Lecture 6 · July 1, 2024

Data Analysis

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YSEMA
Introduction to Research
Analysis

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Recap – Last Kahoot!

Objectives

- Compare quantitative and qualitative research methods
- Define and describe the levels of measurement
- Define descriptive statistics
- Define inferential statistics
- Describe the process for choosing a statistical test
- Apply common statistical tests to practice data

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Evaluating Data Analysis

Primary objectives:

- Become familiar with types of data produced
- Become familiar with most common statistics used in medical journals
- Grasp how the study's conclusions flow from results and statistical analyses
- Understand rationale behind selection of statistical analyses and how well specific analyses test the study's hypotheses

Descriptive Statistics

Processes or analyses that "describe" the sample

Measures of central tendency

- Mean, median, and mode

Measures of variability

- Range, standard deviation, and standard error of the mean

TABLE 11.1 Definitions of Data Types

Data Type	Definition	Example
Nominal data	Data that categorizes	Gender, eye color, race, graduating cohort, practice specialty
Ordinal data	Data defined by order, but the distance between the choices or values is not defined	Likert scales, preference scales, rankings
Interval data	Data with a defined interval between the values, but with no true zero value	Ambient temperature: Zero does not indicate a total lack of temperature; it is a value on a scale. The temperature interval difference between 61°F and 62°F is the same as the interval difference between –61°F and –62°F.
Ratio data	Data with an absolute zero value, where zero means there is a total absence of what is being measured	Visual acuity, range of motion, height, weight, blood pressure, blood alcohol level

Inferential Statistics

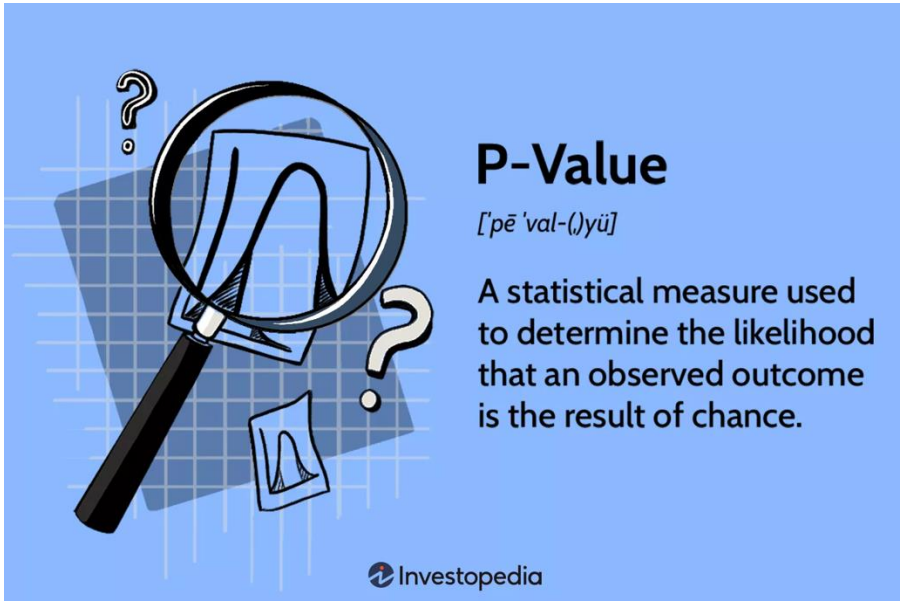
Used to draw inferences about the results, mainly to test the hypotheses of a study

