1.2 The Classical Scientific Method and Statistical Inference

“The whole of science is nothing more than a refinement of everyday thinking.”

- Albert Einstein

Population of units

Random Variable $X$

Hypothesis (about $X$)

**EXPERIMENT**

“What actually happens this time, regardless of hypothesis.”

**THEORY**

“What ideally must follow, if hypothesis is true.”

Random Sample (empirical data)

$n = \# \text{ observations}$

- $x_1$
- $x_2$  \ldots  $x_n$
- $x_3$

Mathematical Theorem (formal proof)

Proof: If Hypothesis (about $X$), then Consequence (about $X$).

QED

**Analysis:** Observed vs. Expected, under Hypothesis

“Is the difference statistically significant? Or just due to random, chance variation alone?”