Quantitative Data 101: A Refresher

Quantitative methods use numerical data to quantify and understand specific elements of the environment including student attitudes, understanding, and behavior. This data may be used to produce descriptive or inferential statistics. This session will first focus on the former, then shift to briefly describe three basic, but helpful statistics.

Session attendees will learn how to:
- name and identify different types of variables.
- understand the difference and calculate between mean, median, and mode.
- produce simple and accurate graphs of descriptive data.
- identify uses for chi-squared, correlation, and t-test analyses.

Coding the Environment

➢ **Codes**: Numbers/symbols used to represented items of interest—often called 'variables'—within the environment.

➢ **Variables**: Any item of interest that may vary from one person, condition, or situation to the next.

Describing Variables
Levels of Measurement

- **Nominal Variables**

  - Identifies/describes mutually exclusive categories of interest within the environment. (e.g., on- off-campus, member/non-member, hair color)

- **Ordinal Variables**

  - Rank ordered categories on some 'greater than' or 'less than' dimension, but the conceptual distance between each is unknown. (e.g., undergraduate classification)

- **Interval Variables**

  - Builds on ordinal variables with 'known' distances between ordered categories.

- **Ratio Variables**

  - With all the characteristics of the above, these variables also have an absolute zero (no negative values). Common in physical sciences, but not social sciences.

Describing Variables
Independent v. Dependent

↬ **Independent Variables:** Also called attribute or descriptor variables, these variables identify characteristics that do no vary within group.

↬ **Dependent Variable:** Also called the criterion or outcome variables, these variables are expected to be altered depending on the independent variables controlled in the study.

Measures of Central Tendency

⤳ These measures describe 'normal', 'the most common', the average, or the center point of a distribution of quantitative data.

⤳ **Mode**: The most frequently occurring value in a distribution.

⤳ **Median**: Is the score at which exactly half of the distribution is either greater or less. In other words, there is an equal of cases with greater values as there are values that are less than.

⤳ **Mean**: the arithmetic average.

Let's Review

- Independent vs. Dependent variables

- Levels of Measurement

    - Nominal

    - Ordinal

    - Interval

    - Ratio

    - Now adding, "String"

Statistics

- "There are three kinds of lies: lies, damned lies, and statistics" - Benjamin Disraeli

- "Facts are stubborn, but statistics are pliable." - Mark Twain

- Descriptive vs. Inferential Statistics

Chi-Squared Test

➢ Assesses the likelihood that differences between what was observed and what was expected are by chance alone or by some other factor.

Average Floor Program Attendance	Attended	Not Attended	
My Hall	18	7	25
Other Halls	42	33	75
	60	40	

Chi-Squared Test

- Assesses the likelihood that differences between what was observed and what was expected are by chance alone or by some other factor.

Average Floor Program Attendance	Attended	Not Attended	
My Hall	18 15	7 10	25
Other Halls	42 45	33 30	75
	60	40	

- https://www.youtube.com/watch?v=VskmMgXmkMQ

Correlation

➢ Helps to understand the relationships between quantitative variables. Warning: correlation does not indicate causation (e.g., height correlates with intelligence).

