

Impression of Psychology

With hopes of satisfying curiosity, many people listen to talk-radio counselors and psychics to learn about others and themselves.



Dr. Crane (radio-shrink)



Psychic (Ball gazing)

Unit 2:

Research Methods: Thinking Critically with Psychological Science



Unit Overview

- [The Need for Psychological Science](#)
- [How Do Psychologists Ask and Answer Questions?](#)
- [Statistical Reasoning in Everyday Life](#)
- [Frequently Asked Questions about Psychology](#)



Click on the any of the above hyperlinks to go to that section in the presentation.

The Need for Psychological Science

Intuition & Common Sense

Many people believe that intuition and common sense are enough to bring forth answers regarding human nature.

Intuition and common sense may aid queries, but they are not free of error.

Limits of Intuition

Personal interviewers may rely too much on their “gut feelings” when meeting with job applicants.



Did We Know It All Along?

Hindsight Bias

- Hindsight Bias
 - “I knew it all along”
 - “Out of sight, out of mind”
 - “Absence makes the heart grow fonder”

TRUE OR FALSE?

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8. Lie detection tests often lie (see Unit 8B).

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10. The brain remains active during sleep (see Unit 5).

TRUE OR FALSE? Answers: 1. F, 2. T, 3. F, 4. T, 5. F, 6. T, 7. F, 8. T, 9. F, 10. T

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Overconfidence

- Overconfidence
 - Together with hindsight bias, can lead to overestimate our intuition

Overconfidence

Sometimes we think we know more than we actually know.

Overconfidence

Anagram

WREAT

ETYRN

GRABE

How long do you think it would take to unscramble these anagrams?

Overconfidence

Anagram	
WREAT	WATER
ETYRN	ENTRY
GRABE	BARGE

People said it would take about 10 seconds, yet on average they took about 3 minutes (Goranson, 1978).

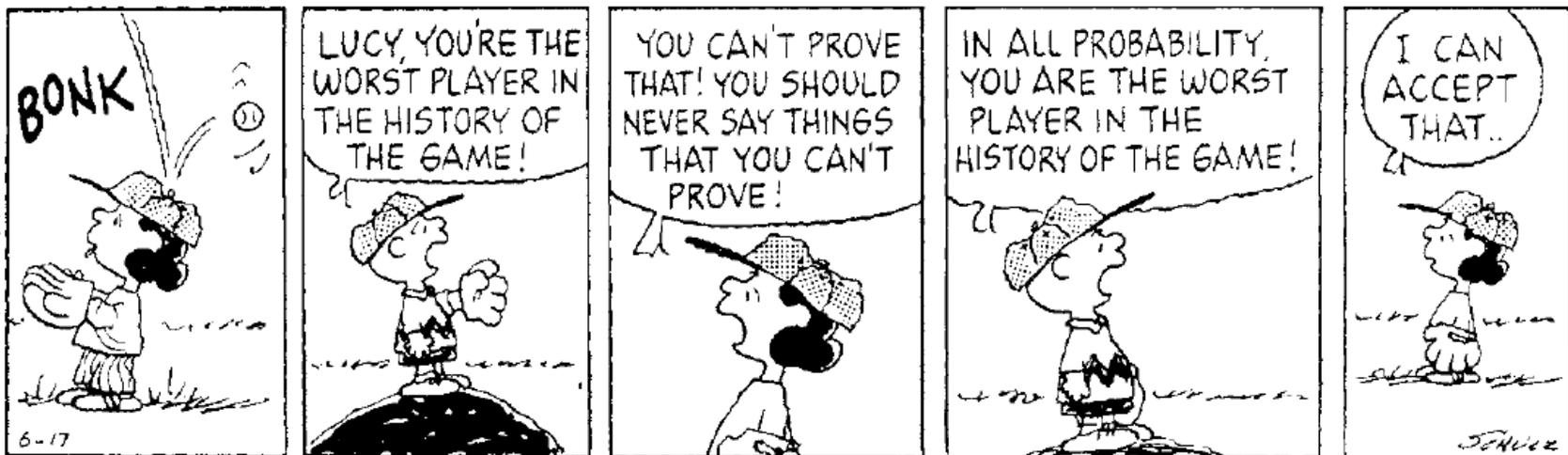
Psychological Science

1. How can we differentiate between uninformed opinions and examined conclusions?
2. The science of psychology helps make these examined conclusions, which leads to our understanding of how people **feel, think, and act as they do!**

The Scientific Attitude

- Three main components
 - Curious eagerness
 - Skeptically scrutinize competing ideas
 - Open-minded humility before nature

Peanuts



Critical Thinking

- Critical Thinking
 - “Smart thinking”
 - Four elements
 - Examines assumptions
 - Discerns hidden values
 - Evaluates evidence
 - Assesses conclusions

Goals of Psychology

- Describe
- Explain
- Predict
- Control

behavior and mental
processes



How Do Psychologists Ask and Answer Questions?



The Scientific Method

- Theory
 - “mere hunch”
- Hypothesis
 - Can be confirmed or refuted
- Operational Definition
- Replication (repeat)

The Need for Psychological Science

■ Theory

- an explanation using an integrated set of principles that organizes and predicts observations
- For example: **low self-esteem contributes to depression.**

■ Hypothesis

- a testable prediction
- often implied by a theory
- **People with low self-esteem are apt to feel more depressed.**

Research Observations

Research would require us to administer tests of self-esteem and depression. Individuals who score low on a self-esteem test and high on a depression test would confirm our hypothesis.



