What is Statistics?

Chapter "P"
YMS3e

AP Stats at LSHS
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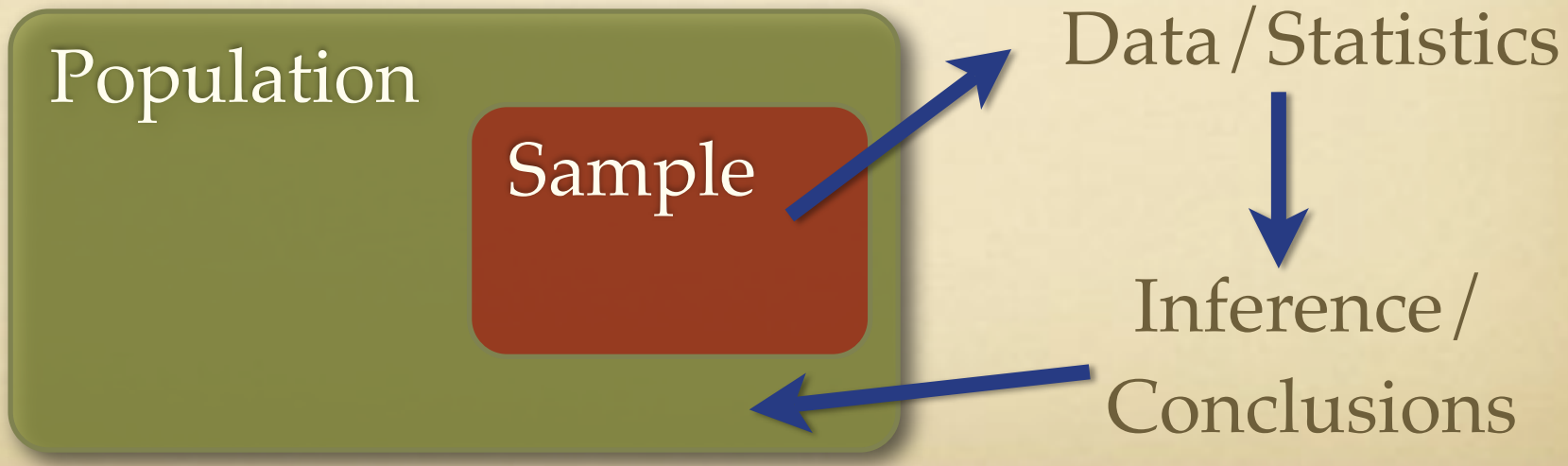
Case Study

- Can Magnets Help Reduce Pain?
  - Read the study on page 3.
- What do you observe? Does there appear to be a difference between the reported Active and Inactive pain scores?
- Can we "condense" the data? What can we calculate to simplify things? What do you observe?
- Is this difference large enough to argue that magnets are effective in reducing pain?
- Is this difference due to chance variation, or is it evidence of a *real* difference?

Intro: What is Stats?

- **Statistics**:
  - The science (and art) of learning from **data**.
- **Data:**
  - Numbers with a contextual meaning.
- We use data and Statistics to draw conclusions about a population based on sample information.



4 Themes of Stats

- Part I: **Exploratory Data Analysis**
  - The tools and strategies for organizing, displaying, describing, and analyzing data.
- Part II: **Producing Data**
  - Designing surveys, experiments, and observational studies that will yield the data necessary to answer a question of interest.
- Part III: **Probability**
  - The study of chance behavior. How likely are certain outcomes?
- Part IV: **Inference**
  - Draw conclusions about the population based on samples. Test claims and compute estimates.

II. Data Production

- When answering a question, **where the data come from is important.**
  - *Data beat personal experiences (anectodal).*
- Data Sources
  - **Available Data**
  - **Surveys**
  - **Observational Studies**
  - **Experiments**
- ***Do P.1-P.5 on page 11.***

I. Data Analysis

- Organize, Display, Summarize, and Interpret
- **Individual:** Objects described by data
- **Variable:** Characteristic of an individual
  - **Categorical:** Places individuals into groups
  - **Quantitative:** Numeric measures
- **Distribution:** Values taken on by a variable and how often it takes those values.

I. Data Analysis

- When analyzing data, ask the following:
  - **Who** are the individuals being described?
  - **What** are the variables?
  - **Why** were the data gathered?
  - **When, where, how, and by whom** were the data produced?
- ***Read pp 12-18, Do 7,9,11,12***

III. Probability

- Long-term chances of an event occuring
  - **Chance behavior is unpredictable in the short run, but has a regular, predictable pattern in the long run.**
  - Consider flipping a coin, rolling dice, etc.
- We use probability to determine how likely certain sample values/statistics are. We want to know, *"Is this value likely to be due to chance?"*
- **See Example P.10**

Statistical Thinking

- Data come from real-world contexts...
  - **Doing statistics means more than just manipulating data!**
- Form the habit of asking "What do the data tell me?"
- Statistics involves a lot of calculating and graphing.
  - We'll let our calculator/computer do most of this. However, **ideas and judgments can not be automated!**
- **You learn statistics by doing statistical problems!**
- **Read Chapter P, Do 13-16,18**