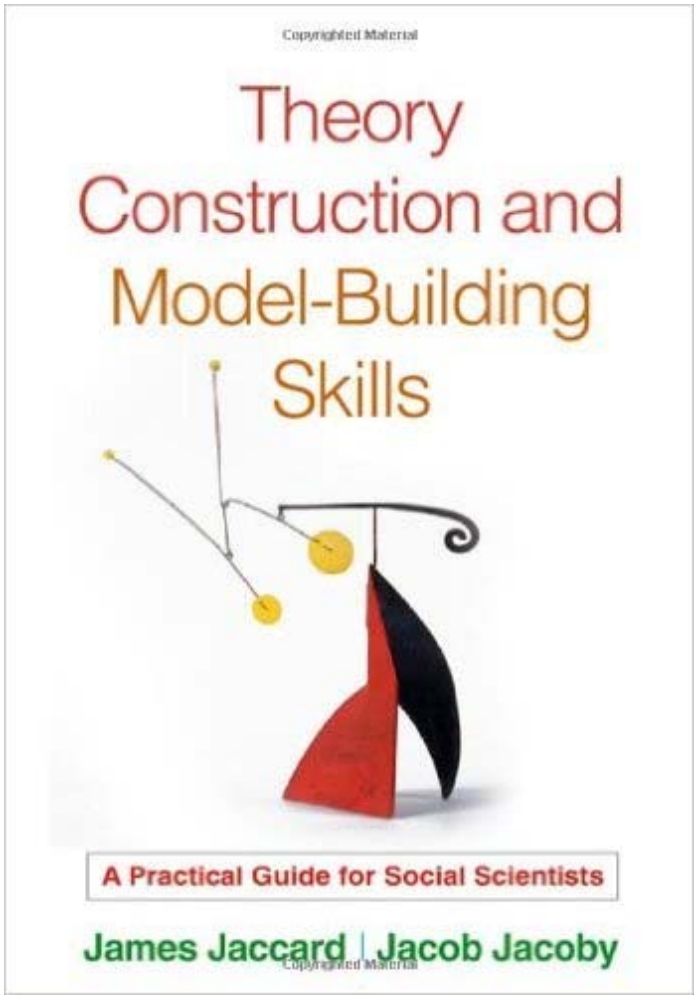

THEORY
STATISTICAL HYPOTHESIS
DATA
Corroboration Problem (Theoretician's Problem
Statistical Inference Problem (Statistician's Concern)

Meehl, 1990

A scientific theory is a set of testable statements about the relation between observations.

We focus a lot on testing theories, but not a lot on theory construction.

Some suggestions how to come up with ideas.



Jacard & Jacoby, 2010

Thought experiments

What would you see, if you could travel at the speed of light?

Personal experiences

Stanley Milgram's mother in law: No one gives up their seat! Data: 56% would.

Put yourself in someone else's shoes

How is it possible people working in concentration camps did what they did?

Observe

How do people sell you a car? What does this tell you about persuasion?

Use metaphors

If memory is like a storage bin, what we put in last, is easiest to retrieve.

Ask *why* and *how*?

Don’t take anything for granted. Ask *why* and *how* like a 3 year old.

Have broad interests

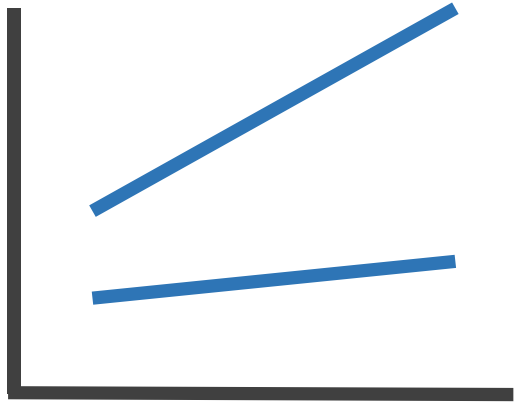
Be inspired by art, movies, comics, books, magazines, music, theater.

After generation, formalize your idea in words, figures, and numbers

McGuire, 2004

“Students are happier than teachers, especially on hot days.”

	Cold days	Hot days
Students	**4.5**	**6.4**
Teachers	**3.2**	**3.4**



ANOVA (Interaction)

Define the boundary conditions of the effect.

“every proposition is occasionally true, at least in certain contexts viewed from certain perspectives”

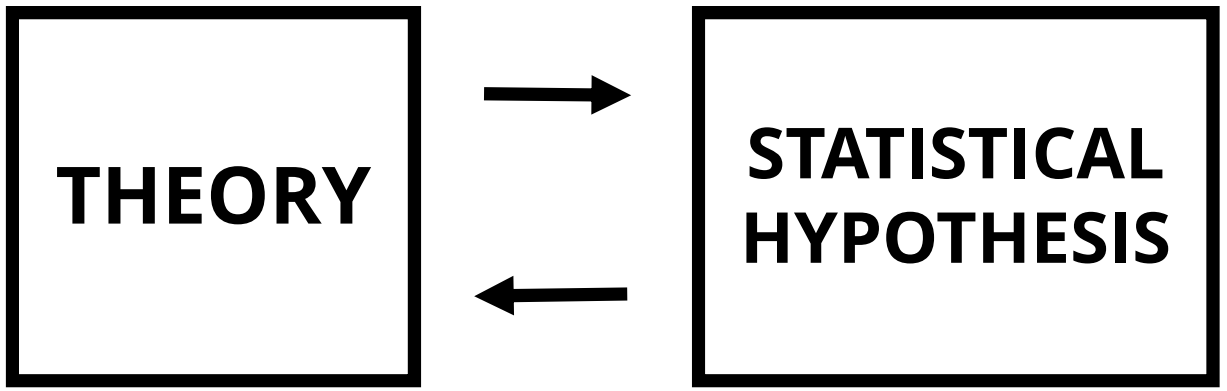
McGuire, 1973

Fiedler (2004): The scientific cycle is both **loosening** and **tightening**.

Loosening: create random variation.
Tightening: Which ideas were good?

What does a theory really imply? Think of as many things as possible.

Play around with methods and data. Simulate data, or explore datasets.



Good theories and good statistical inferences are two sides of the same coin.