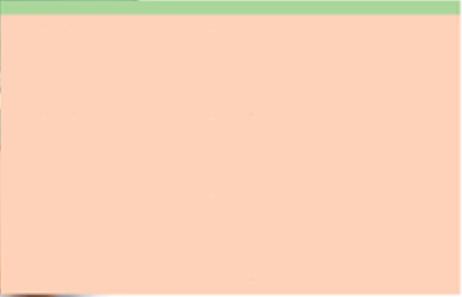
confirm, reject,
or revise



lead to



lead to

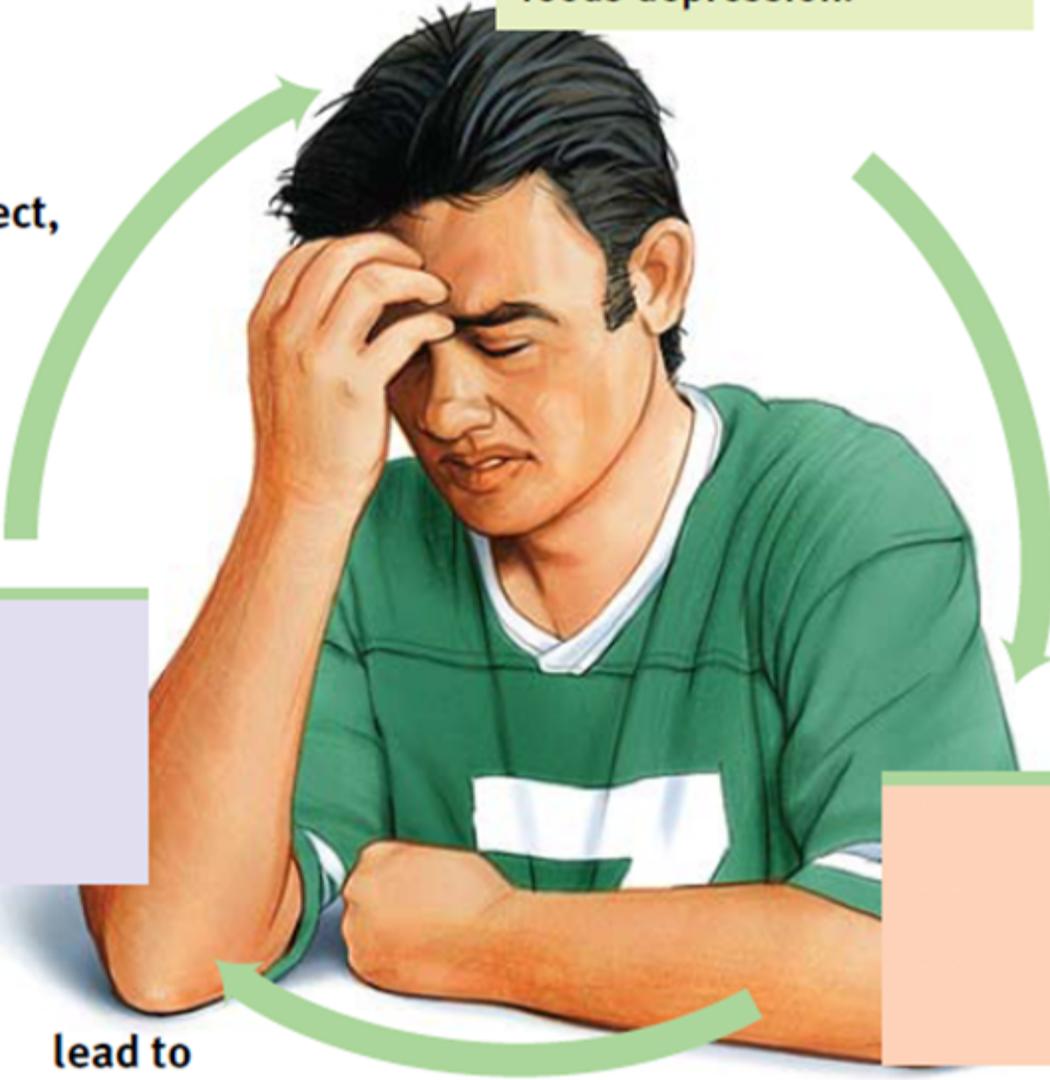
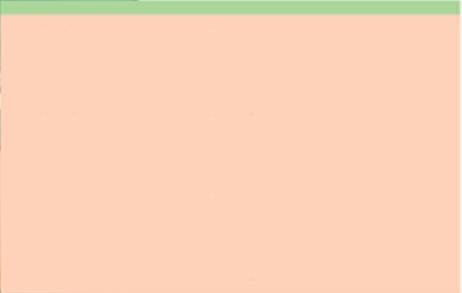


(1) Theories
Example: Low self-esteem feeds depression.

confirm, reject,
or revise

lead to

lead to



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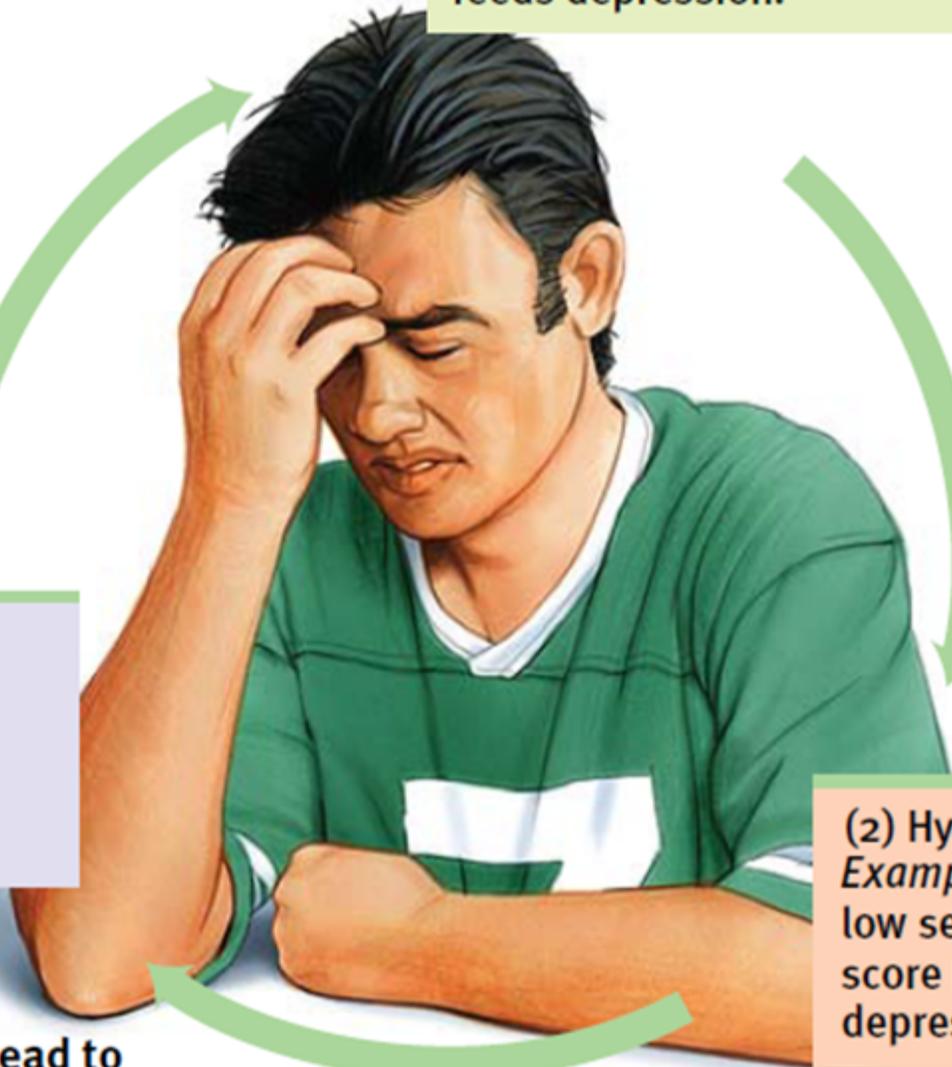
confirm, reject,
or revise

lead to



lead to

(2) Hypotheses
Example: People with low self-esteem will score higher on a depression scale.



