We only use 10% of our brains

The myth: we only use 10% of our brain, where the other 90% is silent/inactive

- Considered, from this point of view, as **unused potential** that can be tapped into with the right products/tools (e.g. "miracle drugs" – ex. movie *Limitless*)
- May have started from a misunderstanding of William James saying that the average person only achieves about 10% of their potential

Why it's wrong:

- If this were true, brain scans would be representative of this activity-inactivity profile
  - Brain imaging techniques (e.g. fMRI, EEG) show that the brain is actually very active
  - Different regions can be seen as contributing to different functions (none of which are inactive all the time.)
- Studies of electrical brain stimulation has yet to find silent areas
- The devastating effects of even small brain injuries can also be seen as evidence against this myth (Kolb & Whishaw, 2003; Sacks, 1985).
  - If we only used 10% of our brain, the odds of real consequences to brain injury would appear less often than it does currently (the odds of damaging the "active 10%" versus the "inactive 90%" are much smaller)
  - Unused areas because of injury (ex. amputation) are either repurposed or degenerate

Introduction to Psychology

Chapter 1

Chapter Overview

- The Need for Psychological Science
- Research Strategies: How Psychologists Ask and Answer Questions
- Statistical Reasoning in Everyday Life

The Need for Psychological Science

- **Humans cannot rely solely on intuition and common sense.**
- Three phenomena illustrate this:
  - Hindsight bias
  - Judgmental overconfidence
  - Tendency to perceive patterns in random events

Did we know it all along?

- **Hindsight bias**
  - Tendency to believe, after learning an outcome, that we could have predicted it.
  - Also known as the I-knew-it-all-along phenomenon.

Hindsight Bias

When drilling the Deepwater Horizon oil well in 2010, oil industry employees took some shortcuts and ignored some warning signs, without intending to harm the environment or their companies' reputations.

After the resulting Gulf oil spill, with the benefit of 20/20 hindsight, the foolishness of those judgments became obvious.

The Limits of Intuition and Common Sense

About how many seconds do you think it would take you to unscramble each anagram?

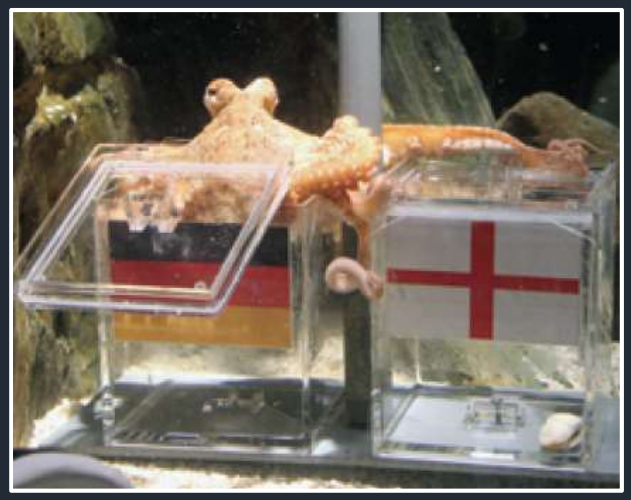
WREAT → WATER
ETRYN → ENTRY
GRABE → BARGE

Knowing the answer makes us overconfident.
The average problem solver spends 3 minutes.

Perceiving order in random events

- **People perceive patterns to make sense of their world.**
- Even in random, unrelated data people often find order, because random sequences often do not look random.
- In actual random sequences, patterns and streaks (such as repeating numbers) occur more often than people expect.
- People trust their intuition more than they should because intuitive thinking is flawed.

Perceiving order in random events



YouTube

- During the 2010 World Cup, a German octopus—Paul, “the oracle of Oberhausen”—selected the right box and correctly predicted the outcomes of Germany’s matches with Spain.

- Random or remarkable?


YouTube

The Need for Psychological Science

- **Why is intuition overused and errors made?**
  - Hindsight bias, overconfidence, and our tendency to perceive patterns in random events often lead us to overestimate our intuition.
  - But scientific inquiry can help us sift reality from illusion.

