

UNIT 2: RESEARCH METHODS



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



Module 4

NEED FOR PSYCH SCIENCE



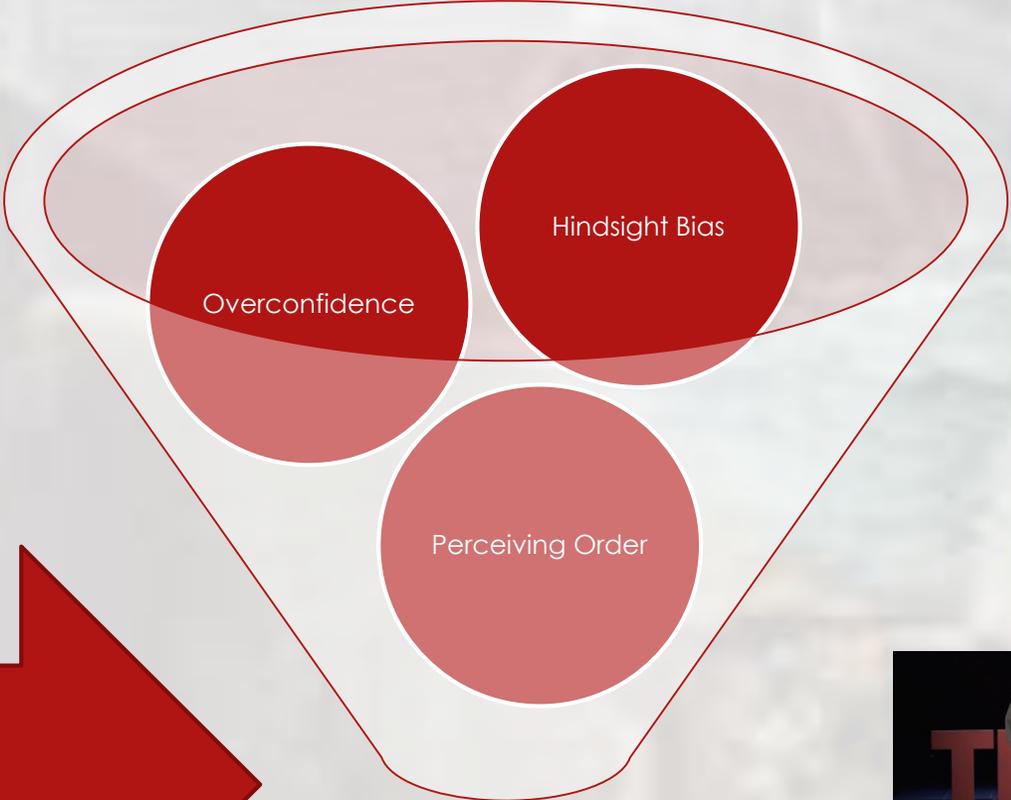
What is Intuition? Lets test it.....

- ▶ 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



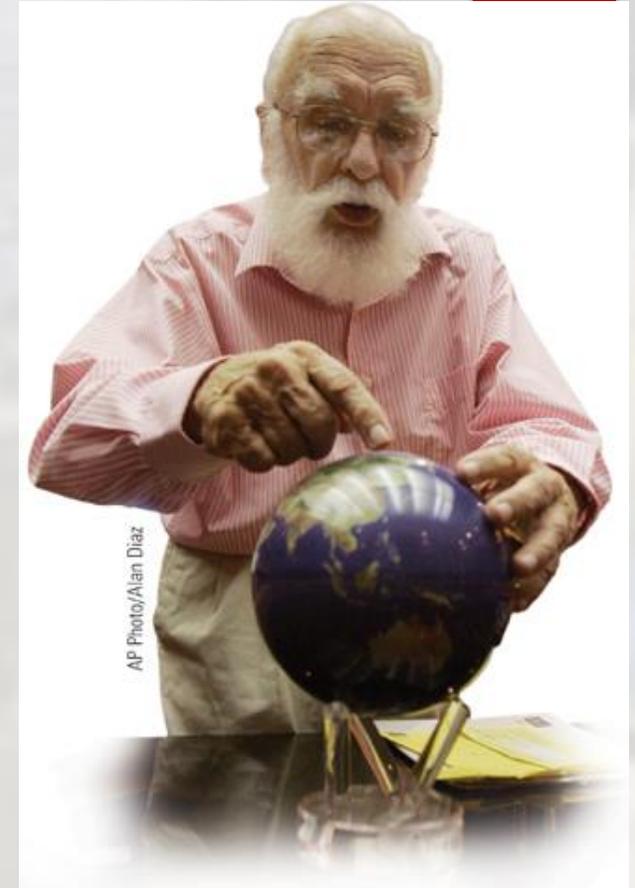
Flaws of Intuition



Scientific Attitude & Critical Thinking

What are the three main components of the “scientific attitude”?

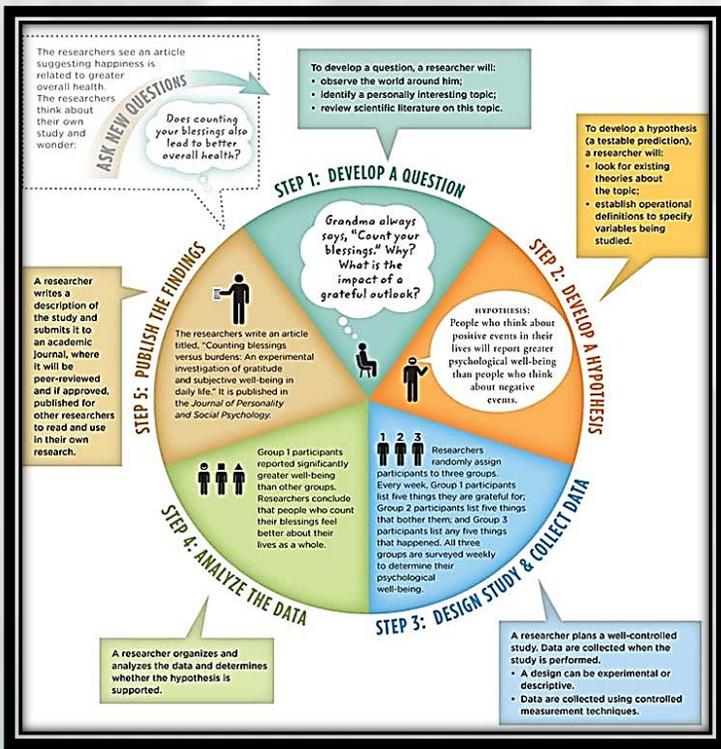
Foundation of Critical Thinking?



The Amazing James Randi!

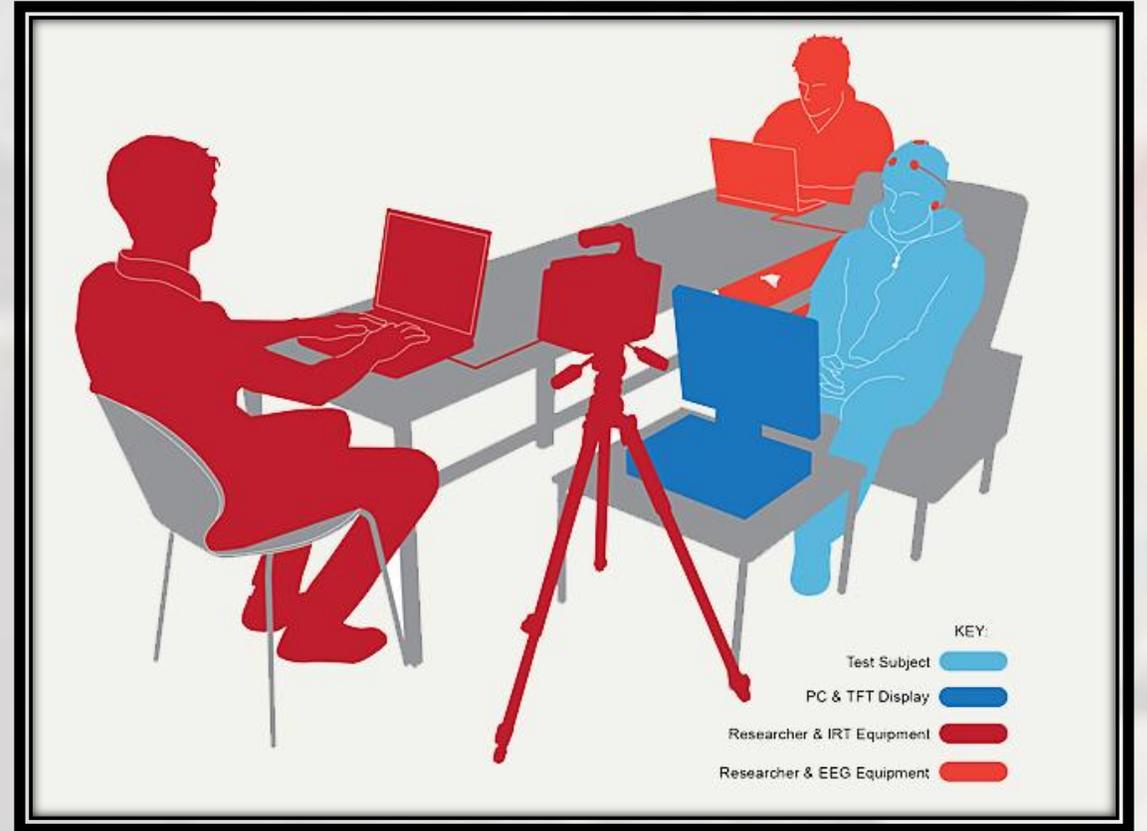
Wrap Up: Identify whether hindsight bias (HB), overconfidence (O), or the tendency to perceive patterns in random events (P) is at work below

- ▶ **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

3. Testing the Hypothesis

5. Drawing Conclusions



2. Forming a hypothesis

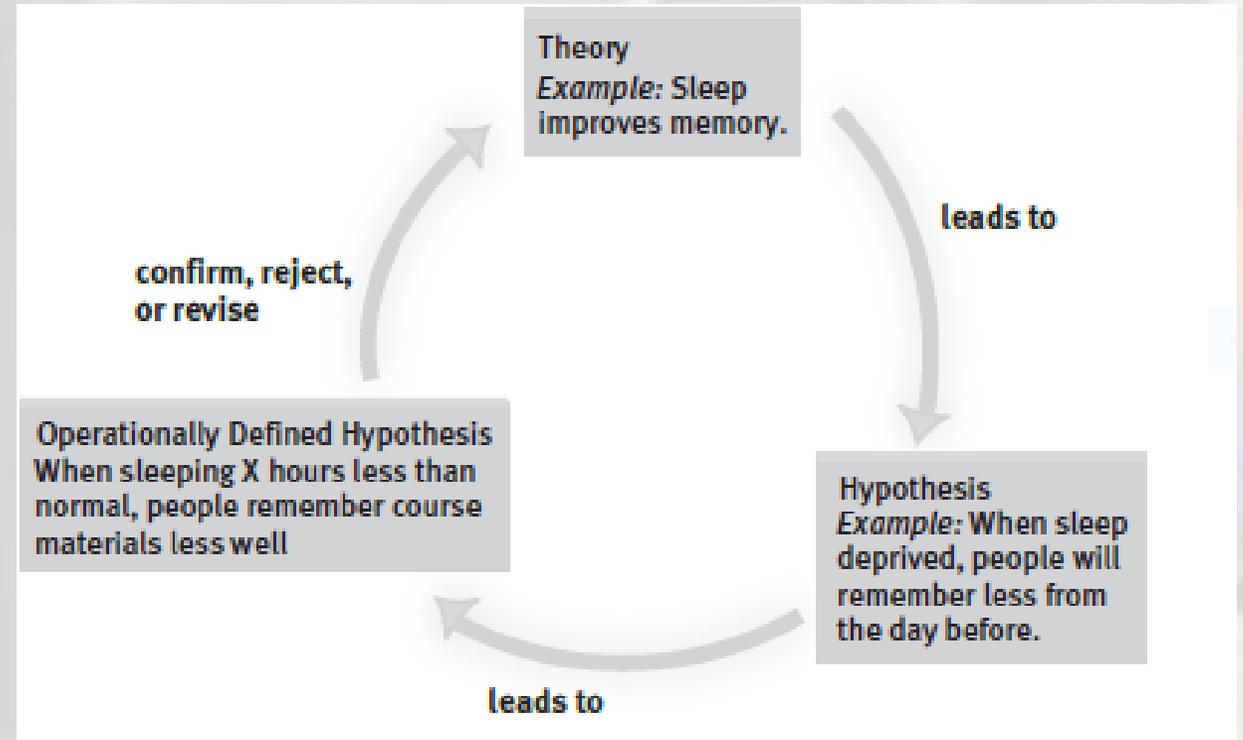
4. Analyzing the results

Final Element:
REPLICATION



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)



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

- 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.

DISADVANTAGES

- 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

- Allows description of behavior as it occurs in the environment.
- Often useful in first stages of a research program.

DISADVANTAGES

- 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

- Provides a large amount of information on large numbers of people.
- Cheap
- Hits a lot of people at once

DISADVANTAGES

- 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?

