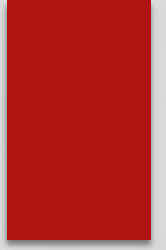# UNIT 2: RESEARCH METHODS

Need for Psychological Science
Scientific Method
Correlation & Experimentation
Statistical Reasoning
Applied Research & Ethics

Module 4

NEED FOR PSYCH SCIENCE

What is Intuition? Lets test it.......

► 1. Most people suffer from unrealistically low self-esteem.

► 2. The opinions of 1500 randomly selected people can provide a fairly accurate picture of the opinions of an entire nation.

► 3. The scientific finding that depressed people tend to have low self-esteem proves that depression causes people to be down on themselves.

► 4.Often people think that psychological findings are common sense that people knew all along.

► 5. Given the number of people who purchase lottery tickets, statisticians believe it is actually likely that somewhere, someone will win the lottery twice.

► 6. Several psychics have been subjected to scientific tests of their abilities and found to possess real paranormal powers.

Intuitive Thinking...................
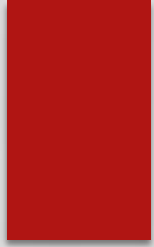
1. TED Talk & Analysis
2. Flaws of Intuition
3. Intuition Research
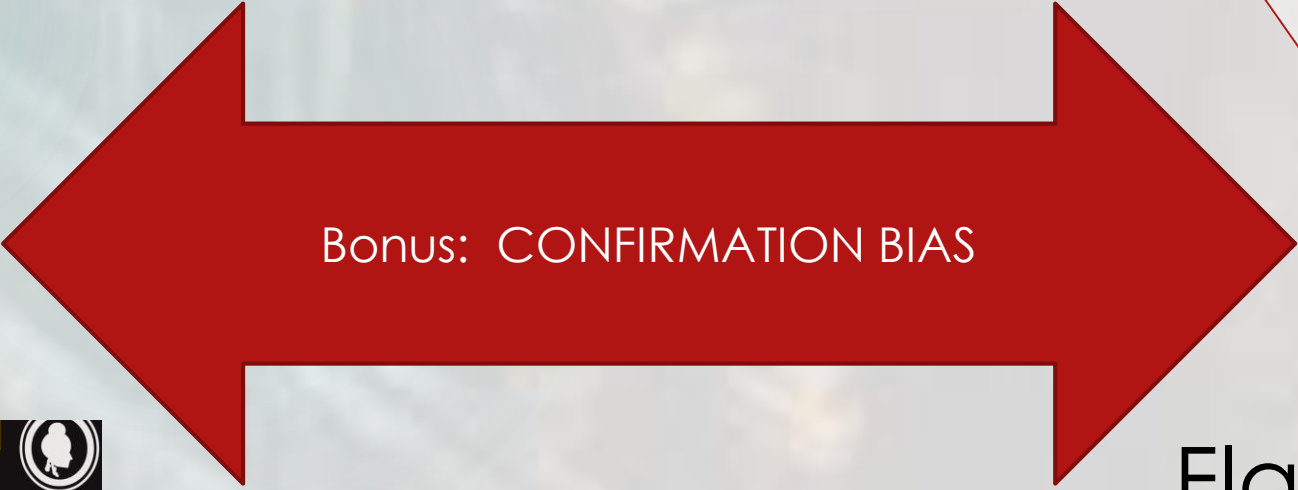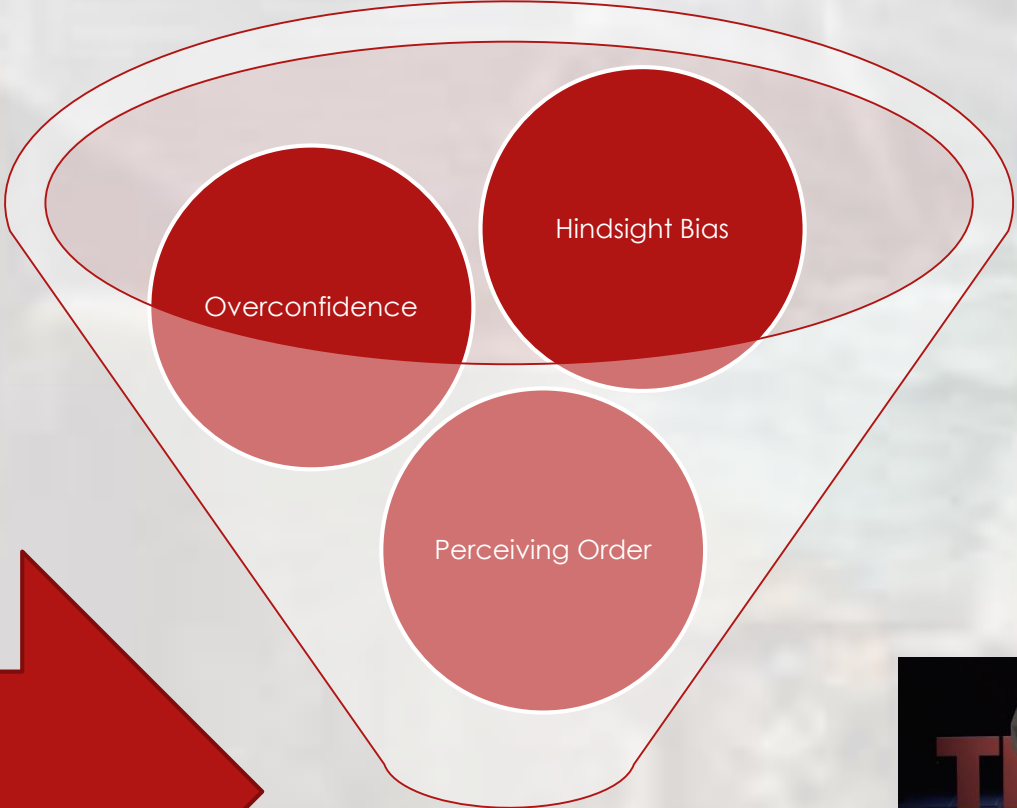
Bonus: CONFIRMATION BIAS

Overconfidence
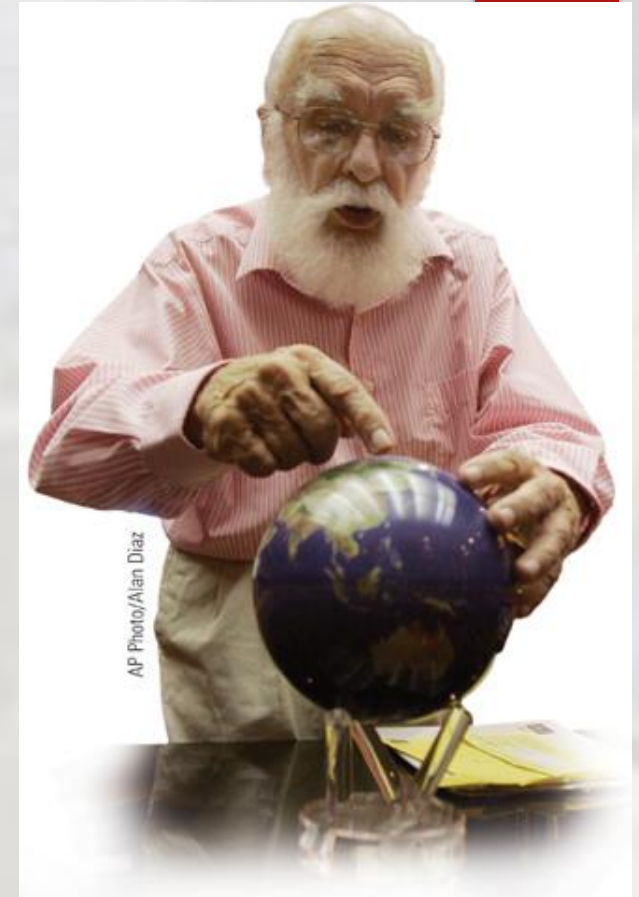
Hindsight Bias

Perceiving Order

Flaws of Intuition

Scientific Attitude & Critical Thinking

What are the three main components of the "scientific attitude"?

Foundation of Critical Thinking?

AP Photo/Alan Diaz

The Amazing James Randi!

Wrap Up: Identify whether hindsight bias (HB), overconfidence (O), or the tendency to perceive patterns in random events (P) is at work below

▶ **1.** Toni notices that the last four times she has been to the grocery store she has scored a parking place right up front! She knows she is on a lucky streak!

▶ **2.** Bruce is often called a Monday Morning Quarterback by his friends for saying he knew the Eagles should have put the rookie wide receiver in last Sunday's game.

▶ **3.** Amanda, a senior in high school with a 3.0 GPA, is filling out her college applications. When asked by her friends and family what schools she is applying to and what schools she thinks she will get into, she lists Princeton, Yale, Harvard and Stanford and says she thinks she will get into all of them, except maybe for Harvard, which is her reach school.

▶ **4.** Shreya and Steve break up. Their classmate, Iram, tells her mother that she knew all along the two of them were not going to make it.

▶ **5.** Fiona, a student in your class, is certain that the instructor does not like her. For the last three class sessions, the instructor has not called on her to answer a question, even though her hand was raised.
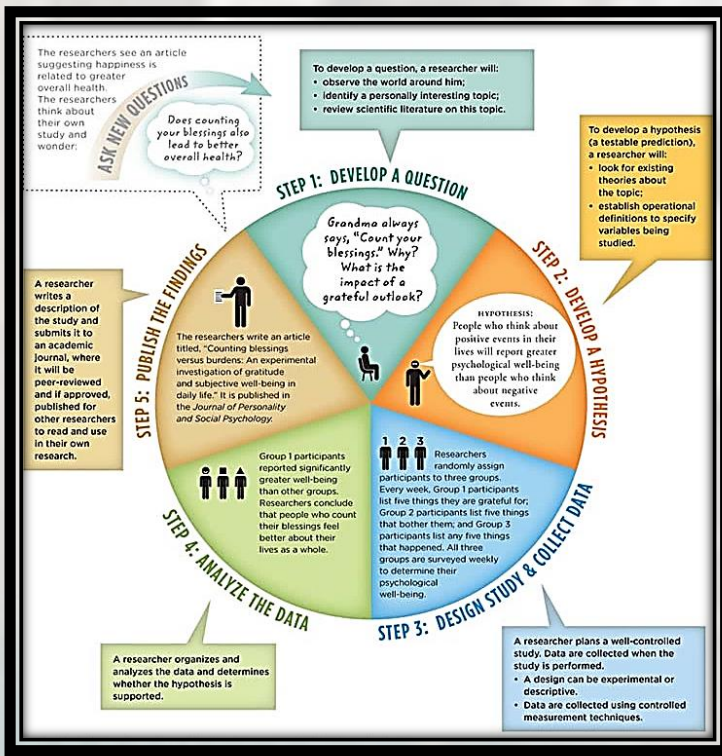
Module 5

THE SCIENTIFIC METHOD & DESCRIPTION
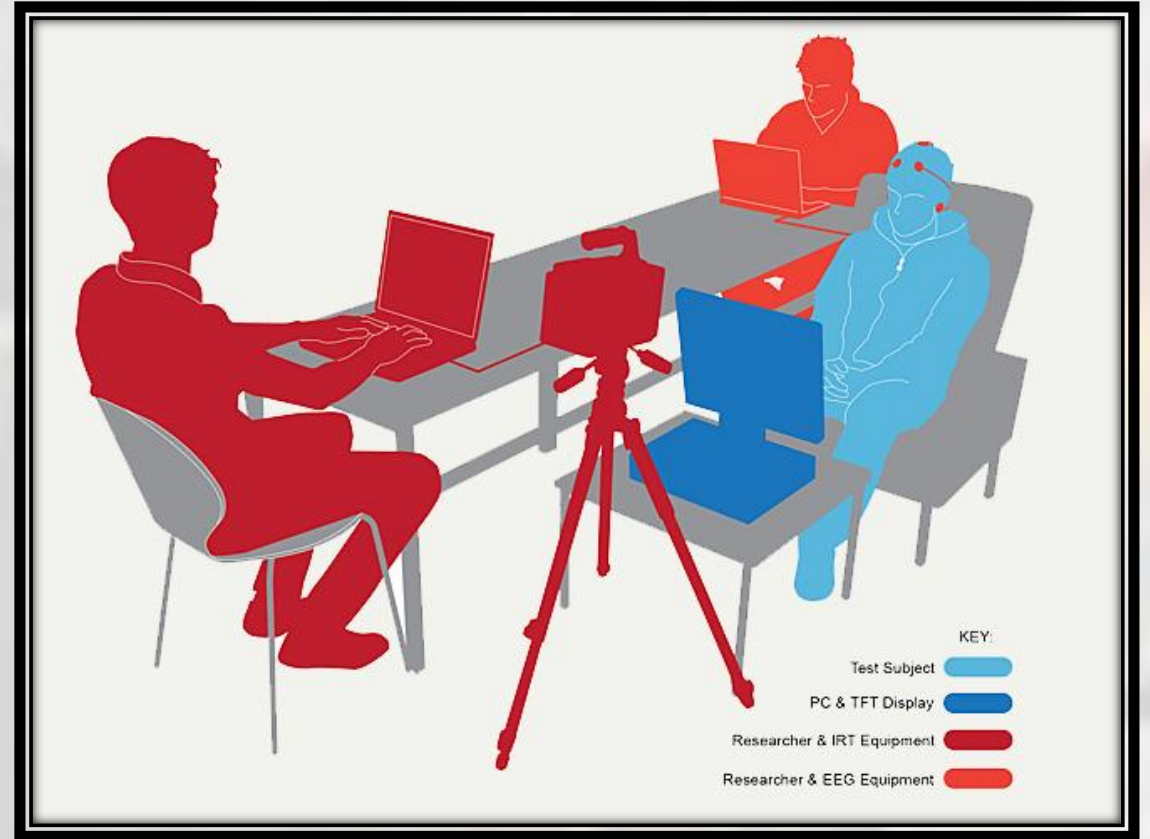
Basics of Scientific Method

1. Crash Course Key Points
2. Module 5 Takeaways
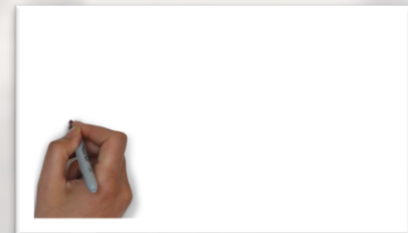3. Operational Definitions

1. Forming a question

2. Forming a hypothesis

3. Testing the Hypothesis

4. Analyzing the results

5. Drawing Conclusions

Final Element: REPLICATION

How does a researcher choose which method to use? It depends on the research question. Each research method has advantages and disadvantages.

TABLE 1.6	RESEARCH METHODS: ADVANTAGES AND DRAWBACKS	
Research Method	Advantages	Disadvantages
Descriptive	Good for new research questions; can study phenomena in their naturally occurring environment.	Very little control; increased experimenter/participant bias; cannot determine cause and effect.
Correlational	Shows whether two variables are related; useful when an experiment is not possible.	Directionality and third-variable problems; cannot determine cause and effect.
Experimental	Can determine cause and effect; increased control over variables.	Results may not generalize beyond lab setting; potential for extraneous variables.

Complete Chart on Descriptive Research

Case Studies

ADVANTAGES	DISADVANTAGES
• Good source of hypotheses. • Provides in-depth information on individuals. • Unusual examples can shed light on situations or problems that are unethical or impractical to study in other ways.	• Vital information may be missing, making the example difficult to interpret. • The person's memories may be selective or inaccurate. • The individual may not be representative or typical.

Naturalistic Observation

ADVANTAGES	DISADVANTAGES
• Allows description of behavior as it occurs in the environment. • Often useful in first stages of a research program.	• Allows researcher little or no control of the situation. • Observations may be biased. • Does not allow firm conclusions about cause and effect.

Laboratory Observation

ADVANTAGES

- Allows more control than naturalistic observation.
- Allows use of sophisticated equipment.

DISADVANTAGES

- Allows researcher only limited control of the situation.
- Observations may be biased.
- Does not allow firm conclusions about cause and effect.
- Behavior may differ from behavior in the natural environment.

