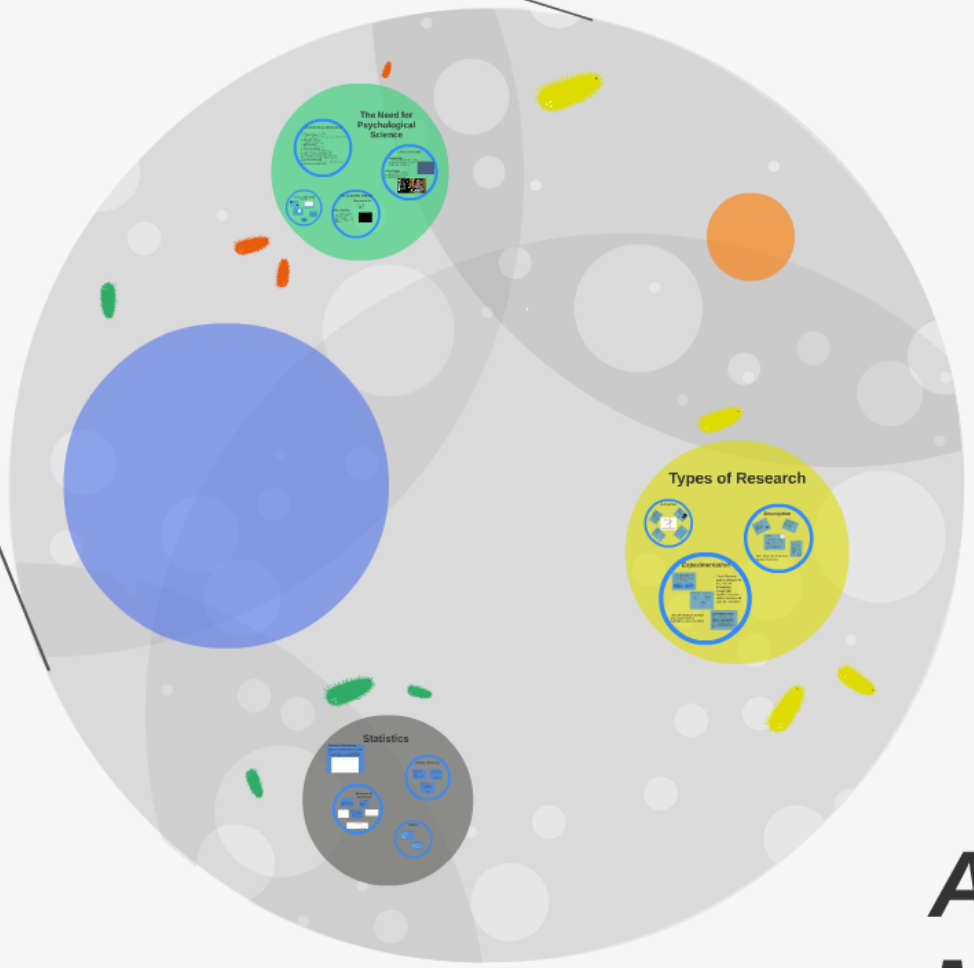
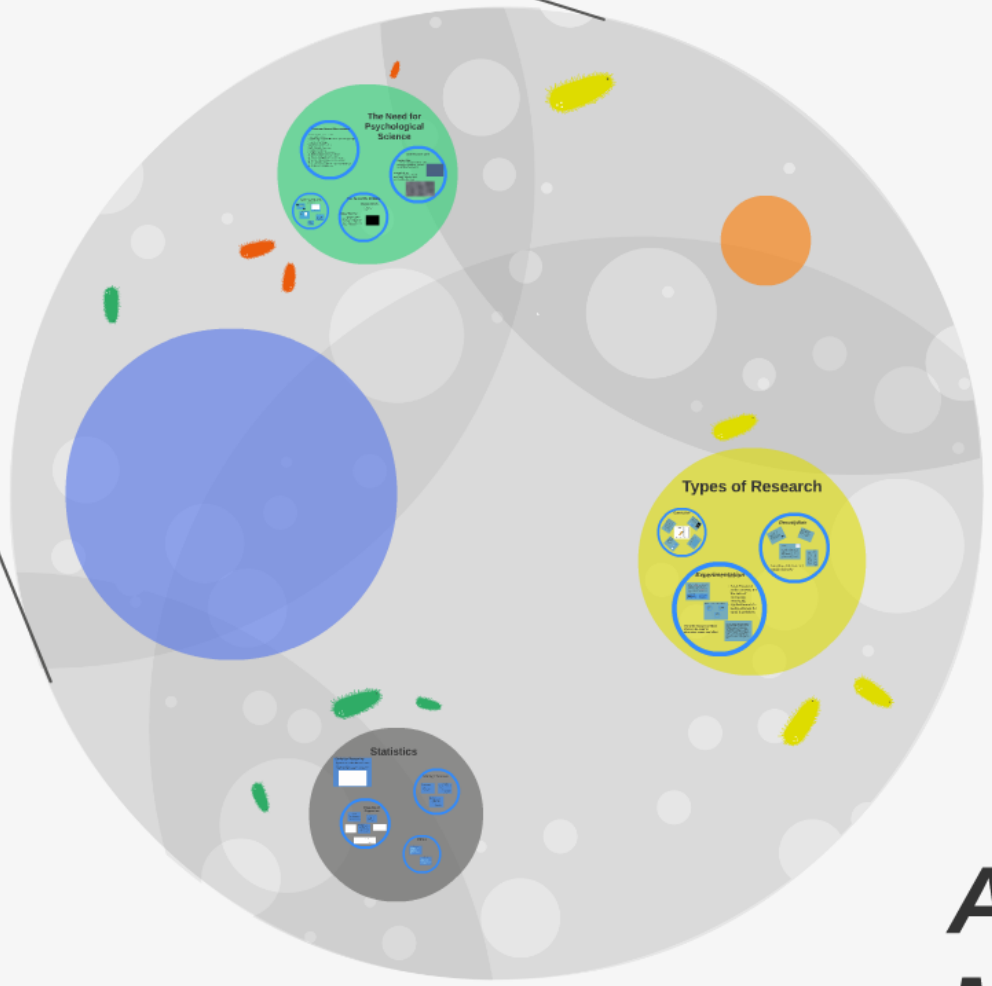
Ch. 1: Research Methods



AP Psych
Mrs Wilson

Ch. 1: Research Methods



AP Psych
Mrs Wilson

The Need for Psychological Science

Common Sense Observations

1. Birds of a feather flock together.
2. Look before you leap.
3. Boyfriends/girlfriends are like buses; if you wait long enough, another one will come.
4. Out of sight, out of mind.
5. Spare the rod, spoil the child.
6. Opposites attract.
7. You're never too old to learn.
8. Clothes make the man.
9. Neither a borrower nor a lender be.
10. Absence makes the heart grow fonder.
11. You can't teach an old dog new tricks.
12. If you have nothing nice to say, say nothing.
13. You can't make a silk purse out of a sow's ear.
14. He who hesitates is lost.
15. You can catch more flies with honey than with vinegar.
16. As you sow, so shall you reap.

Limits of Common Sense

Hindsight Bias
- The tendency to believe, after learning an outcome, that one would have foreseen it.

Overconfidence
- our confidence in our knowledge in greater than our objective accuracy

How do Psychologists use the scientific method to study behavior and mental processes?

The Scientific Attitude

Characteristics

- Curiousity
- Skepticism
- Humility

Critical Thinking

Thinking that does not blindly accept arguments and conclusions, rather, it examines assumptions, discerns hidden valuse, evaluates evidence, and assesses conclusions.

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Curiosity

scientists ask questions about the world around them

- Does participation in sports improve grades?
- Does caffeine improve mental acuity
- Is musical taste an indicator of intelligence
- does texting diminish interpersonal communication

How might you apply the scientific method to one of the questions we posed?