KEY TERMS: Populations & Samples

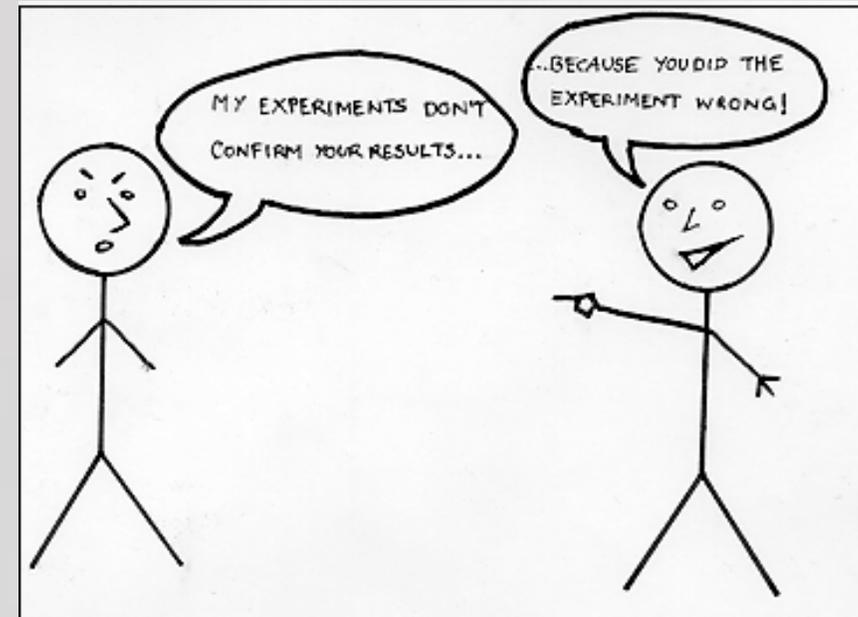
- **Population:** everyone who can be in a study
- Psychologists would like to **generalize** what they learn to all people but due to time and money, they have to pick a sample of the total population
- **Sample:** Subset of a population who is actually IN the study
 - Random sample (random selection): 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



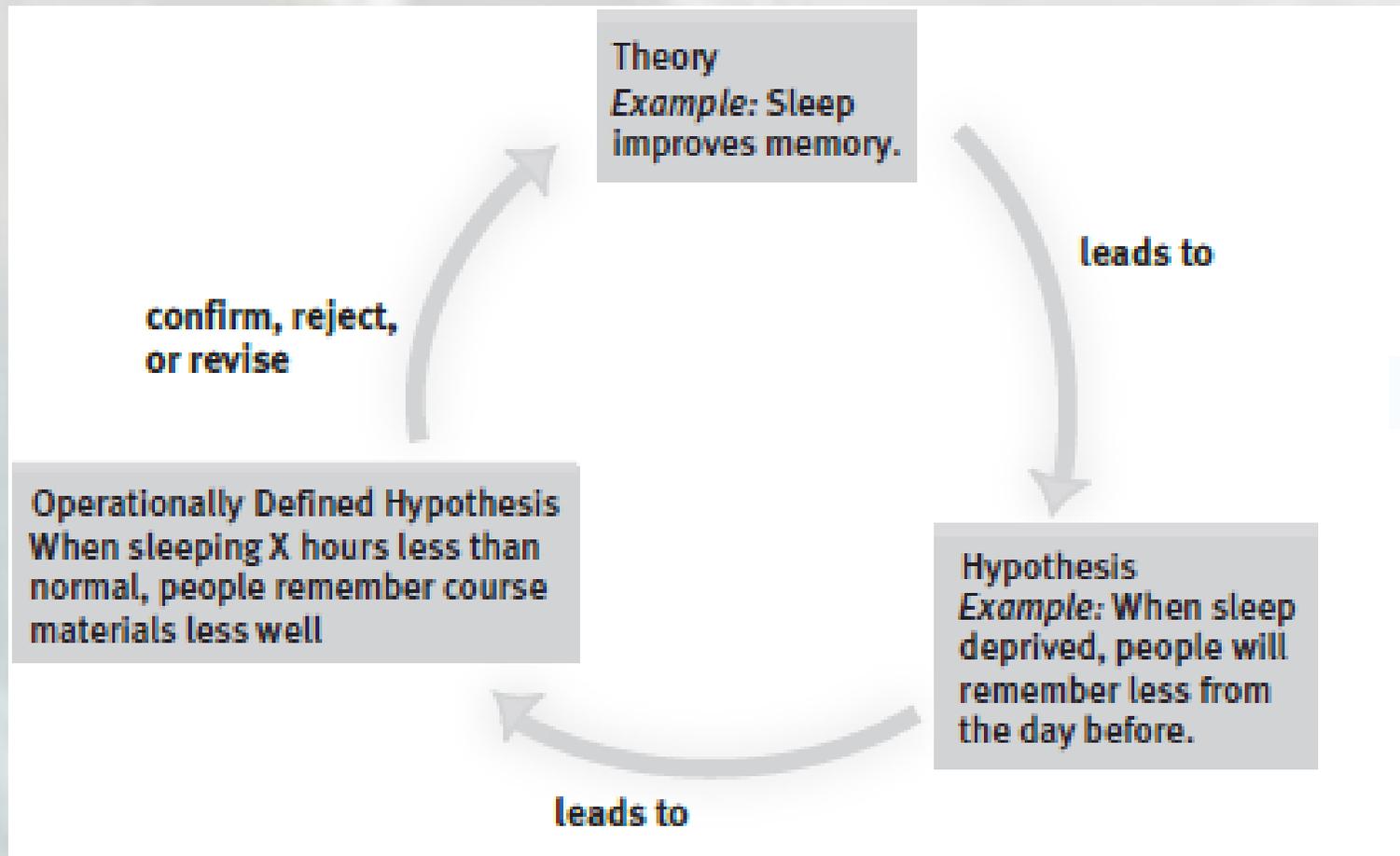
- ▶ Why is replication so important?



WRAP UP

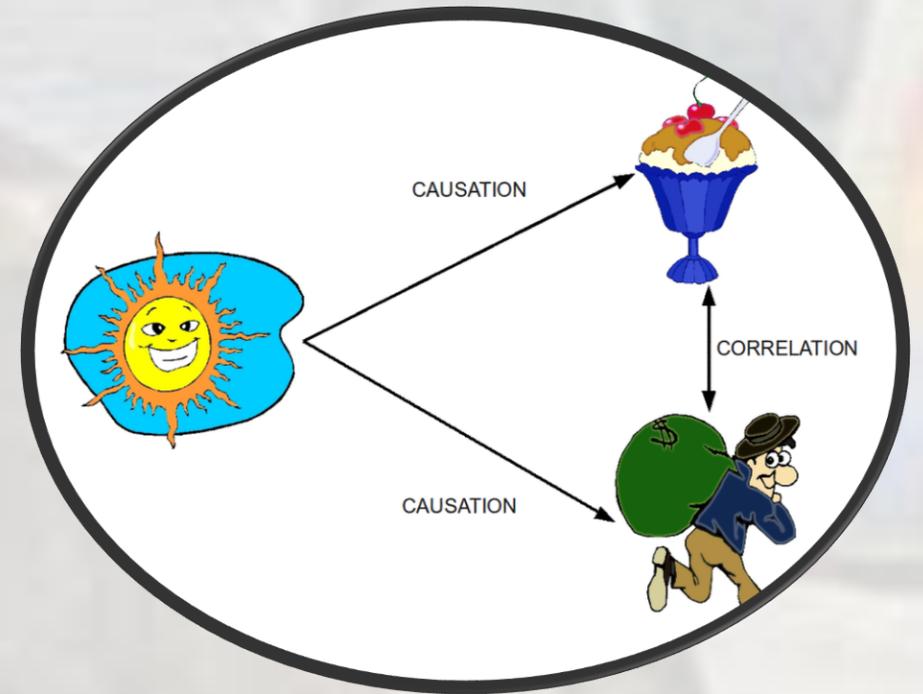
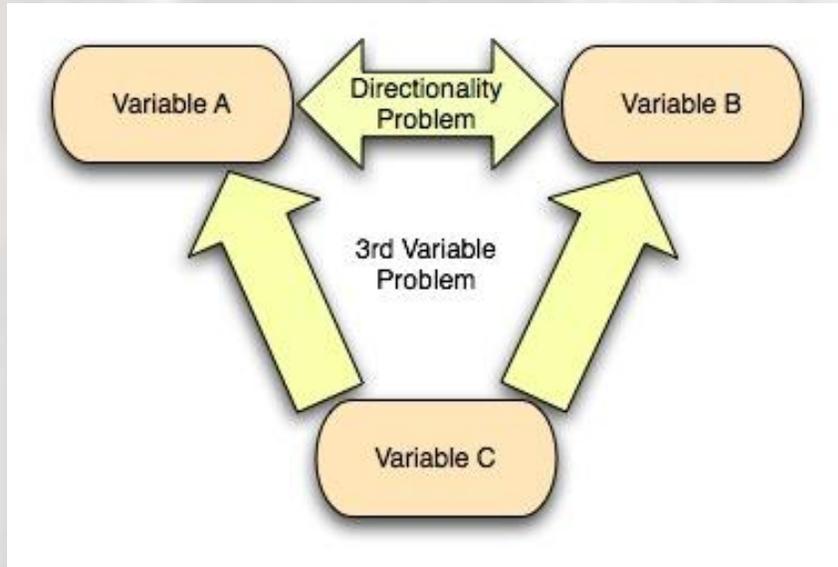
- ▶ **A theory....**
 - ▶ is an explanation using an integrated set of principles that organizes observations and predicts behaviors or events, often highly researched
- ▶ **A hypothesis....**
 - ▶ is a testable prediction, often implied by a theory. In psych, it is a statement between or among variables
- ▶ **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



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.

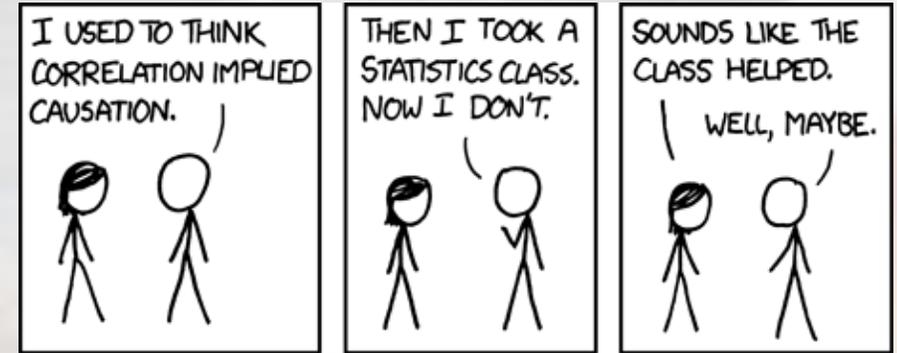


Module 6

CORRELATION & EXPERIMENTATION

Discuss and Identify these basic concepts

Correlation

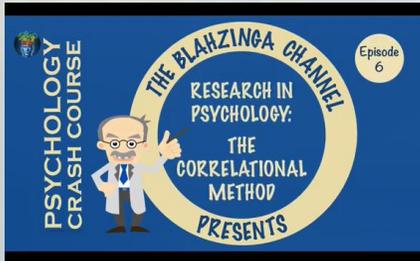


Correlation Coefficient

Scatterplot

Positive/Direct

Negative/Inverse

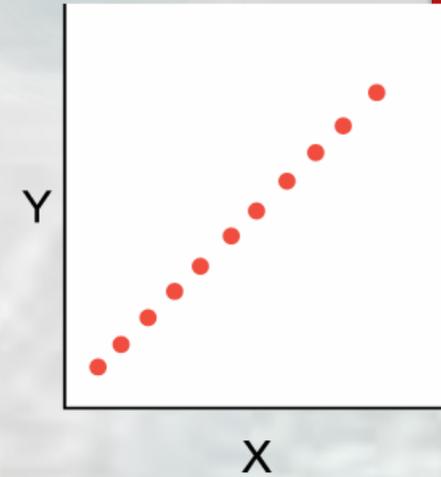


Correlations

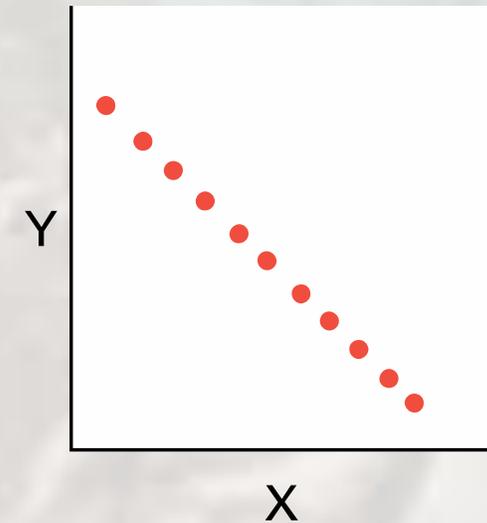
- Shows how closely related two sets of scores are to each other
- How well does A predict B?
- No manipulation of variables in correlational studies so **cannot prove causation**
- A statistical measurement called a correlation coefficient (**represented as r**) describes the strength and direction 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