Surveys

ADVANTAGES	DISADVANTAGES
• **Provides a large amount of information on large numbers of people.** • **Cheap** • **Hits a lot of people at once**	• If sample is non-representative or biased (Volunteer bias), it may be impossible to generalize from the results. • Demand characteristics: people respond in a way they know the researcher wants them to • The wording of surveys may be biased and participants are not always honest • Low response rate

Framing (Why is Wording of Surveys/Interviews important)

► 1255 people were surveyed by New York's American Museum of Natural History:

1. 77% interested in plants and trees, but only 39% interested in botany

2. 48% interested in fossils, but only 39% interested in paleontology

3. 42% interested in rocks and minerals, but 53% interested in geology

Other EXAMPLES?

WHY THE NUMBERS MATTER

RELATIVE RISK

"New wonder drug reduces heart attack risk 50%"

ABSOLUTE RISK

"New wonder drug reduced heart attacks from from 2 per 100 to 1 per 100"

The **absolute risk** is more useful at conveying the true impact of an intervention, yet is often under-reported in the research and the news.

HEALTHNEWSREVIEW
YOUR HEALTH NEWS WATCHDOG

KEY TERMS: Populations & Samples

- **Population**: everyone who can be in a study

- Psychologists would like to **generalize** what they learn to all people but due to time and money, they have to pick a sample of the total population

- **Sample:** Subset of a population who is actually IN the study

  - Random sample (random selection): every person has an equal chance of participating (names in a hat)

  - Representative sample: characteristics that are similar to those in the population A random sample typically generates a representative sample

- **Sampling bias:** An error in the sampling process that allows some members of a population to be more or less likely than others to be included in a study.

Replication Crisis?
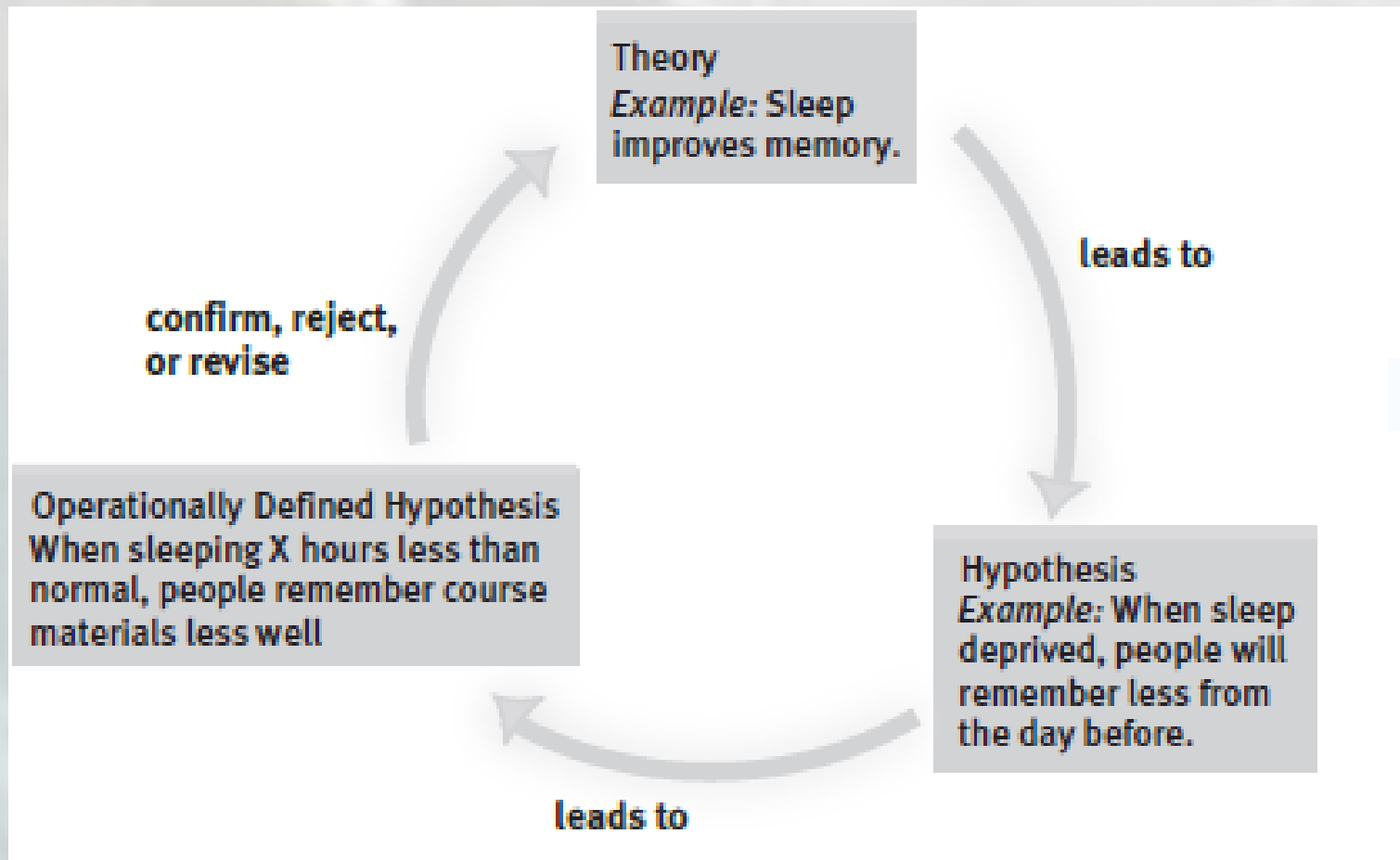
- Read article and summarize key points

- Why is replication so important?
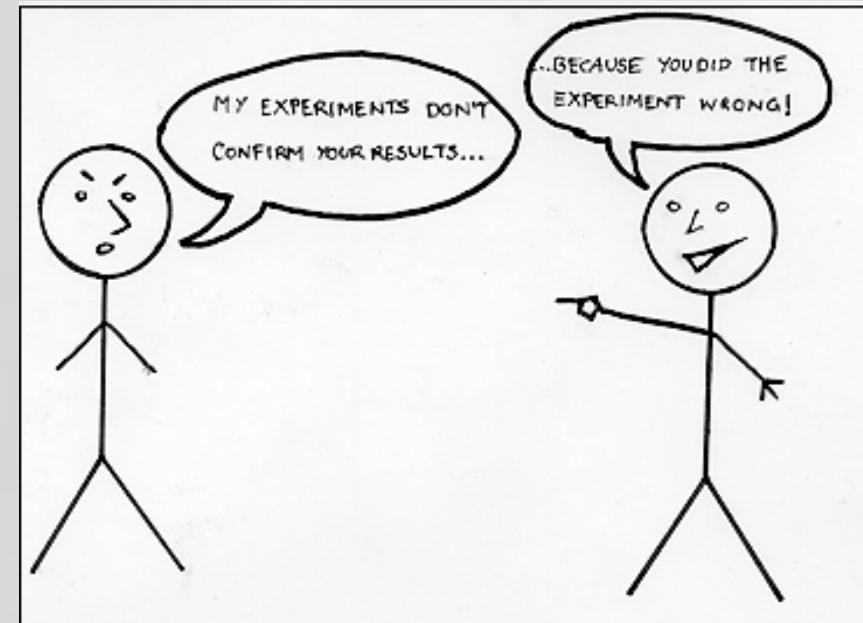
WRAP UP

- A **theory**….
  - is an explanation using an integrated set of principles that organizes observations and predicts behaviors or events, often highly researched
- A **hypothesis….**
  - is a testable prediction, often implied by a theory. In psych, it is a statement between or among variables
- **Operationally defining** the variables allows for repetition and replication, which is essential;…..
  - These need to be measurable and manageable.
- **Replication** importance:….
  - If a result is true, it should show itself over and over. If a study shows that gratitude increases positive well-being, then replication of that study should show the same results. Replicated studies with the same results can lead to advancing our knowledge.
- **Generalizability….**
  - The degree that results of a study can be applied to different types of populations

Discuss and explain

Theory
Example: Sleep improves memory.

leads to

Hypothesis
Example: When sleep deprived, people will remember less from the day before.

leads to

Operationally Defined Hypothesis
When sleeping X hours less than normal, people remember course materials less well

confirm, reject, or revise

Which descriptive technique would be best utilized in each case: a case study (CS), naturalistic observation (NO) or survey (S).

1. Mr. Bucher wants to determine whether he should use the building funds for a renovated student courtyard or a faculty exercise room.

2. An army doctor wants to see how soldiers are handling the transition back to civilian life.

3. A parent is curious to know how their child behaves when away from home at school.

4. An animal researcher wants to prove that squirrels run in packs as wolves do.

5. The Central Bucks School Board is trying to determine if teachers and students feel the building facilities are adequate and safe.
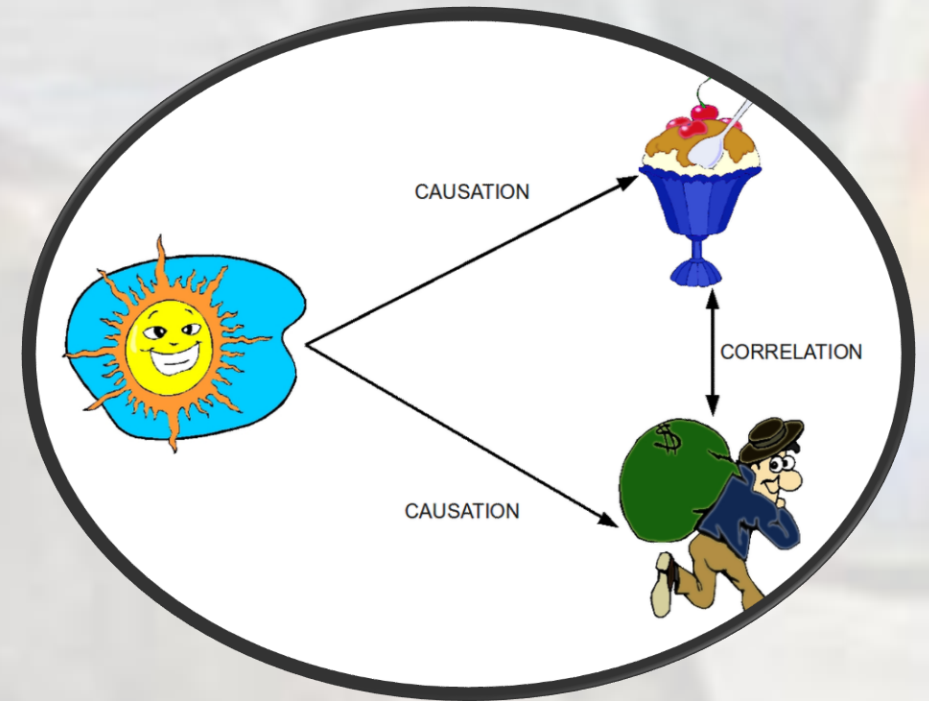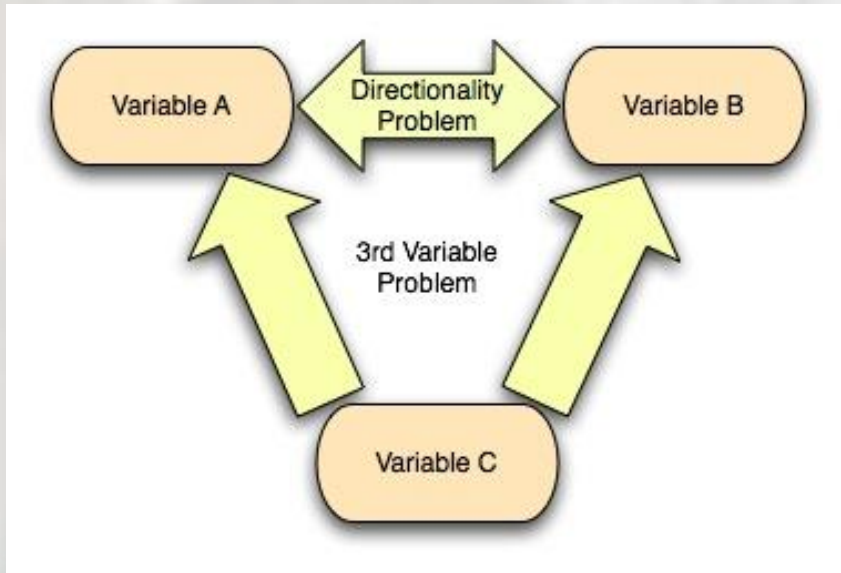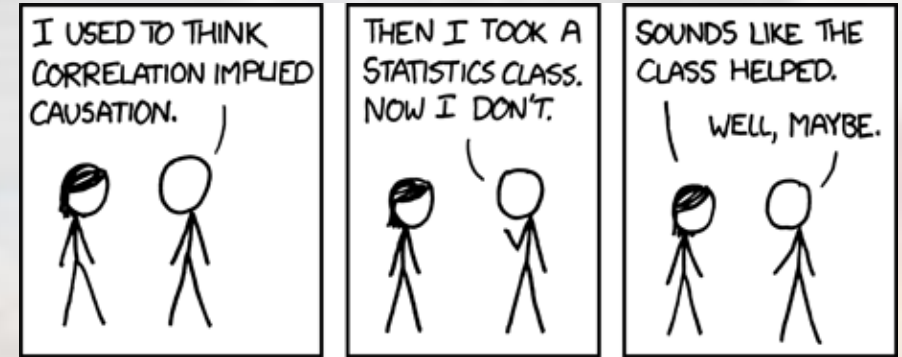
Module 6
## CORRELATION & EXPERIMENTATION

Correlations

- Shows how closely related two sets of scores/variables are to each other (A is related to B)

- How well does A predict B?
  - No manipulation of variables in correlational studies so **cannot prove causation**

- A statistical measurement called a correlation coefficient **(represented as *r*)** describes the strength and direction of the relationship. You will not have to calculate!