Terms to Know

Hypothesis - a testable prediction often implied by a theory

Theory - an explanation using an integrated set of principles that organizes observations and predicts behaviors and events

Types of Research

Descriptive - gathering information pertaining to the research question
Correlation - Does a relationship exist between two variables
Experiment - is there a causal relationship between two variables

Operational Definitions - a statement of the procedures used to define the research variables

Replication - Repeating the essence of a research study, usually with different participants in different situations to see whether the basic finding extends to other participants and circumstances

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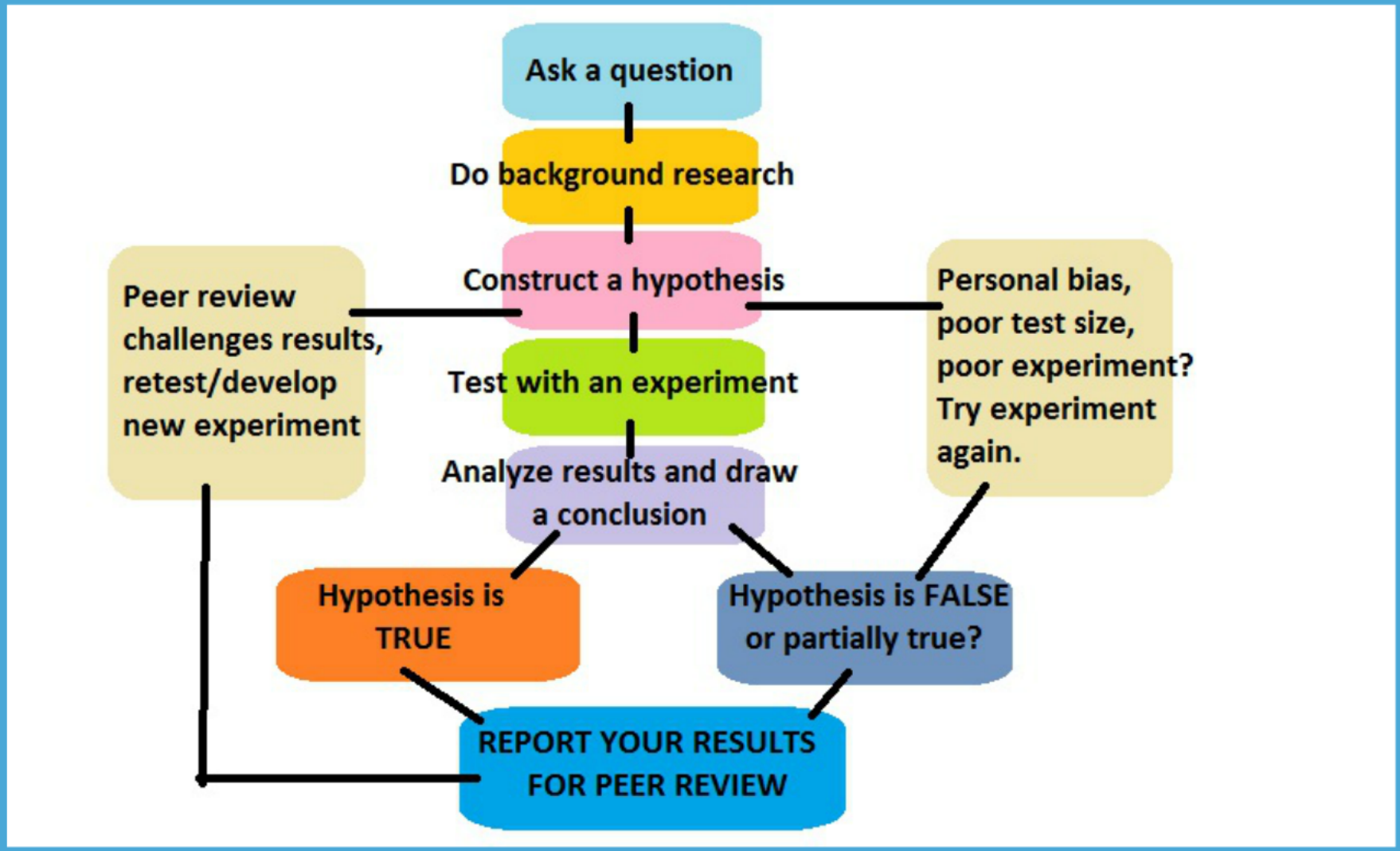

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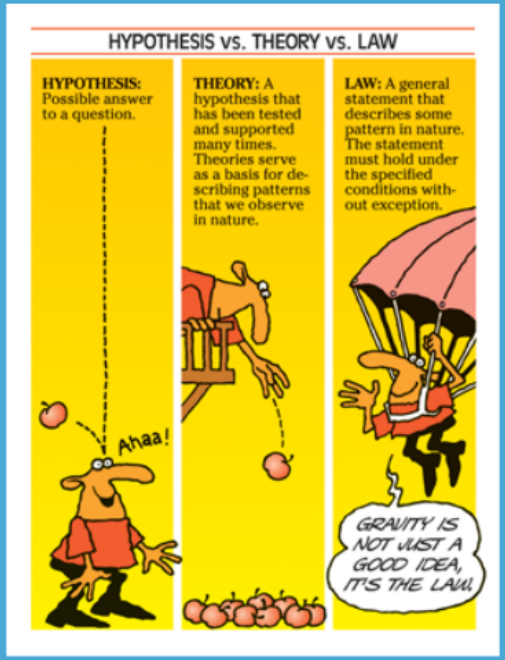

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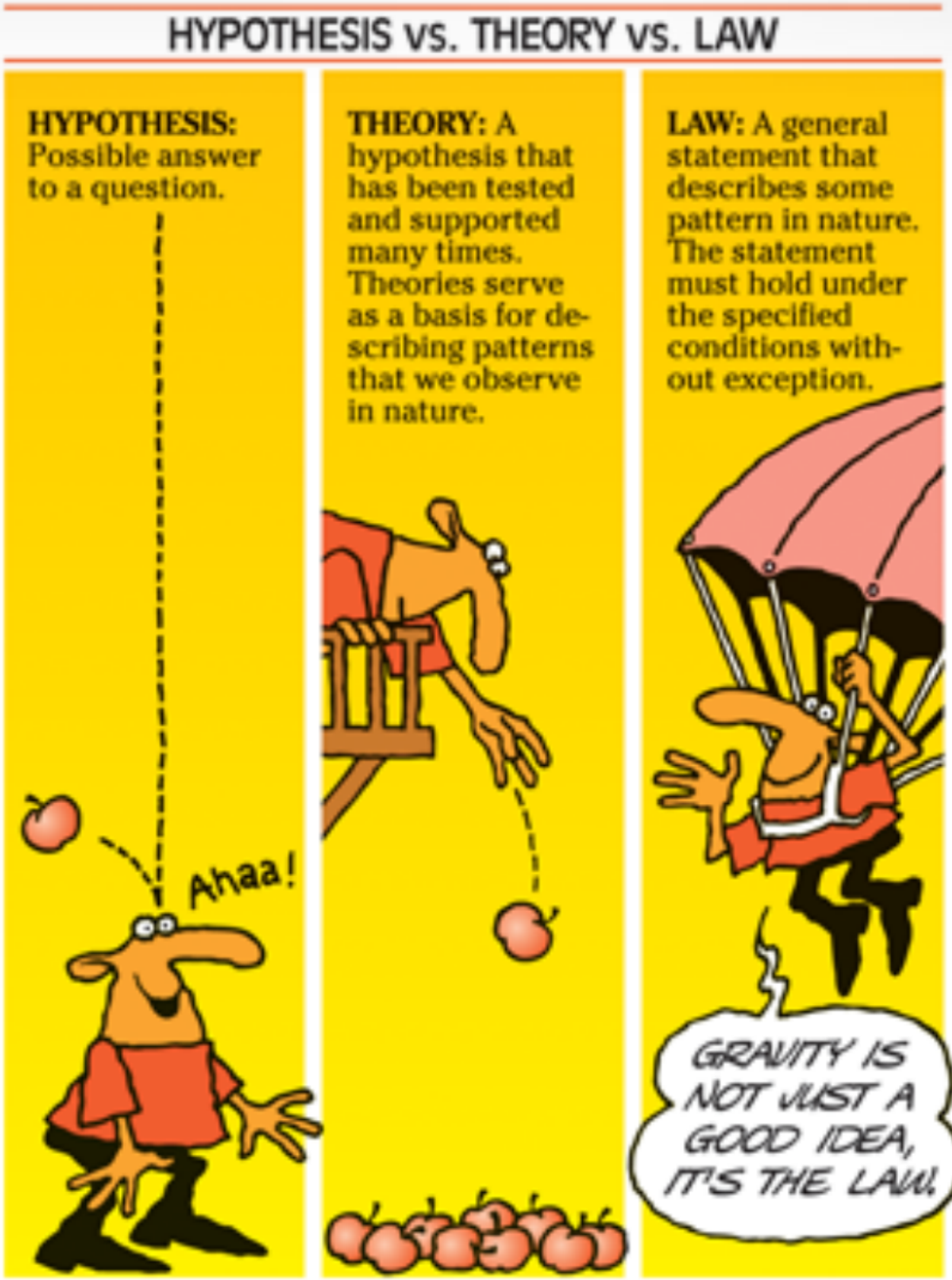
HYPOTHESIS vs. THEORY vs. LAW
HYPOTHESIS: Possible answer to a question.
Ahaa!
THEORY: A hypothesis that has been tested and supported many times. Theories serve as a basis for describing patterns that we observe in nature.
LAW: A general statement that describes some pattern in nature. The statement must hold under the specified conditions without exception.
GRAVITY IS NOT JUST A GOOD IDEA, IT'S THE LAW.