Perfect positive correlation

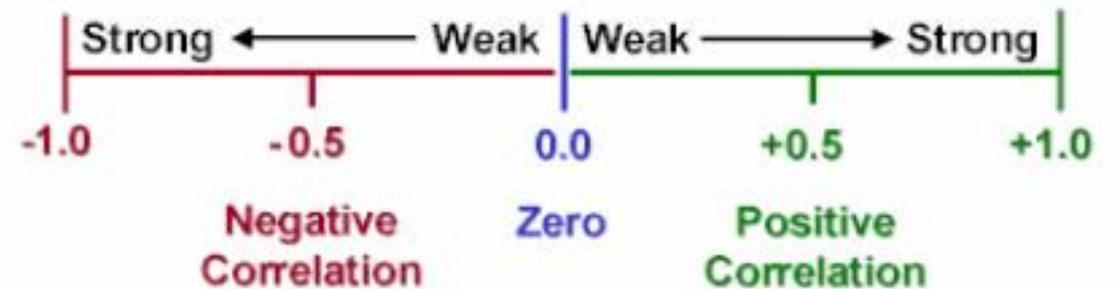


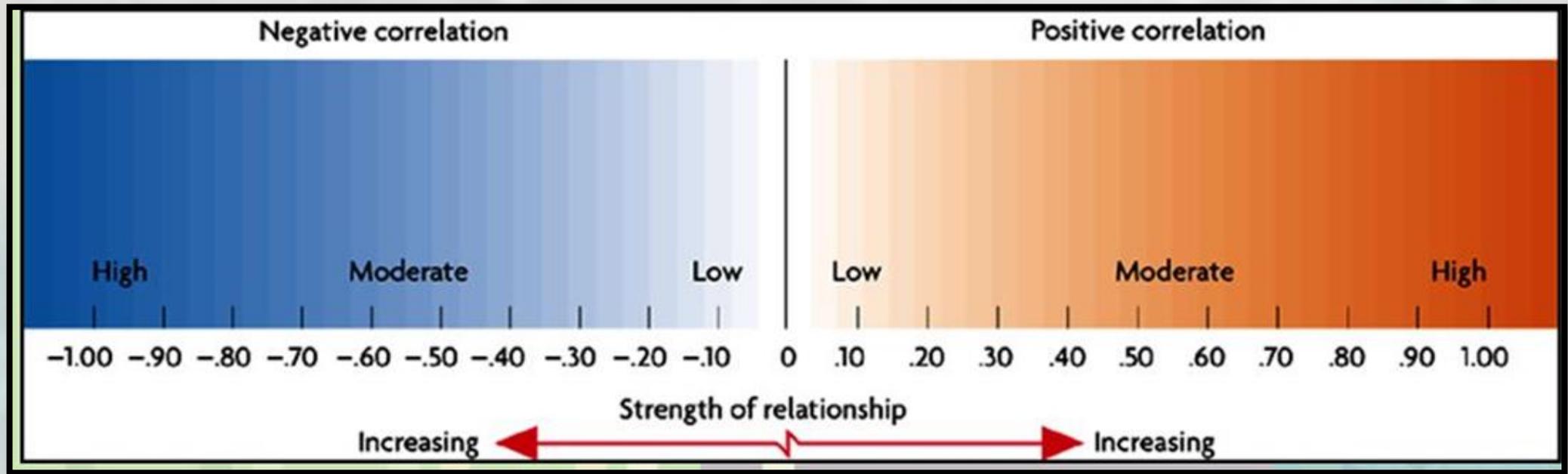
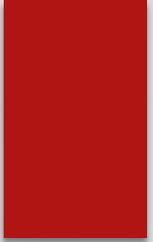
Perfect negative correlation

Correlations

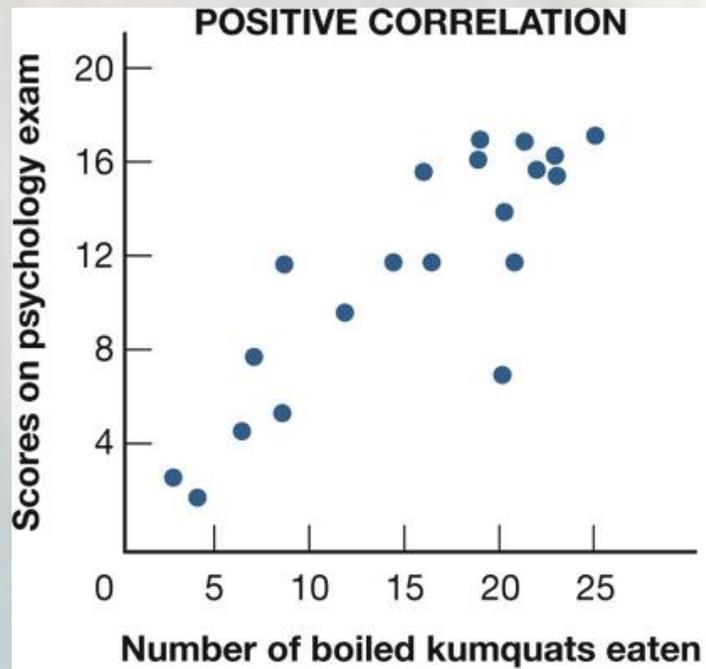
- Correlation coefficients range from +1.00 to -1.00
- **The number (-.38) represents the strength of the correlation and the sign (+/-) represents the DIRECTION**
- A correlation coefficient of -.70 indicates a stronger relationship than a coefficient of +.65
- A correlation of 0 shows that the two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

Correlation Coefficient
Shows Strength & Direction of Correlation

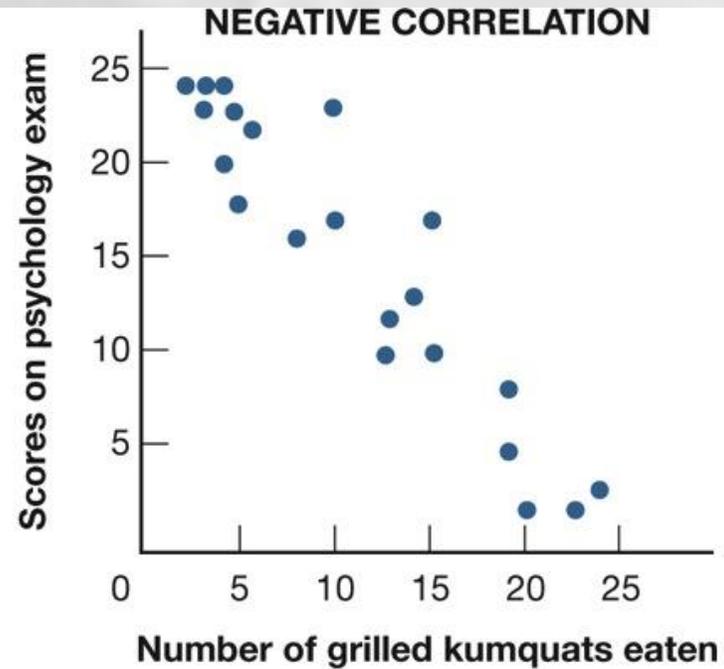




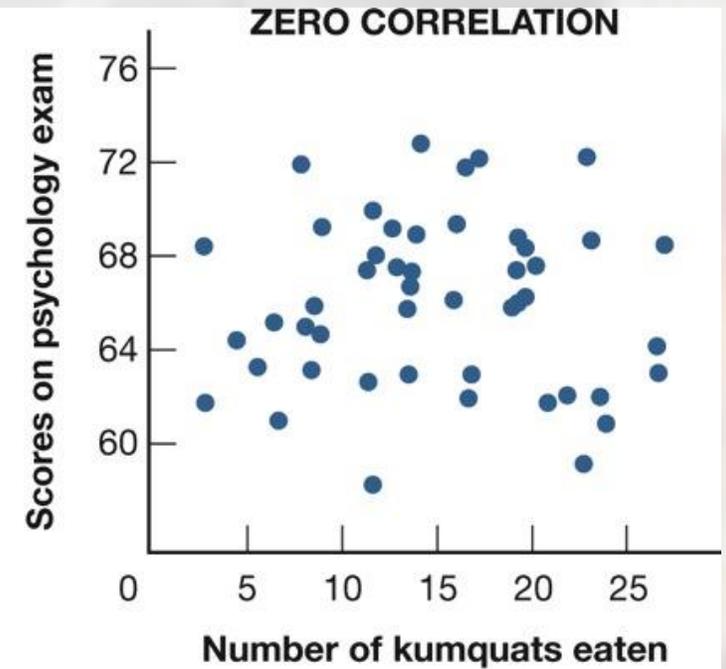
How do you visually represent correlation coefficient on a scatterplot?



(a)



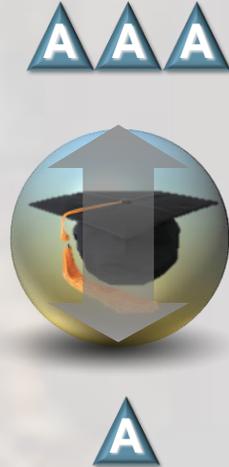
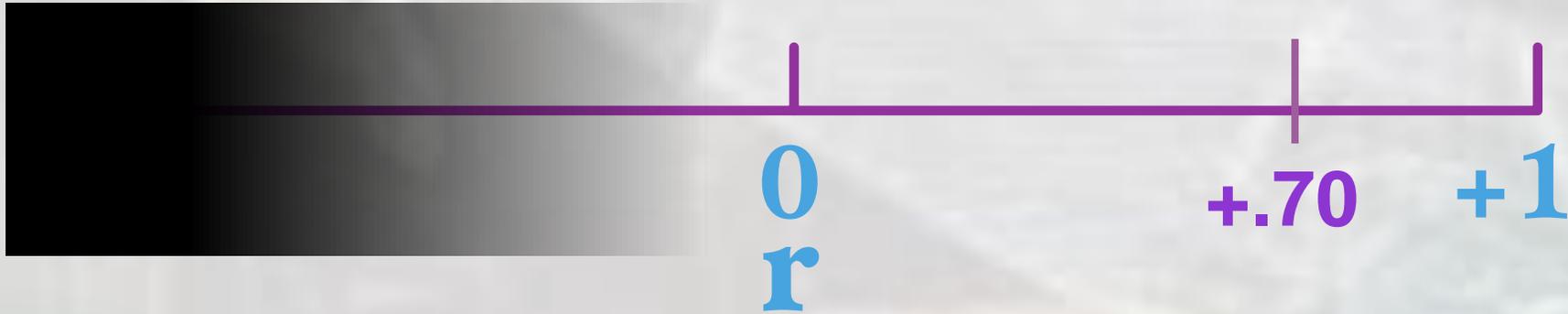
(b)



(c)