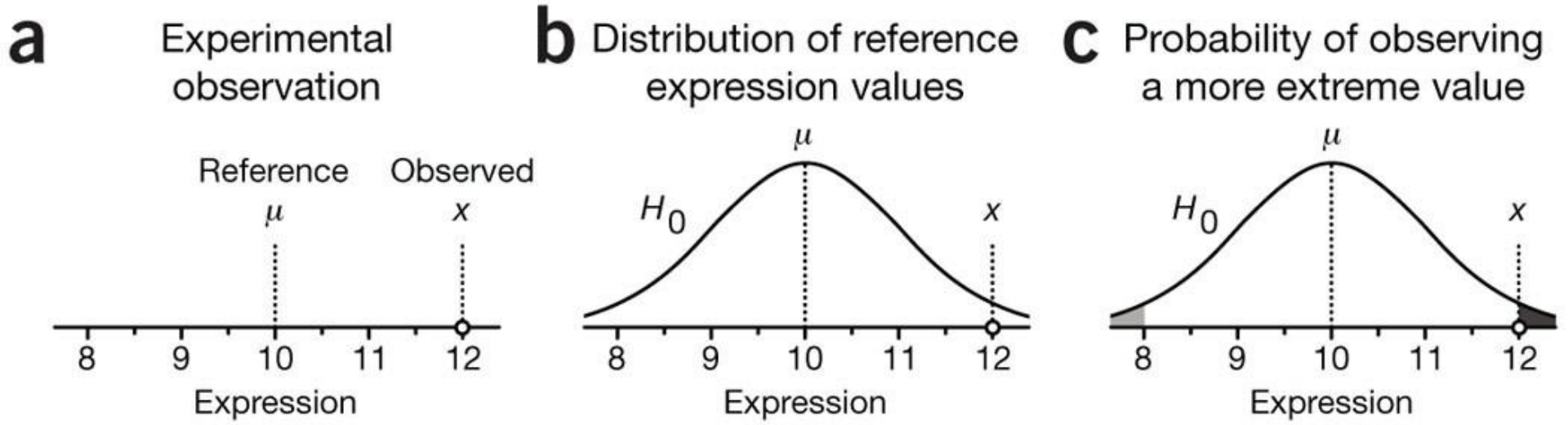
Select significance level, called alpha (α)

- Set at .05 or .01

Statistical test yields a *p*-value

- Reject null hypothesis if $p < \alpha$
- Reject null hypothesis if $p > \alpha$





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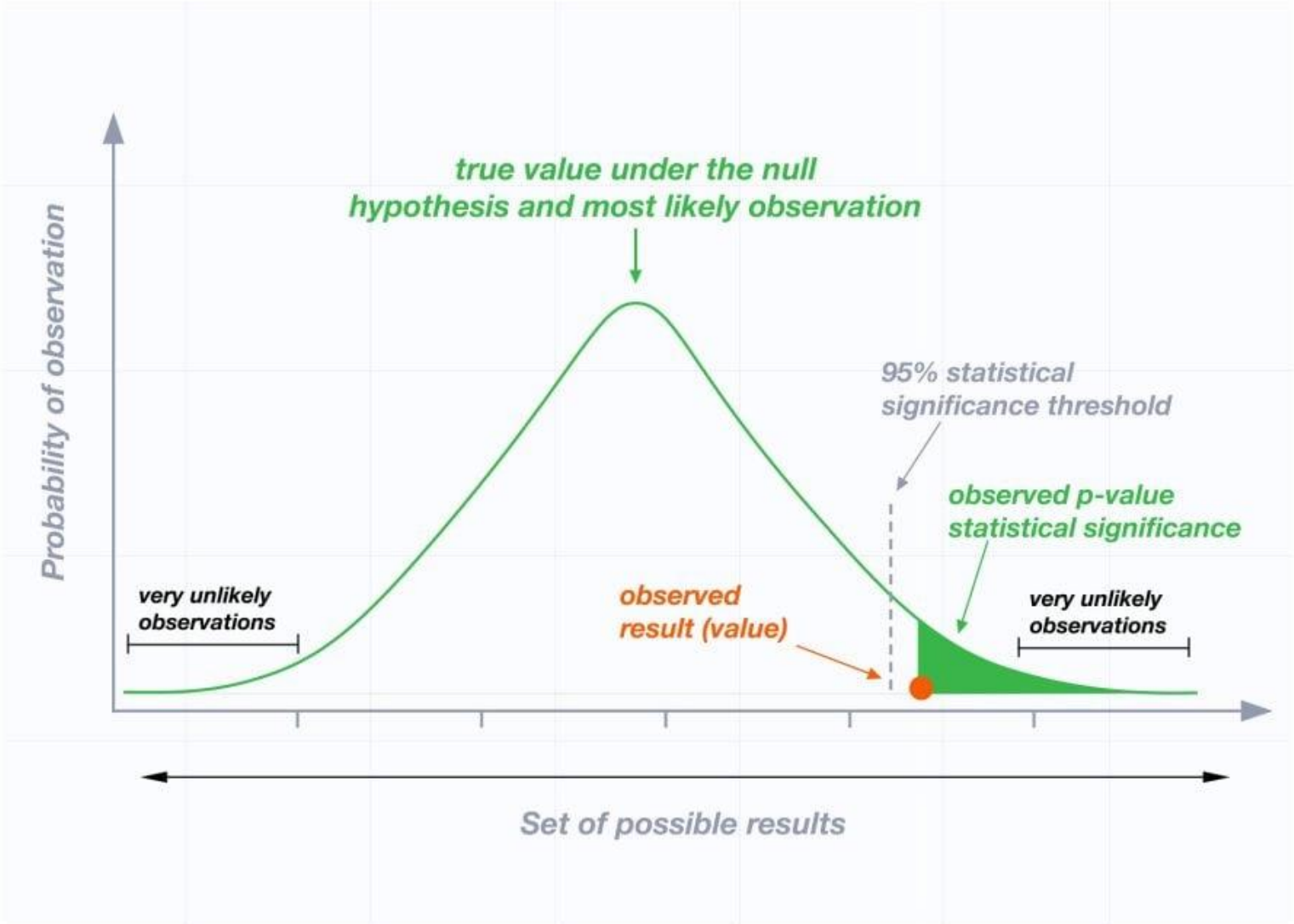
Probability & statistical significance