- A **scatterplot** is a type of graph used to display correlational data so that the relationship between two variables is visible

Netflix & Not so Chill

- A **positive or DIRECT** correlation, shows variables that either rise or fall together
  - V1: # of HW assignment turned in increases; V2: a person's grade in AP Psych also increases
- A **negative or INVERSE** correlation, shows variables that go in opposite directions
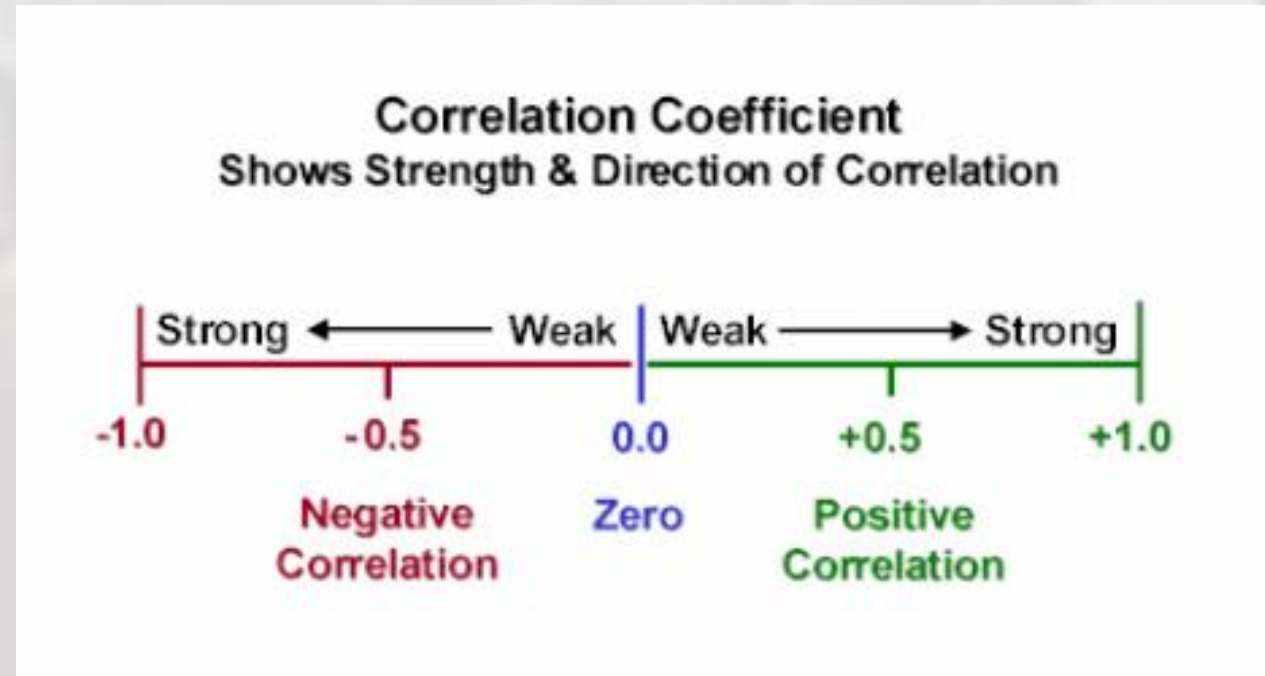 - # of hours watching Netflix increases; a person's GPA decreases

Y

X

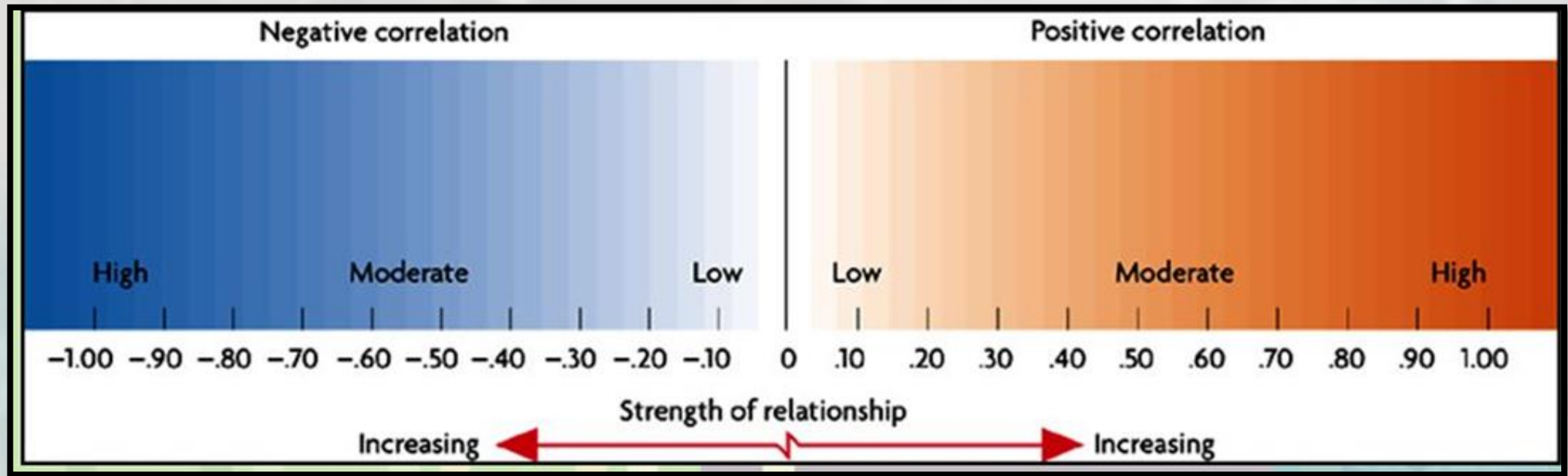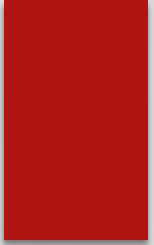**Perfect positive correlation**

Y
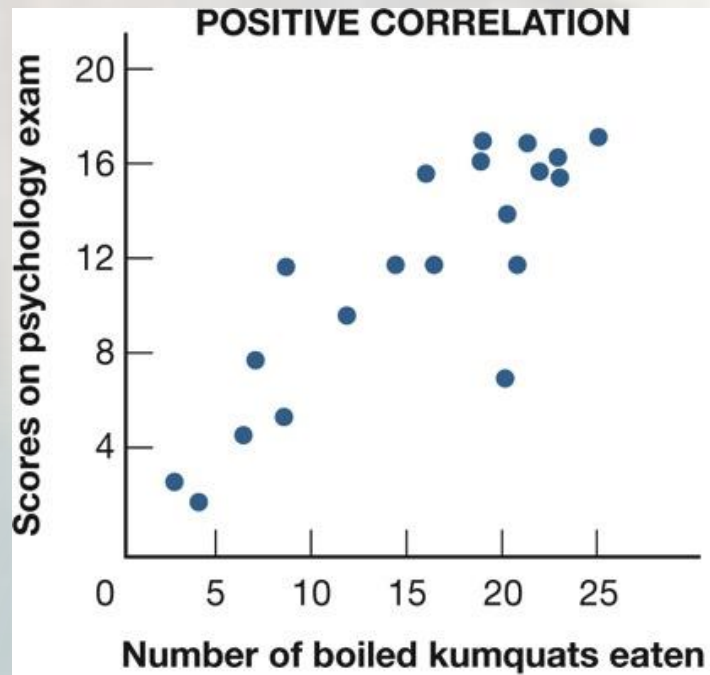
X
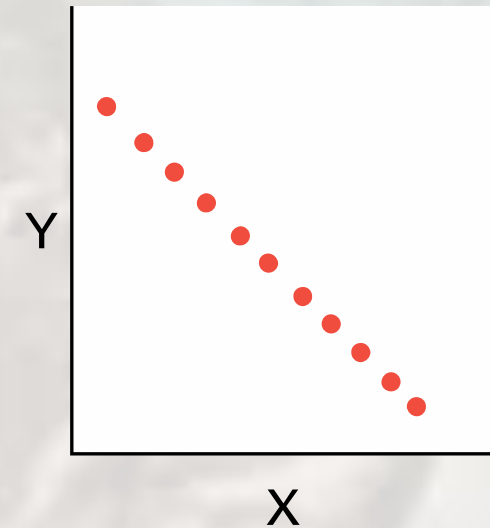
Perfect negative correlation

Correlations

- Correlation coefficients range from +1.00 to -1.00
- **The number (-.38) represents the strength of the correlation and the sign (+/-) represents the DIRECTION**
- A correlation coefficient of -.70 indicates a stronger relationship than a coefficient of +.65
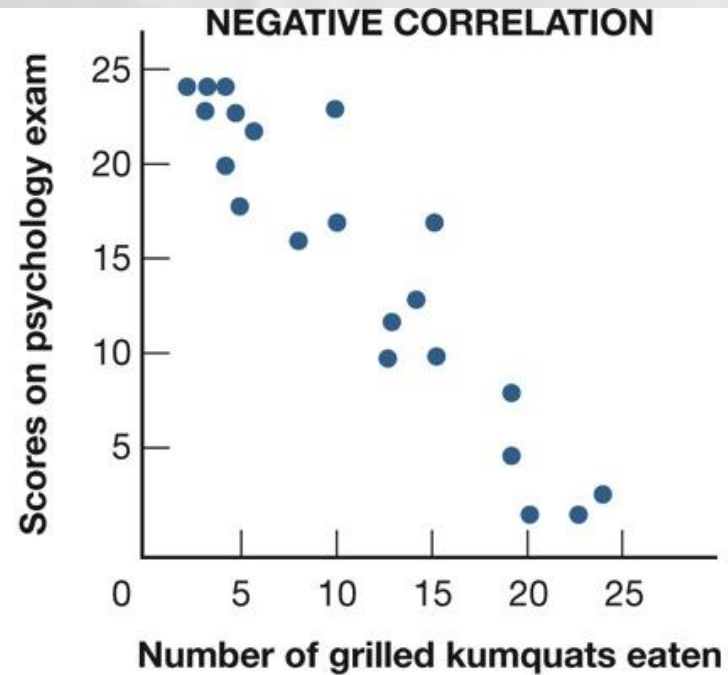- A correlation of 0 shows that the two sets are not related

Correlation Coefficient
Shows Strength & Direction of Correlation

Strong ← Weak | Weak → Strong

-1.0   -0.5   0.0   +0.5   +1.0
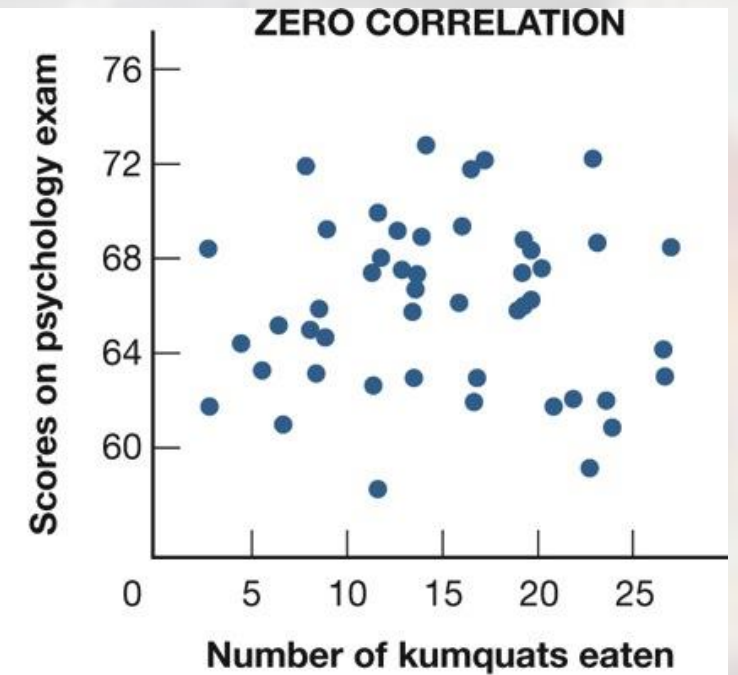
Negative Correlation   Zero   Positive Correlation

How do you visually represent correlation coefficient on a scatterplot?

POSITIVE CORRELATION — Scores on psychology exam vs. Number of boiled kumquats eaten (a)

NEGATIVE CORRELATION — Scores on psychology exam vs. Number of grilled kumquats eaten (b)

ZERO CORRELATION — Scores on psychology exam vs. Number of kumquats eaten (c)

Positive Correlation

0

r

+.70

+1
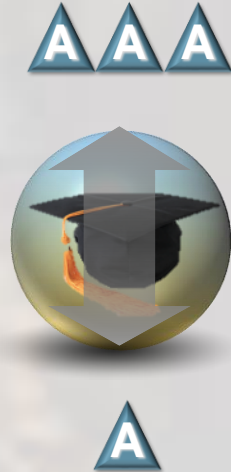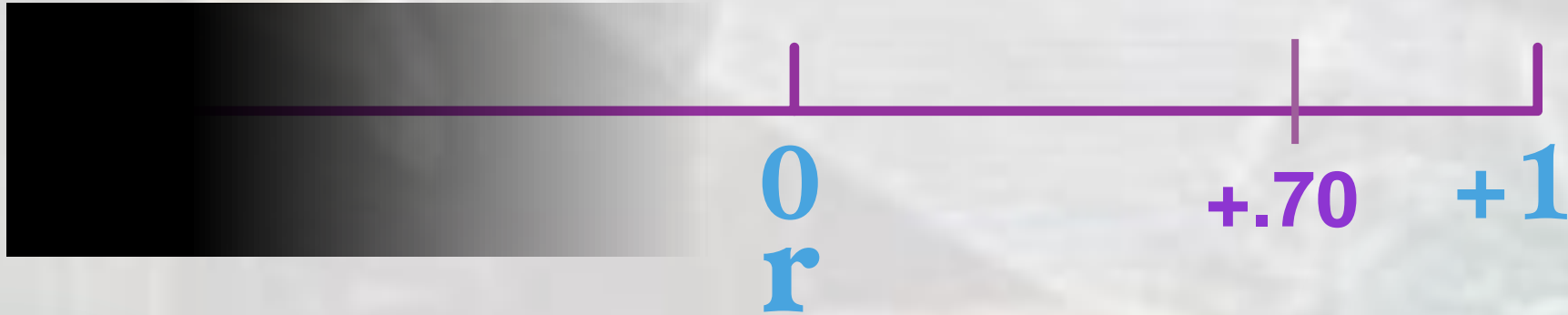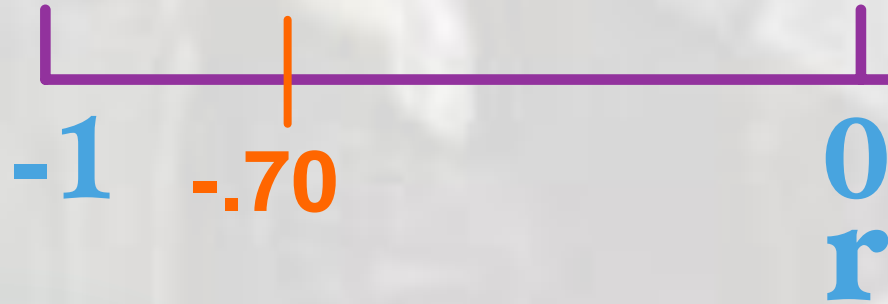
Positive correlation: Variables related in same direction

▶ Show graph

Negative Correlation

-1   -.70   0

r

Negative correlation:
Variables related in opposite direction

Show graph

Confounding (Third) Variables

► Third variable problem: Positive correlation between murder rate and the sale of ice-cream.

  ► Third variable which includes a confounding variable

  ► Weather is cold, fewer people are out interacting with others and less likely to purchase ice-cream.

  ► Hot outside, more social interaction and more ice-cream being purchased

  ► Weather is the variable that confounds the relationship between ice-cream sales and murder

Correlation Does not mean Causation
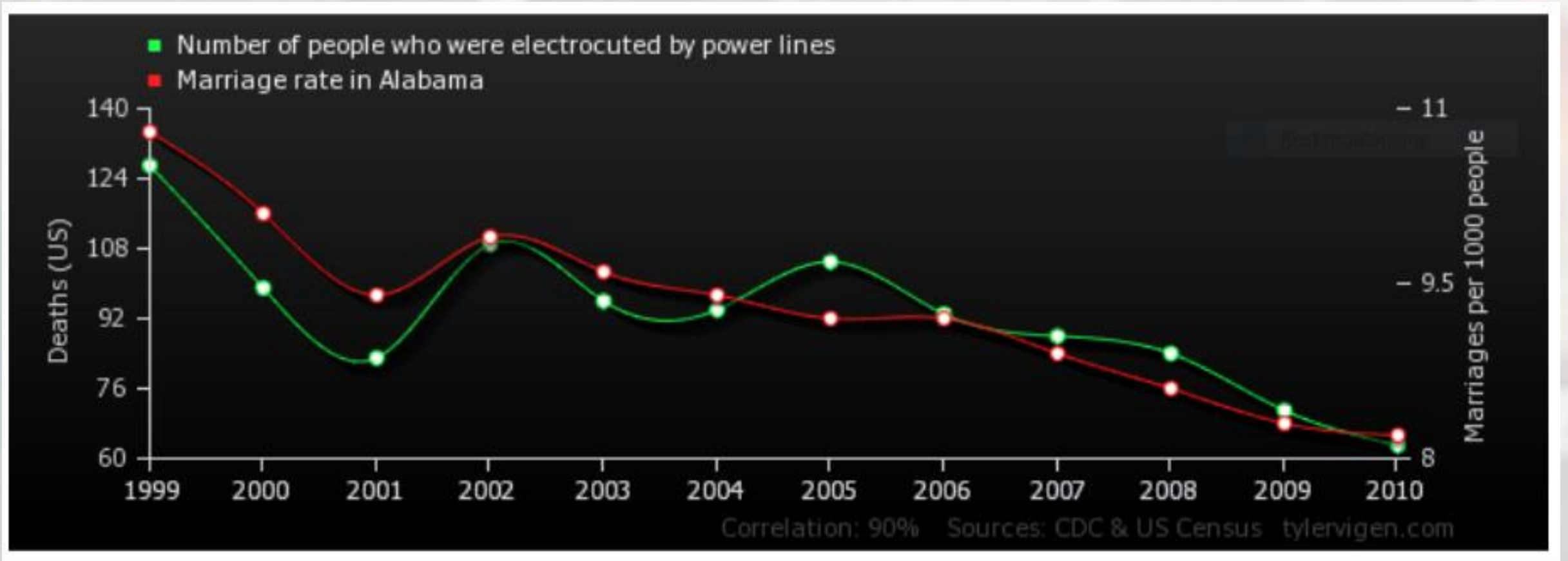
Correlation Does not mean Causation