Positive Correlation



Positive correlation:
Variables related in
same direction



Show graph

Negative Correlation



Negative correlation:
Variables related in
opposite direction

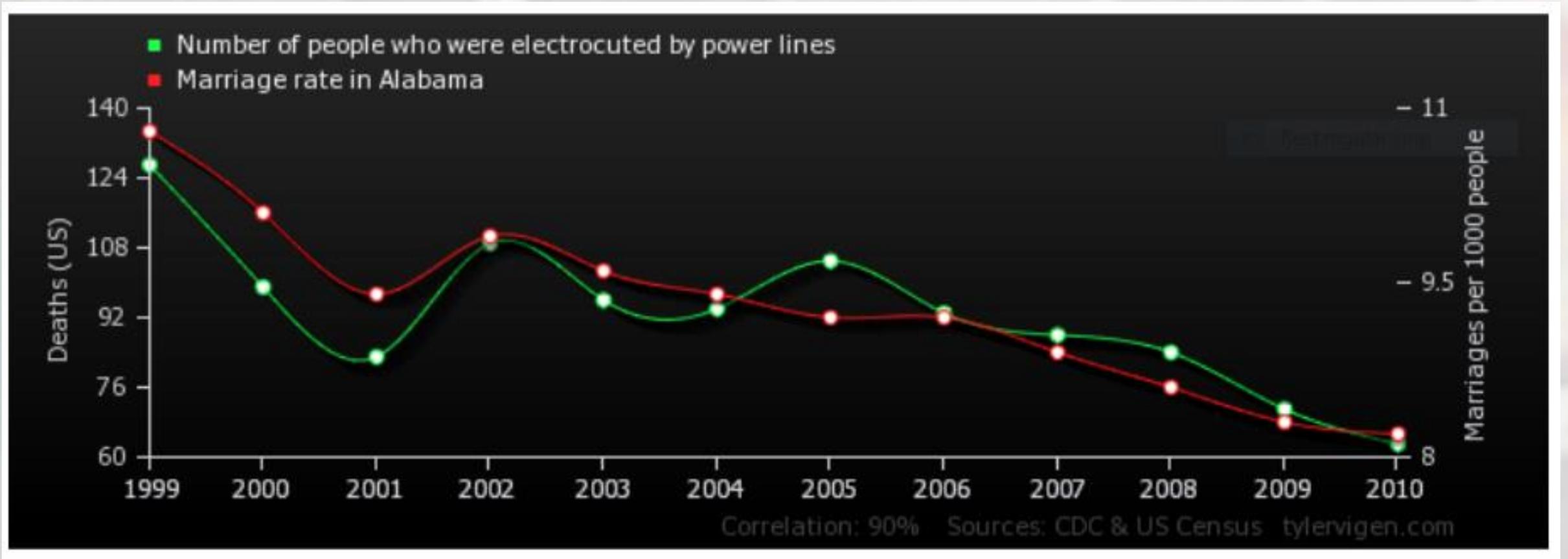


Confounding (Third) Variables

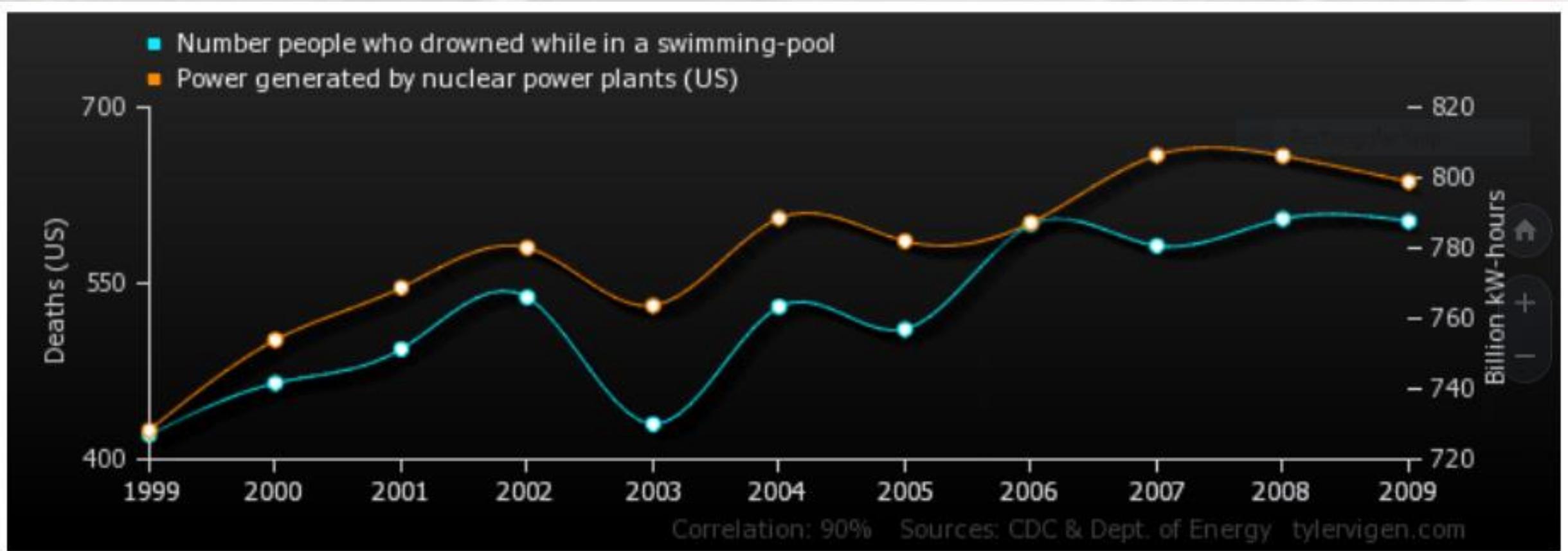
- ▶ **Third variable problem:** Positive correlation between murder rate and the sale of ice-cream.
 - ▶ Third variable which includes a confounding variable
 - ▶ Weather is cold, fewer people are out interacting with others and less likely to purchase ice-cream.
 - ▶ Hot outside, more social interaction and more ice-cream being purchased
 - ▶ Weather is the variable that confounds the relationship between ice-cream sales and murder



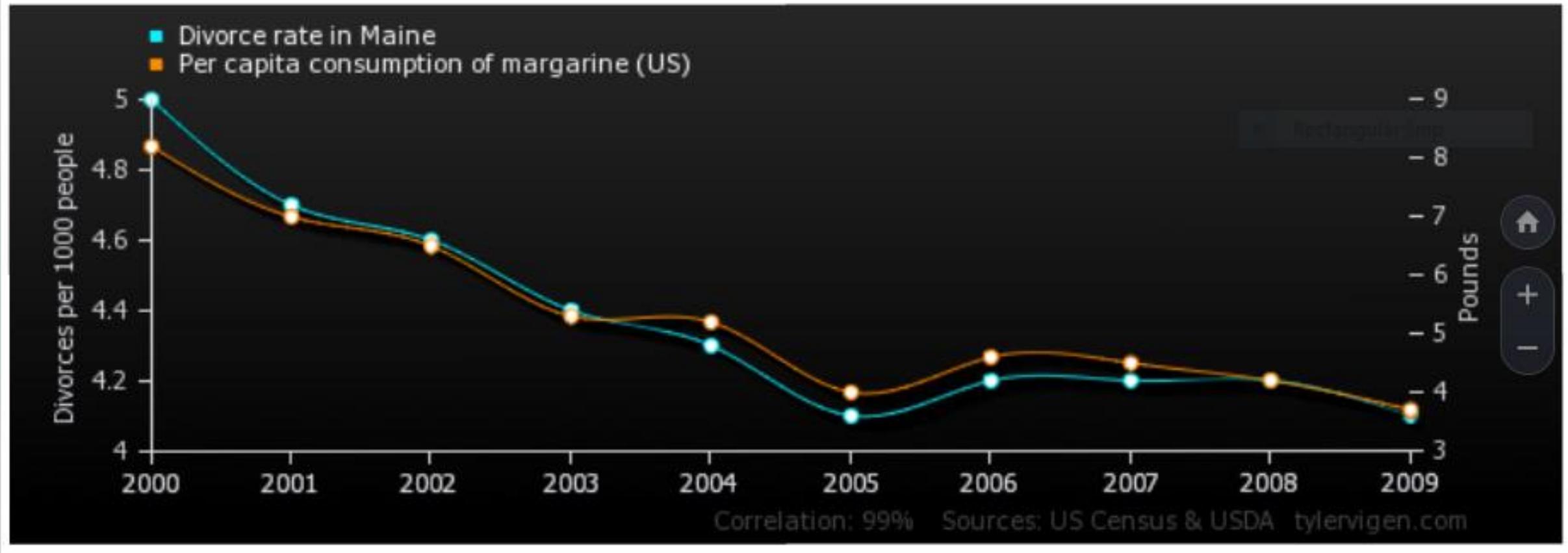
Correlation Does not mean Causation



Correlation Does not mean Causation



Correlation Does not mean Causation

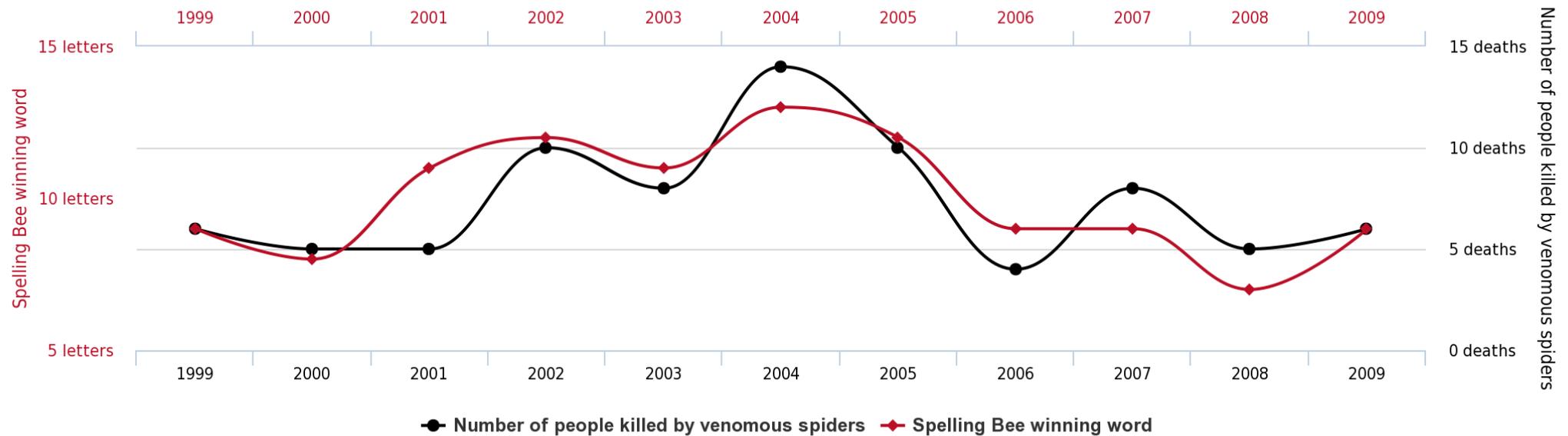


Correlation Does not mean Causation

Letters in Winning Word of Scripps National Spelling Bee

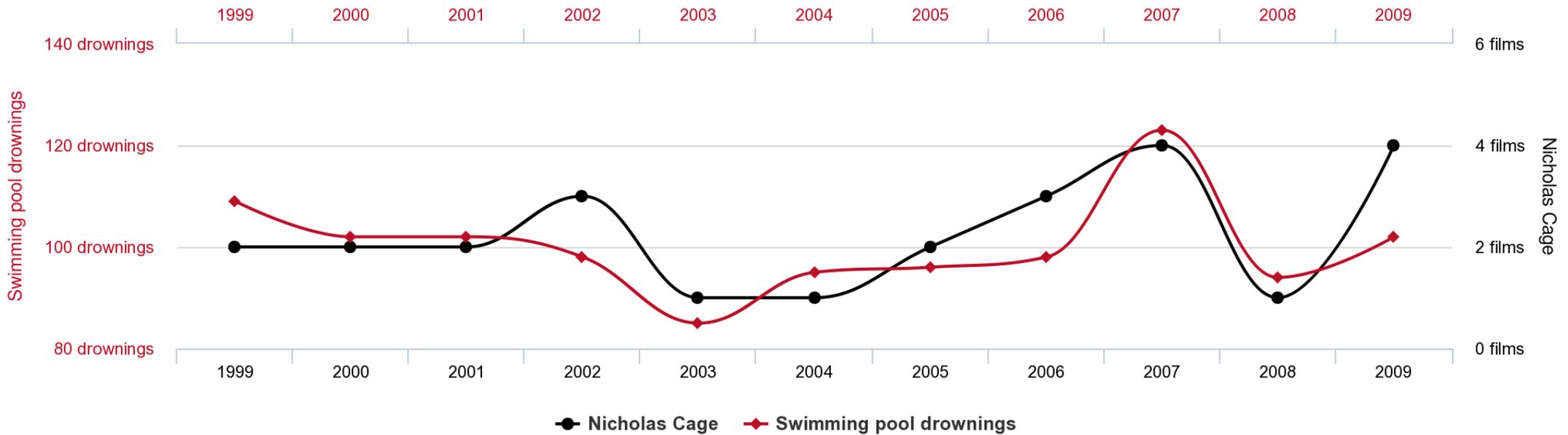
correlates with

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



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!