(1) Theories
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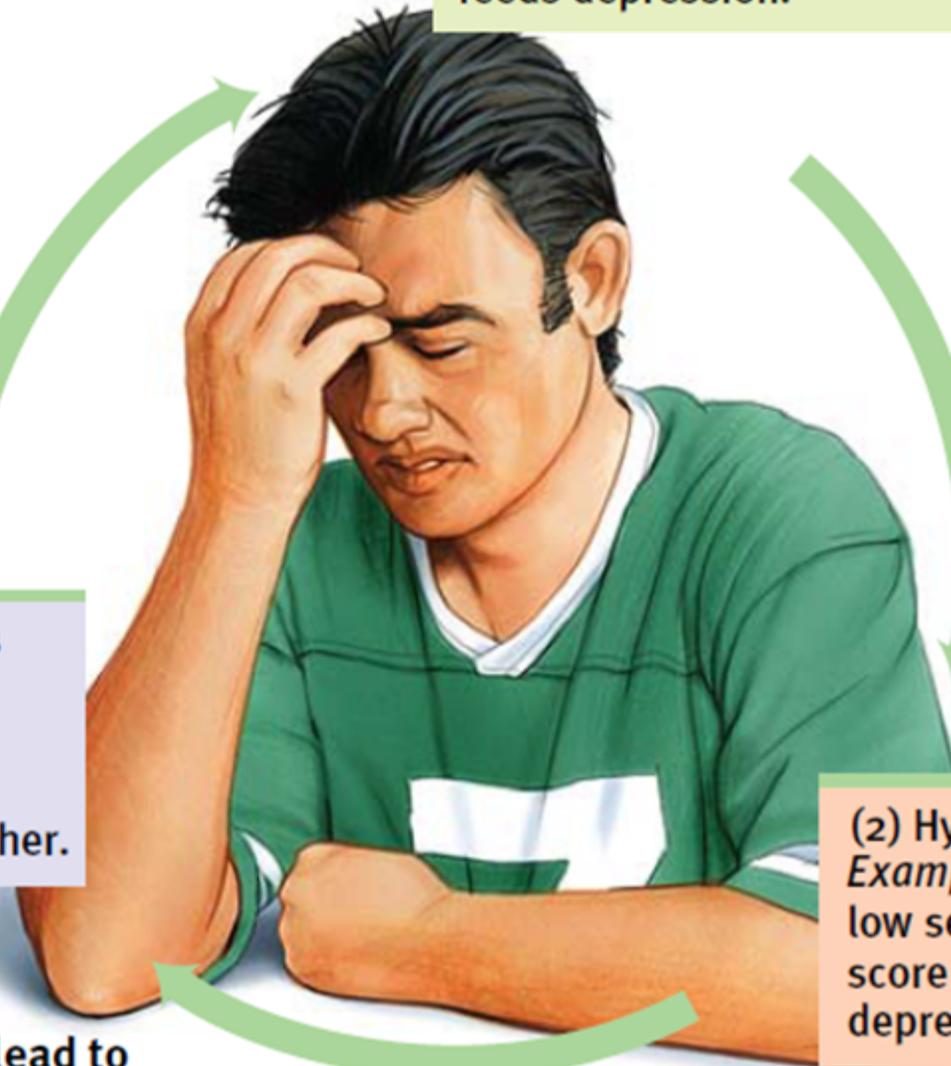
confirm, reject,
or revise

lead to

(3) Research and observations
Example: Administer tests of self-esteem and depression. See if a low score on one predicts a high score on the other.

(2) Hypotheses
Example: People with low self-esteem will score higher on a depression scale.

lead to



The Need for Psychological Science

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

The Scientific Method

- A good theory is useful if it:
 - Effectively organizes a range of self-reports and observations
 - Implies clear predictions that anyone can use to check the theory

Thinking Critically ...

Description

- The Case Study
- The Survey
- Naturalistic Observation

Description

Case Study

- Psychologists study one or more individuals in great depth in the hope of revealing things true of us all



Is language uniquely human?

Case Study

Clinical Study

A clinical study is a form of case study in which the therapist investigates the problems associated with a client.



<http://behavioralhealth.typepad.com>

Description

The Case Study

- Case Study
 - Suggest further study
 - Cannot discern general truths

The Case Study Method

Defined as a thorough, exhaustive study of a person. It includes personal, educational, family and work histories.

Advantage:

A wealth of background information about one person

Disadvantages:

Information cannot be generalized to others; also, researcher's biases can influence subject's behavior.

Description The Survey

- Survey
 - Looks at many cases at once
- Word effects
- Random sampling
 - Representative sample

Description

- **Survey**
 - technique for ascertaining the self-reported attitudes or behaviors of people
 - usually by questioning a representative, random sample of people



Survey

Wording Effect

Wording can change the results of a survey.

- Even subtle changes in the order or wording of questions can have major effects.

Q: Should cigarette ads and pornography be **allowed** on television? (“not allowed” vs. “forbidden”)

Description The Survey

- Sampling
 - Population
 - Random Sample



"How would you like me to answer that question? As a member of my ethnic group, educational class, income group, or religious category?"

The Survey Method

Defined as asking questions of a carefully selected group of people and tabulating their answers.

Advantage:

Information can be gathered about feelings, opinions, and behavior patterns.

Disadvantages:

Interpretation difficult; people lie; sample may not be representative.



Samples and Sampling

■ Sample

selected segment of the population

■ Representative sample

closely parallels the population on relevant characteristics

■ Random selection

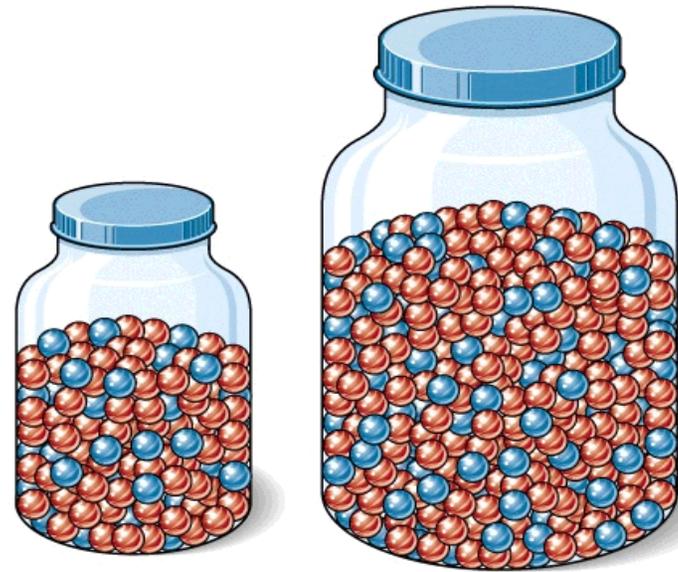
every member of larger group has equal chance of being selected for the study sample

Survey

Random Sampling

If each member of a population has an equal chance of inclusion into a sample, it is called a random sample (unbiased).

If the survey sample is biased, its results are not valid.



The fastest way to know about the marble color ratio is to blindly transfer a few into a smaller jar and count them.

Description

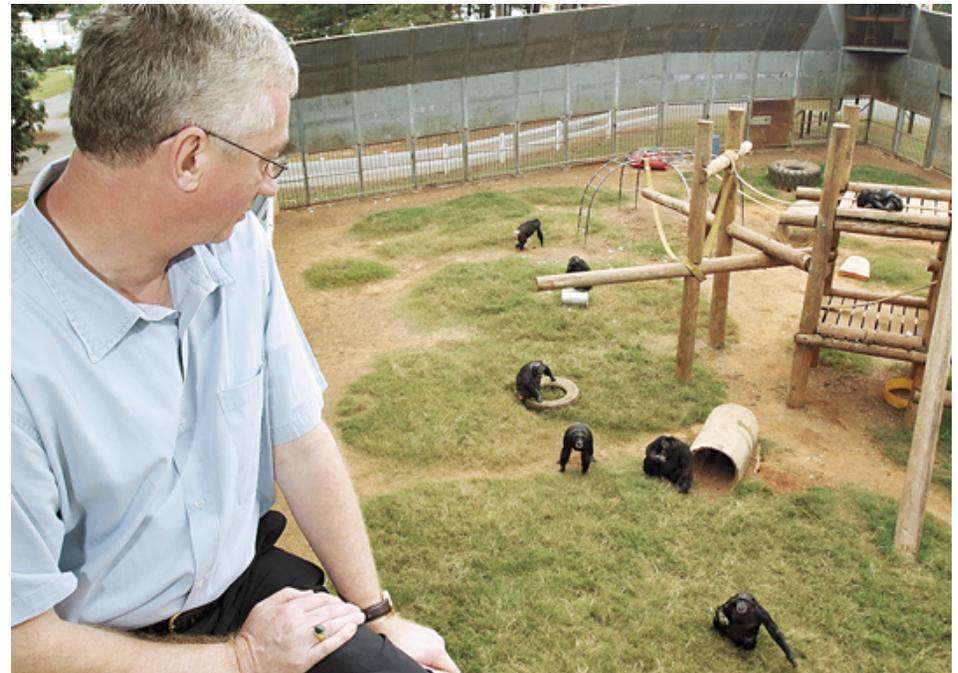


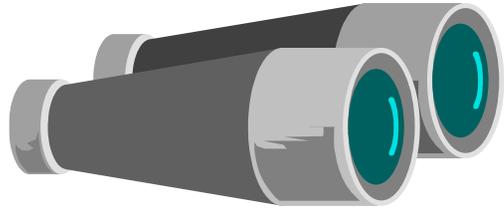
- Naturalistic Observation
 - observing and recording behavior in naturally occurring situations without trying to manipulate and control the situation