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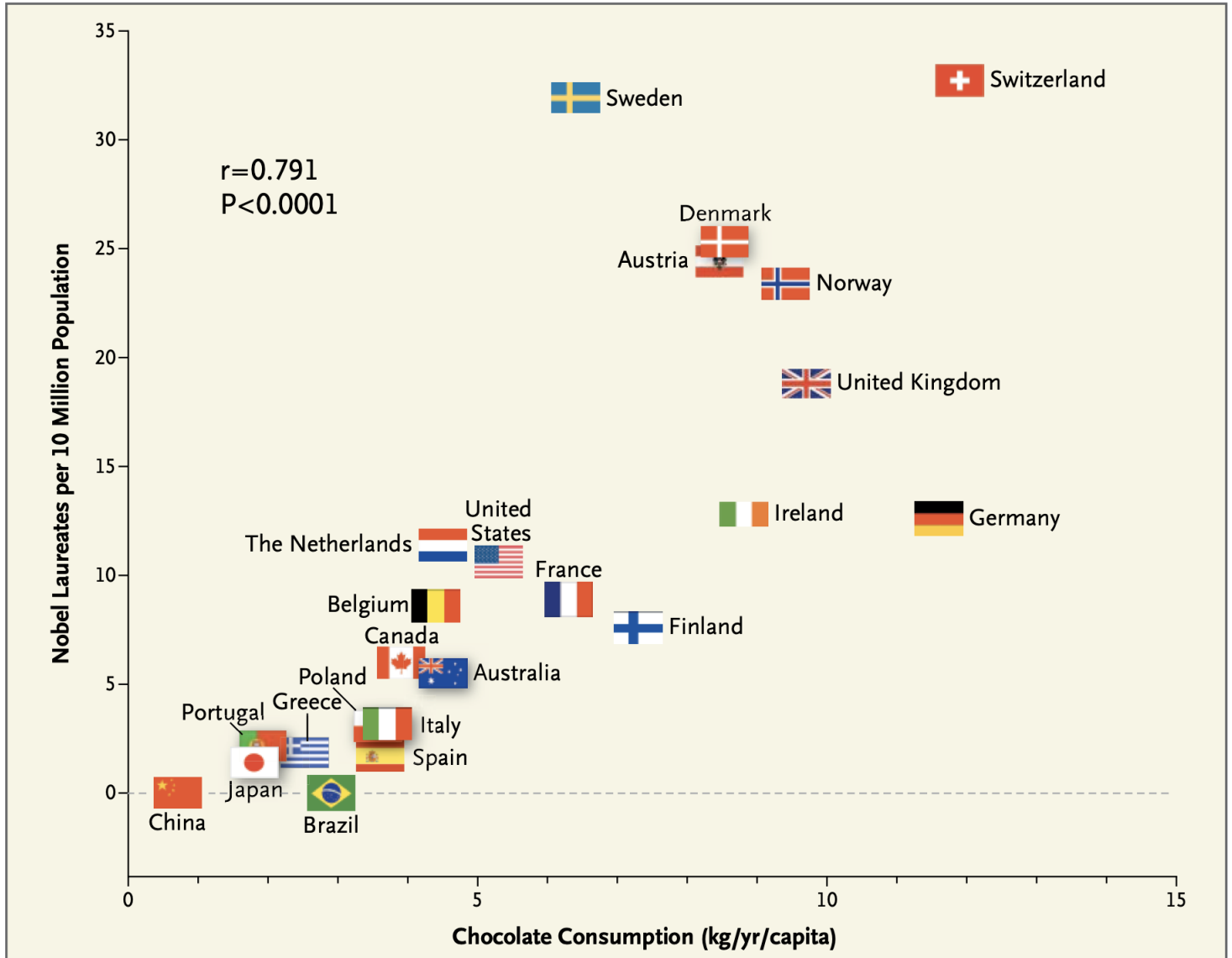