WHY THE NUMBERS MATTER

RELATIVE RISK

**"New wonder drug
reduces heart
attack risk 50%"**

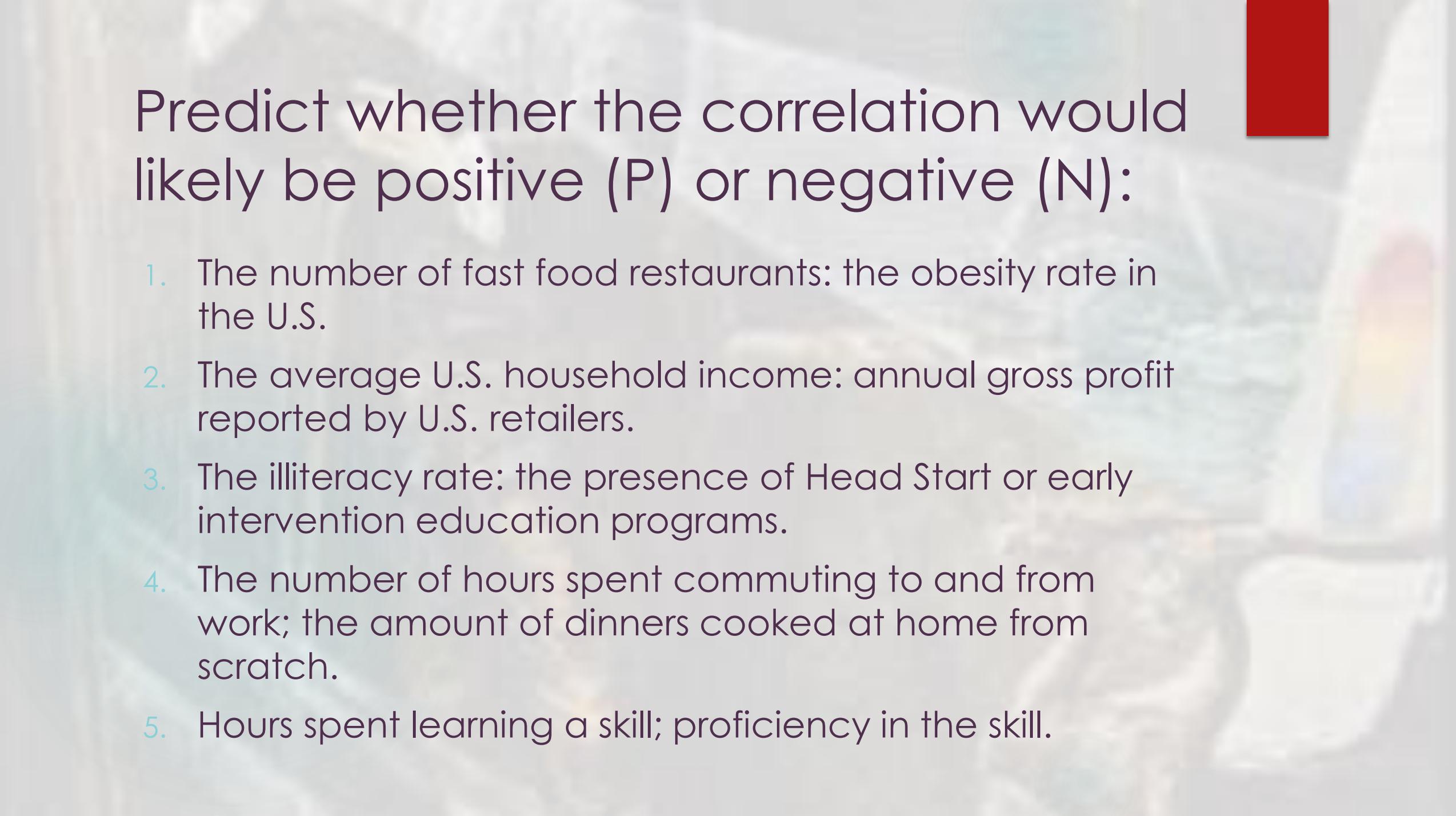
ABSOLUTE RISK

**"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



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

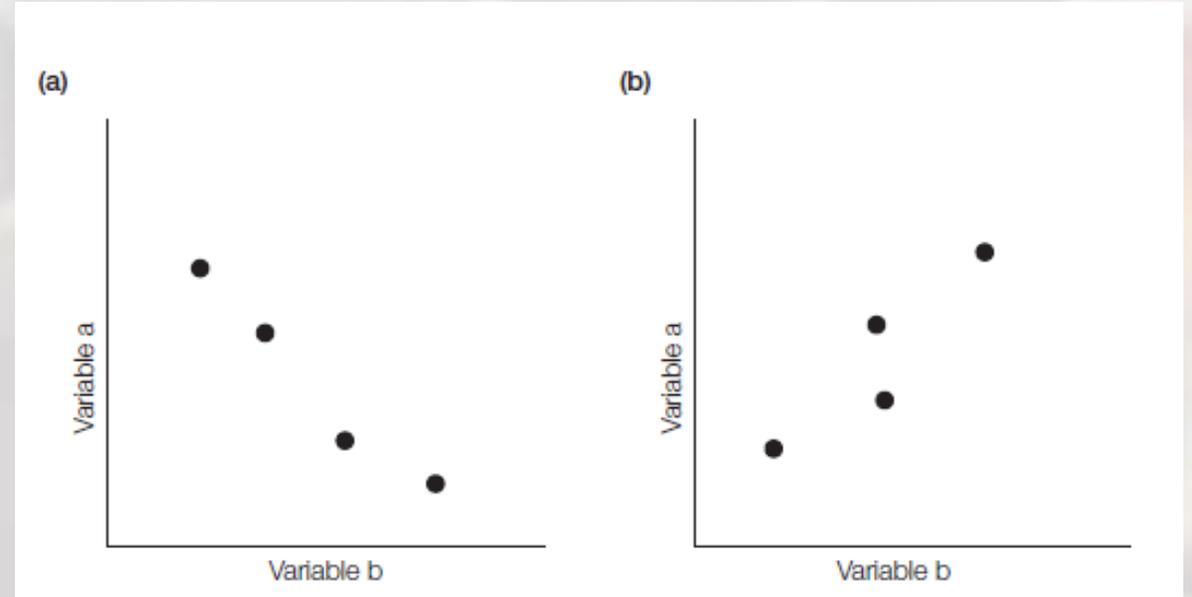
1. The number of fast food restaurants: the obesity rate in the U.S.
2. The average U.S. household income: annual gross profit reported by U.S. retailers.
3. The illiteracy rate: the presence of Head Start or early intervention education programs.
4. The number of hours spent commuting to and from work; the amount of dinners cooked at home from scratch.
5. Hours spent learning a skill; proficiency in the skill.

Scatterplot Correlation Practice

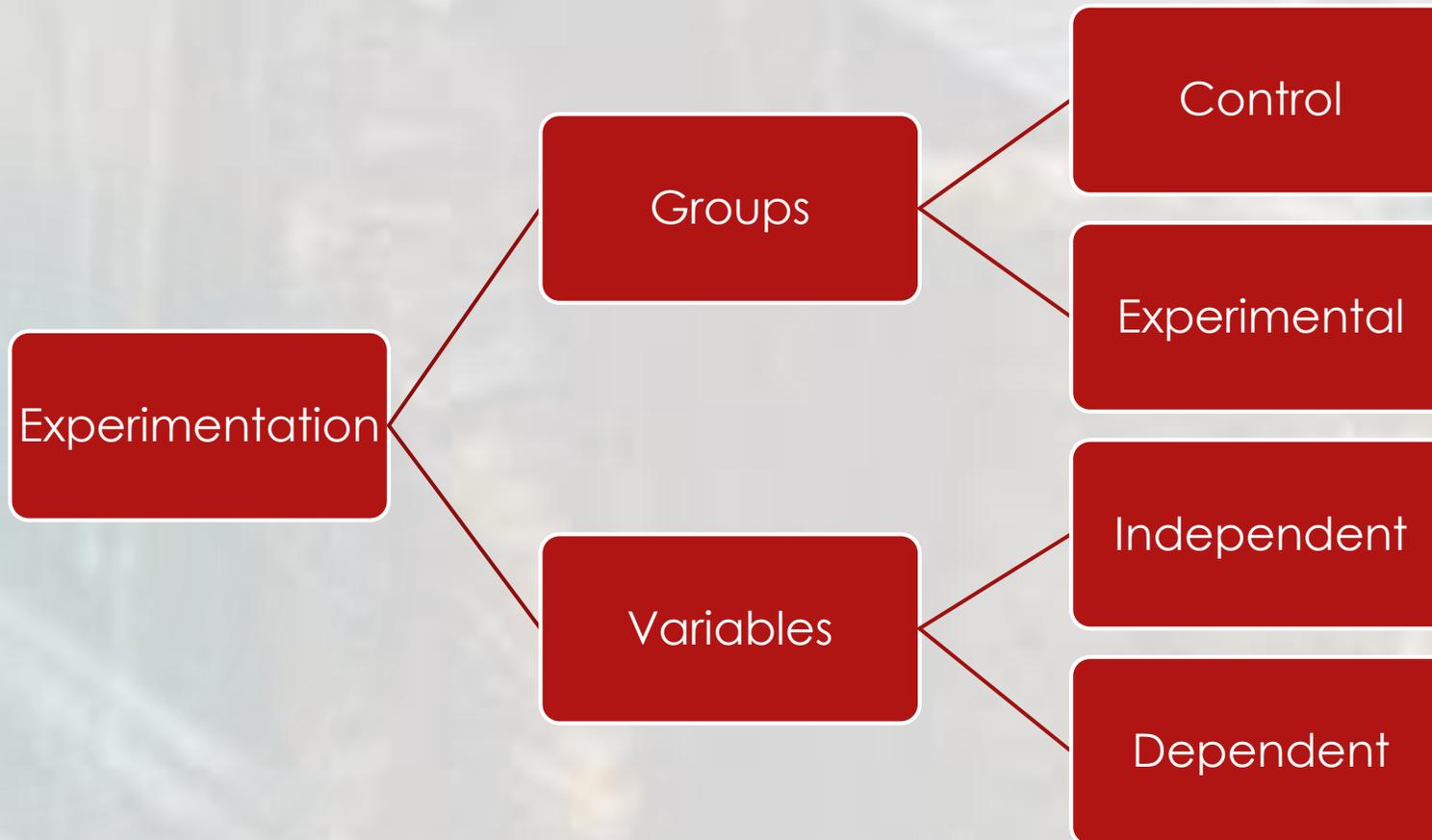
1. Which is +/-

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.”

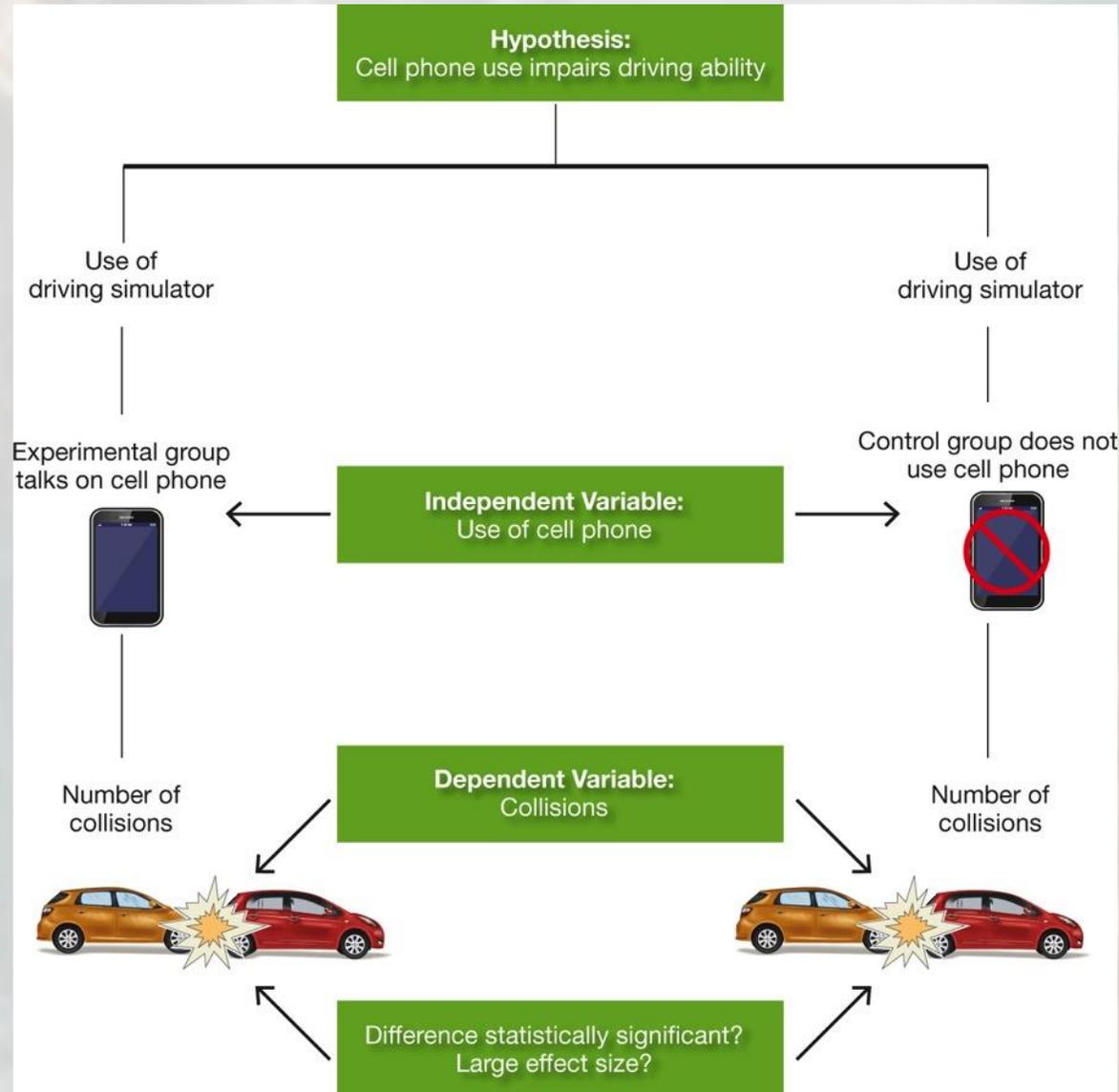
X

**Independent
variable**

Y

**Dependent
variable**

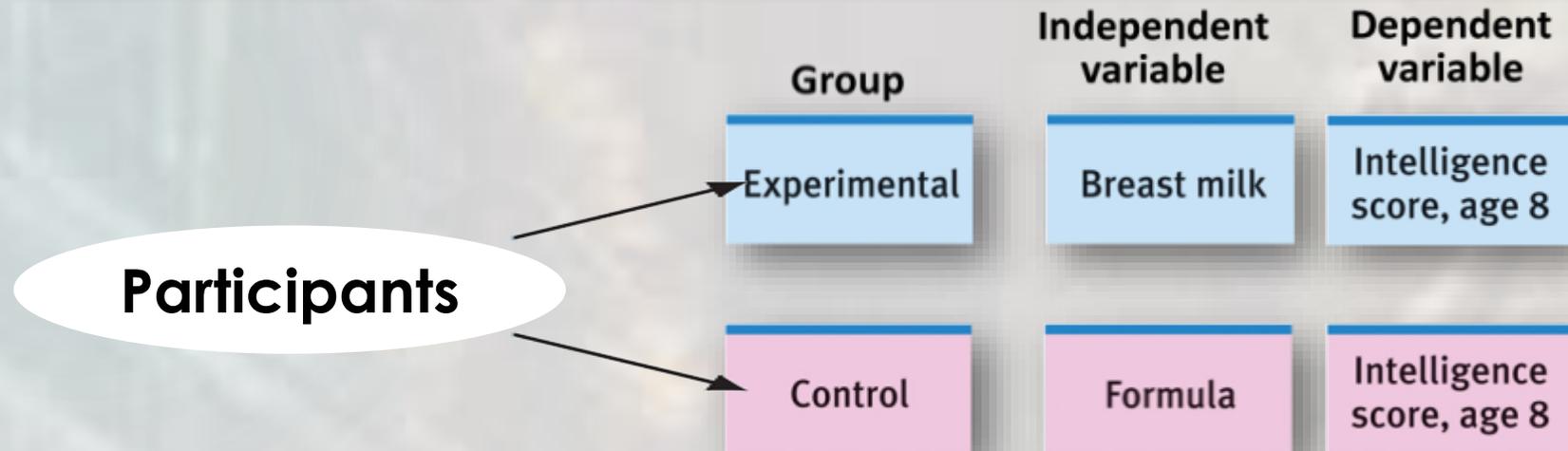
Do Cell Phone Use and Driving Mix?