The Scientific Attitude

- Curiosity
- Skepticism
- Humility

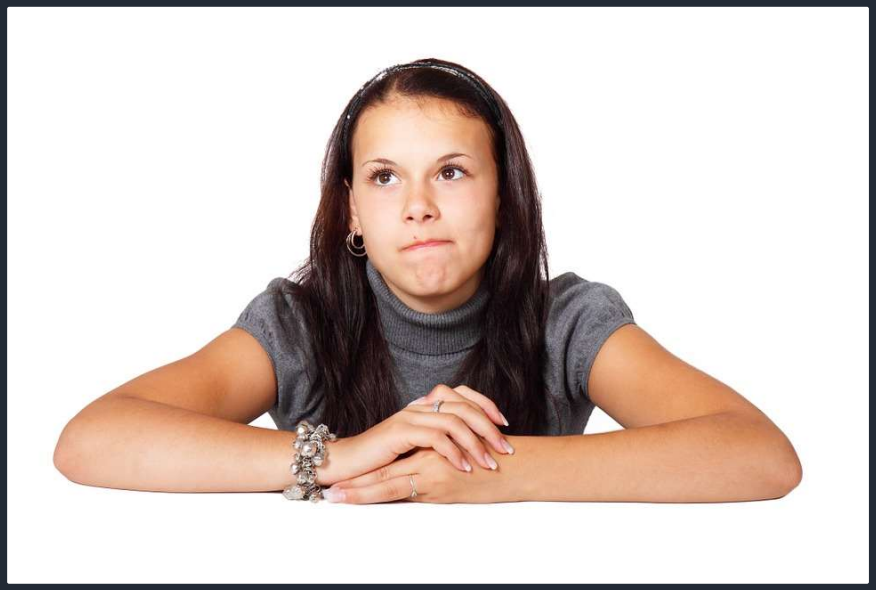
Let's take a closer look at each of these.