Number people who drowned while in a swimming-pool
Power generated by nuclear power plants (US)

Correlation: 90%   Sources: CDC & Dept. of Energy   tylervigen.com
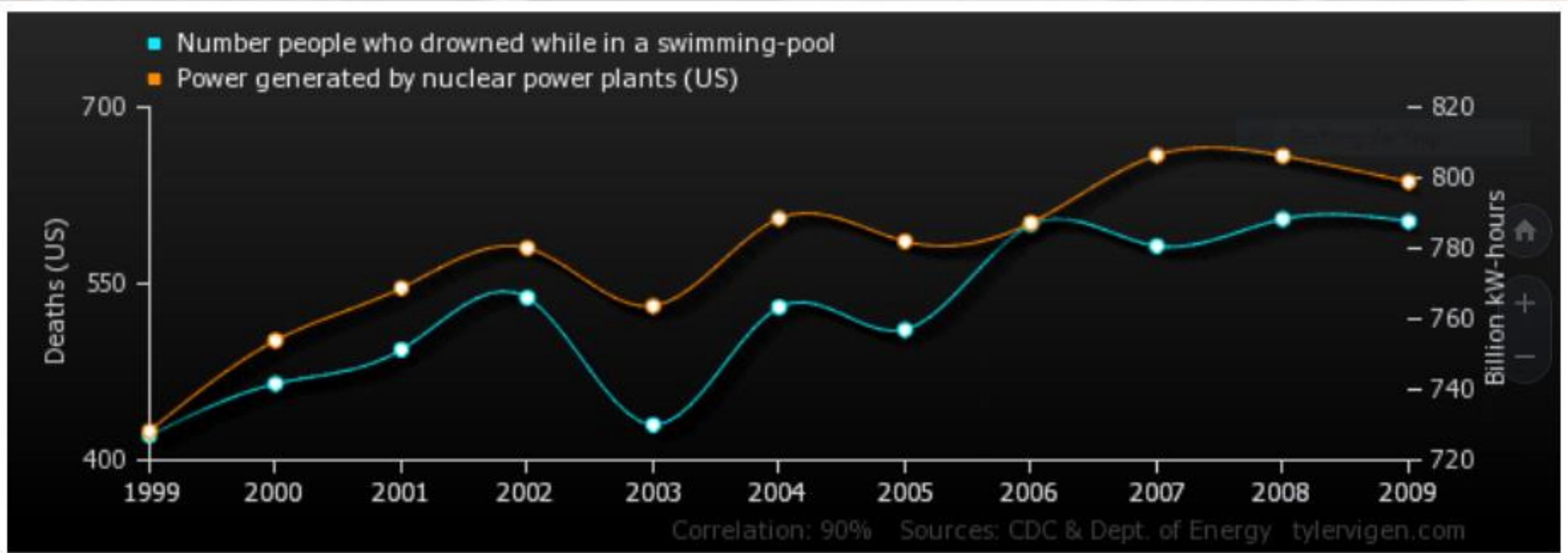
Correlation Does not mean Causation
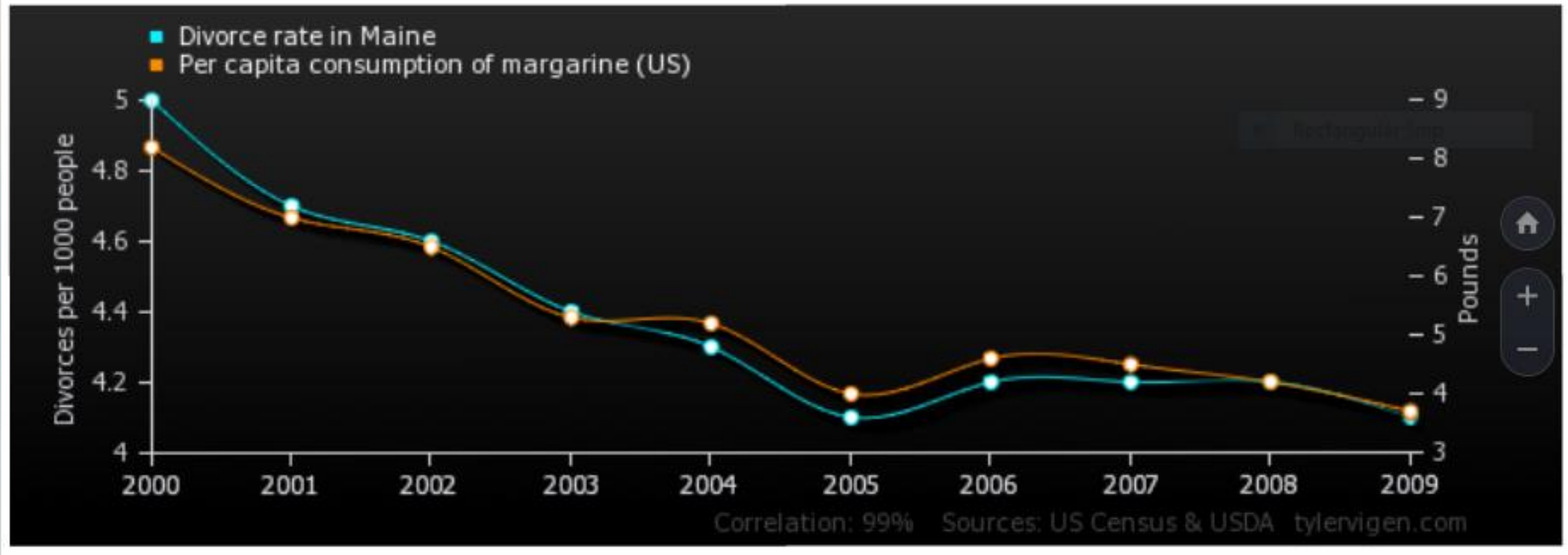
Correlation Does not mean Causation

Letters in Winning Word of Scripps National Spelling Bee
correlates with
Number of people killed by venomous spiders
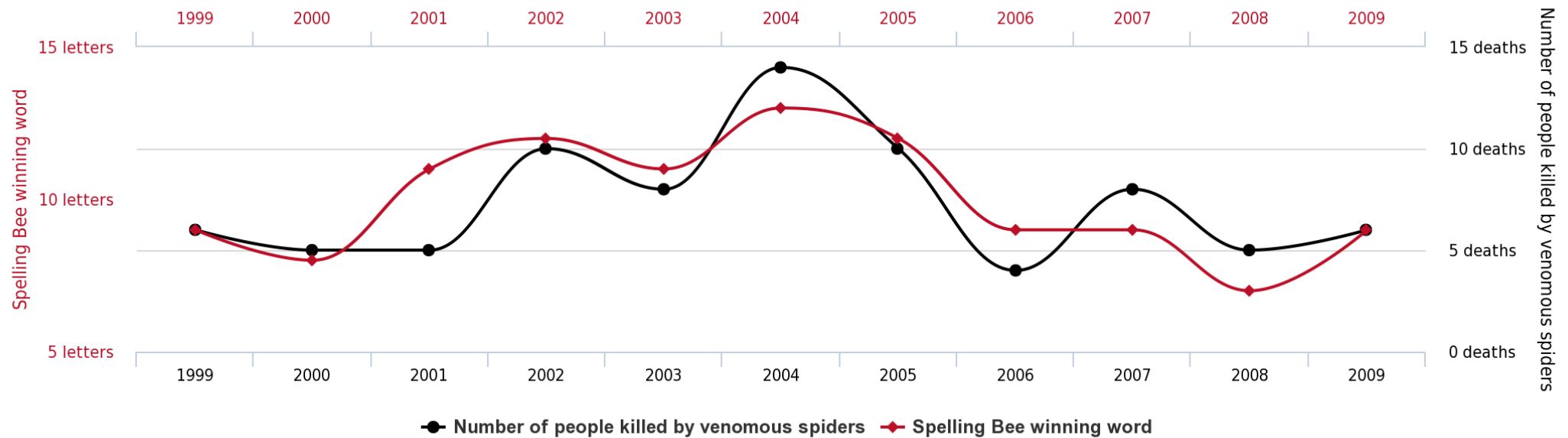
Correlation Does not mean Causation

Number of people who drowned by falling into a pool
correlates with
Films Nicolas Cage appeared in

tylervigen.com

Illusory Correlations?

▶ **Illusory correlation**: A suspected relationship that doesn't empirically exist

> ▶ I saw a few very short students getting A's on my quizzes in class, therefore, short kids must be smarter!

Predict whether the correlation would likely be positive (P) or negative (N):

1. The number of fast food restaurants: the obesity rate in the U.S.

2. The average U.S. household income: annual gross profit reported by U.S. retailers.

3. The illiteracy rate: the presence of Head Start or early intervention education programs.

4. The number of hours spent commuting to and from work; the amount of dinners cooked at home from scratch.

5. Hours spent learning a skill; proficiency in the skill.

Scatterplot Correlation Practice

1. Which is +/-

2. Which scatterplot is stronger? Why?

3. Could you estimate numerical range from this data?
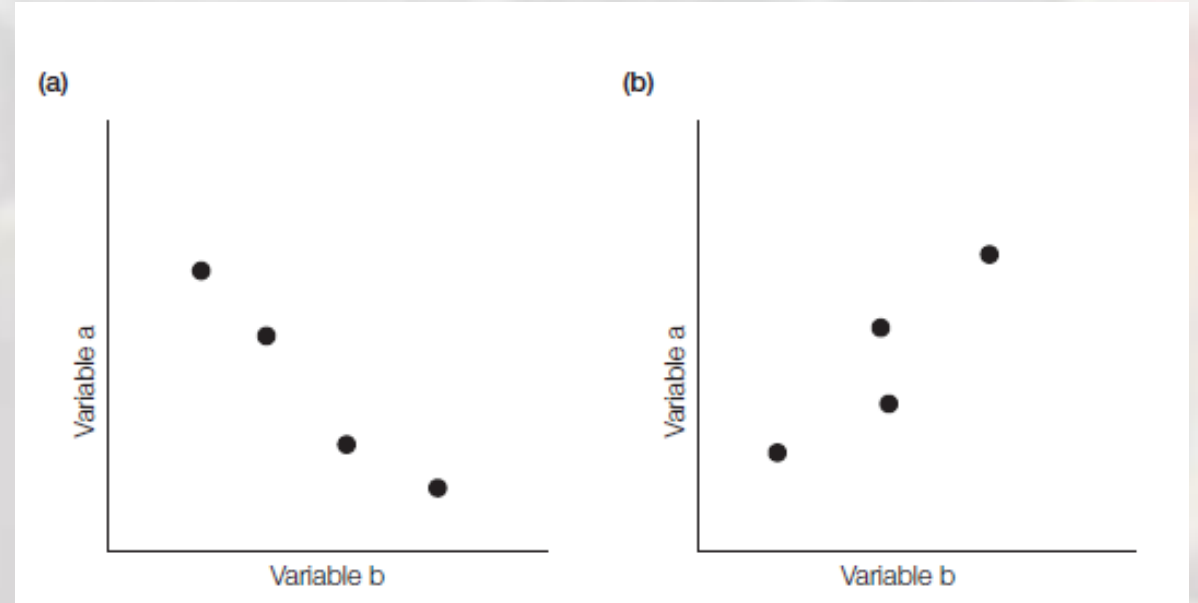
Experimentation: Discuss Basic Terms
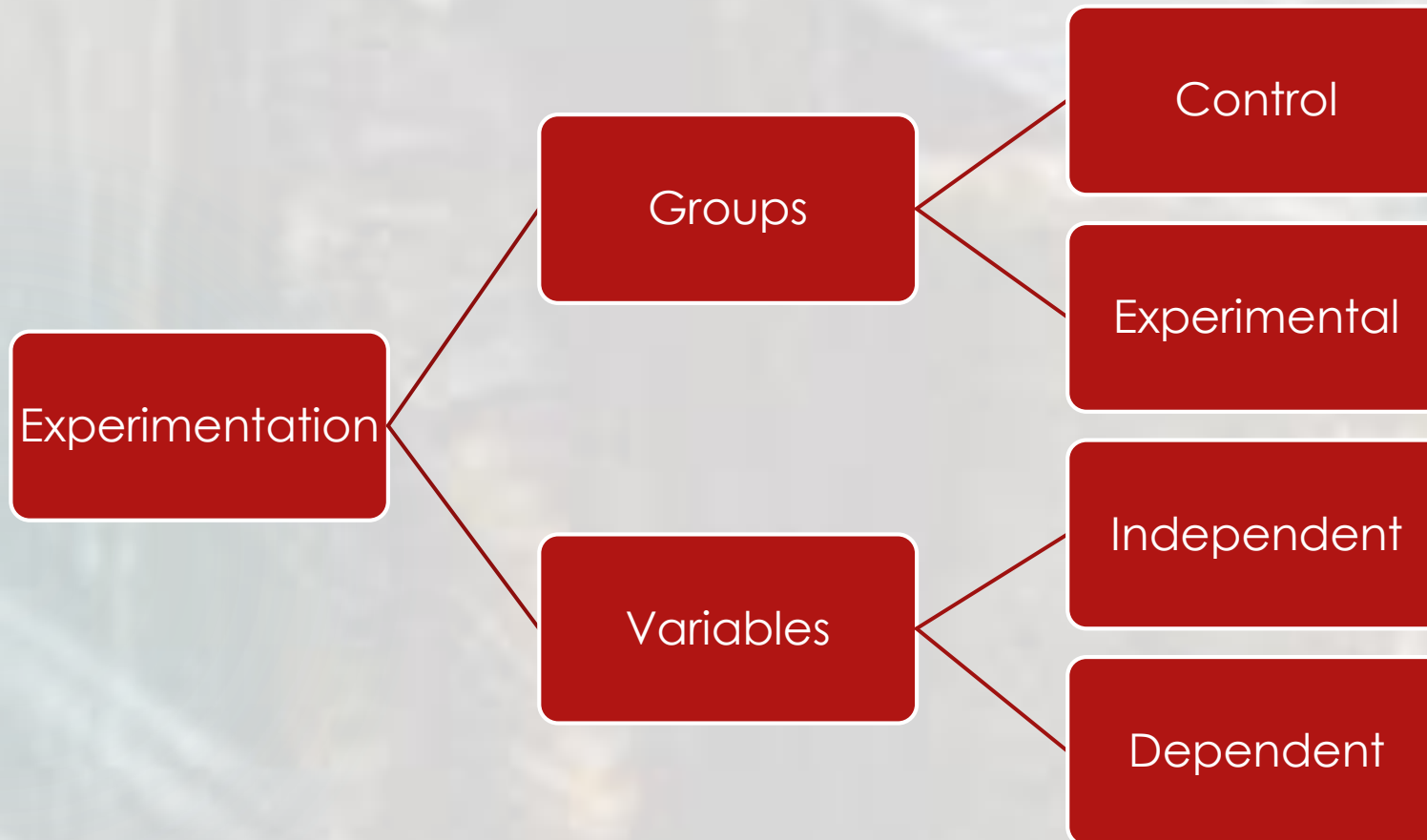
Experiment

ADVANTAGES

- Allows researcher to control the situation.
- Permits researcher to isolate cause and effect and to distinguish placebo effects from treatment effects.

DISADVANTAGES

- Situation is artificial, and results may not generalize well to the real world.
- Sometimes difficult to avoid experimenter effects.

When psychologists set up an experiment, they think, "If I do X, the people in my study will do Y."