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



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

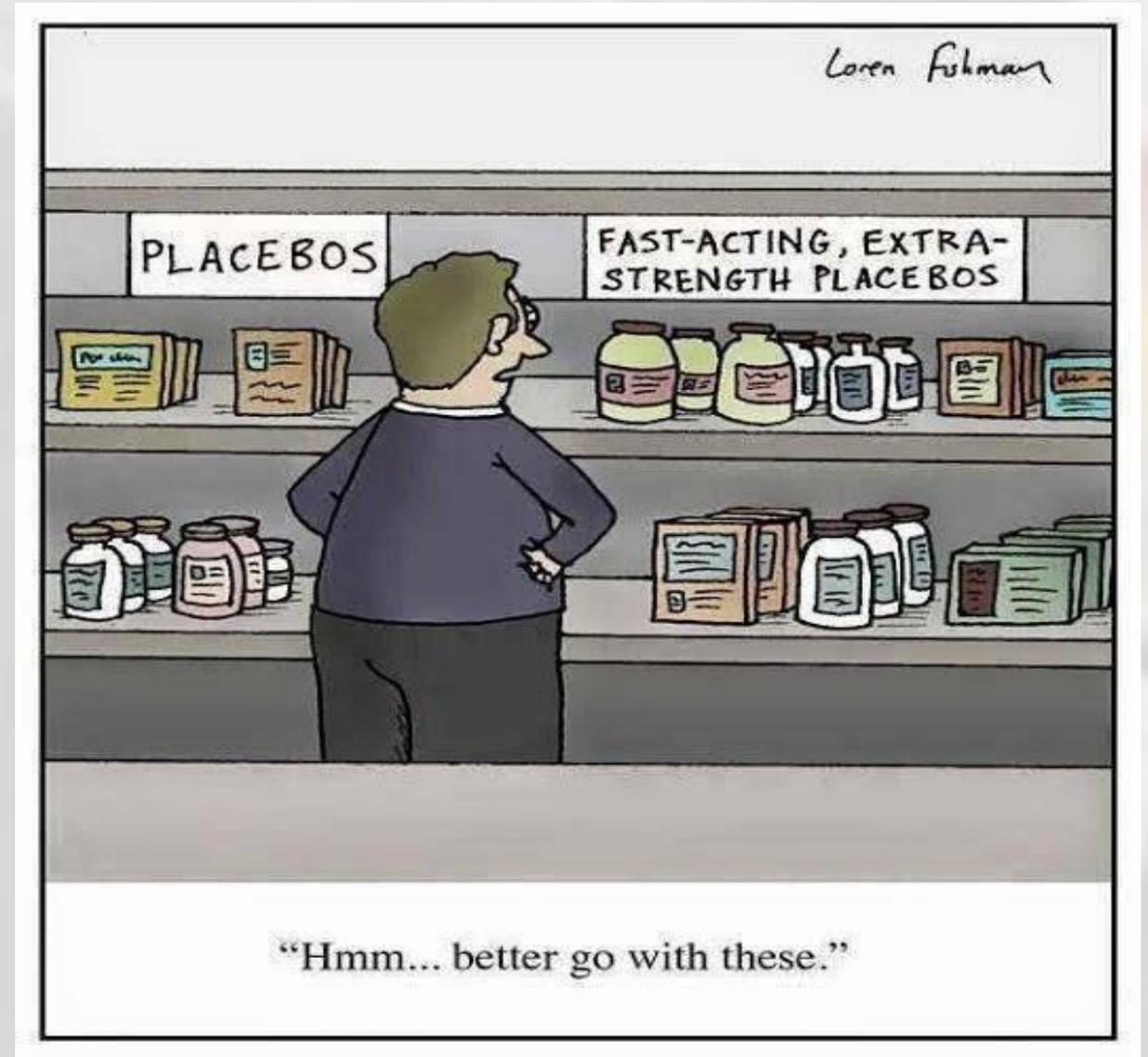
▶ **Double-blind study**

- ▶ Neither experimenter nor participants know who is in which group
- ▶ Eliminates experimenter bias



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



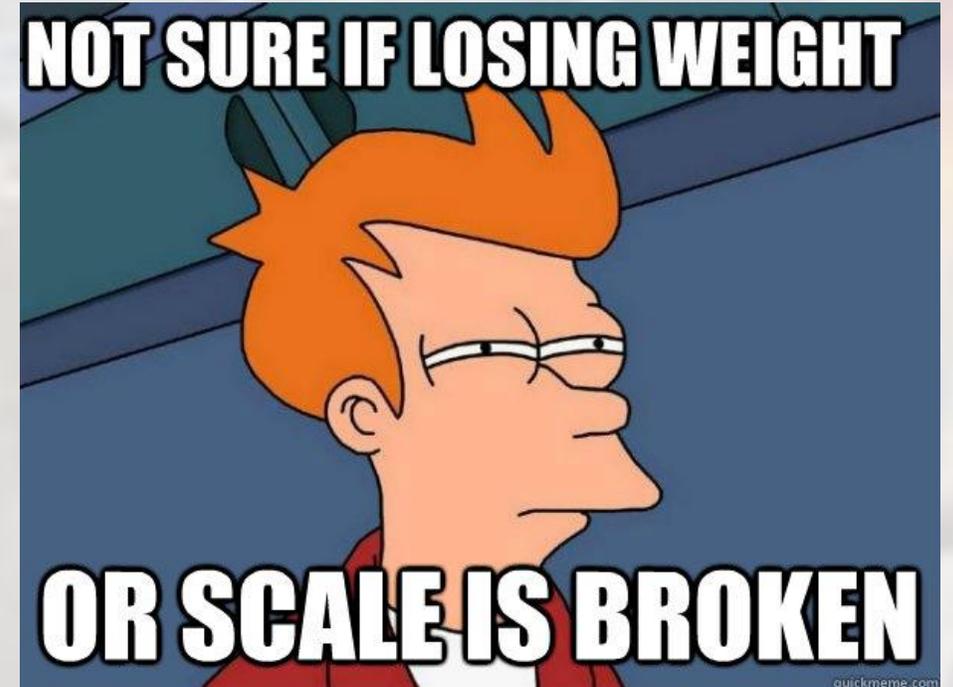
Does my Experiment Test what it is supposed to test? What is validity?



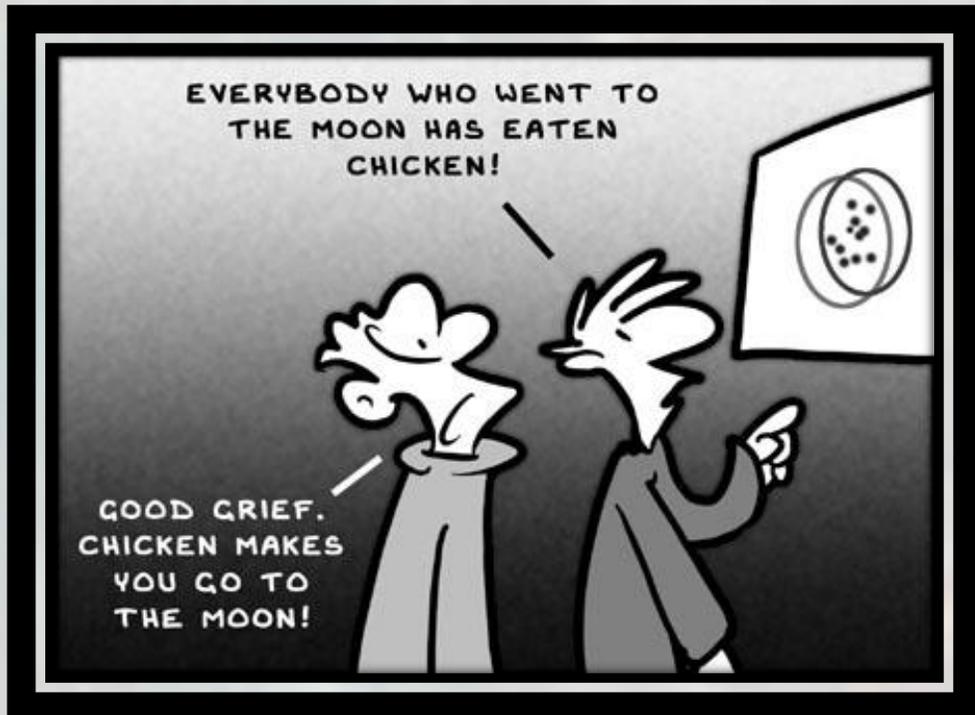
- **Internal Validity:** How well constructed was the experiment to control for confounding variables?
- **Content Validity:** Learning Shakespeare, test questions on Shakespeare NOT Geometry
 - IQ tests are strictly timed, may be a good measure of speed of processing. However, if researchers do not 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.



Exit Slip

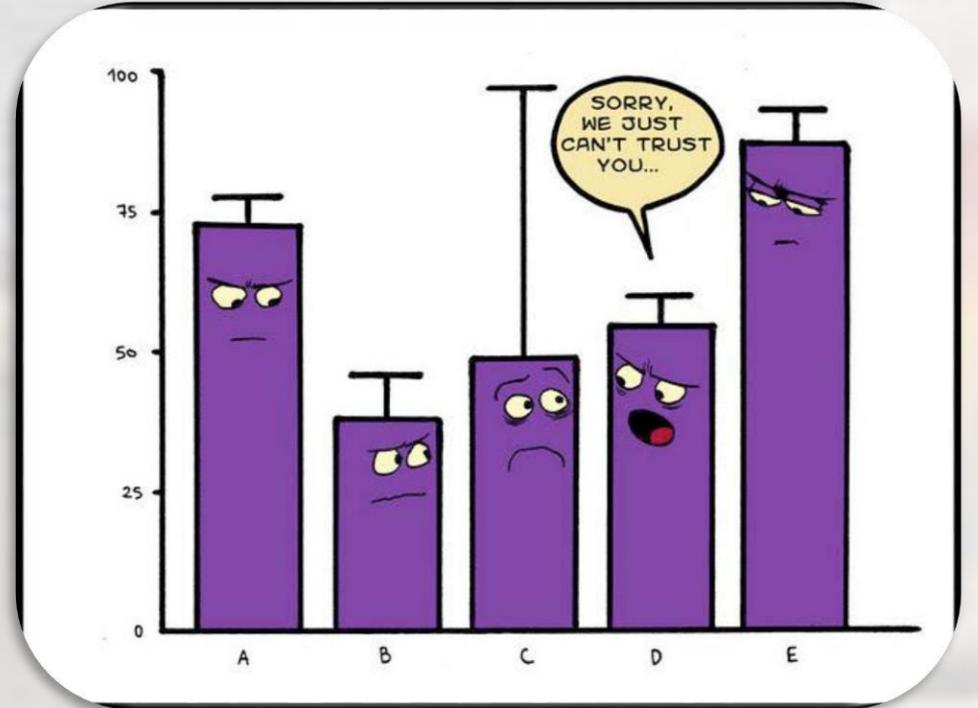


- ▶ What is meant by the phrase “correlation” does not imply causation? Explain using 4 terms discussed in class today (underline the 4 terms you use)



Module 7

STATS IN EVERYDAY LIFE



2003 AP[®] PSYCHOLOGY FREE-RESPONSE QUESTIONS

PSYCHOLOGY

SECTION II

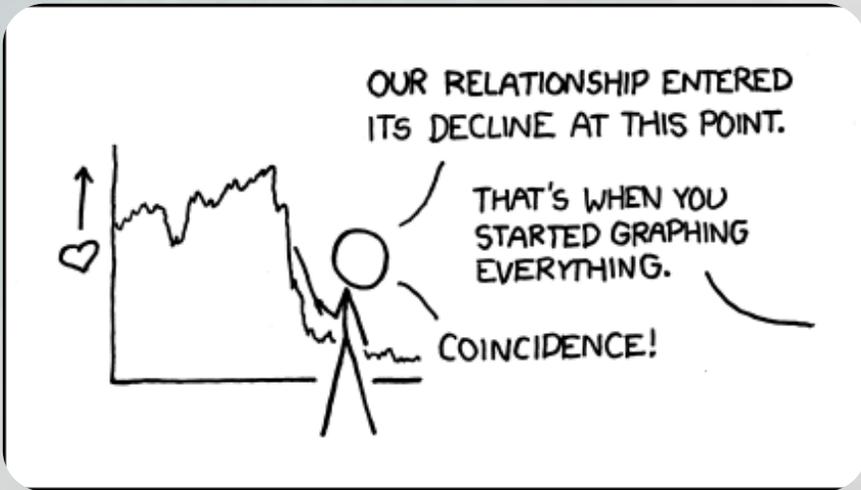
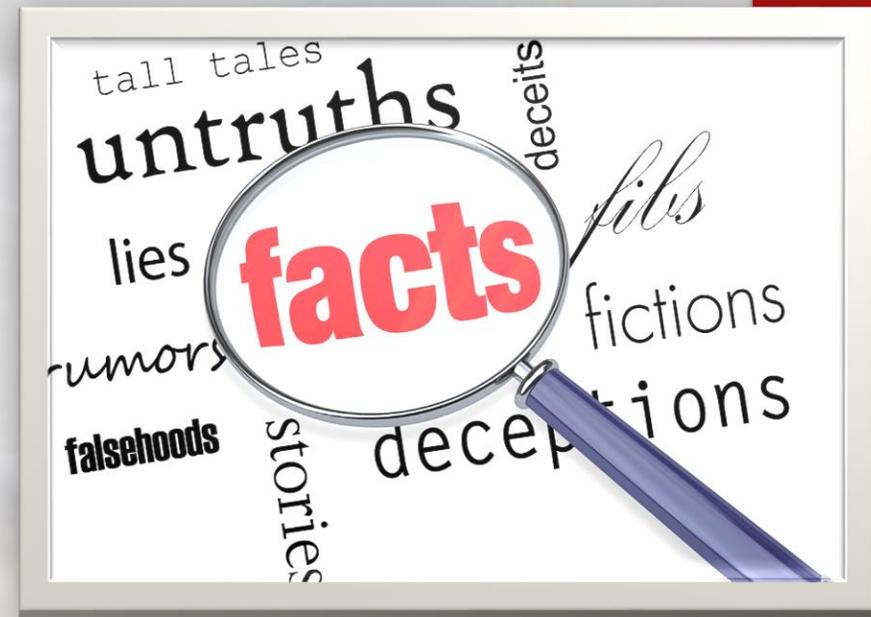
Time—50 minutes

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?