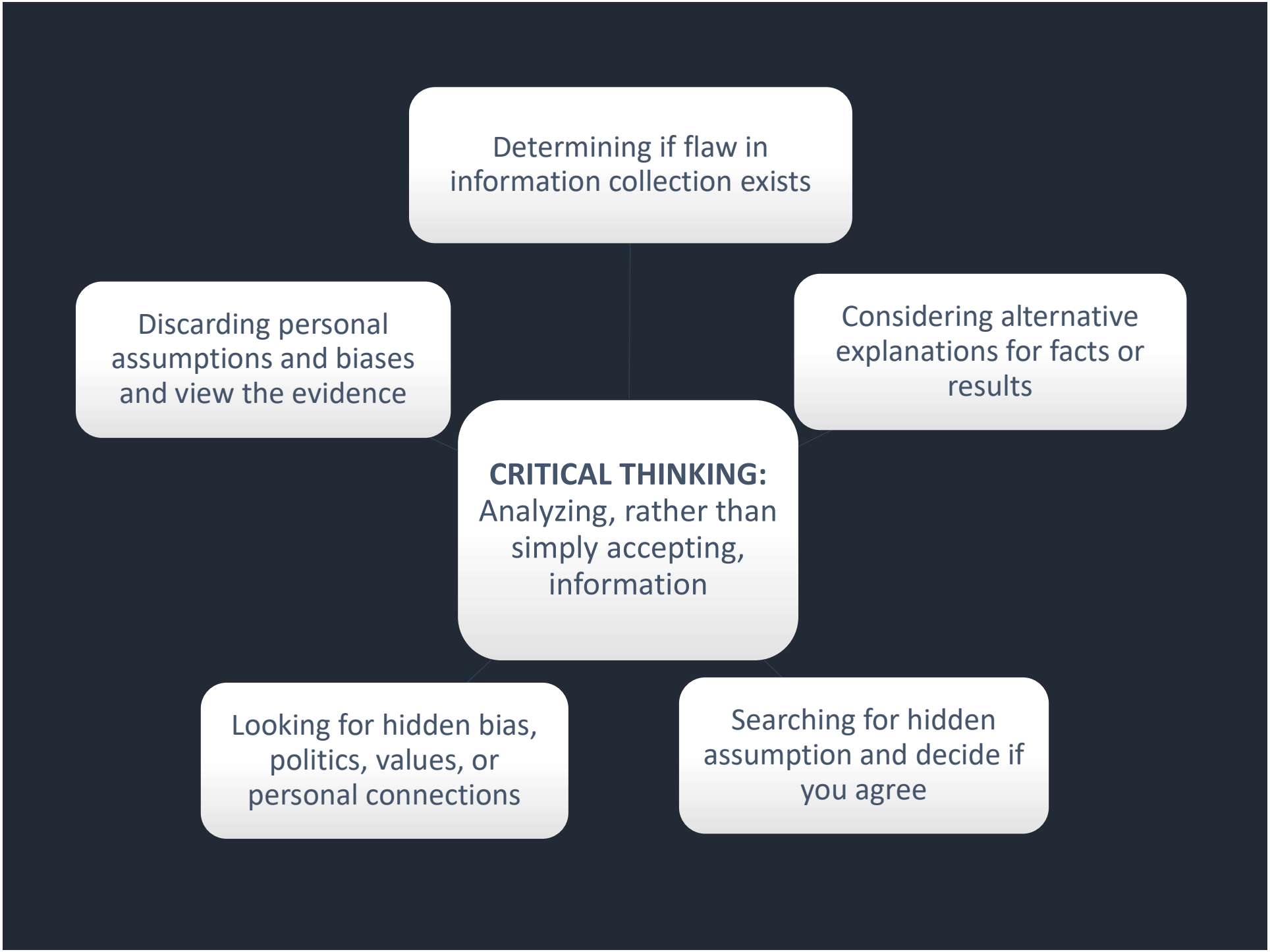
The Scientific Attitude

- **Curiosity**
  - Includes a passion to explore and understand the world without misleading or being misled
  - Questions to consider
    - What do you mean?
    - How do you know?

The Scientific Attitude

- **Thinking critically**
  - **Critical thinking** refers to a more careful style of forming and evaluating knowledge than simply using intuition.
  - In addition to the scientific method, critical thinking helps develop more effective and accurate ways to figure out what makes people do, think, and feel the things they do.




Determining if flaw in information collection exists
Discarding personal assumptions and biases and view the evidence
Considering alternative explanations for facts or results
CRITICAL THINKING: Analyzing, rather than simply accepting, information
Looking for hidden bias, politics, values, or personal connections
Searching for hidden assumption and decide if you agree

The Scientific Attitude

- **Skepticism**
  - Supports questions about behavior and mental processes: What do you mean? How do you know?
  - Don’t just believe everything that you hear!

The Scientific Attitude

- **Humility**
  - Involves awareness that mistakes are possible and willingness to be surprised
  - One of psychology's early mottos: "The rat is always right."

The Scientific Method

- **Scientific method is the process of testing ideas about the world by**
  - Setting up situations that test our ideas
    - If the data do not fit our ideas, then ideas are modified and tested again.
  - Making careful, organized observations
  - Analyzing whether the data fit with our ideas

The Scientific Method

- **Theory**
  - Explanation using an integrated set of principles that organizes observations and predicts behaviors or events
- **Hypothesis**
  - Testable prediction, often implied by a theory
- **Operational definition**
  - Carefully worded statement of the exact procedures (operations) used in a research study
- **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

A good theory…

- Effectively organizes a range of self-reports and observations
- Leads to **clear predictions** that anyone can use to check the theory
- Often stimulates research that leads to a revised theory which better organizes and predicts what we know
- May be replicated and supported by similar findings

The Scientific Method

- Descriptive methods describe behaviors, often by using case studies, surveys, or naturalistic observations.
- Correlational methods associate different factors. (You'll see the word factor often in descriptions of research. It refers to anything that contributes to a result.)
- Experimental methods manipulate, or vary, factors to discover their effects.

Research Strategies: Description

- **Descriptive research** is a *systematic, objective observation of people*
- The goal is to provide a clear, accurate picture of people's behaviors, thoughts, and attributes

Descriptive Research

Case study

- Descriptive technique in which one person is studied in depth in the hope of revealing universal principles

Naturalistic observation

- Descriptive technique of observing and recording behavior in naturally occurring situations without trying to change or control the situation

Survey

- Descriptive technique for obtaining the self- reported attitudes or behaviors of a group, usually by questioning a representative, random sample of that group

Descriptive Research

Case studies	Naturalistic observations	Surveys and interviews

• Examines one individual in depth
• Provides fruitful ideas
• Cannot be used to generalize
	• Records behavior in natural environment
	• Describes but does not explain behavior
	• Can be revealing
		• Examines many cases in less depth
		  • Wording effect
		  • Random sampling
		• Utilizes random sampling of population for best results

Research Strategies: Correlation

- **General Definition:** an observation that two traits or attributes are related to each other (thus, they are “co”-related)
- **Scientific definition:** a measure of how closely two factors vary together, or how well you can predict a change in one from observing a change in the other

Correlation

- **Positive correlation (between 0 and +1.00)**
  - Indicates a direct relationship, meaning that two things increase together or decrease together
- **Negative correlation (between 0 and –1.00)**
  - Indicates an inverse relationship: As one thing increases, the other decreases.
- **Correlation coefficient**
  - Provides a statistical measure of how closely two things vary together and how well one predicts the other

Correlations – A Mini-Test

Indicate whether each association is a positive correlation or a negative correlation.