Description

Naturalistic Observation

- Naturalistic Observation
 - Describes behavior
 - Does not explain behavior





The Naturalistic Observation Method

Defined as observing behaviors in their natural settings.

Disadvantages:

Researcher cannot interact with the subject.

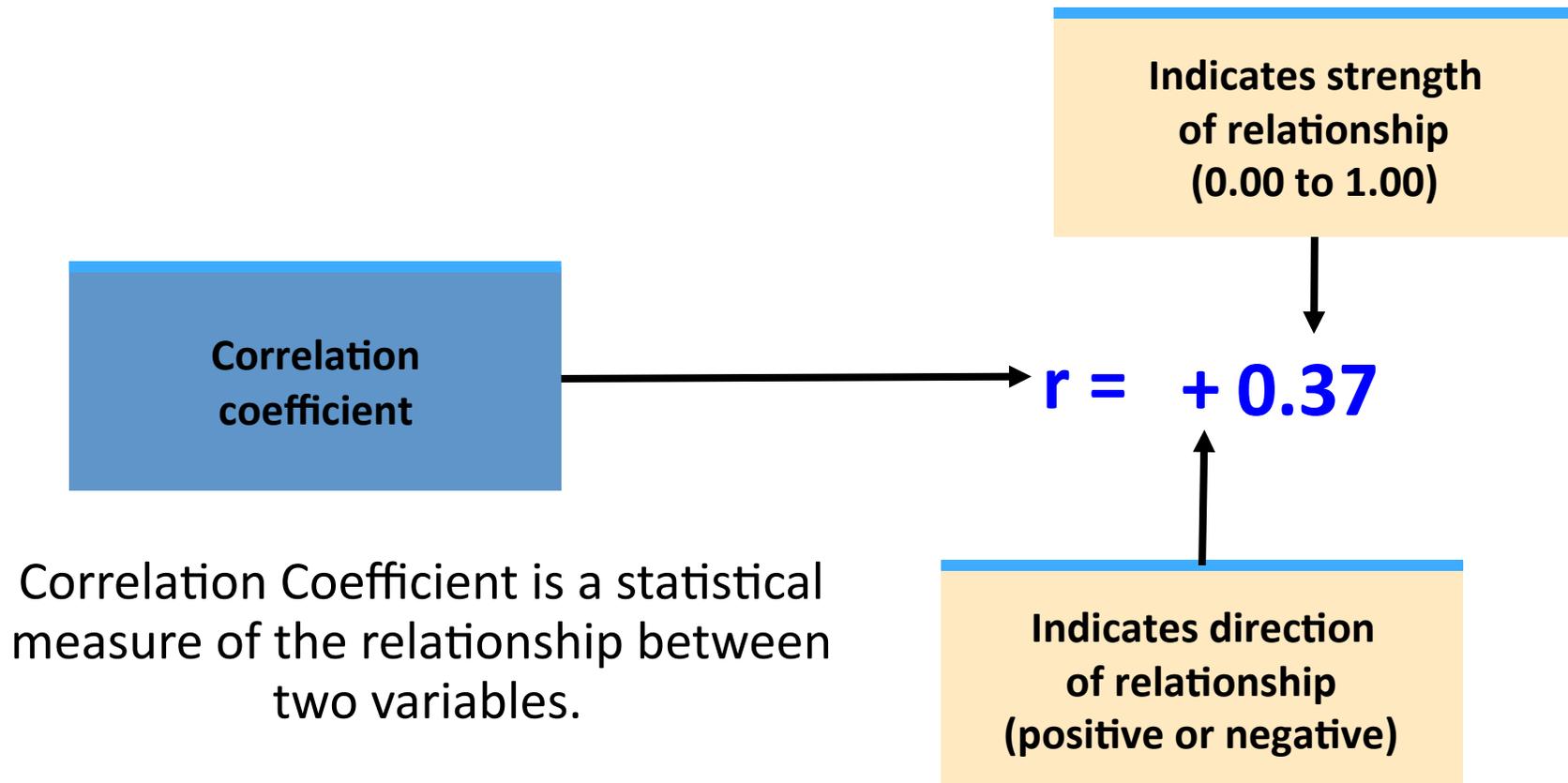
Researcher may interpret subject's responses incorrectly.

Correlation

- Correlation (correlation coefficient)
 - How well A predicts B
 - Positive versus negative correlation
 - Strength of the correlation
 - -1.0 to +1.0
 - Scatterplot

Correlation

When one trait or behavior accompanies another, we say the two correlate.