X

Independent variable

Y

Dependent variable

Do Cell Phone Use and Driving Mix?
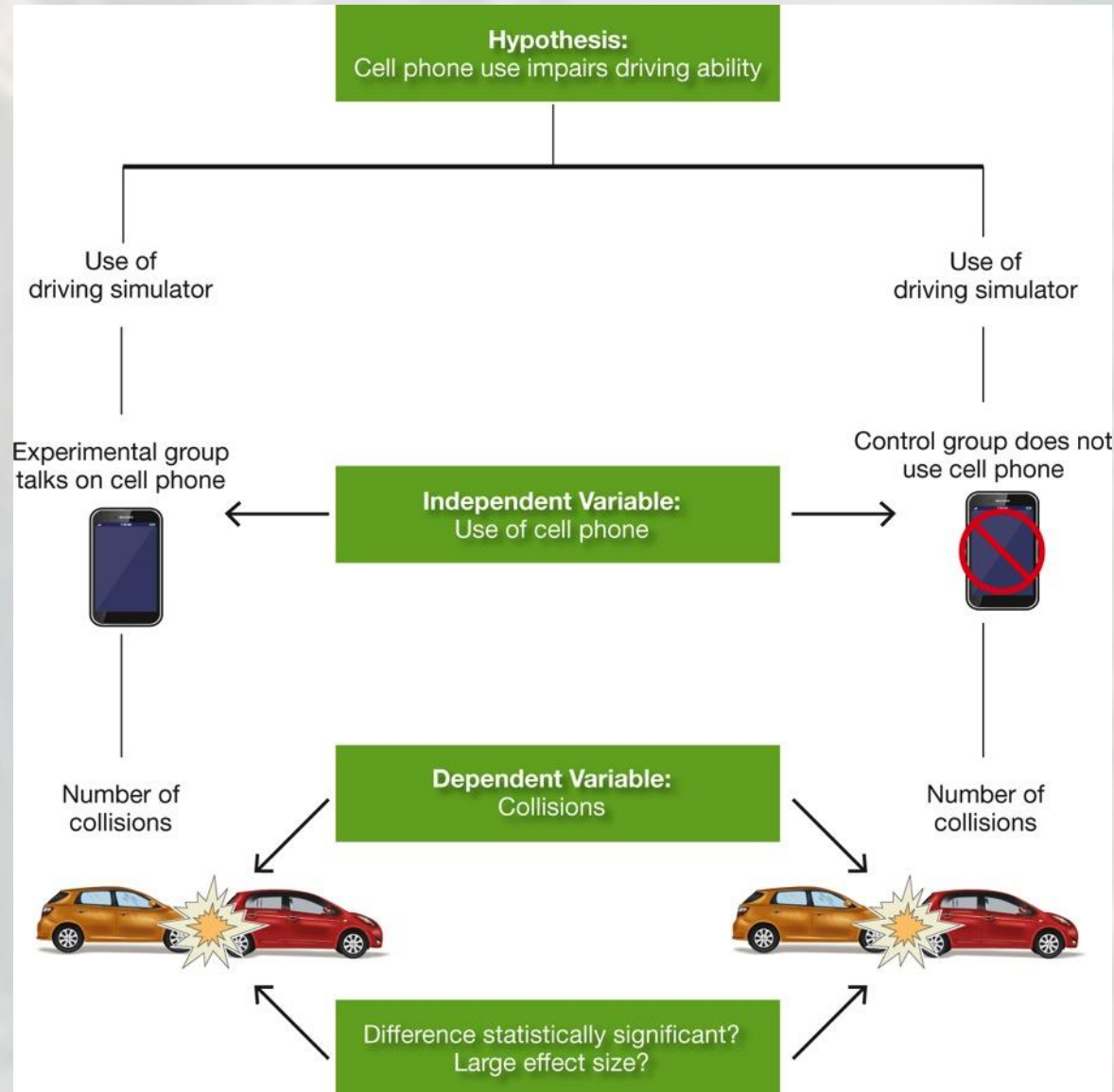
In an experiment, participants are **randomly assigned** . . .

. . . into **experimental** and **control groups** . . . which are then subject to **independent** and **dependent variables.**

Random Assignment
Controlling for **confounding variables** such as parental intelligence and environment

Group	Independent variable	Dependent variable
Experimental	Breast milk	Intelligence score, age 8
Control	Formula	Intelligence score, age 8

Participants
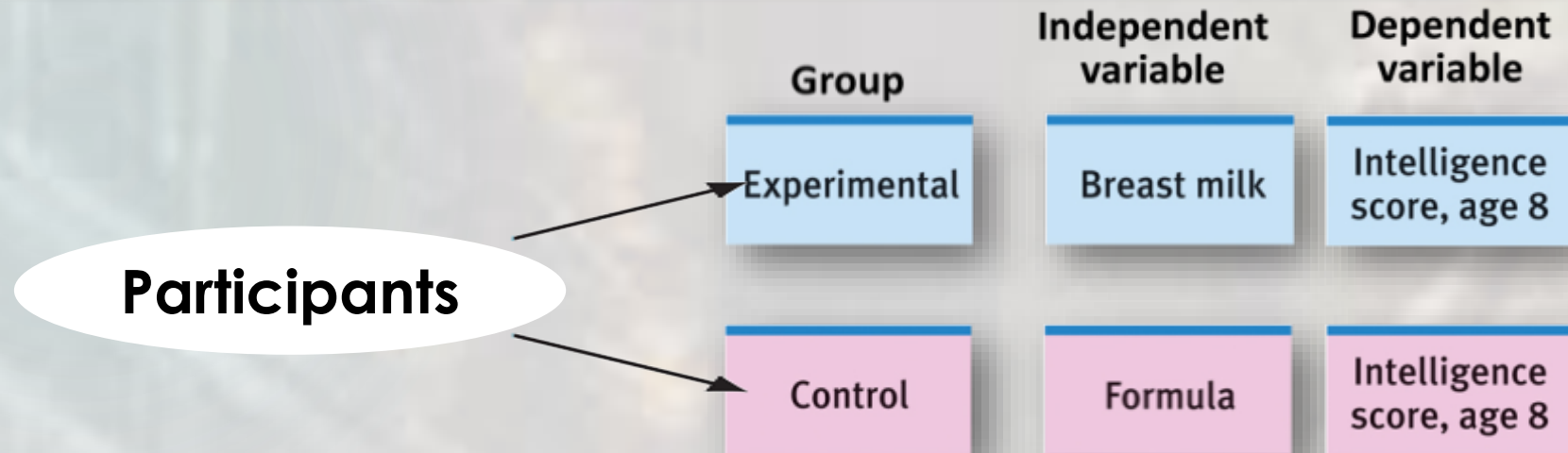
Variables and Null Hypothesis

- Anything that can change or be changed
- **Independent Variable (sleep):** Experimenter manipulates this
- **Dependent Variable (memory):** Variable that researchers measure
- Null Hypothesis: IV has no impact on DV (trying to disprove/reject this)

Theory
Example: Sleep improves memory.

leads to

Hypothesis
Example: When sleep deprived, people will remember less from the day before.

leads to

Operationally Defined Hypothesis
When sleeping X hours less than normal, people remember course materials less well

confirm, reject, or revise
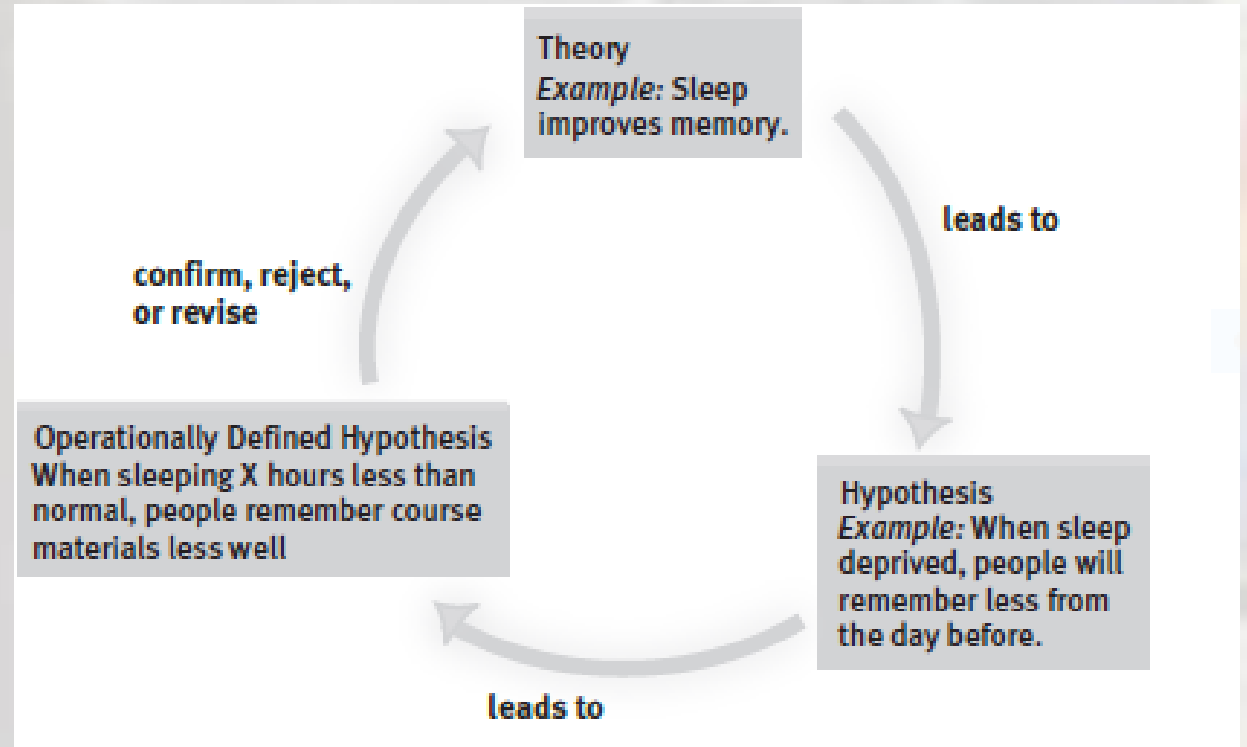
Experimental Method

Experimental group

- Members of an experiment who are exposed to the treatment variable or manipulation by the researcher; represents the treatment group.

Control group

- Participants in an experiment who are not exposed to the treatment variable; this is the comparison group.

Experimental Method

Independent variable (IV)

- In an experimental design, the variable manipulated by the researcher to determine its effect on the dependent variable

Dependent variable (DV)

- In an experimental design, the characteristic or response that is measured to determine the effect of the researcher's manipulation

Variables continued….

Extraneous variable

- Variable in the environment or of the participants that could unintentionally influence the outcome of the study

Confounding variable

- Type of extraneous variable that may interfere with the independent variable, making it difficult to discern which one is causing changes in the dependent variable
- Effect of protein on running speed; other foods in diet may confound

What does "blind" mean in research lingo?

- **Single-blind study**
  - Experimenter knows who is in which group
  - Participants do not

- **Double-blind study**
  - Neither experimenter nor participants know who is in which group
  - Eliminates experimenter bias

DOUBLE BLIND STUDY...

What is the Placebo Effect?

- An action or substance given to members of the control group; the fake treatment that has no benefit, but is administered as if it does

- People taking the placebos often experience effects that are similar to those reported by the participants taking the actual drug or treatment

Loren Fishman

PLACEBOS

FAST-ACTING, EXTRA-STRENGTH PLACEBOS

"Hmm... better go with these."
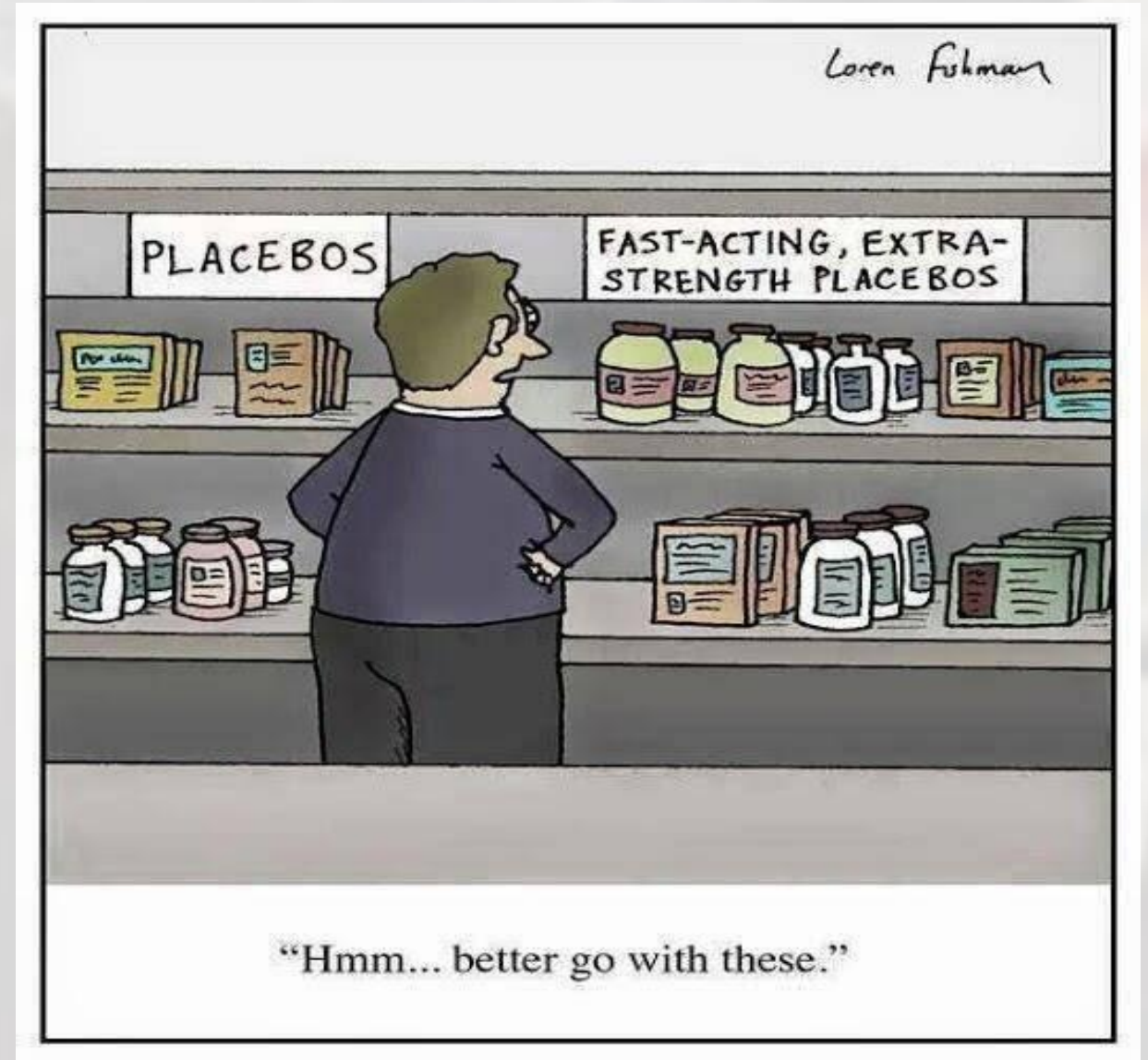
Does my Experiment Test what it is supposed to test? What is validity?
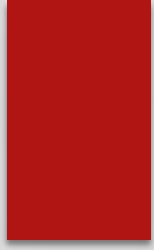
- **Internal Validity:** How well constructed was the experiment to control for confounding variables?

- **Content Validity:** Learning Shakespeare, test questions on Shakespeare NOT Geometry

  - IQ tests are strictly timed, may be a good measure of speed of processing. However, if researchers do not believe processing speed is an important component of intelligence, content validity would be questioned

- **Face Validity:** Tests appears valid to test taker

- **Construct Validity:** Self-esteem is a CONSTRUCT. What does it exactly mean though? Difficult to operationalize, need to be clear how you are measuring the construct

What about......Reliability?

- Refers to the consistency of a research study or measuring test.

  - If a person weighs themselves during the course of a day they would expect to see a similar reading. Scales which measured weight differently each time would be of little use.