- The more children and youth used various media, the less happy they were with their lives (Kaiser, 2010).
  _____
- The less sexual content teens saw on TV, the less likely they were to have sex (Collins et al., 2004). _____
- The longer children were breast-fed, the greater their later academic achievement (Horwood & Ferguson, 1998).
  _____
- The more income rose among a sample of poor families, the fewer psychiatric symptoms their children experienced (Costello et al., 2003). _____

Correlations – A Mini-Test

Indicate whether each association is a positive correlation or a negative correlation.

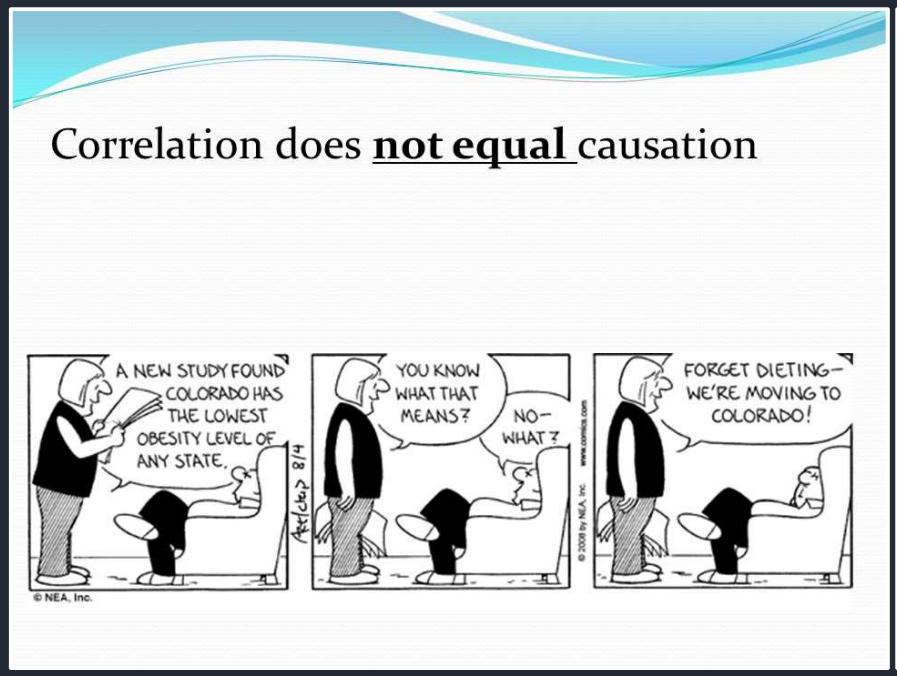
- The more children and youth used various media, the less happy they were with their lives (Kaiser, 2010). **NEGATIVE**
- The less sexual content teens saw on TV, the less likely they were to have sex (Collins et al., 2004). **POSITIVE**
- The longer children were breast-fed, the greater their later academic achievement (Horwood & Ferguson, 1998). **POSITIVE**
- The more income rose among a sample of poor families, the fewer psychiatric symptoms their children experienced (Costello et al., 2003). **NEGATIVE**

Research Strategies: Regression Toward the Mean

- **Illusory correlation**
  - Refers to the perception of a relationship between two variables when only a minor or no relationship actually exists
  - May be fed by regression toward the mean
- **Regression toward the mean**
  - Refers to the tendency for extreme or unusual scores or events to fall back (regress) toward the average

Correlation and Causation

- No matter how strong the relationship, correlation does not prove causation.
- Correlation indicates the possibility of a cause-effect relationship, but does not prove it.