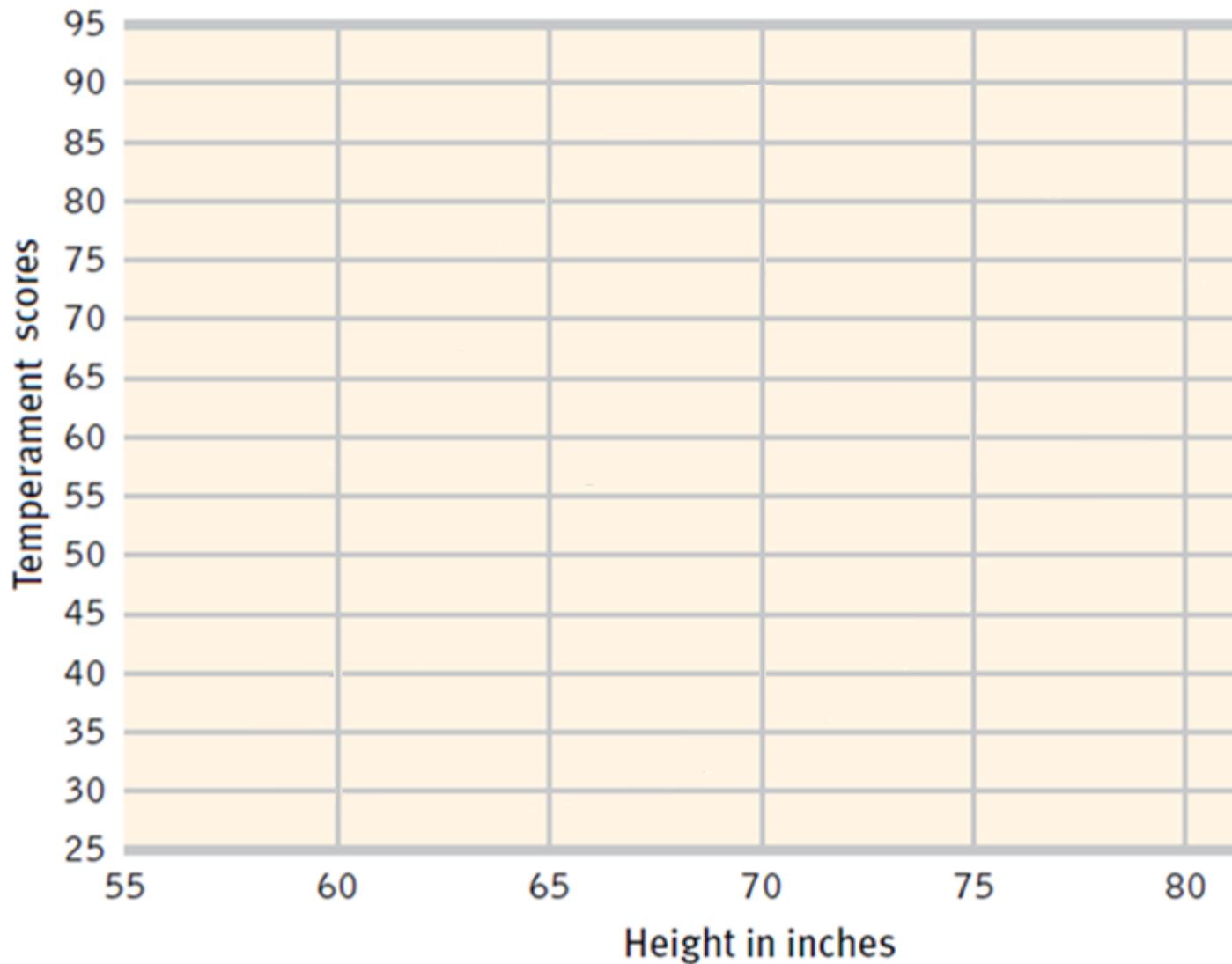


Coefficient of Correlation

Numerical indication of magnitude and direction of the relationship between two variables

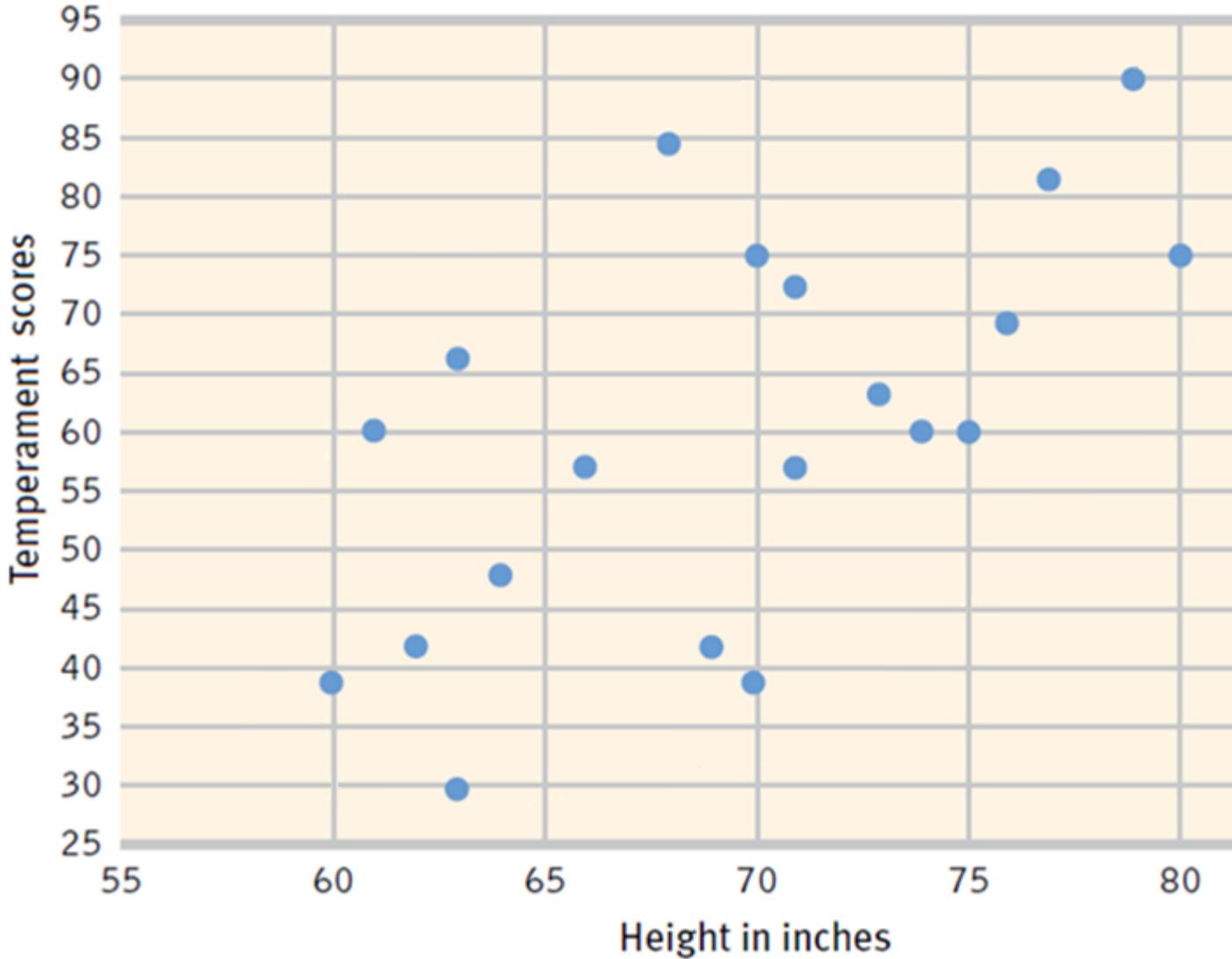
- **Positive correlation**— two variables vary systematically in the SAME direction
- **Negative correlation**— two variables vary systematically in OPPOSITE directions