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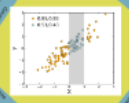
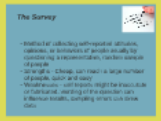
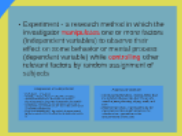


Description



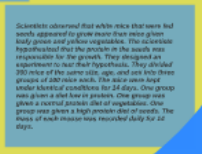
Describes but does not explain behavior

Experimentation



- Basic Research - seeks answers for the sake of increasing knowledge
- Applied reaearch - seeks answers for specific problems

The only research method that can be used to determine cause and effect



Description

The Case Study

- In depth study of one person or a small group of subjects
- Utilizes observation, testing, interviews, etc.
- Popular with Freud and Piaget
- Strengths - allows study of infrequent or nonreplicable, in-depth
- Weaknesses - observer bias, inability to generalize to larger populations

Naturalistic Observation

- Systematic Observation of an organism in a natural setting
- Strength - behavior is not influenced by an artificial environment, can gather data at the time of an event
- Weaknesses - Observer bias, Observer influence, inability to generalize to other populations

The Survey

- Method of collecting self-reported attitudes, opinions, or behaviors of people usually by questioning a representative, random sample of people
- Strengths - Cheap, can reach a large number of people, quick and easy
- Weaknesses - self reports might be inaccurate or fabricated, wording of the question can influence results, sampling errors can skew data

Random Sampling

Because of our tendency to generalize from limited data and the false consensus effect, we need a large, random, representative sample to gather data on a large group of individuals

- Population - the entire group to be studied
- Random Sample - representative group being surveyed. Every person in the population has an equal chance of being selected
- Stratified Sample - sub groups in the population are represented porportionally

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Anna O. (Bertha Pappenheim)

- Patient of Josef Breuer
- Fell ill during her father's illness and death
- Symptoms included - cough, blurred vision, hallucination, partial aphasia, loss of the use of her left side

- She was treated using the talking cure
- became the foundation of Psychoanalysis
- Her illness continued after the treatment

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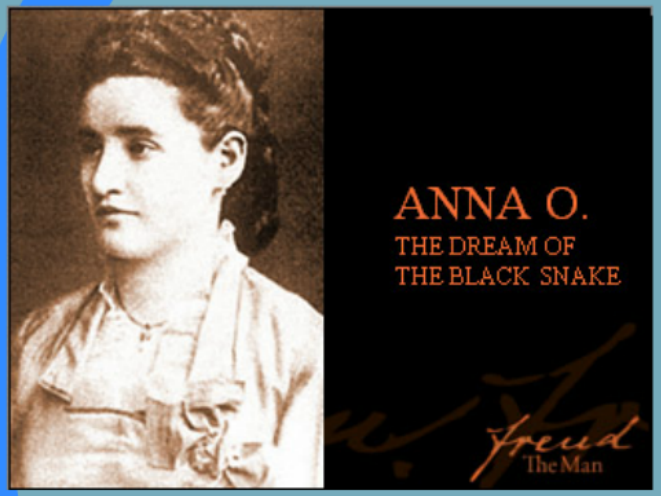

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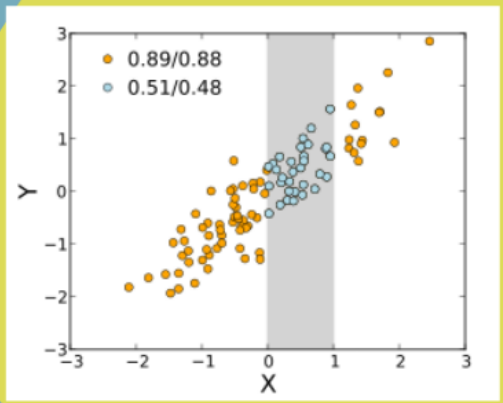
- a measure of the extent to which two factors vary together and thus how well each factor predicts
- Correlation coefficient is the mathematical expression of the relationship ranging from -1 to +1 (Pearson product-moment correlation coefficient or Pearson's r)

Illusory Correlations

- A perceived nonexistent relationship
- When we believe there is a relationship between two variables we tend to notice and recall events that support our beliefs
- Explains superstitious beliefs



Scatterplots

- A graph of plotted data points that show the relationship between two variables
- the slope of the data suggests the direction of the relationship (positive or negative)
- The amount of scatter suggests the strength of the relationship (r)

Say it with me now!

Correlation does not imply Causation

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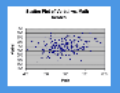
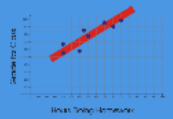
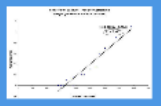
Relationship

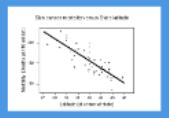




Direction of Relationship

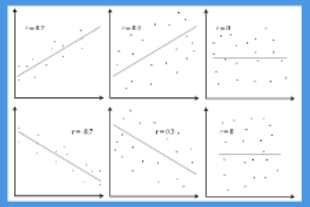
Positive Correlation - the values of the variables tend to rise and fall together





Negative Correlation - as the value of one variable goes up the other tends to go down

Strength of Relationship



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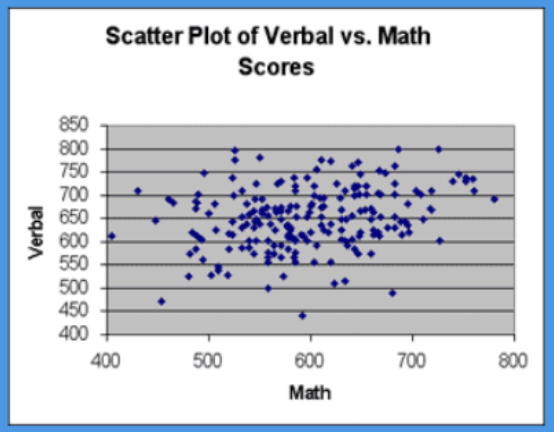