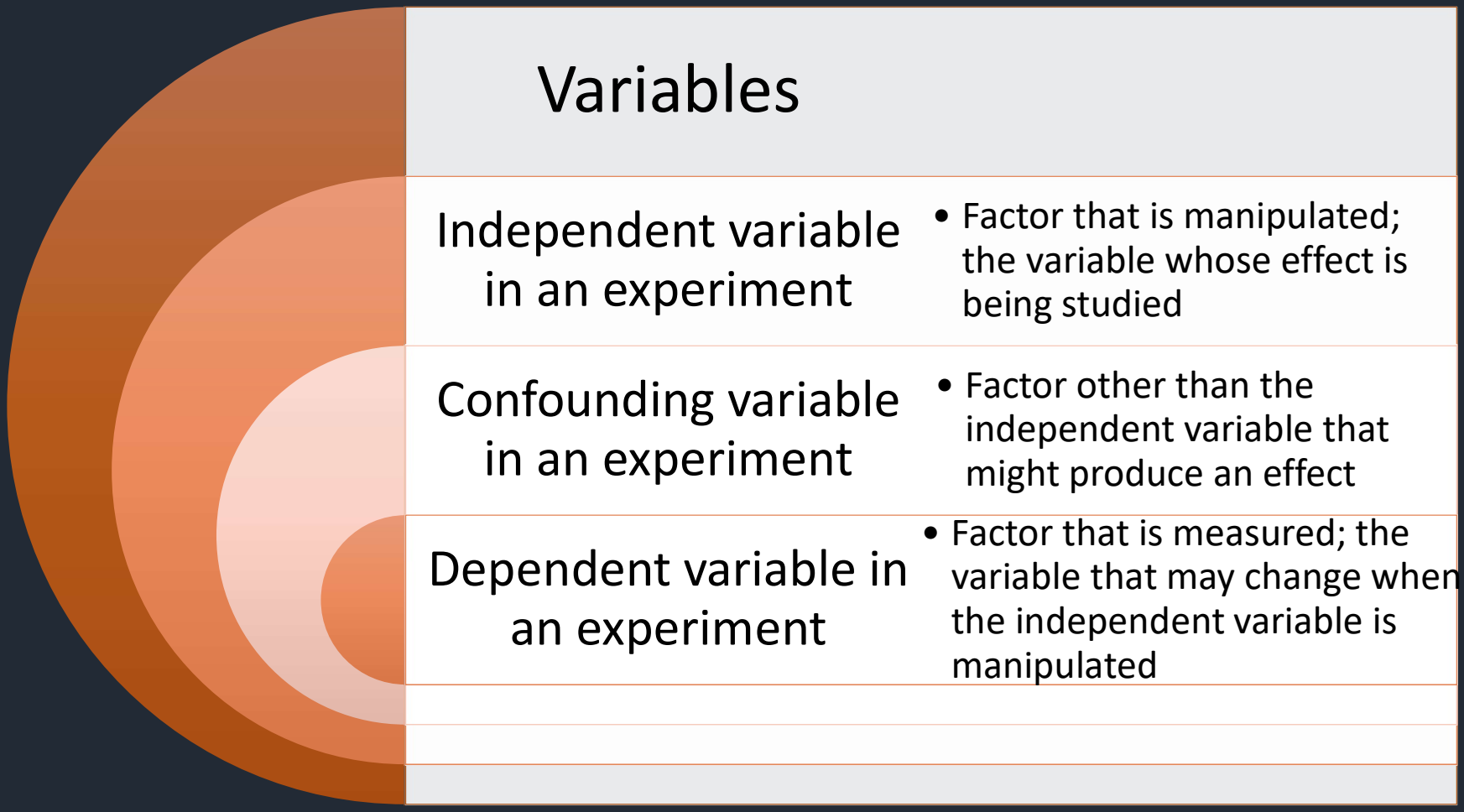
Research Strategies: Experimentation

- **With experiments, researchers can focus on the possible effects of one or more factors in several ways.**
  - Manipulating the factors of interest to determine their effects
  - Holding constant ("controlling") other factors
    - Experimental group and control group

Experimentation

- **Double-blind procedure: Eliminating bias**
  - Neither those in the study nor those collecting the data know which group is receiving the treatment.
  - Treatment's actual effects can be separated from potential placebo effect.
- **Placebo effect**
  - Effect involves results caused by expectations alone.

Experimentation



Comparing Research Methods

Research Method	Basic Purpose	How Conducted	What Is Manipulated	Weaknesses
Descriptive	To observe and record behavior	Do case studies, naturalistic observations, or surveys	Nothing	No control of variables; single cases may be misleading
Correlational	To detect naturally occurring relationships; to assess how well one variable predicts another	Collect data on two or more variables; no manipulation	Nothing	Cannot specify cause and effect
Experimental	To explore cause and effect	Manipulate one or more factors; use random assignment	The independent variable(s)	Sometimes not feasible; results may not generalize to other contexts; not ethical to manipulate certain variables

Research Strategies: Predicting Real Behavior

- **Experiment purpose**
  - Test theoretical principles, not recreation of exact everyday life behaviors
- **Resulting principles**
  - Help explain everyday behavior, not specific findings
- **Psychological science**
  - Focuses on seeking general principles that help explain many behaviors and less on particular behavior

Research Strategies: Predicting Real Behavior

- **Can laboratory experiments illuminate everyday life?**
  - Controlled, artificial environments are created in laboratory experiments to test general theoretical principles.
  - These general principles help explain everyday behaviors.