Descriptive Statistics

Organized into a frequency distribution (orderly arrangement of scores) so as to get a measure

Number of Pets (x)	Tally	Frequency (f)
0		4
1		6
2		5
3		3
4		2

Type of data determines the type of statistics

Nominal: identifies categories (e.g. Eye color; Are you a Democrat (1), Republican (2) or Independent (3))

Ordinal: produces data that can be ordered in a set (compare the GPA of all kids in class, Shortest to tallest)

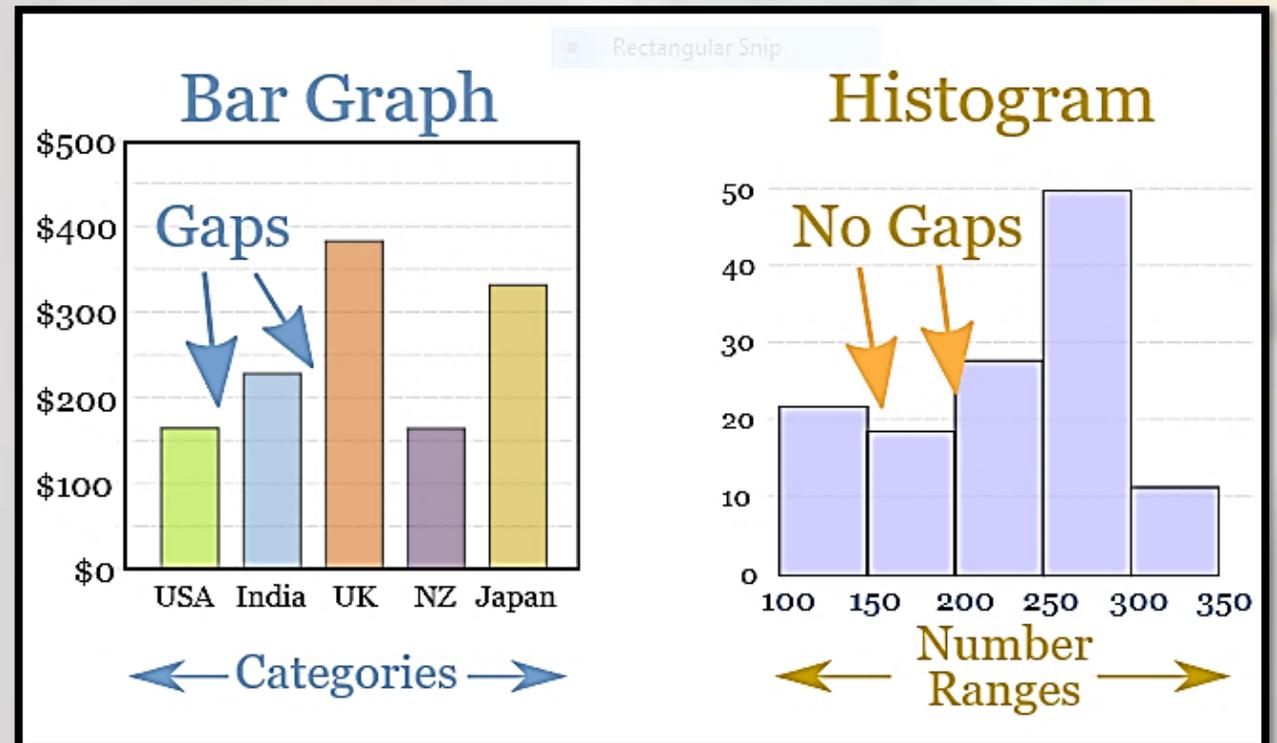
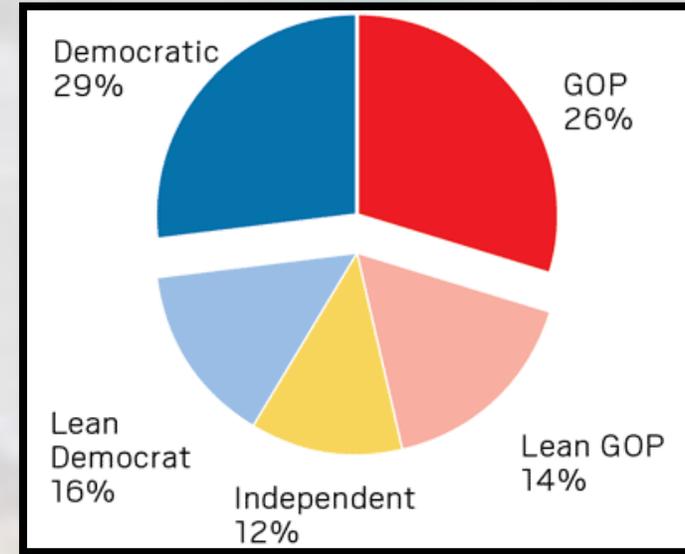
Interval: falls within a number line that has a zero point (height and weight); weight of zero is no weight

Ratio: falls within a number line where zero is another number in the line, 0 degrees doesn't mean 0 temperature



Data Display

- ▶ **Pie chart:** % or proportions
- ▶ **Bar graph:** Good for when data are in categories, spaces between data
- ▶ **Histogram:** when you have continuous data (person's height), no spaces



Measures of Central Tendency

Defined

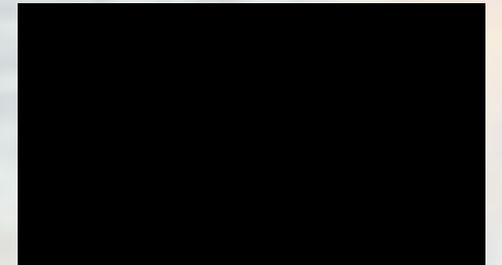
- View Kahn Academy Video
- Basic concept of central tendency

Measures

- Mean
- Mode
- Median

Skewing

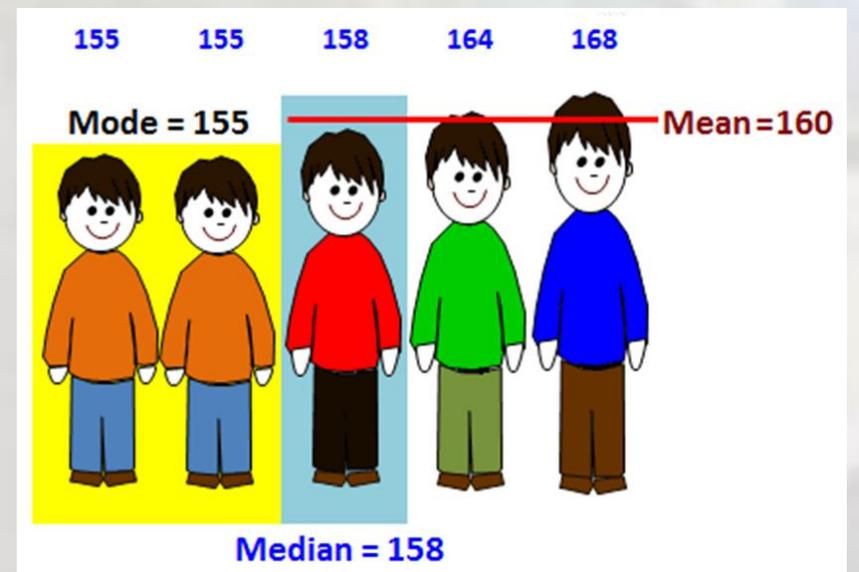
- Positive Skew
- Negative Skew

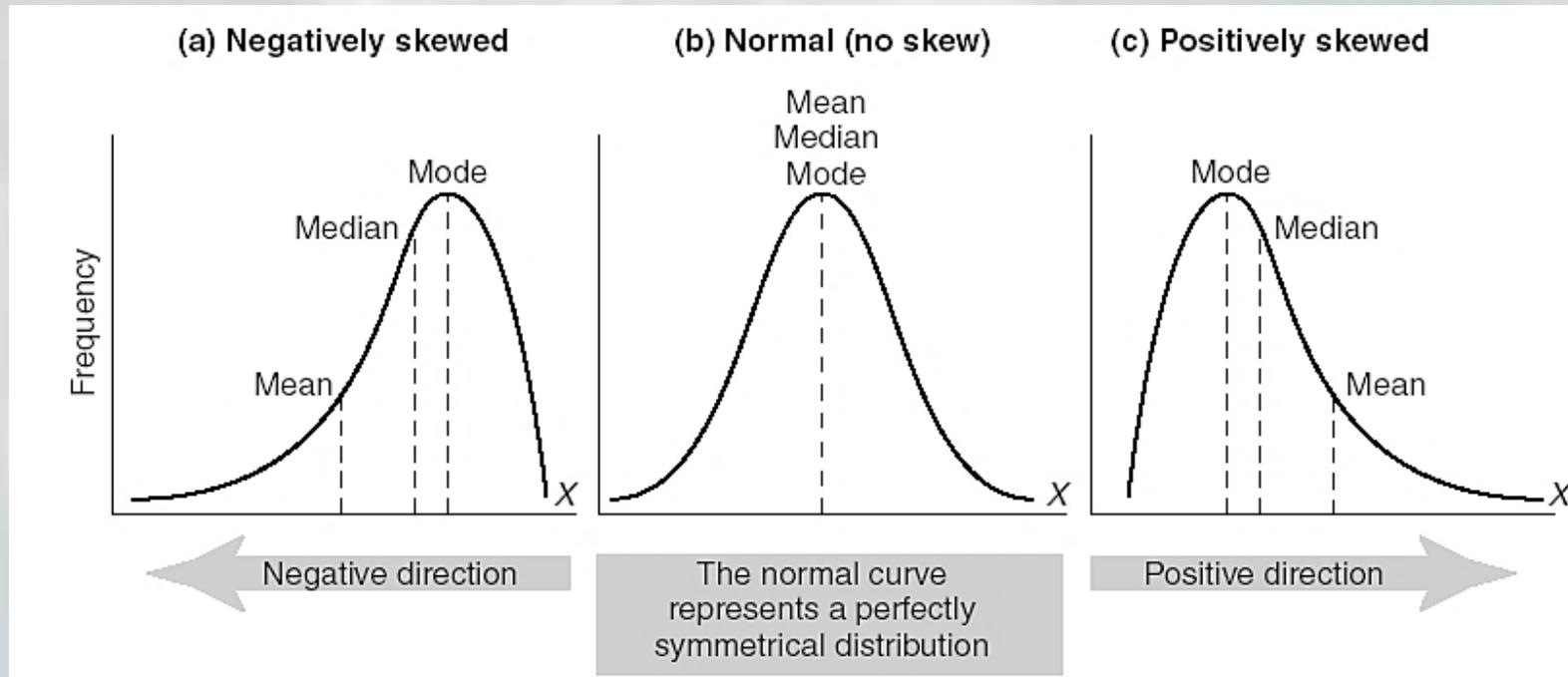


Central Tendency

- 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.





- ▶ 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



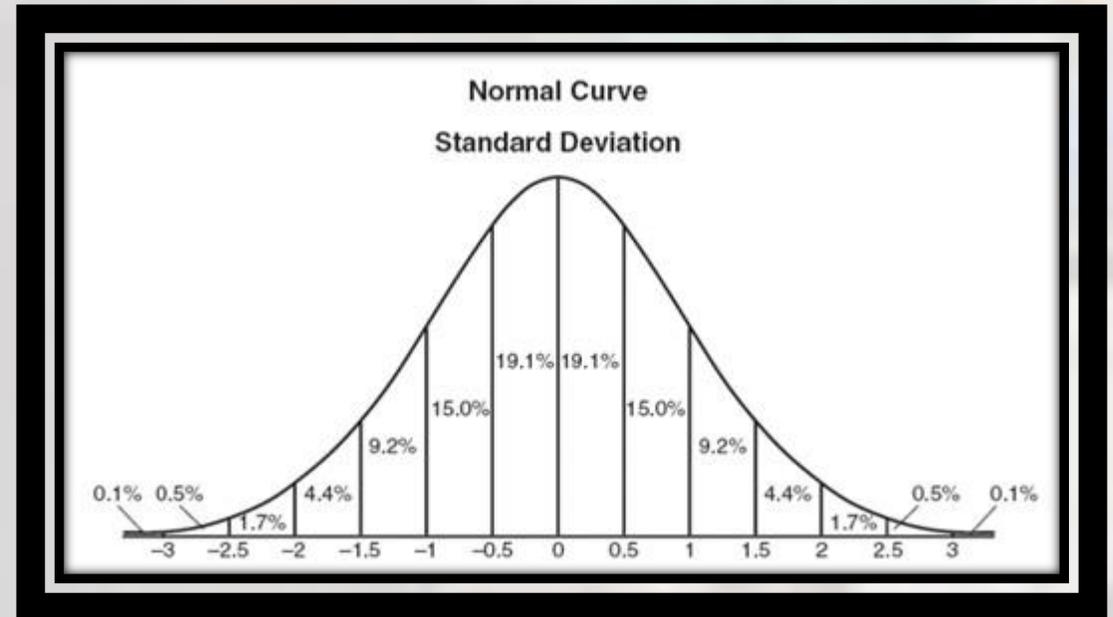
The median salary looks good at \$100,000. The mean salary also looks good at about \$110,000. But the mode salary is only \$25,000. Maybe not the best place to work. Then again living in Scranton is kind of cheap.