Correlation



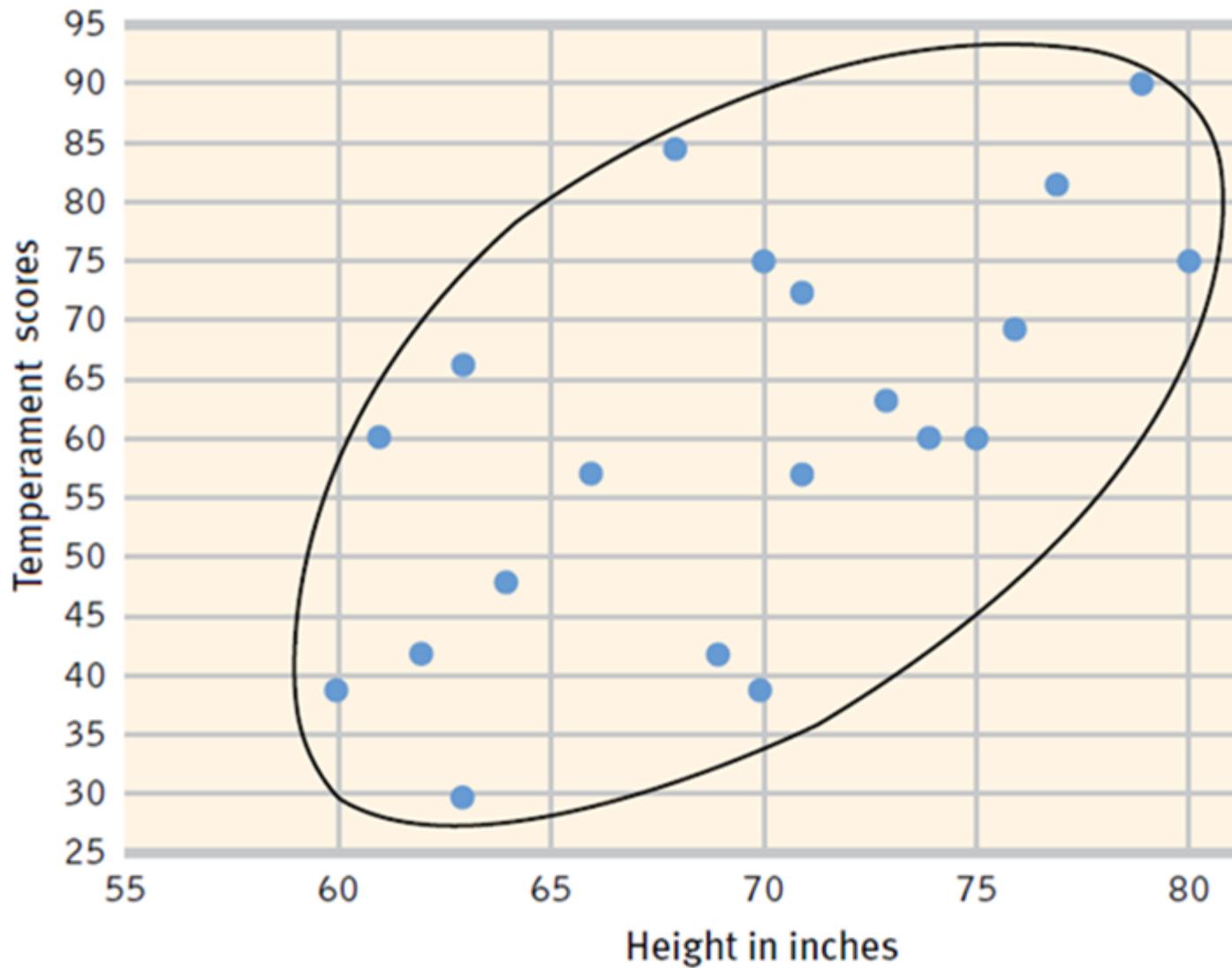
HEIGHT AND TEMPERAMENT OF 20 MEN		
Person	Height in Inches	Temperament
1	80	75
2	63	66
3	61	60
4	79	90
5	74	60
6	69	42
7	62	42
8	75	60
9	77	81
10	60	39
11	64	48
12	76	69
13	71	72
14	66	57
15	73	63
16	70	75
17	63	30
18	71	57
19	68	84
20	70	39

Correlation



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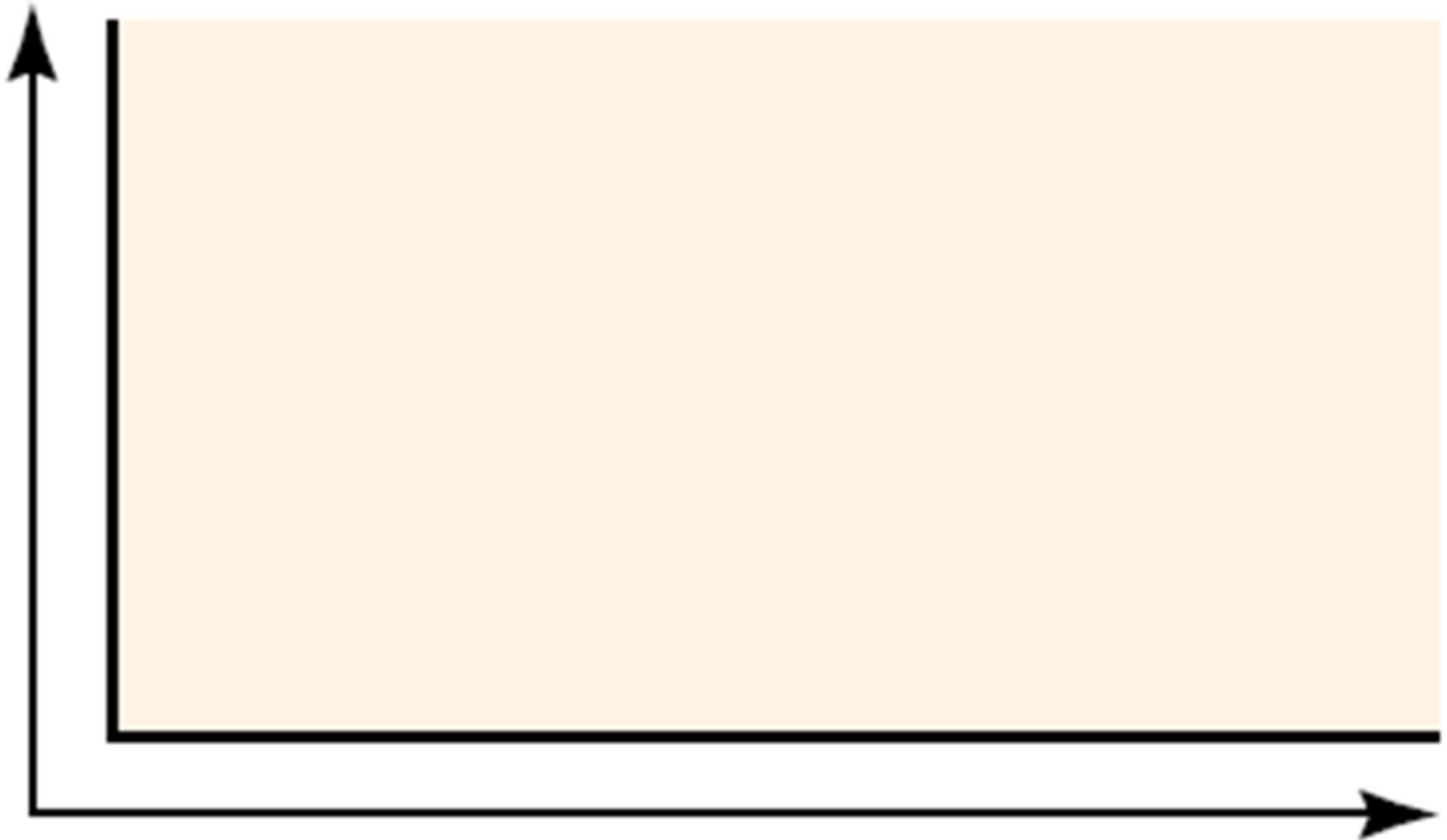
Correlation