Figure 1. **Correlation between Countries' Annual Per Capita Chocolate Consumption and the Number of Nobel Laureates per 10 Million Population.**

https://www.nejm.org/doi/pdf/10.1056/NEJMon1211064

Qualitative Research

Answers questions that begin with “what,” “how,” or “why”

Healthcare researchers becoming more familiar with:

- Potential to enhance understanding of the phenomenon that patients, physicians, nurses, and others face
- Expansion of knowledge obtained quantitatively

Qualitative research approach can be used to study:

- Human experiences of illness and care
- Interactions among clinicians, patients, and families
- Lifestyle interventions
- Quality of life
- Cross-cultural perspectives
- The caregivers’ experience
- Experiences after treatments and/or health training

Characteristics of Qualitative Research

- Evaluation of a problem using non-numerical methods, e.g. words, observations, notes, documents, interviews, records, case studies, meetings, etc.
- Studies attitudes, values, non-verbal and verbal behaviors, feelings, actions, opinions, etc.
- Can be used for problem-solving, decision-making, policy assessment, and organizational development programs
- Falls within interpretivism or constructivism
- Operates on assumptions of **subjective reality and multiple truths**
- Values the **lived experiences** of individuals
- Attempts to understand reality as defined by individuals through experiences in natural settings.

TABLE 8.1 Key Differences Between Quantitative and Qualitative Studies in Health Care[5]

Element	Quantitative	Qualitative
Researcher's involvement	Detached	Participatory
Researcher's stance	Objectivity	Subjective confirmability
Setting	Controlled	Naturalistic
Sampling	Random population-based	Case-based/purposeful
Methodology	Positivist method	Naturalistic inquiry
Data	Numbers	Words
Analysis and reasoning	Hypothesis testing Deductive	Hypothesis generation/working hyp Inductive
Reporting	Statistics	Themes/categories
Study validation	Internal and external validity	Trustworthiness

TABLE 8.2 A Comparison of Quantitative and Qualitative Studies Terminology Regarding Validation and Rigor[5]

Traditional Terminology	Qualitative Terminology	Purpose
External validity (generalizability)	Transferability	Establishes a relationship between the study's results and the world outside of the study
Internal validity	Credibility	Ensures the study's processes are performed in an appropriate and rigorous manner
Reliability	Dependability	Signifies the level of confidence in the study's data collection methods
Objective reproducibility	Confirmability	Assesses the ability of researchers to accomplish a similar study and replicate the results

Questions

Read

Chapter 12-17: Writing Your Argument

Final

Individual Project – Research Proposal

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"The power of statistics and the clean lines of quantitative research appealed to me, but I fell in love with the **richness and depth of qualitative research.**

- Brené Brown