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

Measures of Variation: Standard Deviation

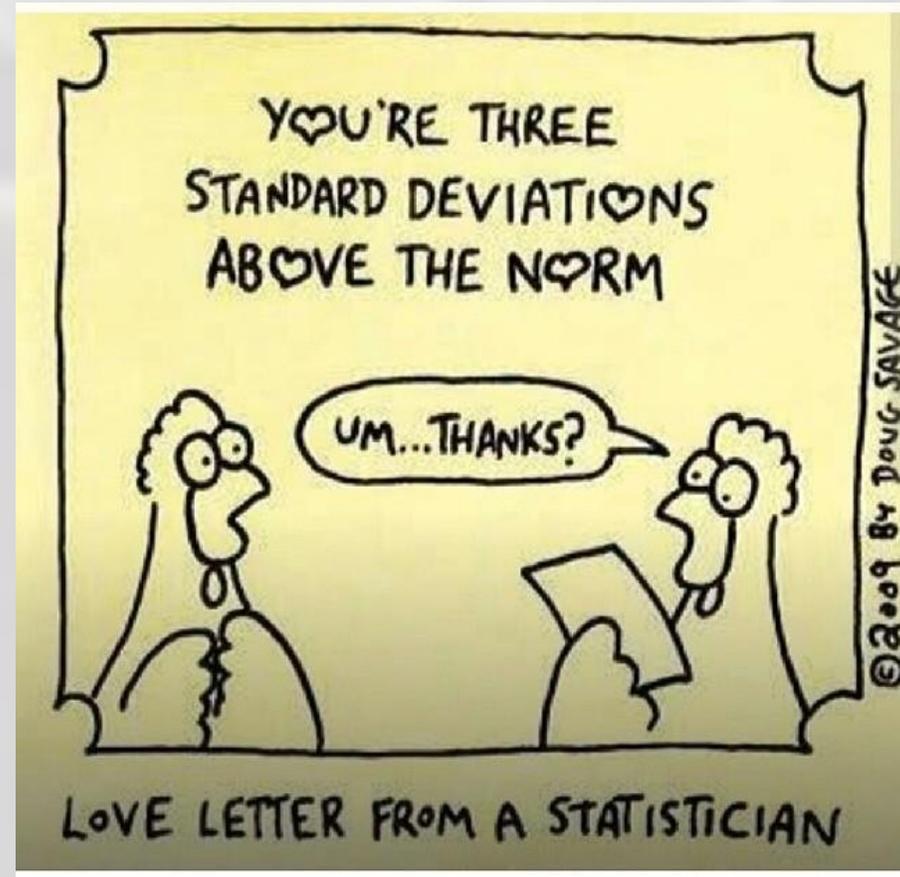
View Kahn Academy
video on Standard
Deviation and summarize
key points

What is the
important takeaway
related to standard
deviation?



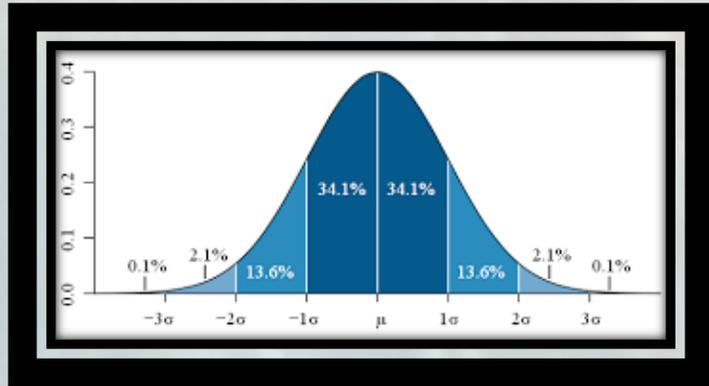
Measures of Variation (Variability)

- 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



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. $60 \div 10 = 6$
 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
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.

$$12 \div 10 = 1.2$$

-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.

$$\sqrt{1.2} = 1.1$$

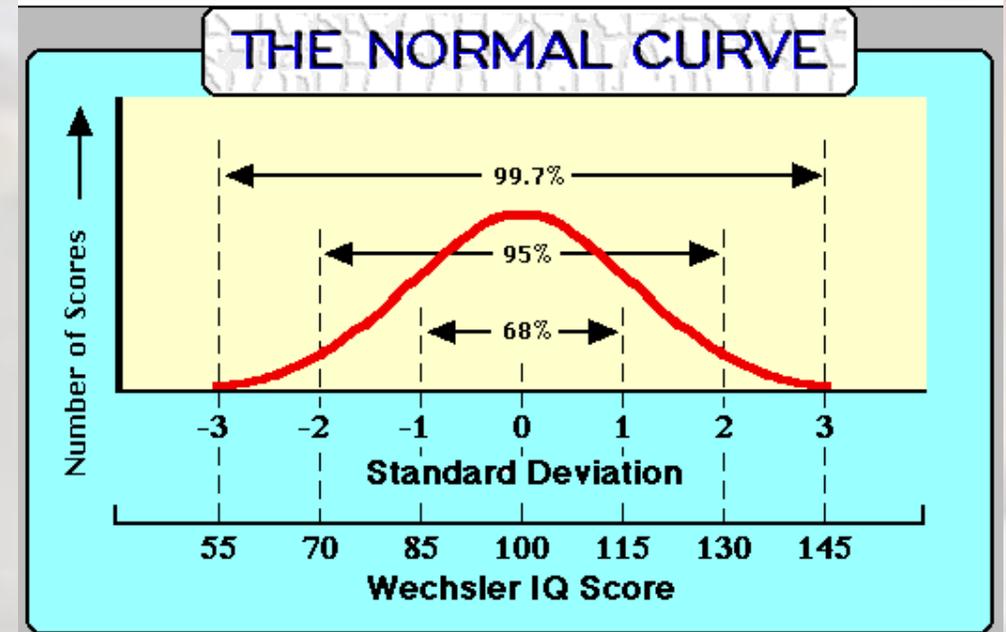
- ▶ The smaller this number is, the more confident you can be in using the mean to represent the group.

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 ____.

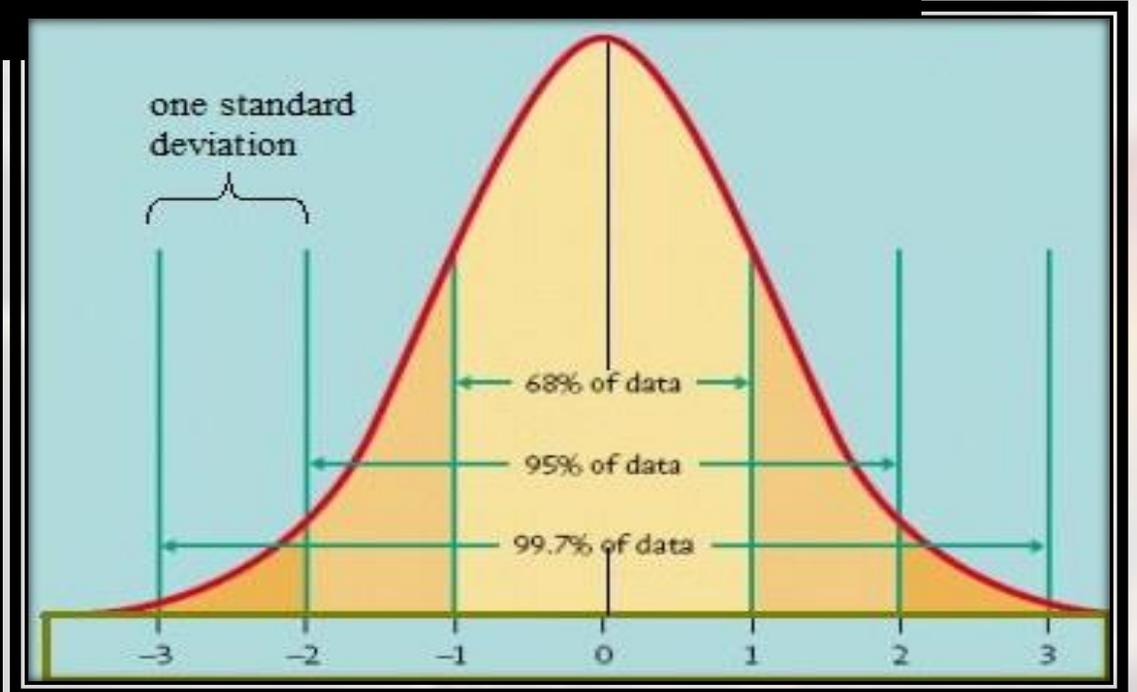
Normal Distribution Of Scores

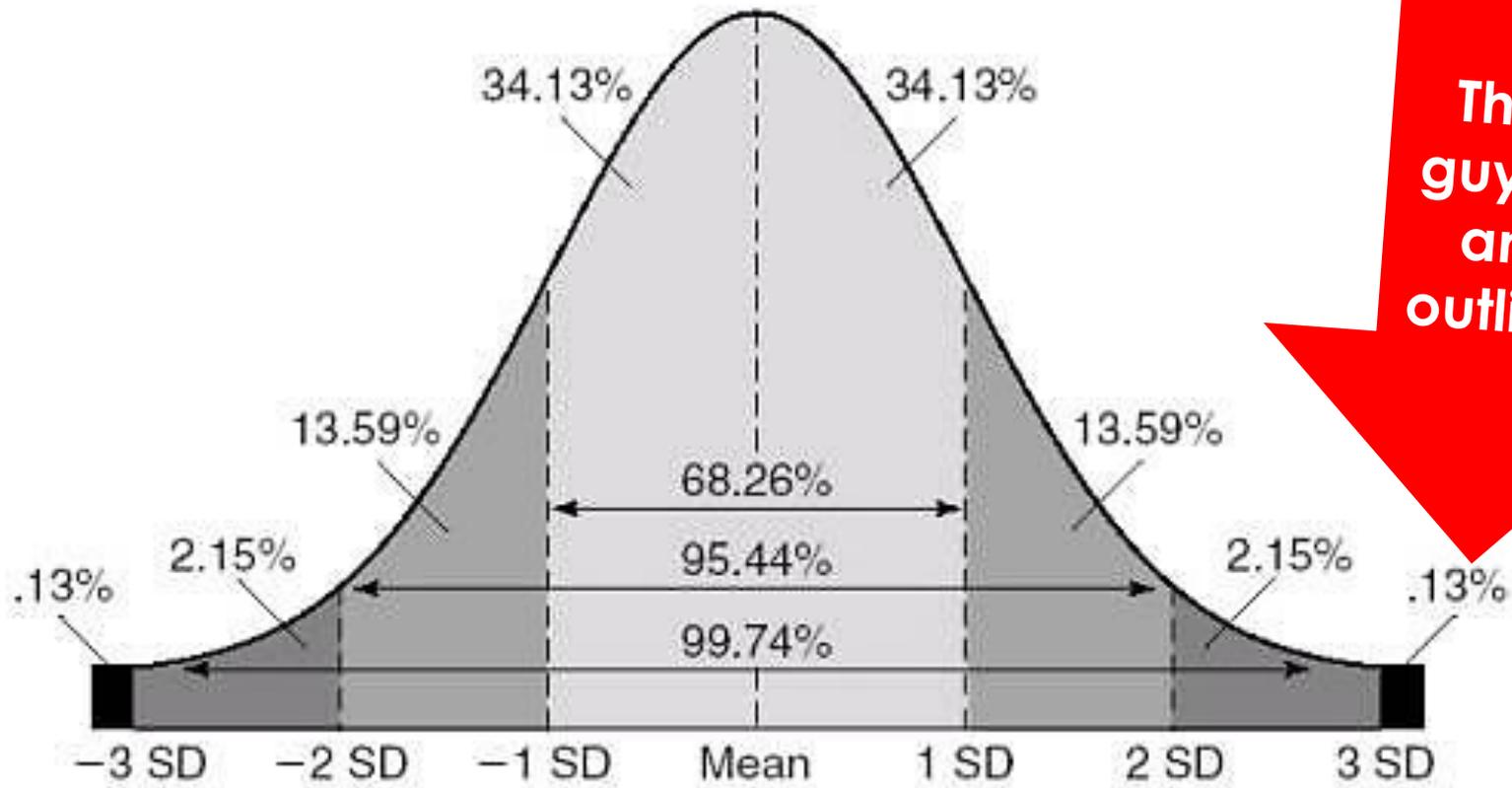
- IQ Scores, heights, shoe sizes of large groups of people usually produce a symmetrical distribution; pattern of scores on one side are a mirror of the other side
- Referred to as “Bell Curve” because of the shape
- Data in a normal distribution fall around the mean in the same way each time
- Percentile 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





**This
guy is
an
outlier**

	-3 SD	-2 SD	-1 SD	Mean	1 SD	2 SD	3 SD
z-scores	-3	-2	-1	0	1	2	3
Percentile ranks	0.1	2	16	50	84	98	99.9
IQ	55	70	85	100	115	130	145



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 $p \leq 0.05$** , 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 **$p \leq 0.05$** , 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?

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?

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.