Protecting Research Participants: Studying and Protecting Animals

- **Is it right to place the well-being of humans above that of other animals**?
  - Response varies by culture
    - Canada and U.S.: About 60% deemed medical testing on animals as “morally acceptable”
    - Britain: only 37% agreed

Psychology's Research Ethics Protecting Research Participants

- **What safeguard should protect animals in research?**
  - Response varies by culture
    - 98% support government regulation protecting primates, dogs, and cats
    - 74% support protection for rats and mice.

Protecting Research Participants: Studying and Protecting Animals

- **Professional associations and funding agency guidelines**
  - **Universities**: IRB ethics committees; laboratory regulation and inspection
  - **British Psychological Society (BPS)**: Guidelines for reasonably natural living conditions and companions for social animals
  - **American Psychological Association (APA)**: Guidelines for humane treatment and minimization of infection, illness, and pain
  - **European Parliament**: Standards for animal care and housing

Protecting Research Participants: Studying and Protecting Humans

- **Ethics codes of APA, Britain's BPS, and university ethics committee**
  - Obtain potential participants' informed consent before the experiment
  - Protect them from harm and discomfort
  - Keep information about individual participants confidential
  - Fully debrief people (explain the research afterward)

Research Strategies: Psychology's Research Ethics

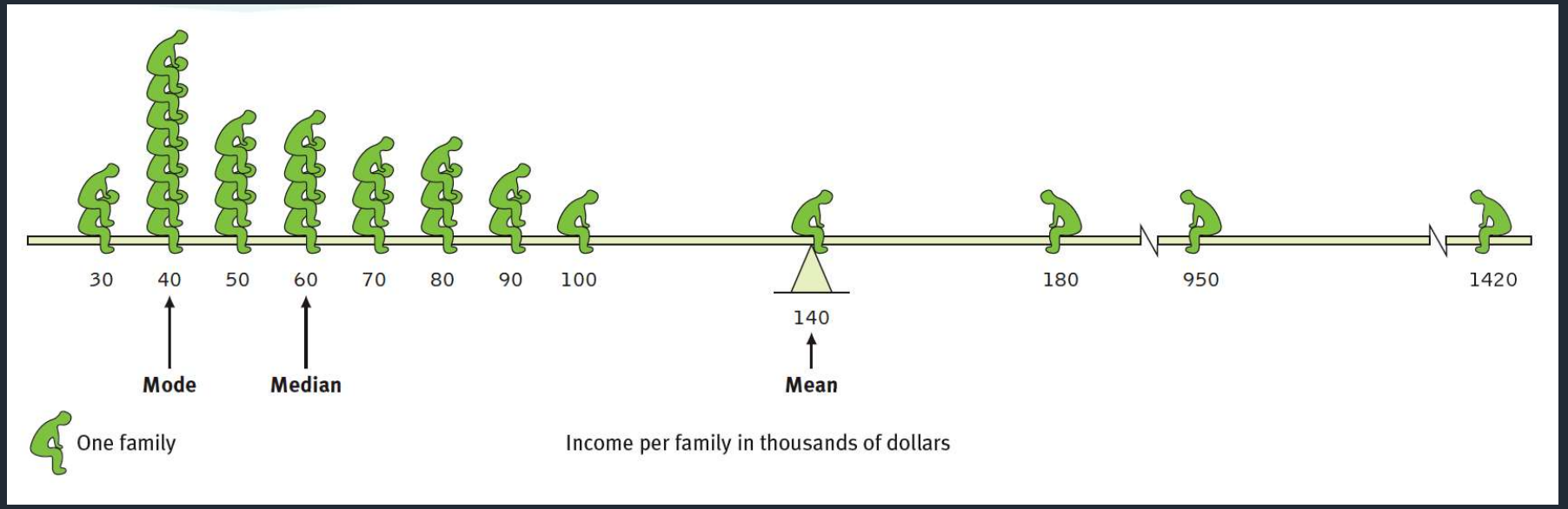
- **Values in research**
  - Affect what is studied, how it is studied, and how results are interpreted
  - Can color "facts"
  - Can be influenced by popular application of psychology

Statistical Reasoning in Everyday Life: Describing Data

- **Accurate statistical understanding is important.**
  - Casual estimates often misread reality and misinform
  - Big, round, undocumented numbers warrant caution
  - Teaching statistical reasoning is needed
  - Presentation of statistical information needs more transparency

Statistical Reasoning in Everyday Life: Describing Data

- **Measures of central tendency include a single score that represents a set of scores.**
  - **Mode**: Most frequently occurring score(s) in a distribution
  - **Mean**: Arithmetic average of a distribution, obtained by adding the scores and then dividing by the number of scores; can be distorted by few atypical scores
  - **Median**: Middle score in a distribution; half the scores are above it and half are below it.