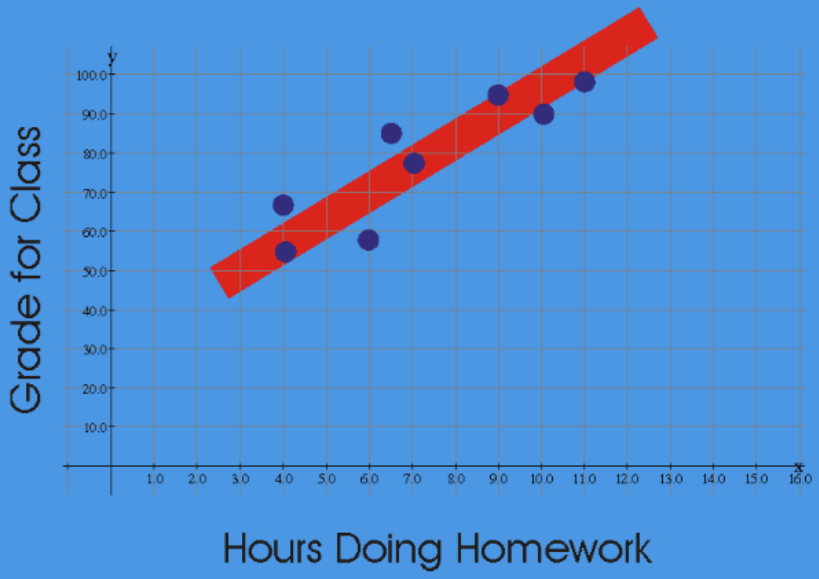

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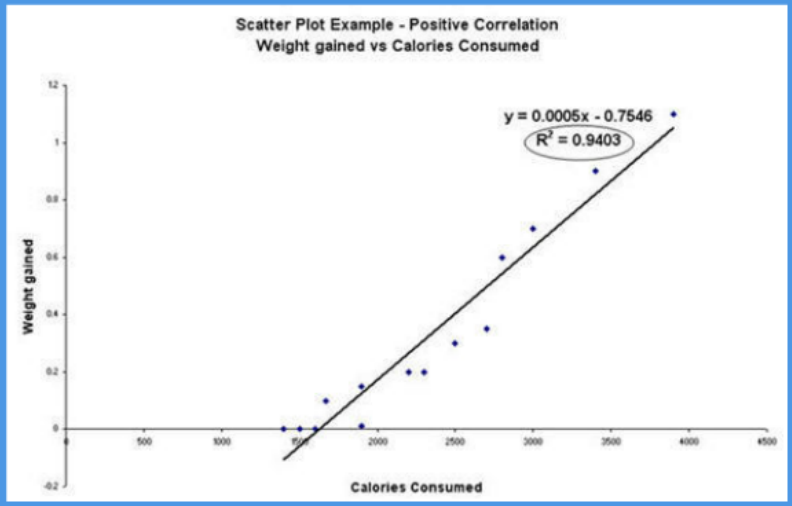