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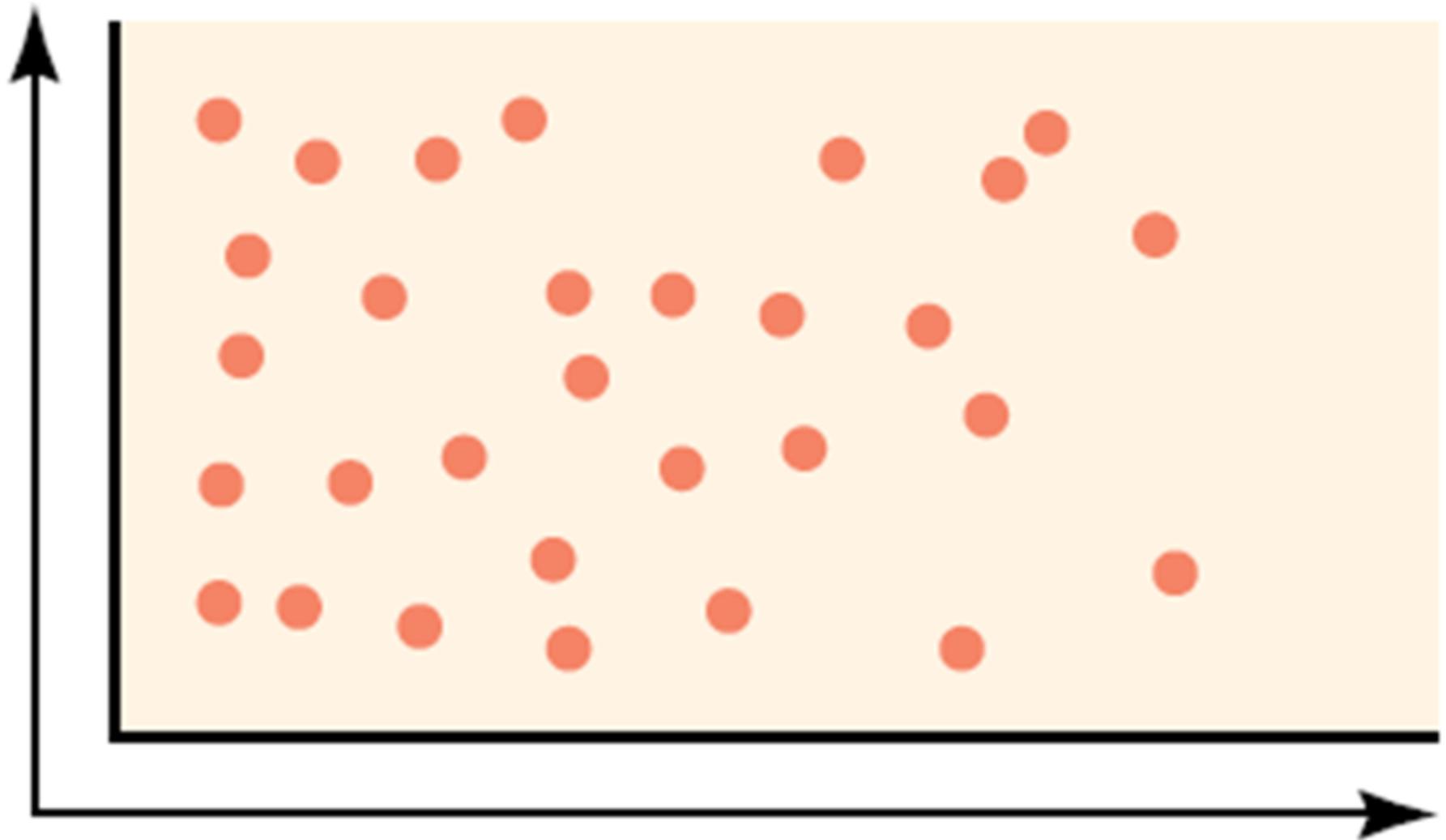
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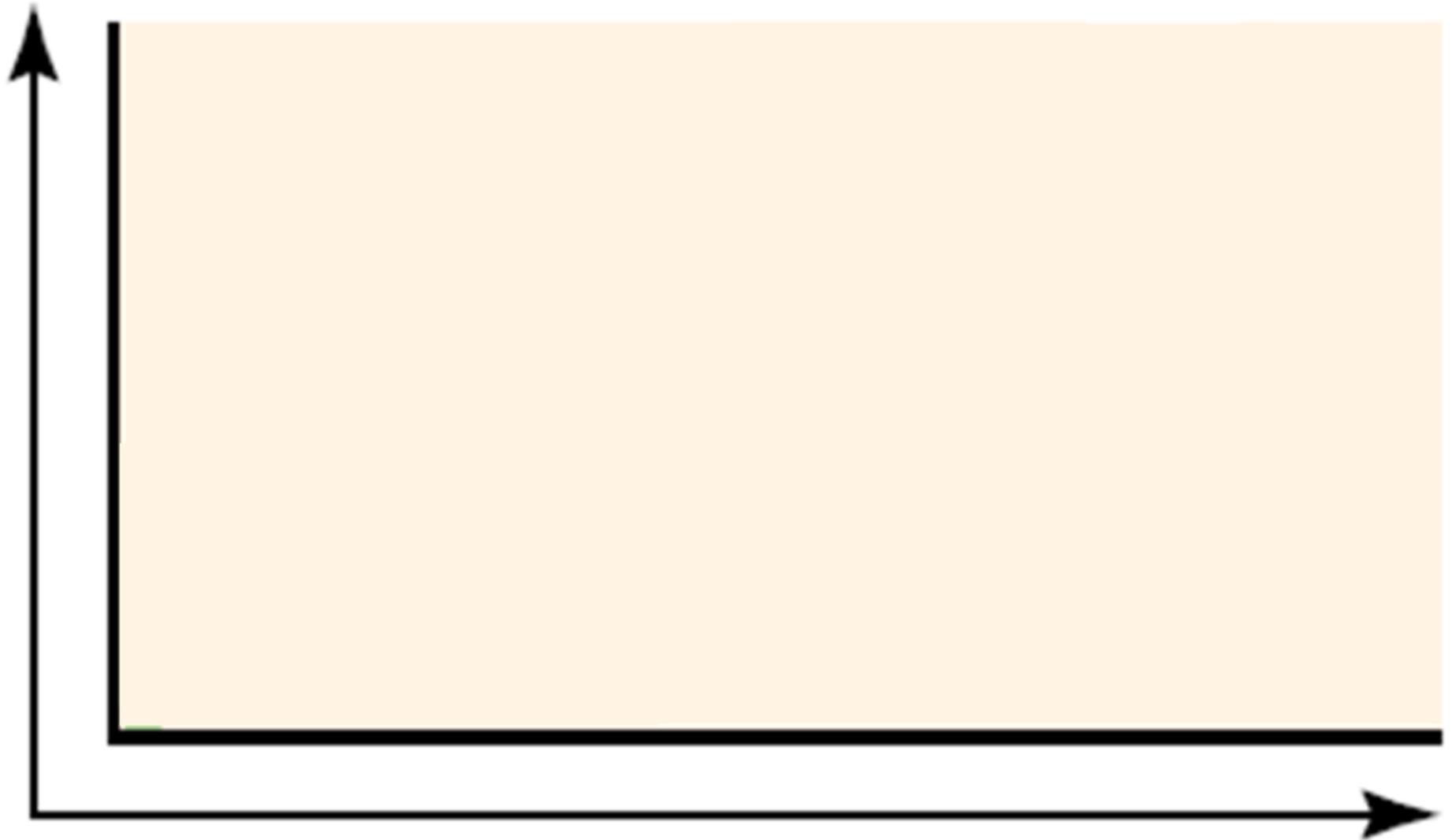
No relationship (0.00)