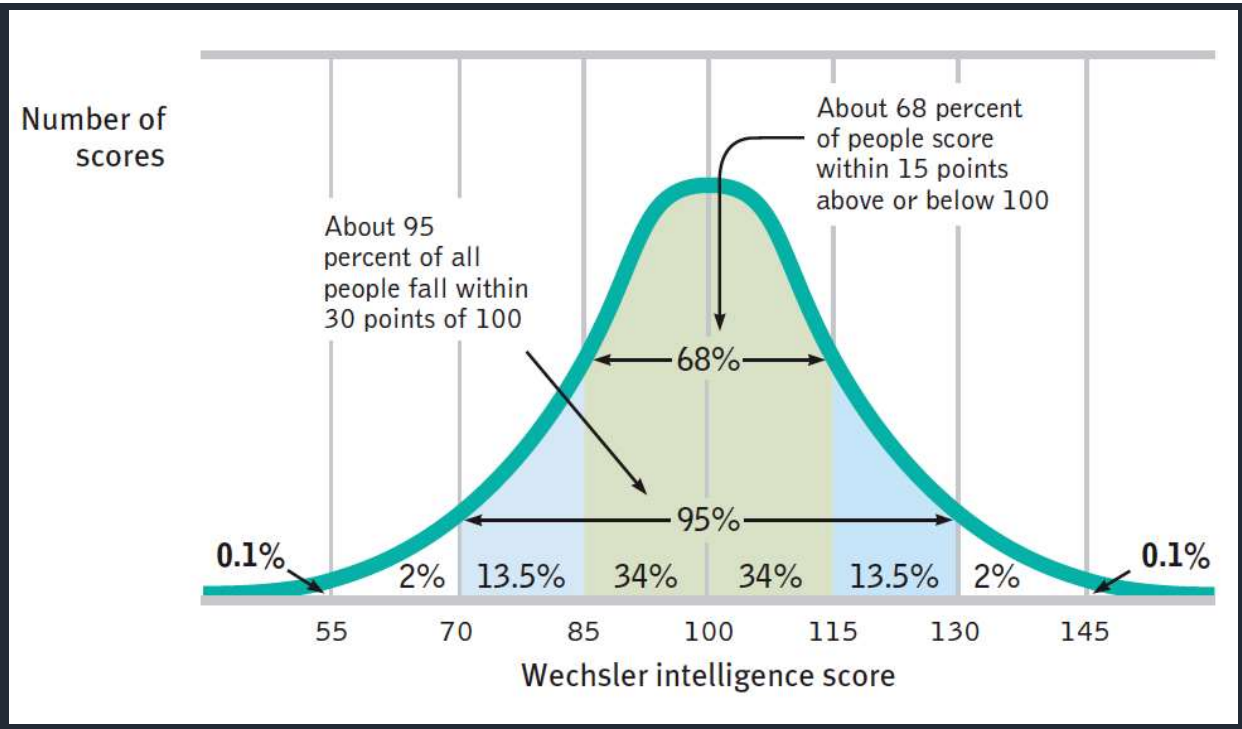


A SKEWED DISTRIBUTION

This graphic representation of the distribution of a village's income illustrates the three measures of central tendency—mode, median, and mean. Note how just a few high incomes make the mean—the fulcrum point that balances the incomes above and below—deceptively high.

Statistical Reasoning in Everyday Life: Describing Data

- **Measures of variation reveal similarity or diversity in scores.**
  - **Range**: Difference between the highest and lowest scores in a distribution
  - **Standard deviation**: Computed measure of how much scores vary around the mean score.
  - **Normal curve (normal distribution):** Symmetrical, bell-shaped curve that describes the distribution of many types of data; most scores fall near the mean (about 68 percent fall within one standard deviation of it) and fewer and fewer near the extremes



THE NORMAL CURVE

Scores on aptitude tests tend to form a normal, or bell shaped, curve. For example, the most commonly used intelligence test, the Wechsler Adult Intelligence Scale, calls the average score 100.