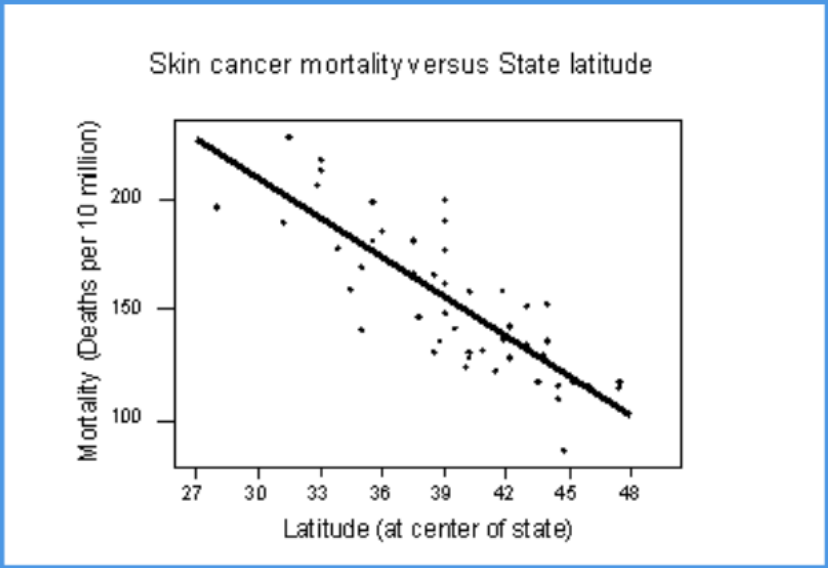

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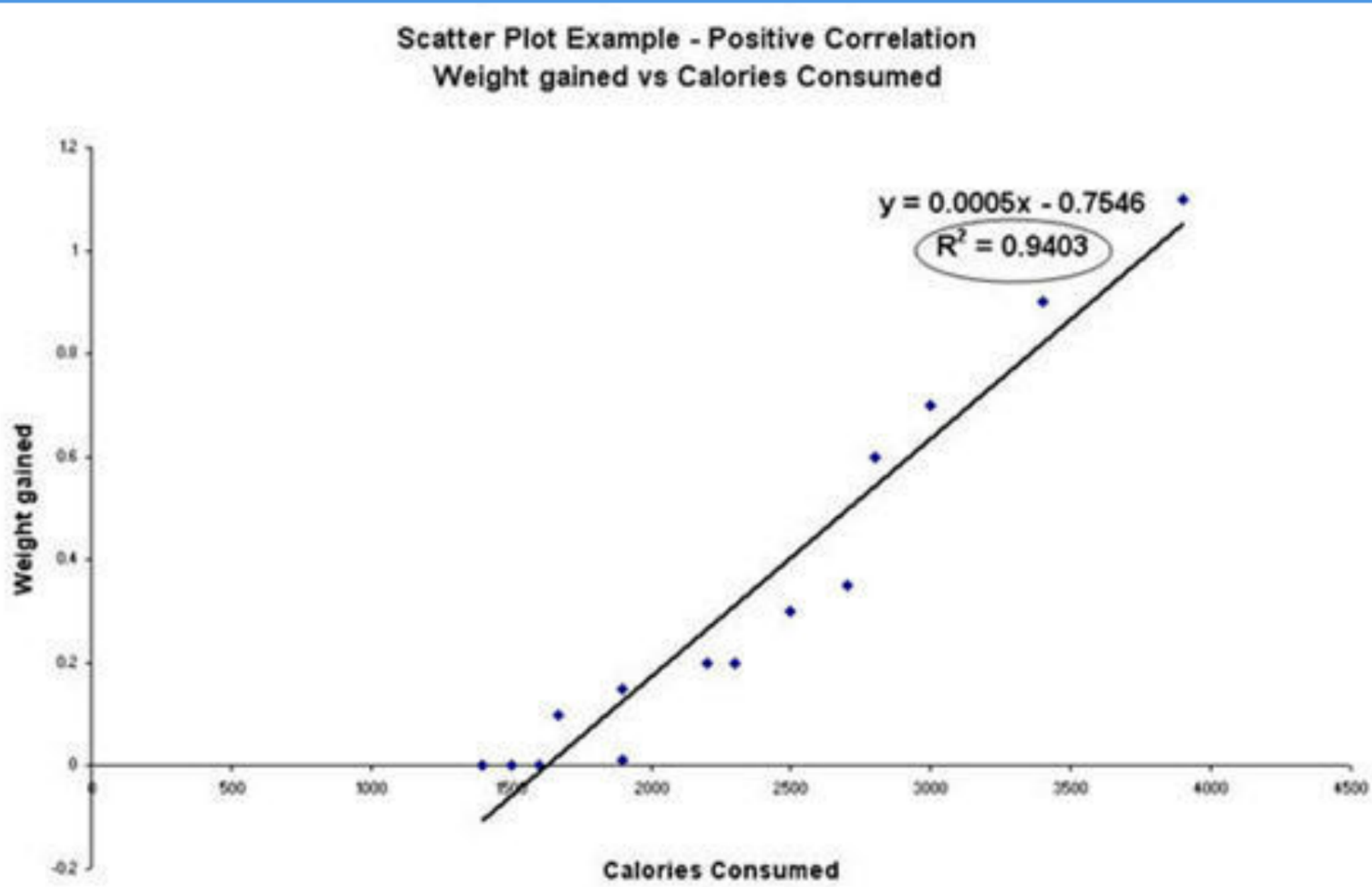
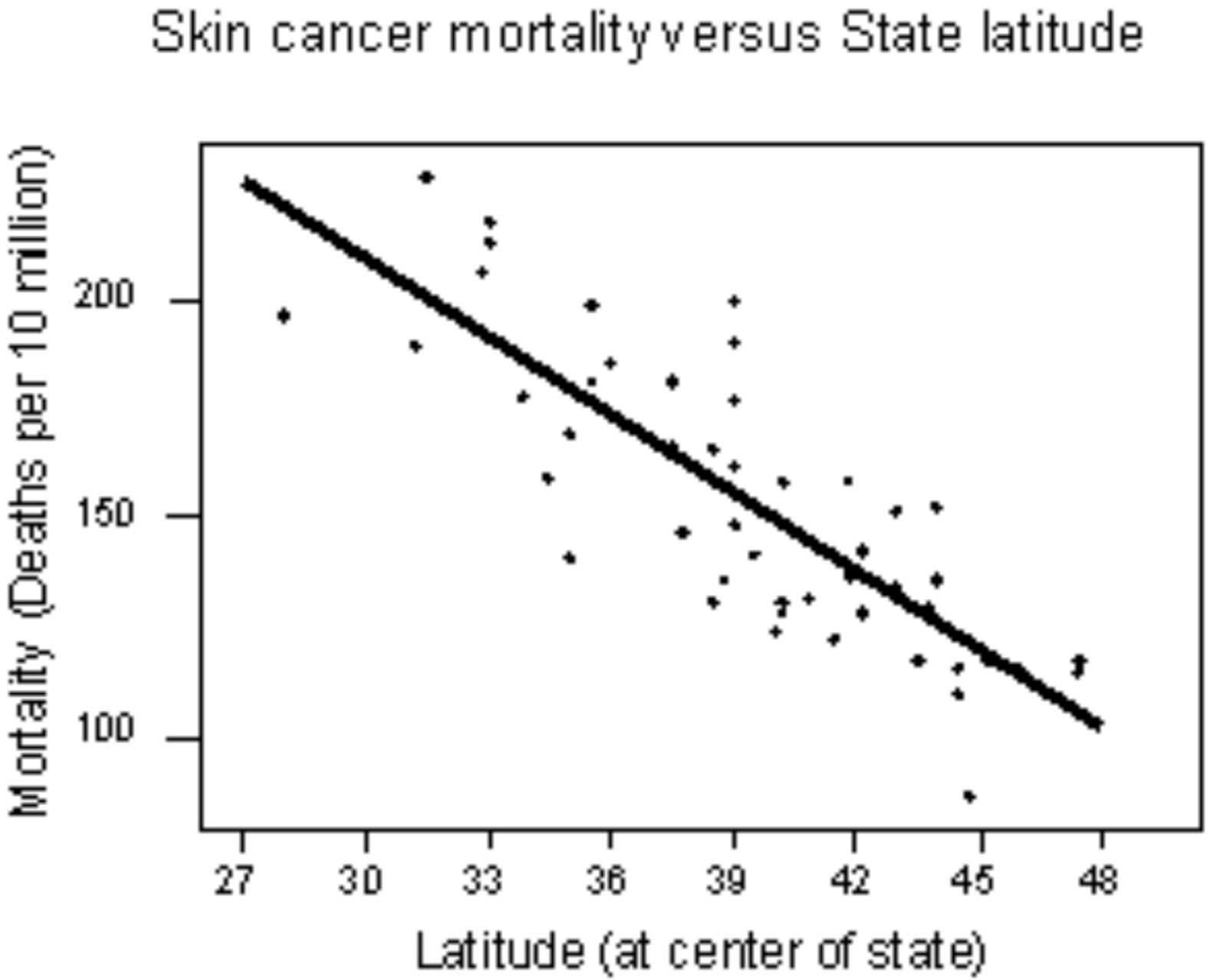
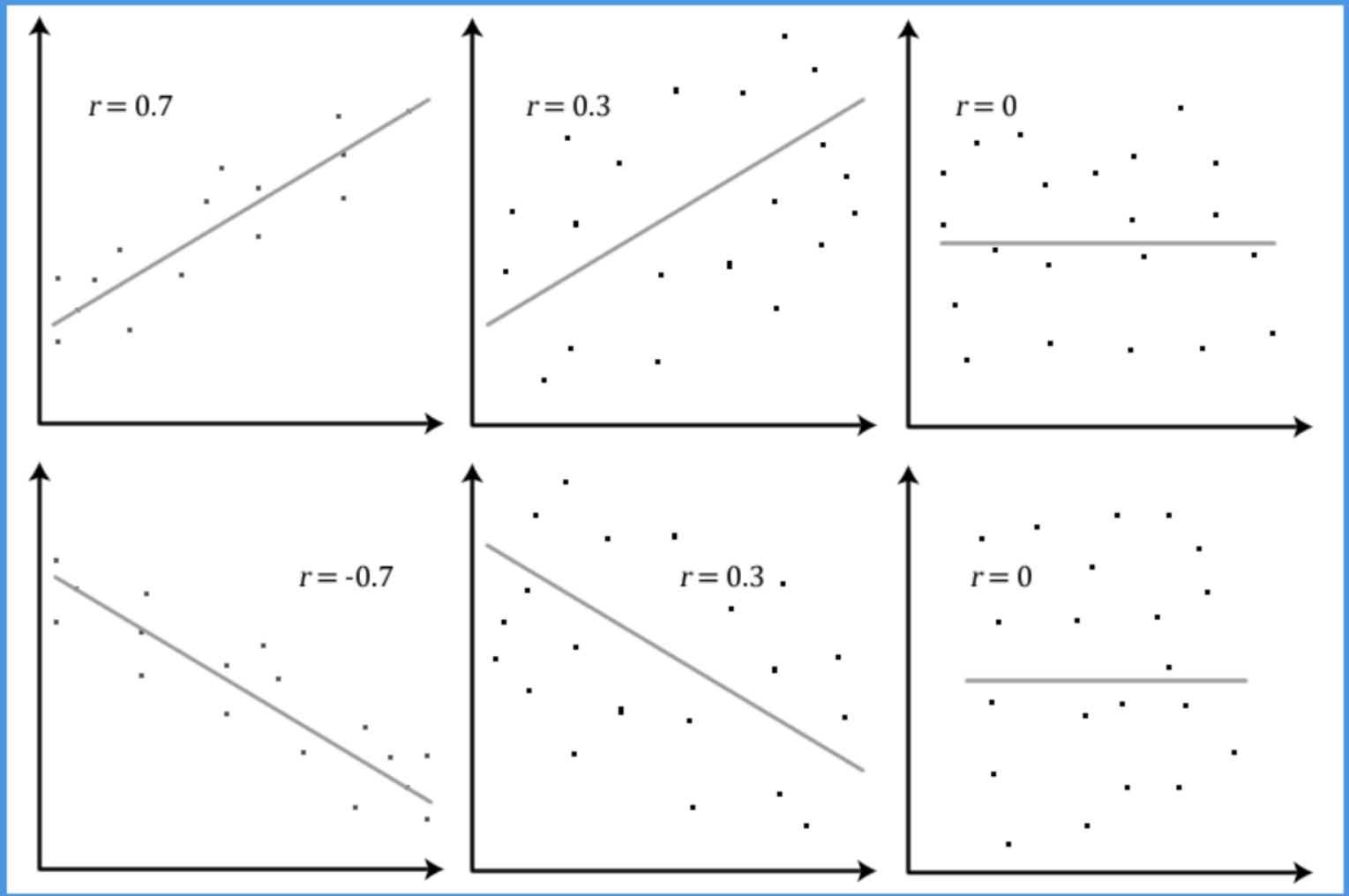

Scatter Plot Example - Positive Correlation
Weight gained vs Calories Consumed
y = 0.0005x - 0.7546
R² = 0.9403
Weight gained
Calories Consumed
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
500
1000
2000
2500
3000
3500
4000
4500


Skin cancer mortality versus State latitude
Mortality (Deaths per 10 million)
200
150
100
27
30
33
36
39
42
45
48
Latitude (at center of state)

Strength of Relationship



Say it with me now!