NOT SURE IF LOSING WEIGHT

OR SCALE IS BROKEN
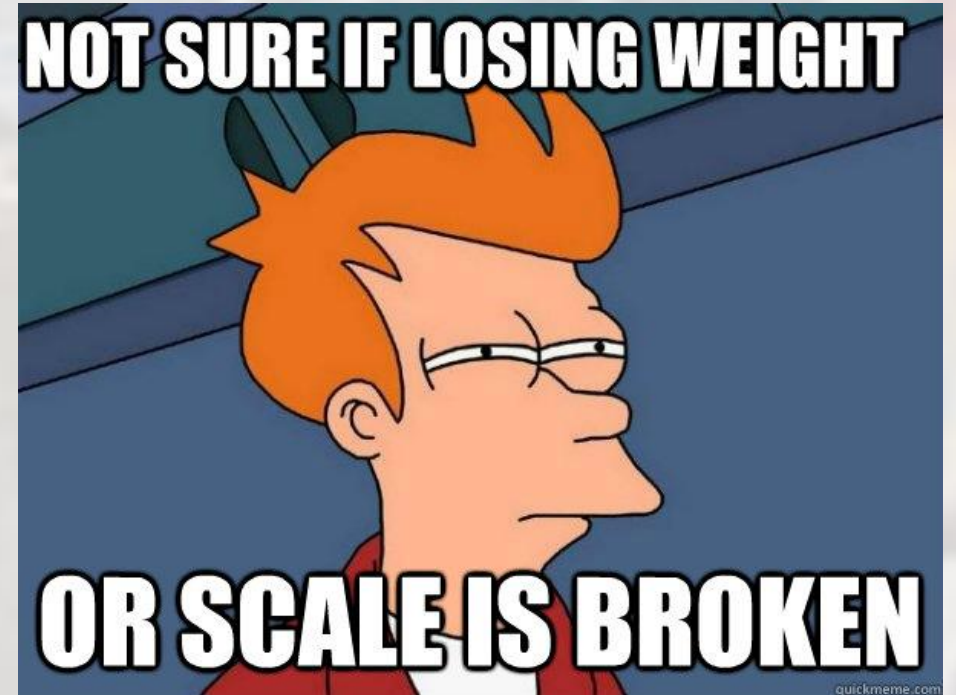
Module 7

STATS IN EVERYDAY LIFE
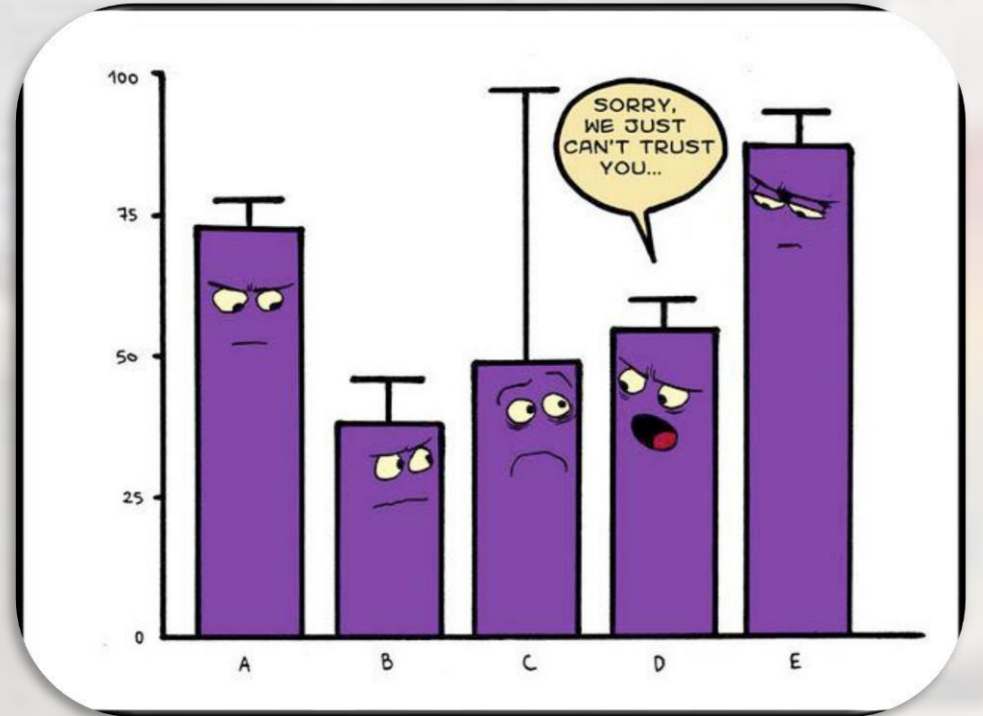
PSYCHOLOGY
SECTION II
Time—50 minutes

Percent of total grade—$33\frac{1}{3}$

Directions: You have 50 minutes to answer BOTH of the following questions. It is not enough to answer a question by merely listing facts. You should present a cogent argument based on your critical analysis of the questions posed, using appropriate psychological terminology.

1. A. Statistics are often used to describe and interpret the results of intelligence testing.

   - Describe three measures of central tendency (mean, median, and mode).

   - Describe a skewed distribution.

   - Relate the three measures of central tendency to a normal distribution.

   - Relate the three measures of central tendency to a positively skewed distribution.

   - An intelligence test for which the scores are normally distributed has a mean of 100 and a standard deviation of 15. Use this information to describe how the scores are distributed.

   - In two normal distributions, the means are 100 for group I and 115 for group II. Can an individual in group I have a higher score than the mean score for group II? Explain.

   B. Apply knowledge of psychological research in answering the following questions about intelligence scores.

   - Explain why norms for standardized intelligence tests are periodically updated.

   - Describe how to determine whether an intelligence test is biased.

Importance of Statistics
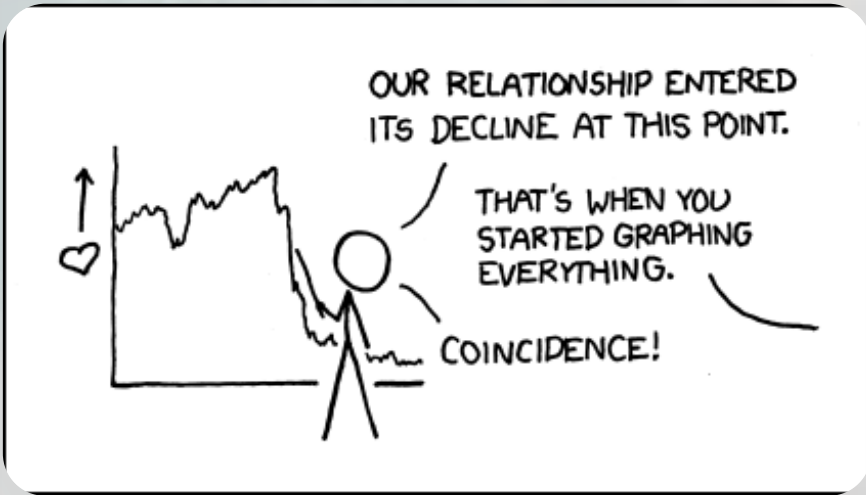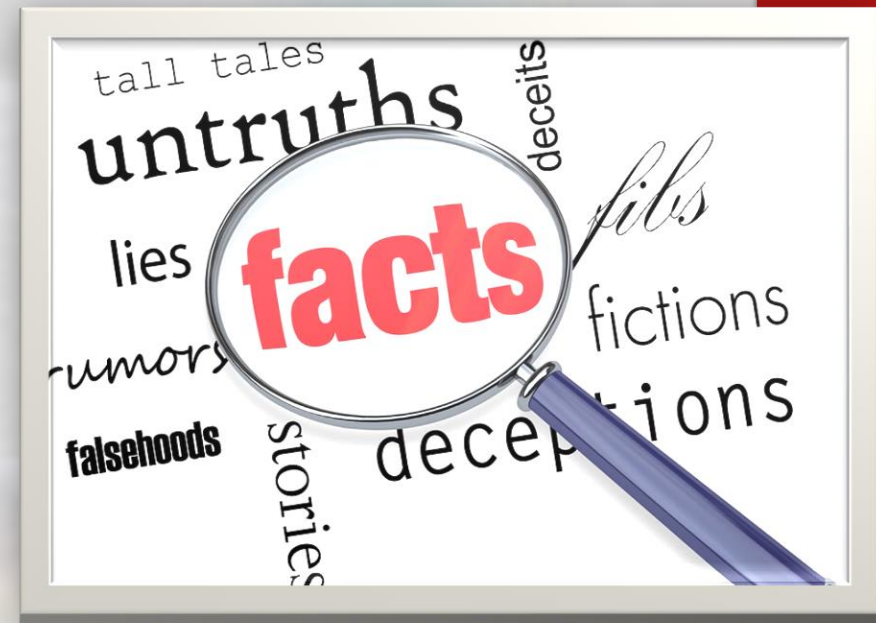
From what we have already discussed this unit and from module 7 why is statistical reasoning and transparency so important?

Measures of Central Tendency

Defined
- Basic concept of central tendency

Measures
- Mean
- Mode
- Median

Skewing
- Positive Skew
- Negative Skew

Central Tendency

- 3 Measures of Central Tendency (OR single scores that represents a whole set of scores)

- **Mean:** the arithmetic average
  - Add all scores then divide by number of scores (N)
  - Strongly influenced by outliers – gets pulled up or down depending on extreme data points

- **Median:** the middle score in a distribution

- **Mode:** the most frequently occurring score
  - **Bimodal** – if two scores appear most frequently
  - **Multimodal** – if three or more scores appear most frequently

Hey diddle diddle,
the median's the middle;
YOU ADD AND DIVIDE FOR THE MEAN.
The mode is the one that appears the most,
and the range is the difference between.

24, 25, 26, 27, 28, 28, 29, 30, 31, 31, 32, 32, 32, 34, 36

Median   Mode

155   155   158   164   168

Mode = 155   Mean = 160

Median = 158

(a) Negatively skewed
Mode
Median
Mean
Frequency
Negative direction

(b) Normal (no skew)
Mean
Median
Mode
The normal curve represents a perfectly symmetrical distribution

(c) Positively skewed
Mode
Median
Mean
Positive direction
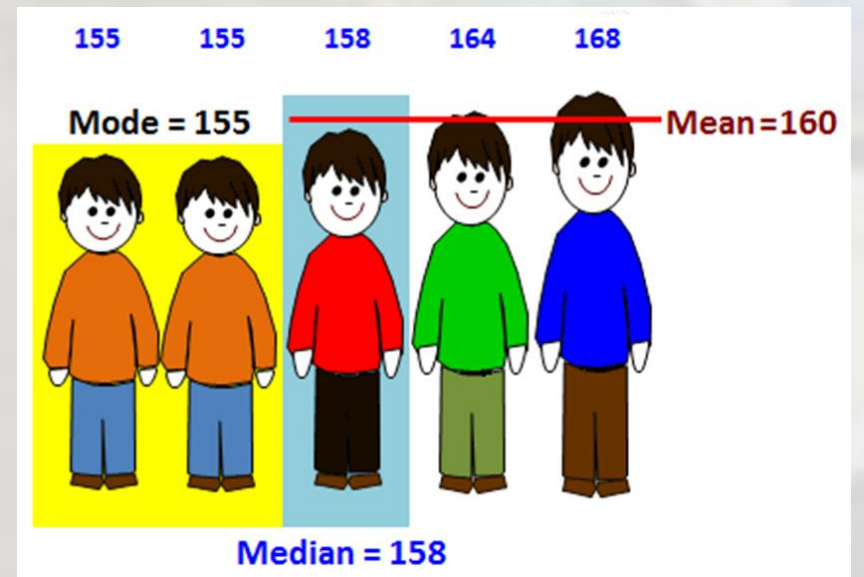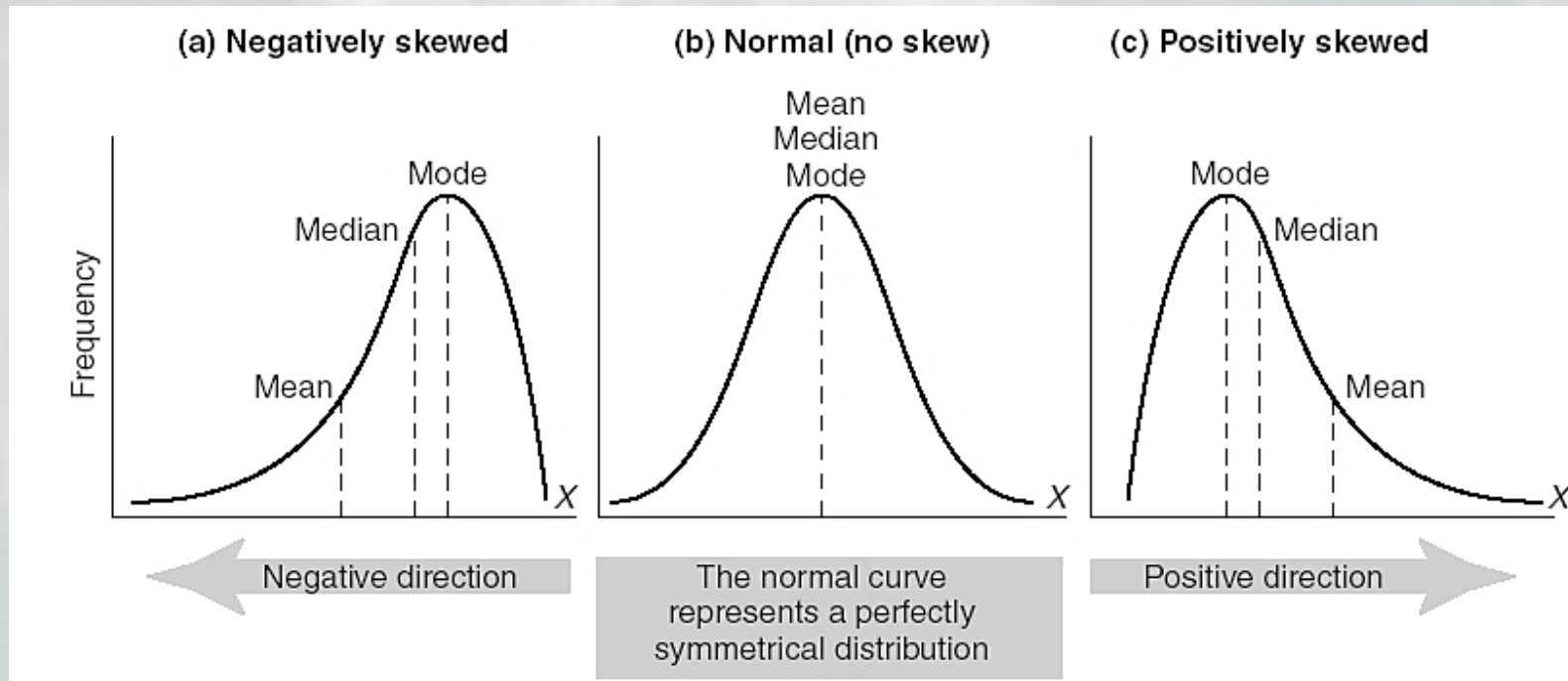
- Note that when a variable is normally distributed, the mean, median, and mode are the same number.

- You can use the following two rules to provide some information about skewness even when you cannot see a line graph of the data (i.e., all you need is the mean and the median):

- 1. **Rule One.** *If the mean is smaller (because of a very low score) than the median, the data are skewed to the left.*

- 2. **Rule Two.** *If the mean is larger (because of a very high score) than the median, the data are skewed to the right.*

Practice: Central Tendency AT Dunder-Mifflin

$25,000-Pam
$25,000- Kevin
$25,000- Angela
$100,000- Andy
$100,000- Dwight
$200,000- Jim
$300,000- Michael

The median salary looks good at $100,000.
The mean salary also looks good at about $110,000.
But the mode salary is only $25,000.
Maybe not the best place to work.
Then again living in Scranton is kind of cheap.

Mean, Median and Mode - Watch out for extreme scores or outliers!

Measures of Variation: Standard Deviation

What is the important takeaway related to standard deviation?