➢ https://www.youtube.com/watch?v=Ypgo4qUBt5o
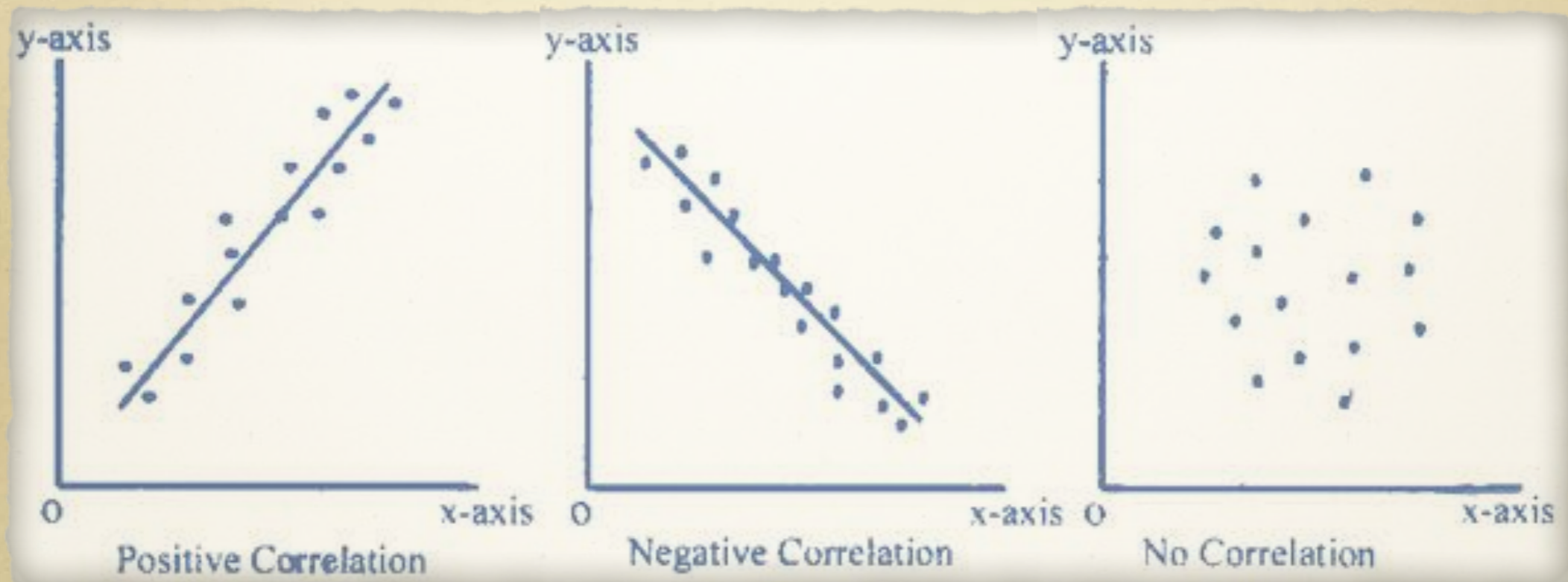
The *t*-test

➤ Used to compare two samples and determine if observed differences (on a dependent variable) occurred by chance alone or perhaps due to an independent variable.

similar   different
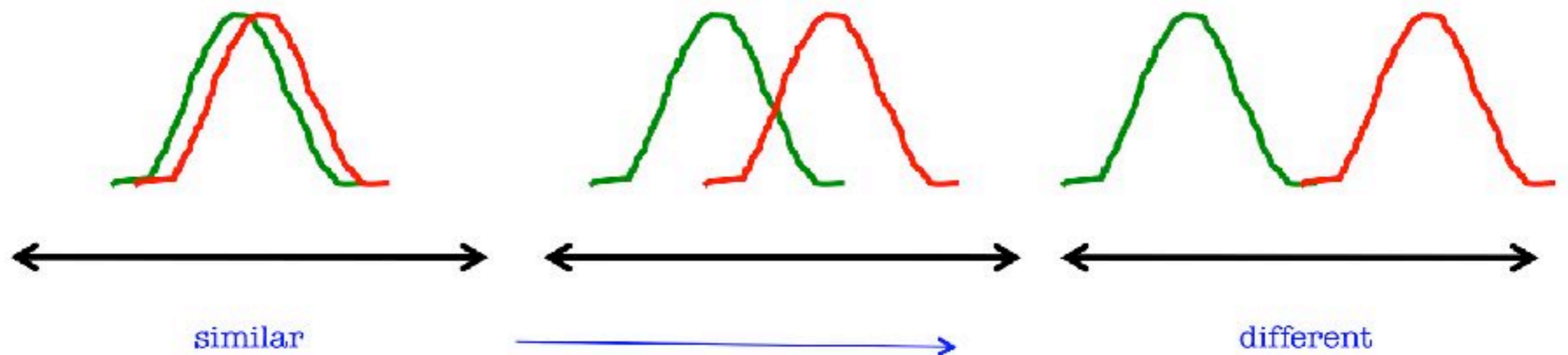
The TQA
A Three Question Assessment

⤳ What ideas did this presentation generate for you?

⤳ Did you learn something today that might help you perform your job better.? Please describe.

⤳ What could be changed about this presentation to make it more helpful or effective?

References

‣ Dilman, D., Smyth, J., & Christian, L. (2009). *Internet, mail, and mixed-mode surveys: The tailored design method* (3rd ed.). Hoboken, NJ: John Wiley & Sons.

‣ Henning, G. W. & Roberts, D. (2016). *Student affairs assessment: Theory to practice.* Sterling, VA: Stylus Publishing.

‣ Spector, P. E. (1992). Summated rating scale: An introduction. Series: *Quantitative applications in the social sciences. 7(82)*. Sage Publications.