Correlation does not imply Causation

CORRELATION IS NOT CAUSATION

Do you get the joke?

images via Dilbert

Illusory Correlations

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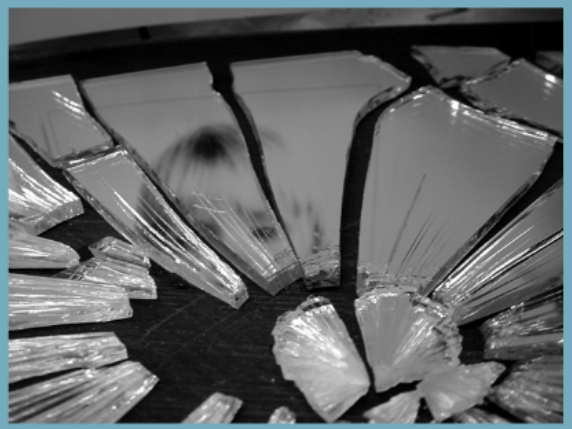

Perceiving Order In Random Events

When given data we look for meaningful patterns, even if they don't really exist

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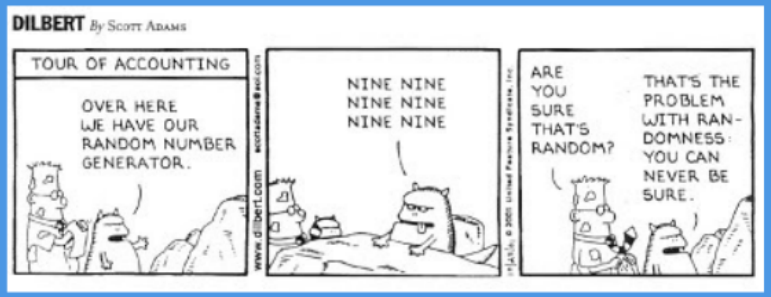

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Describes
explain be

Experimentation

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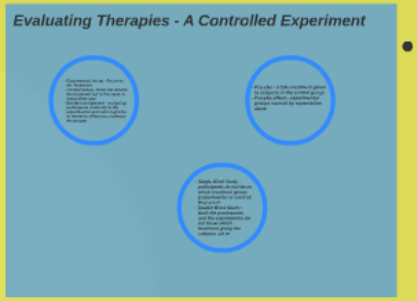

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The only research method that can be used to determine cause and effect

Scientists observed that white mice that were fed seeds appeared to grow more than mice given leafy green and yellow vegetables. The scientists hypothesized that the protein in the seeds was responsible for the growth. They designed an experiment to test their hypothesis. They divided 300 mice of the same size, age, and sex into three groups of 100 mice each. The mice were kept under identical conditions for 14 days. One group was given a diet low in protein. One group was given a normal protein diet of vegetables. One group was given a high protein diet of seeds. The mass of each mouse was recorded daily for 14 days.

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Components of an Experiment

- *Participants - or subjects*
- *Variables - Factors that can have different values*
- *Operational Definitions - Describes the specific procedure used to determine the presence of a variable*
- *Independent Variable (IV)- the variable or factor that is manipulated by the experimenter. This is the cause in the cause/effect relationship*
- *Dependent Variable (DV) - the variable being measured by the researcher. It is the effect that is dependent on the IV*

Problems to Watch for

- *Confounding Variables - factors (other than the IV) that influence the DV. The are the result of poor planning, sloppy work, and bias*
- *Experimenter Bias - expectations by the experimenter that might influence the results of an experiment or the interpretation of the data*

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Evaluating Therapies - A Controlled Experiment

- *Experimental Group - Receives the Treatment*
- *Control Group - Does not receive the treatment but is the same in every other way*
- *Random assignment - assigning participants randomly to the experimental and control groups to minimize differences between the groups*

- *Placebo - a fake treatment given to subjects in the control group*
- *Placebo effect - experimental groups caused by expectation alone*

- *Single Blind Study - participants do not know which treatment group (experimental or control) they are in*
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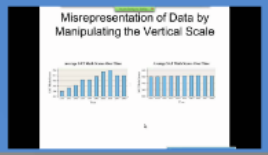
Statistics

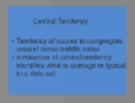
Statistical Reasoning

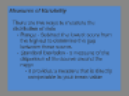
- Statistics allows us to analyze and interpret data
- misrepresentation or incorrect organization of data can lead to erroneous conclusion

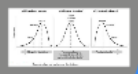


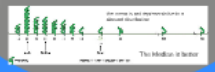
Making Inferences

Measures of Dispersion









Ethics

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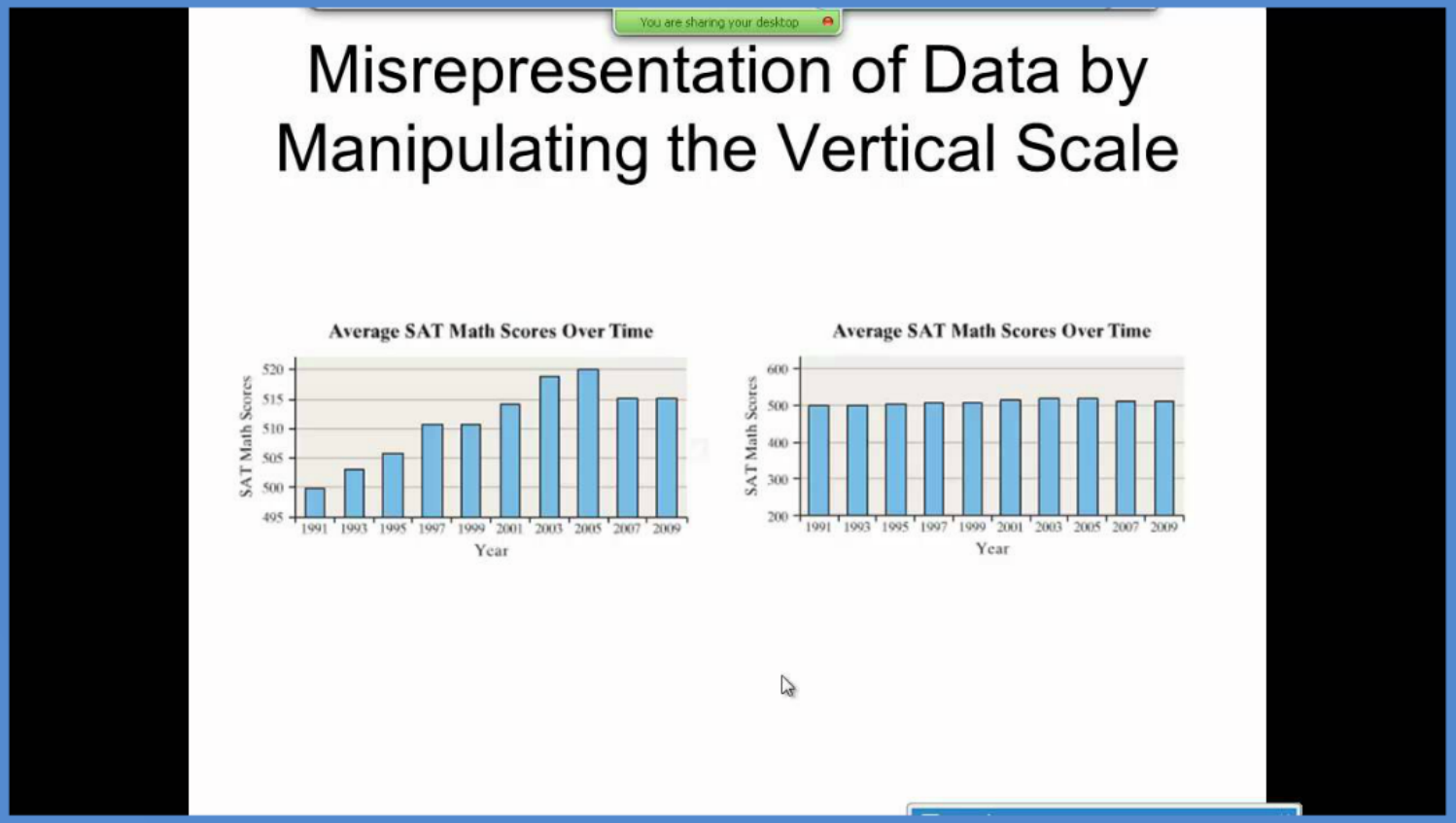
- Statistics allows us to analyze and interpret data
- misrepresentation or incorrect organization of data can lead to erroneous conclusion