CREATED USING
PowToon

Normal Curve
Standard Deviation

19.1% 19.1%

15.0% 15.0%

9.2% 9.2%

0.1% 0.5% 4.4% 4.4% 0.5% 0.1%
1.7% 1.7%
-3 -2.5 -2 -1.5 -1 -0.5 0 0.5 1 1.5 2 2.5 3
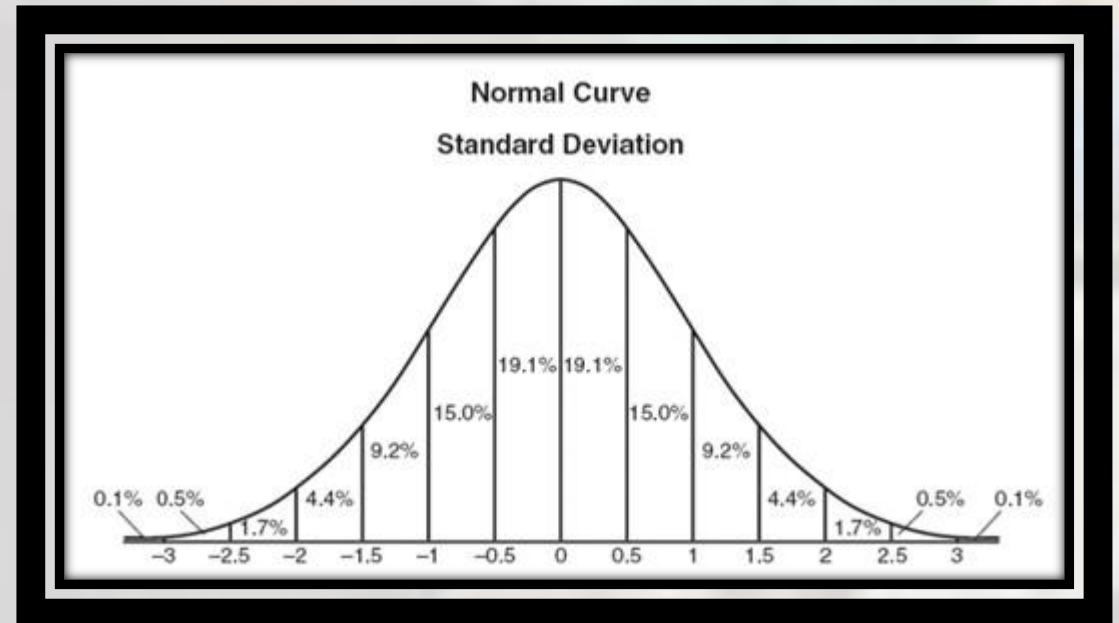
Measures of Variation (Variability)

- Variability: How spread out or dispersed the data is

  - **Range:** Calculated by taking the largest data point and subtracting from it the smallest data point, represents span of scores

  - **Variance:** The mean of the squared difference scores

YOU'RE THREE STANDARD DEVIATIONS ABOVE THE NORM

UM...THANKS?

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LOVE LETTER FROM A STATISTICIAN
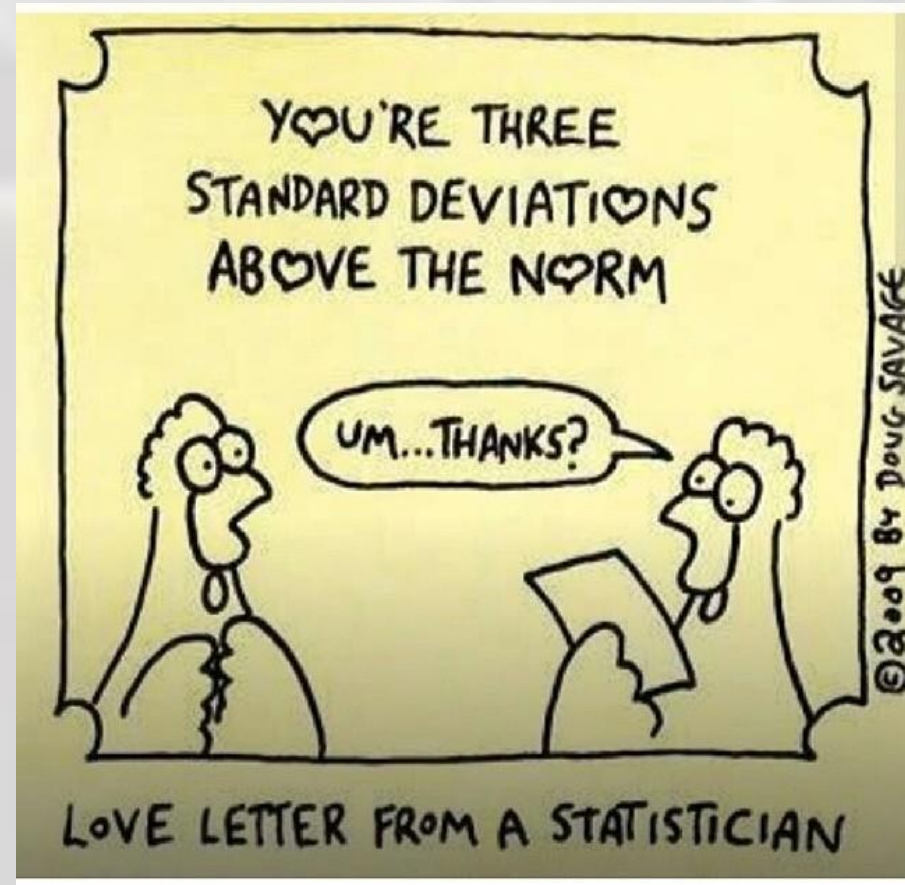
Measures of Variation (Variability)

Standard deviation: Average distance from the mean for a set of scores
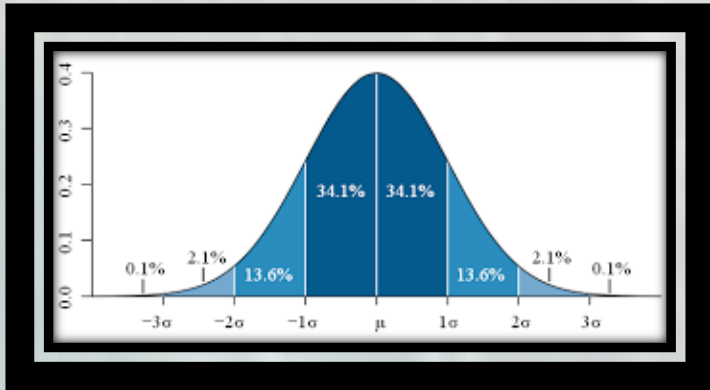
- Higher the SD, the less similar the scores are
- SD = 0 means all the scores in the distribution are the same
- If our first test has a SD of 5, everyone scored similarly, if it was 50, our scores were not similar at all!
- **Z-score** measures the distance of a score from the mean in units of standard deviation
- A z-score of -1SD means a score is 1SD BELOW the mean, a +1SD is one above

Z-Score practice

▶ IQ tests scores were compared between CB South & CB West. CB South had a positive Z score while CB West had a negative Z score. These scores definitively show:

a. Children at West are not as intelligent as children at South
b. Children at South scored above the mean
c. The IQ test result differences are statistically significant between the two schools
d. Children at South are above average in intelligence
e. None of the above

To Calculate Variance

► To calculate the variance for the set of numbers 4, 5, 5, 6, 6, 6, 6, 7, 7, 8:

1. Calculate the mean (average)

   1. 60÷10 = 6

2. Subtract the mean from each score in the distribution above

3. This shows you how far each score deviates from the mean, and when you add all of these numbers together, they should always equal zero.

4-6=	**-2**
5-6=	**-1**
5-6=	**-1**
6-6=	**0**
6-6=	**0**
6-6=	**0**
6-6=	**0**
7-6=	**1**
7-6=	**1**
8-6=	**2**

To Calculate Variance (cont.)

4. However, we want to convert the scores to a form that allows us to add them up and not get zero. Therefore, we square all of the deviations scores, which removes all of the negative values.

5. Now when we add them up, we get 12. The larger this number is, the greater the dispersion of the scores is.

6. Now divide the sum above by the number of scores in the group. This gives you the **variance** or the estimate of the average distance that a score is away from the mean.

   12 ÷ 10 = 1.2

-2 (square this)	-2 x -2=	4
-1	-1 x -1=	1
-1	-1 x -1=	1
0	0 x 0=	0
0	0 x 0=	0
0	0 x 0=	0
0	0 x 0=	0
1	1 x 1=	1
1	1 x 1=	1
2	2 x 2=	4

To Calculate Standard Deviation

- To calculate standard deviation, all you do is calculate the square root of the variation you just calculated.

  $\sqrt{1.2}$ = 1.1

- The smaller this number is, the more confident you can be in using the mean to represent the group.

How to find the standard deviation when given the variance

- Simply take the square root of the variance.

- Ex: If the variance is 81. Take the square root of that. The standard deviation is 9.

- Try these:
  - If the variance is 144, the standard dev is ___.
  - If the variance is 9, the standard dev is ___.

Normal Distribution Of Scores

- IQ Scores, heights, shoe sizes of large groups of people usually produce a symmetrical distribution; pattern of scores on one side are a mirror of the other side

- Referred to as "Bell Curve" because of the shape

- Data in a normal distribution fall around the mean in the same way each time

- Percentile rank: Percentage of scores in a distribution that a particular score falls above
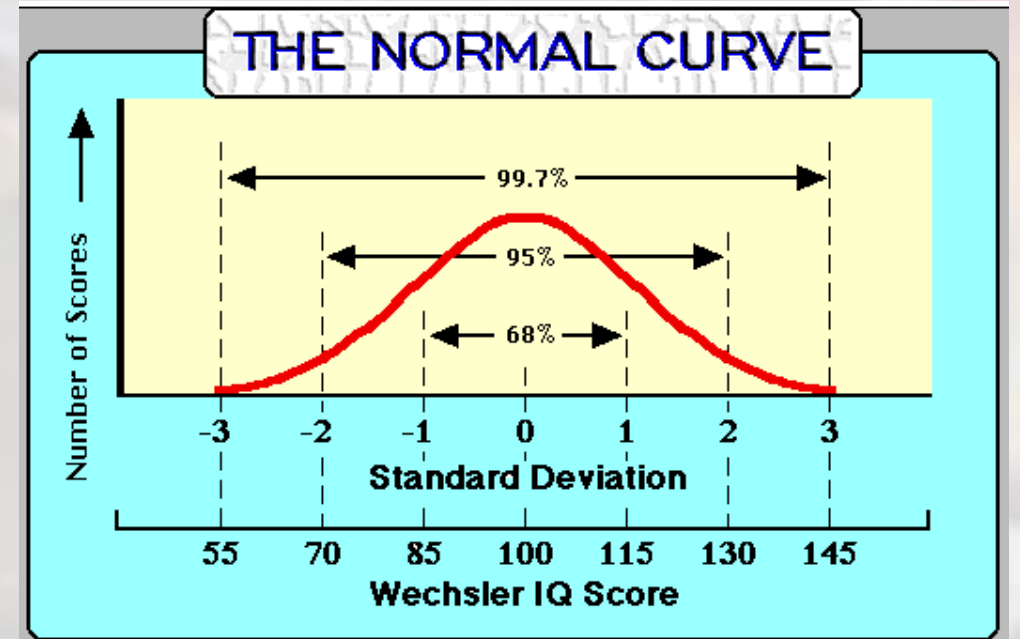
68 - 95 - 99.7 rule

- In a normal distribution:
  - 68% of scores fall within 1 SD of the mean
  - 95% fall within 2 SD
  - 99.7% fall within 3 SD
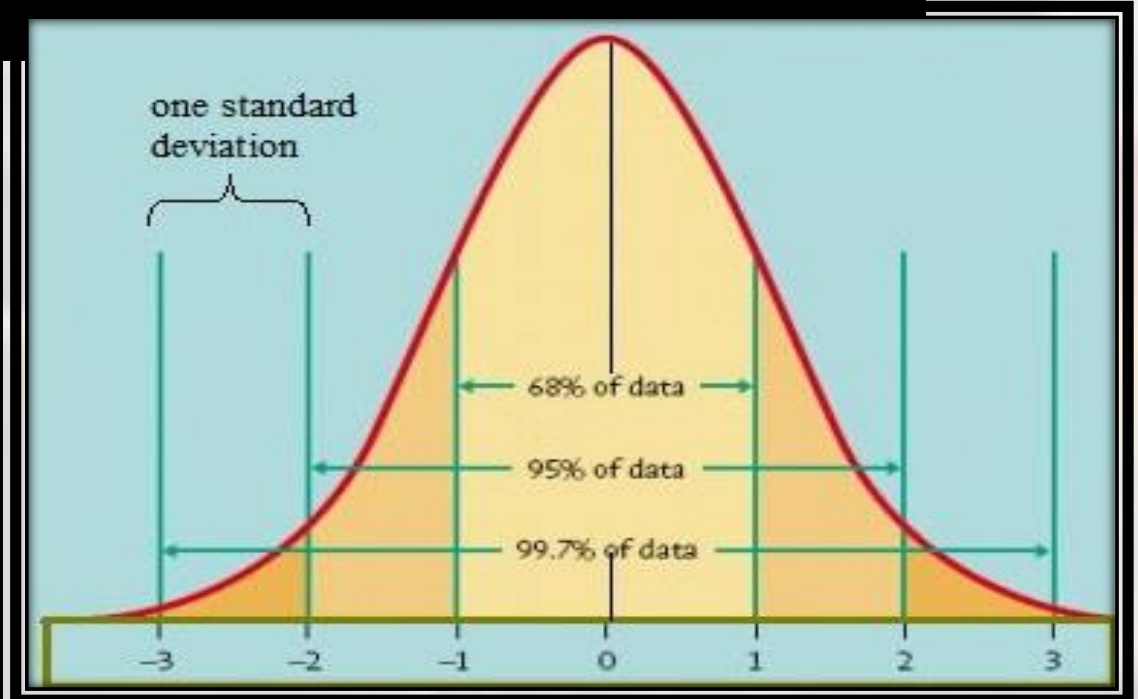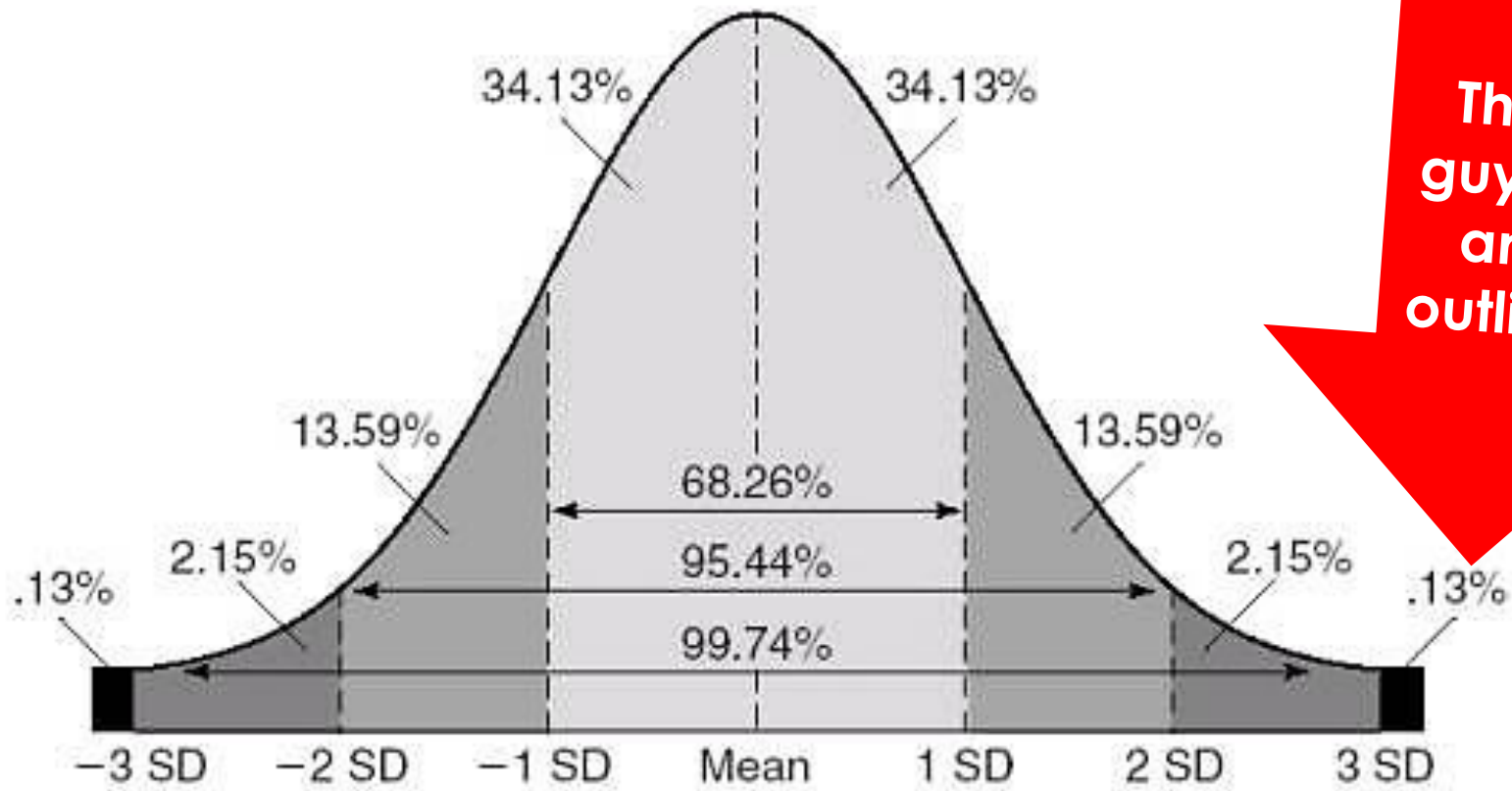
Inferential Statistics

Inferential vs Descriptive

Statistical Significance

Statistical Reliability

Statistical Significance

Significance reported as **p-value**, which is the probability of getting the experimental results

- The closer the **p-value** is to ZERO, the less likely the result is due to chance

- ZERO indicates near certainty that the result is due to manipulation of variables, basically impossible
- When **p (equal to or less than) ≤ 0.05** a researcher can conclude that the result is unlikely due to chance BUT **with p ≤ 0.05**, you can still expect a different result in 1/20 trials
- When statistical analysis shows that the results of a study are significant, the researcher can reject the null hypothesis
- When you reject the null, you are saying that the IV had an impact on the DV
- With **p ≤ 0.05,** rejecting the null will be the wrong decision 5/100 times or less

Module 8

FREQUENTLY ASKED QUESTIONS ABOUT PSYCHOLOGY

Ethical studies in past

- View video on studies from the past
- Why considered unethical?