Statistical Reasoning in Everyday Life: Significant Differences

- **When is an observed difference reliable?**
  - Representative samples are better than biased samples.
  - Less-variable observations are more reliable than those that are more variable.
  - More cases are better than fewer.
- *Generalizations based on a few unrepresentative cases are unreliable*.

Statistical Reasoning in Everyday Life: Significant Differences

- **When is an observed difference significant?**
  - When sample averages are reliable and difference between them is relatively large, the difference has **statistical significance**.
  - Observed difference is probably not due to chance variation between the samples.
  - In psychological research, proof beyond a reasonable doubt means that the odds of its occurrence by chance are less than 5 percent.

EXIT QUESTIONS

- The average of a distribution of scores is the _____.
- The score that shows up most often is the _____.
- The score right in the middle of a distribution (half the scores above it; half below) is the _____.
- We determine how much scores vary around the average in a way that includes information about the _____ of scores (difference between highest and lowest) by using the _____ formula.

- The average of a distribution of scores is the MEAN.
- The score that shows up most often is the MODE.
- The score right in the middle of a distribution (half the scores above it; half below) is the MEDIAN.
- We determine how much scores vary around the average in a way that includes information about the RANGE of scores (difference between highest and lowest) by using the STANDARD DEVIATION formula.

When we have the tendency to believe , after learning an outcome, that one would have foreseen it, it is called:

A. intuition.
B. hindsight bias.
C. overconfidence.
D. perceiving order in random events.

Answer: B

Which of the following is NOT one of the three main components related to critical thinking?

A. Humility
B. Intuition
C. Skepticism
D. Curiosity

Answer: B

A testable prediction is called (a/an):

A. operational definition.
B. theory.
C. replication.
D. hypothesis.

Answer: D

Which of the following does NOT explain the utility of a theory?

A. It organizes a range of self-reports and observations.
B. It explains causation.
C. It implies predictions to derive practical applications.
D. It stimulates further research that may lead to a revised theory.

Answer: B

Which method involves manipulating factors to discover their effects?

A. Replication
B. Descriptive
C. Experimental
D. Correlational

Answer: C

Random sampling:

A. represents a given population.
B. allows each person an equal chance of participating.
C. allows greater generalizability.
D. all of the above.

Answer: D

In a double-blind procedure, who is unaware of the experimental group assignment?

A. The experimenter
B. The participants
C. Neither the experimenter nor the participants are aware
D. Both the experimenter and participants are aware

Answer: C

In a double-blind procedure, who is unaware of the experimental group assignment? ANSWER

C. Neither the experimenter nor the participants are aware

Which of the following is the most frequently occurring score/s in a distribution?

A. Mode
B. Mean
C. Skew
D. Median

Answer: A

Which of the following is a computed measure of how much scores vary around the mean?

A. Range
B. Skew
C. Normal curve
D. Standard deviation

Answer: D

Which of the following is NOT a consideration in generalizing from a sample?

A. Random sampling is unnecessary if the sample is large.
B. Representative samples are better than biased samples.
C. Less-variable observations are more reliable that more variable.
D. More cases are better than fewer.

Answer: A

Critical Thinking Questions

Mary watches several different species of birds to discover how they feed their young in their habitat, without being intrusive. This would be an example of what type of study?

A. Case study
B. Naturalistic observation
C. Survey
D. Experiment

Answer: B

Which of the following would be considered a strong, negative correlation?

A. -.23
B. .90
C. .01
D. -.85

Answer: D

In an experiment that looks at the effects of sugar consumption on hyperactivity in children, the independent variable would be:

A. hyperactivity.
B. cookies.
C. the age of the experimenter.
D. sugar.

Answer: D

In an experiment that looks at the effects of caffeine on alertness in class, one group of students gets caffeinated coffee, another group of students gets water, and a final group of students gets decaffeinated coffee (but thinks it's caffeinated). This last (decaf) group would be the:

A. control group.
B. placebo group.
C. experimental group.
D. confound.

Answer: B

Shandra is designing her research study. As part of her methodology, she is being sure to include informed consent, keeping all records confidential, and plans to debrief participants at the conclusion of the study. What piece of ethics is Shandra missing?

A. Controlling all confounds.
B. Informing participants of her hypothesis.
C. Protecting participants from harm.
D. Informing participants if they are in the control or experimental group.

Answer: C