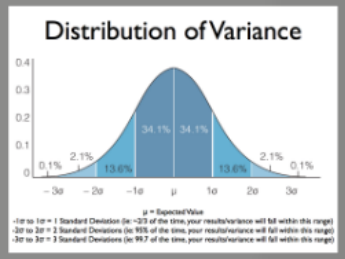
Measures of Dispersion

Central Tendency

- Tendency of scores to congregate around some middle value
- a measure of central tendency identifies what is average or typical in a data set

Measures of Central Tendency

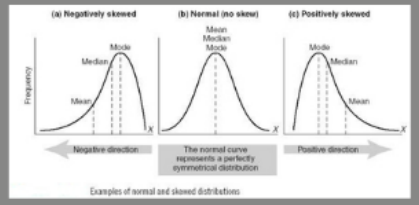
- Mean - the arithmetic average of scores in a distribution
- Median - the middle score in a rank-ordered distribution
- Mode - the most frequently occurring score in a distribution
  - data sets with more than one mode are called multimodal

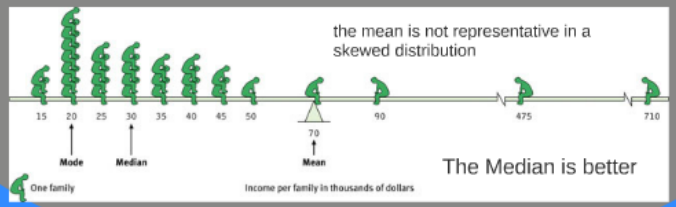


Measures of Variability

There are two ways to measure the distribution of data

- Range - Subtract the lowest score from the highest to determine the gap between these scores
- Standard Deviation - a measure of the dispersion of the scores around the mean
  - it provides a measure that is directly comparable to your mean value





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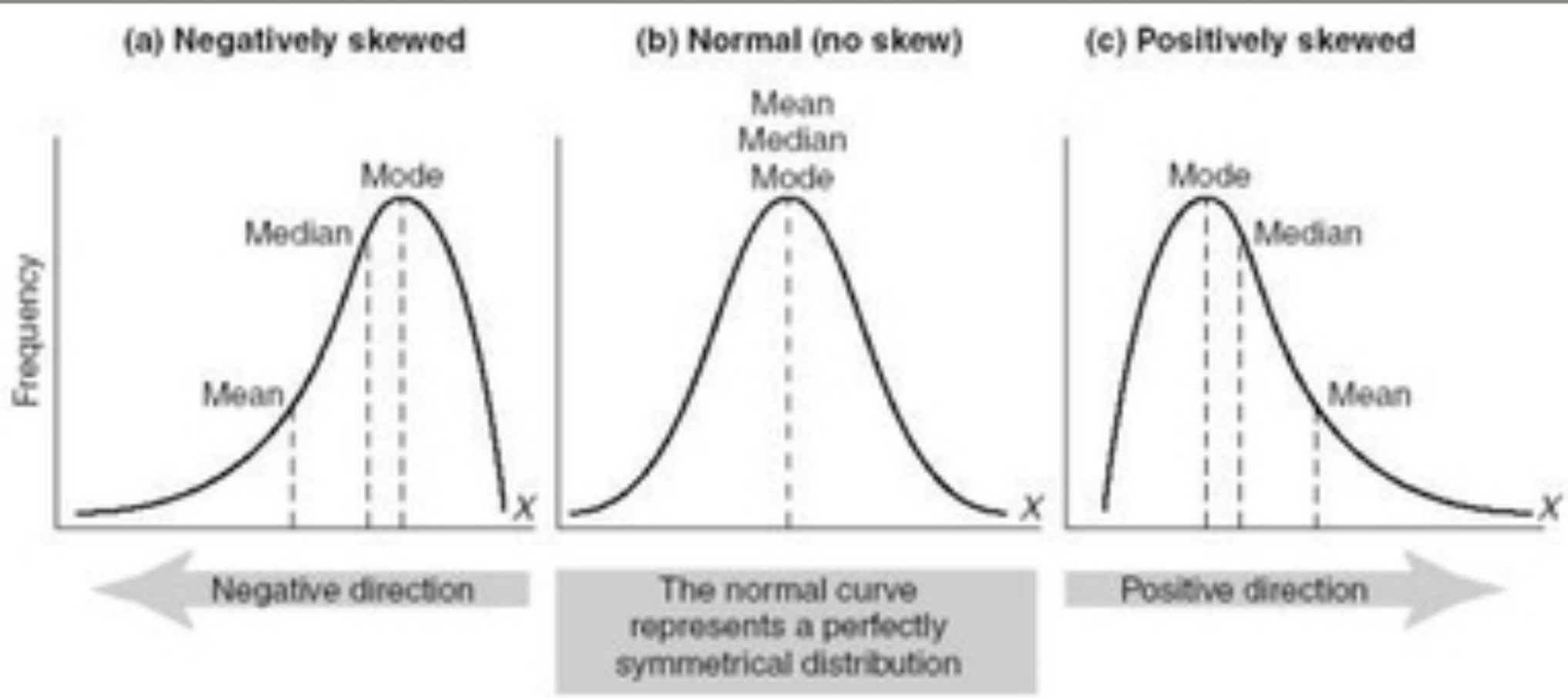
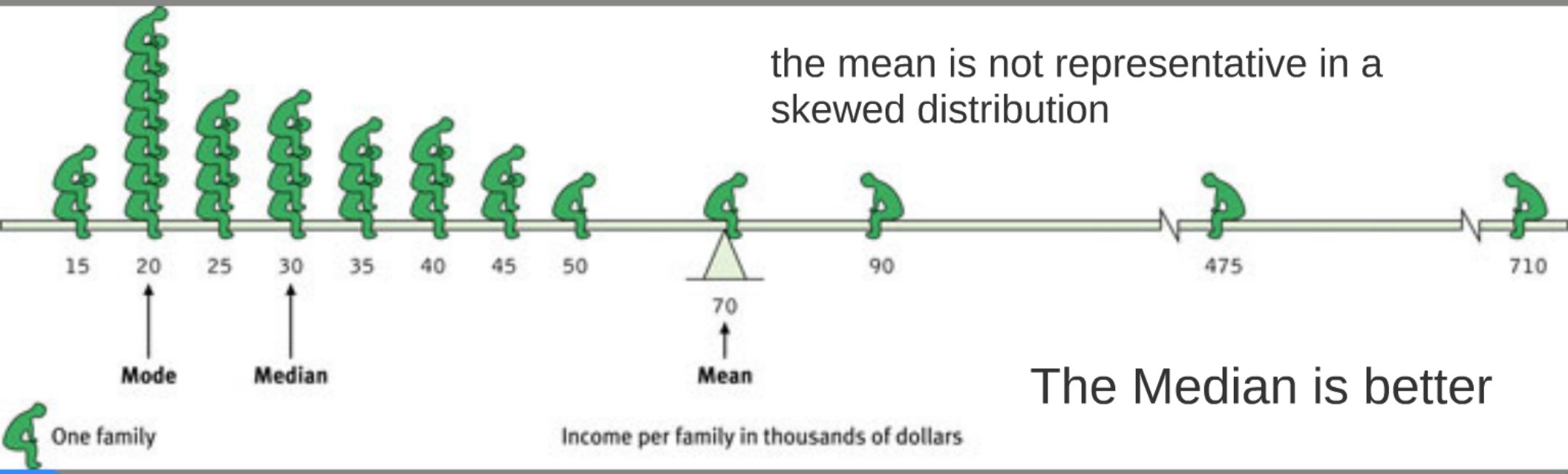