Sponsored By: Lucinda Pierce

STIMULUS

Ethical guidelines

- What considerations are given today for animal/human research?
- what is important about the concepts of "informed consent" and "debriefing"?
- Is psychology free of value judgements?

Psychology Applied

Meyers Text discussion

- Can laboratory experiments illuminate everyday life?
- Does behavior depend on one's culture and gender?

Video Discussion

- Key points from video
- How does this connect to our previous modules?

Social Media Assignment

Step 2: Social Media Analysis (Small Group/In Class)

A.   Share your findings with your group and discuss patterns

B.   Choose one example from your group, research the actual study or an actual study related to the "reference". Using terminology from this unit, write a brief summary of your findings as to whether the study was presented in social media accurately and properly.

Step 3: Reflection (Individual/In Class/On Back): How does this assignment reflect the themes of this unit?

Unit Review

4.1: Describe how hindsight bias, overconfidence, and the tendency to perceive order in random events illustrate why science-based answers are more valid than those based on intuition and common sense.

4.2: Identify how the three main components of the scientific attitude relate to critical thinking.

5.1: Describe how theories advance psychological science.

5.2: Describe how psychologists use case studies, naturalistic observation, and surveys to observe and describe behavior, and explain the importance of random sampling.

Unit Review

6.1: Describe positive and negative correlations, and explain how correlational measures can aid the process of prediction but not provide evidence of cause-effect relationships.

6.2: Explain illusory correlations.

6.3: Describe the characteristics of experimentation that make it possible to isolate cause and effect.

7.1: Describe the three measures of central tendency, and discuss the relative usefulness of the two measures of variation.

Unit Review

7.2: Explain how we know whether an observed difference can be generalized to other populations.

8.1: Explain the value of simplified laboratory conditions in illuminating everyday life.

8.2: Discuss whether psychological research can be generalized across cultures and genders.

8.3: Explain why psychologists study animals, and describe the ethical guidelines that safeguard animal research participants.

8.4: Describe the ethical guidelines that safeguard human research participants.

8.5: Examine whether psychology is free of value judgements.

Practice Questions (71-73)

- 1. d
- 2. b
- 3. d
- 4. b
- 5. a
- 6. b
- 7. a
- 8. b

- 9. a
- 10. a
- 11. c
- 12. c
- 13. e
- 14. a
- 15. c

Sam Greene noticed an ad for an Internet dating service that claimed more people who used its service are in long-term relationships than people who didn't. Sam a good critical thinker, knows this isn't enough to claim that the service causes people to find long-term love and wants to create an experiment to investigate. Use the following terms to describe an experiment that would support or dispute the ad's claim.

Hypothesis

Random Sample

Random Assignment

Operational Definitions

Independent Variable

Dependent Variable

Inferential Statisitcs

Free-Response Answer

▶ The hypothesis in this context is that the Internet dating service causes (or leads to) long-term relationships

▶ Since the population of interest for this study should be people who are looking for long-term relationships, selecting a random sample of adults seeking relationships would help assure that the conclusions could be fairly generalized to the dating public.

▶ In this case, participants should be randomly assigned to use of the Internet service (the experimental group) or not (the control group)

▶ Sam would need to operationally define what is meant by use of the Internet service, possible including a precise number of visits to the website or time spent on the website. The phrase "long term relationship" would also need an operational definition, possibly the number of months together or a formal commitment (like engagement or marriage)

▶ In Sam's study the use of the online dating service is the independent variable

▶ The number of long-term relationships is the dependent variable

▶ Sam will need to calculate statistical significance for the experimental findings. In order to claim support for the hypothesis, the results need to show that there is no more than a 5 percent chance the findings are due to chance.

Dr. Tabor wanted to investigate the relationship between sleep and levels of alertness during a class between sleep and levels of alertness during a class for American university students. She gave surveys to 150 college freshman in her introduction to psychology course, asking them to report how many hours they slept each night during a tw0-week period. Dr. Tabor also had the participants rate their level of alertness on a scale of 1 to 10, with 10 being the most alert each day at the end of class. Dr. Tabor compared the average amount of sleep reported by each participant along with their average score on the alertness scale on a graph to examine the data. The resulting correlation coefficient for Dr. Tabor's data was a +0,89. Define each of the following terms and explain how each concept might apply to Dr. Tabor's research.
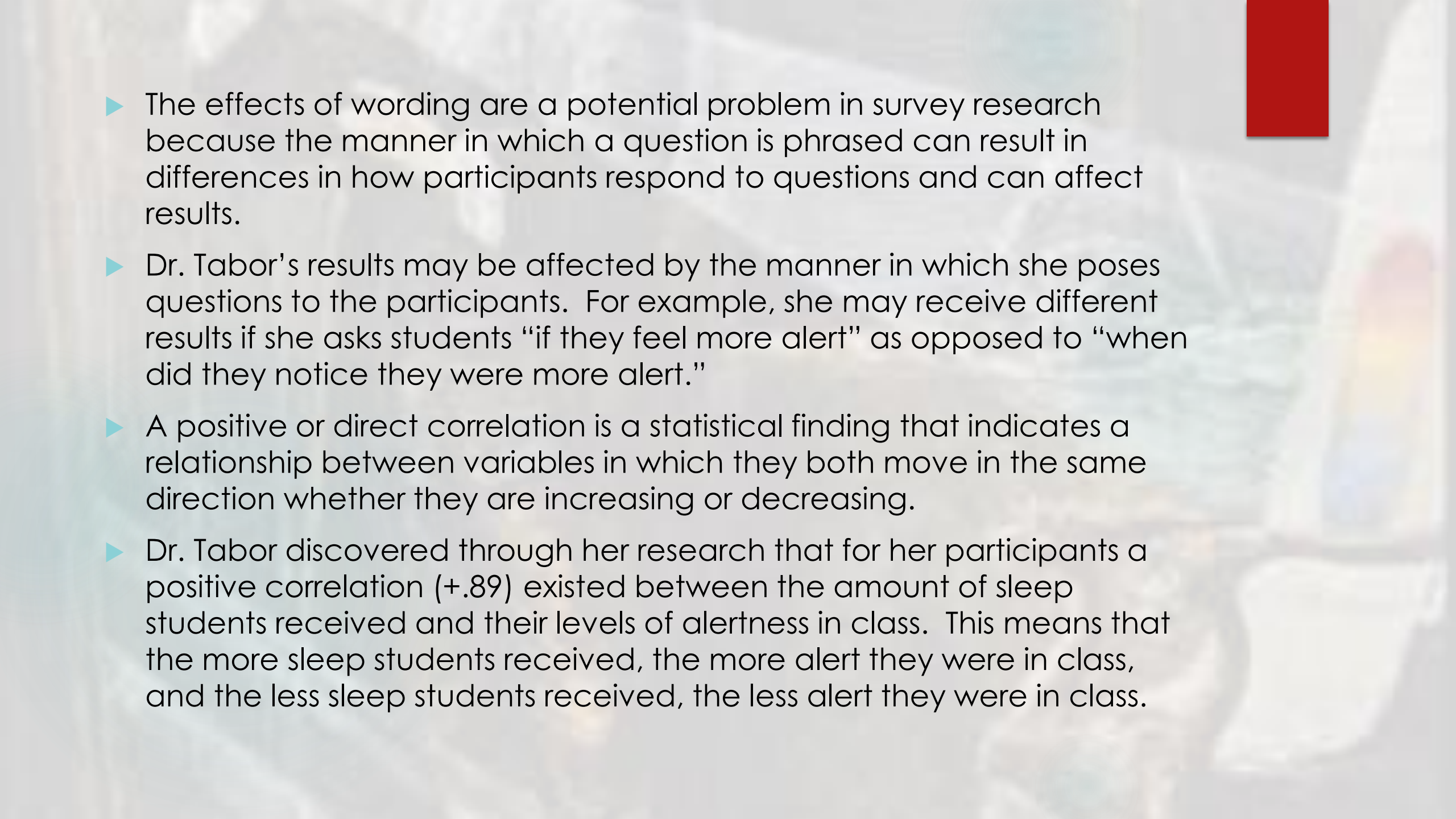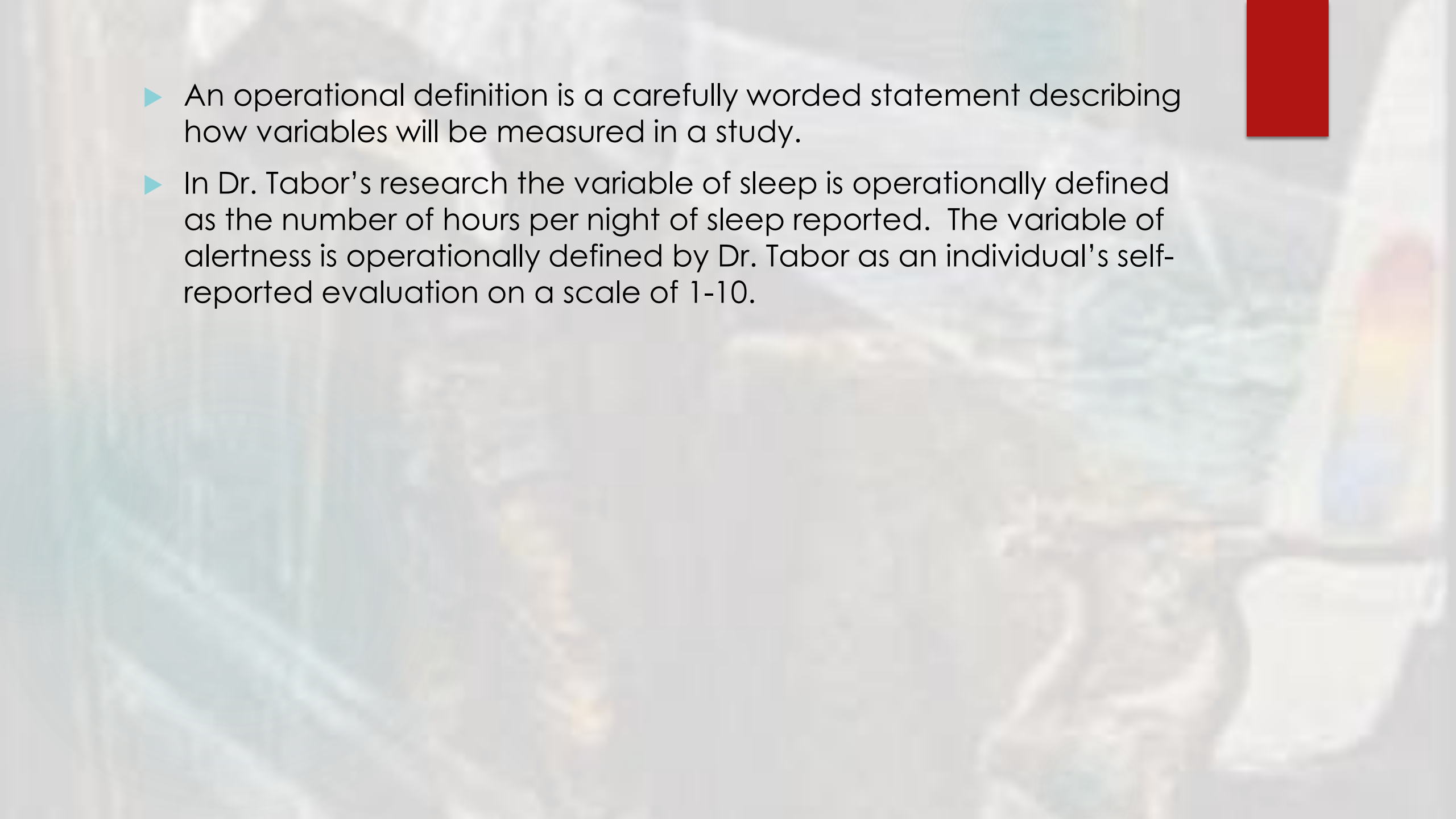
Random Sample

Scatterplot

Wording effects

Positive correlation

Operational Definition

FRQ Answer (10 points)

► A random sample is a subset of the population that is chose in a manner that allows each individual in the overall population to have an equal chance of being selected to participate in the research

► Dr. Tabor is not using a random sample because she is only choosing participants from her own courses, which means that every member of the population (American university students) did not have an equal chance of being chosen to participate

► A scatterplot is a graphed depiction of the relationship between 3 variables. Each dot on the graph represents the values of 2 variables for one participant. The slope of the dots indicates the relationship (positive or negative) between the variables, and the amount of scatter indicates the strength of the relationship between the two variables.

► After Dr. Tabor places her data on a scatterplot, she realizes by the upward slope of her graphed data points that the relationship between alertness is positive or direct. As a result of low amounts of scatter in her graphed data, Dr. Tabor can conclude that the strength of the relationship is high, which predicts a correlation coefficient close to +1.00 which in this case was +0.89

- The effects of wording are a potential problem in survey research because the manner in which a question is phrased can result in differences in how participants respond to questions and can affect results.

- Dr. Tabor's results may be affected by the manner in which she poses questions to the participants. For example, she may receive different results if she asks students "if they feel more alert" as opposed to "when did they notice they were more alert."

- A positive or direct correlation is a statistical finding that indicates a relationship between variables in which they both move in the same direction whether they are increasing or decreasing.

- Dr. Tabor discovered through her research that for her participants a positive correlation (+.89) existed between the amount of sleep students received and their levels of alertness in class. This means that the more sleep students received, the more alert they were in class, and the less sleep students received, the less alert they were in class.

- An operational definition is a carefully worded statement describing how variables will be measured in a study.

- In Dr. Tabor's research the variable of sleep is operationally defined as the number of hours per night of sleep reported. The variable of alertness is operationally defined by Dr. Tabor as an individual's self-reported evaluation on a scale of 1-10.