Examples of normal and skewed distributions



the mean is not representative in a skewed distribution

The Median is better

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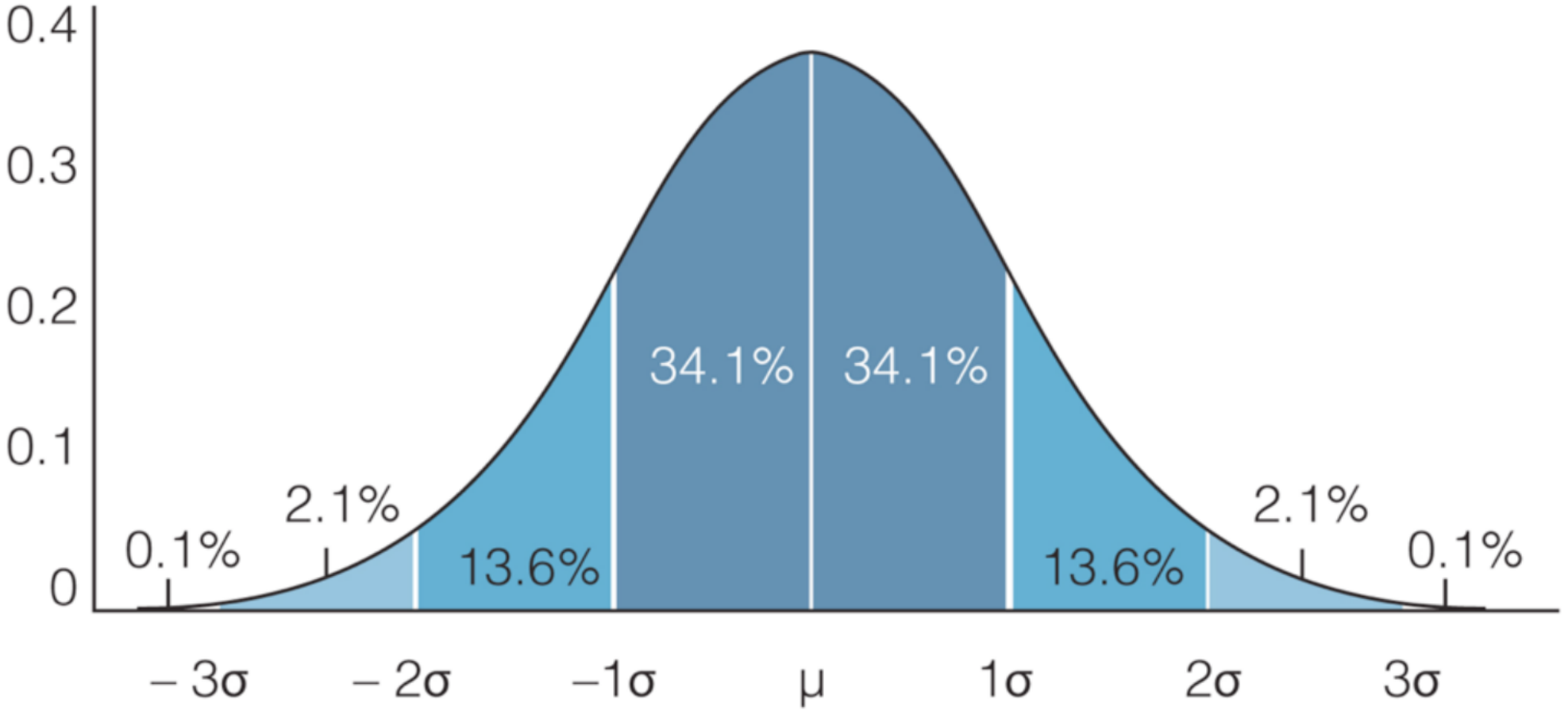
Distribution of Variance



μ = Expected Value

-1σ to 1σ = 1 Standard Deviation (ie: ~2/3 of the time, your results/variance will fall within this range)

-2σ to 2σ = 2 Standard Deviations (ie: 95% of the time, your results/variance will fall within this range)

-3σ to 3σ = 3 Standard Deviations (ie: 99.7 of the time, your results/variance will fall within this range)

Making Inferences

Principles for Making Reliable Generalizations from data

- Make sure you have a representative sample
- Make sure your sample size is large enough
- Look for less variable data

Statistical Significance

When we have data from two sample groups we can ask:

Is there a difference between the means of the samples

And

If there is a difference, how sure are we that the difference is due to genuine differences in the population and not just a produce of random variation

Testing for Differences

Statistical tests allow us to determine:

- ***if there is a relationship between two variables (Chi Square)***
- ***The probability that the difference between two groups on the same variable (t score) due to chance***

These scores allow us to determine statistical significance

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Ethics

With Humans

1. Benefits outweigh the risks
2. Risks are minimized
3. Protect the welfare and dignity of all participants
4. Follow all state and federal laws
5. Informed consent
6. Deception only acceptable when benefit outweighs the risk. subjects must be debriefed at the end of the experiment
7. Subjects right to withdraw
8. Do no mental or physical harm
9. Repair any physical or mental harm inadvertently affected
10. Confidentiality
11. Participants debriefed about the purpose and findings of the study

With Animals

1. Treat animals humanely
2. Follow all state and federal lawa
3. Psychologist with appropriate training in animal research and care must supervise all experiments
4. Minimize the animals pain and discomfort
5. Use appropriate anesthesia and sterilization techniques
6. When necessary, animals should be killed quickly and painlessly

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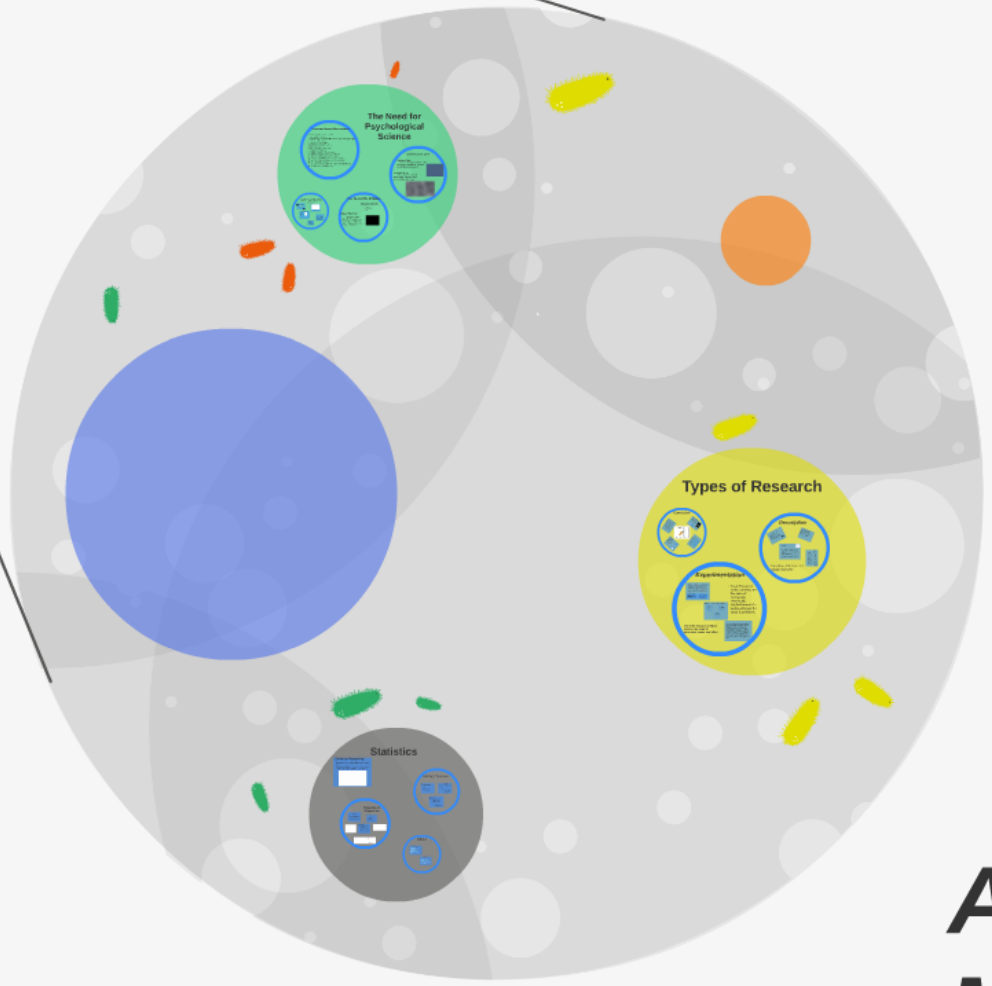
Ch. 1: Research Methods



AP Psych
Mrs Wilson