Correlation



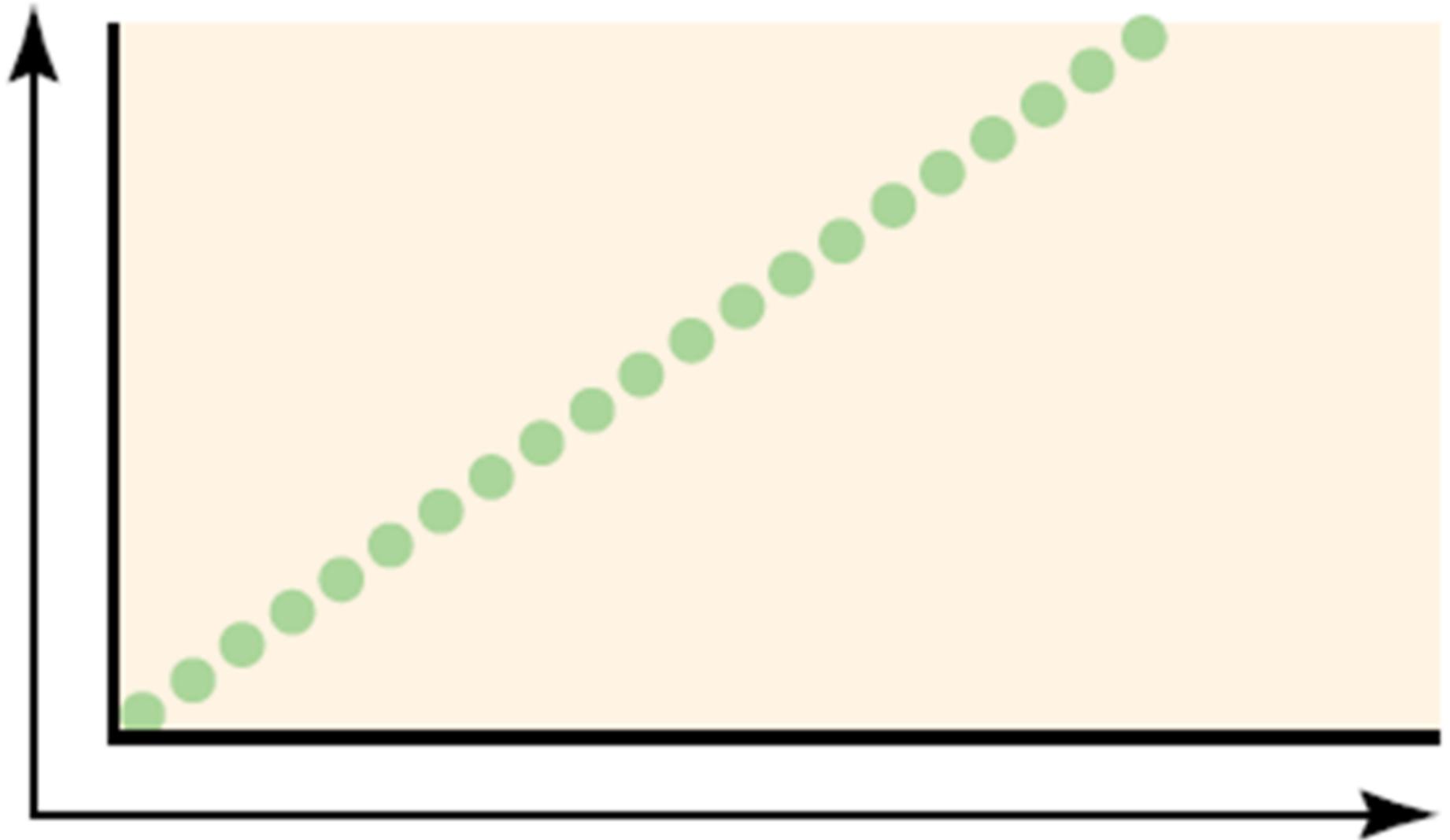
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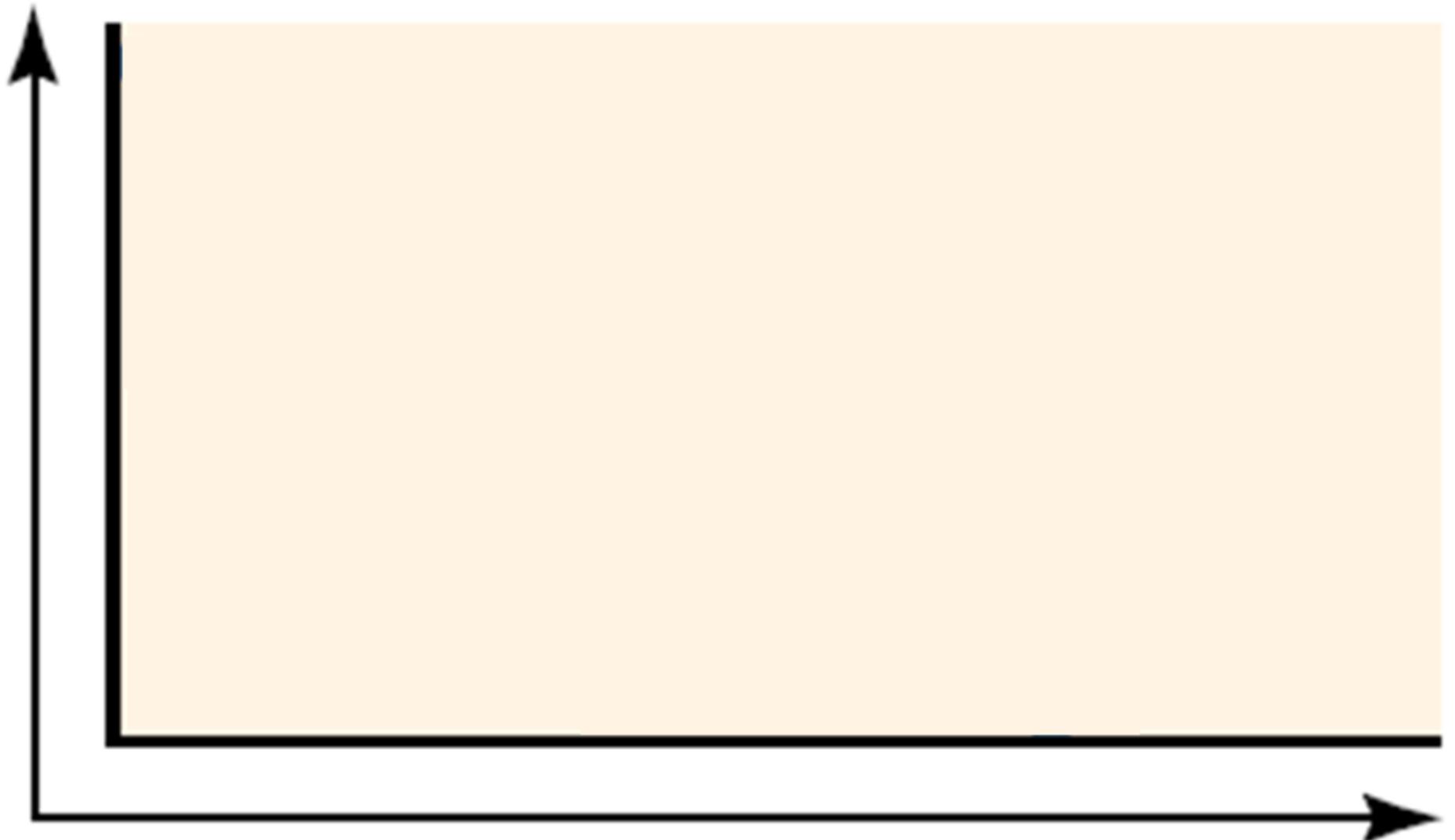
Perfect positive correlation (+1.00)

Correlation



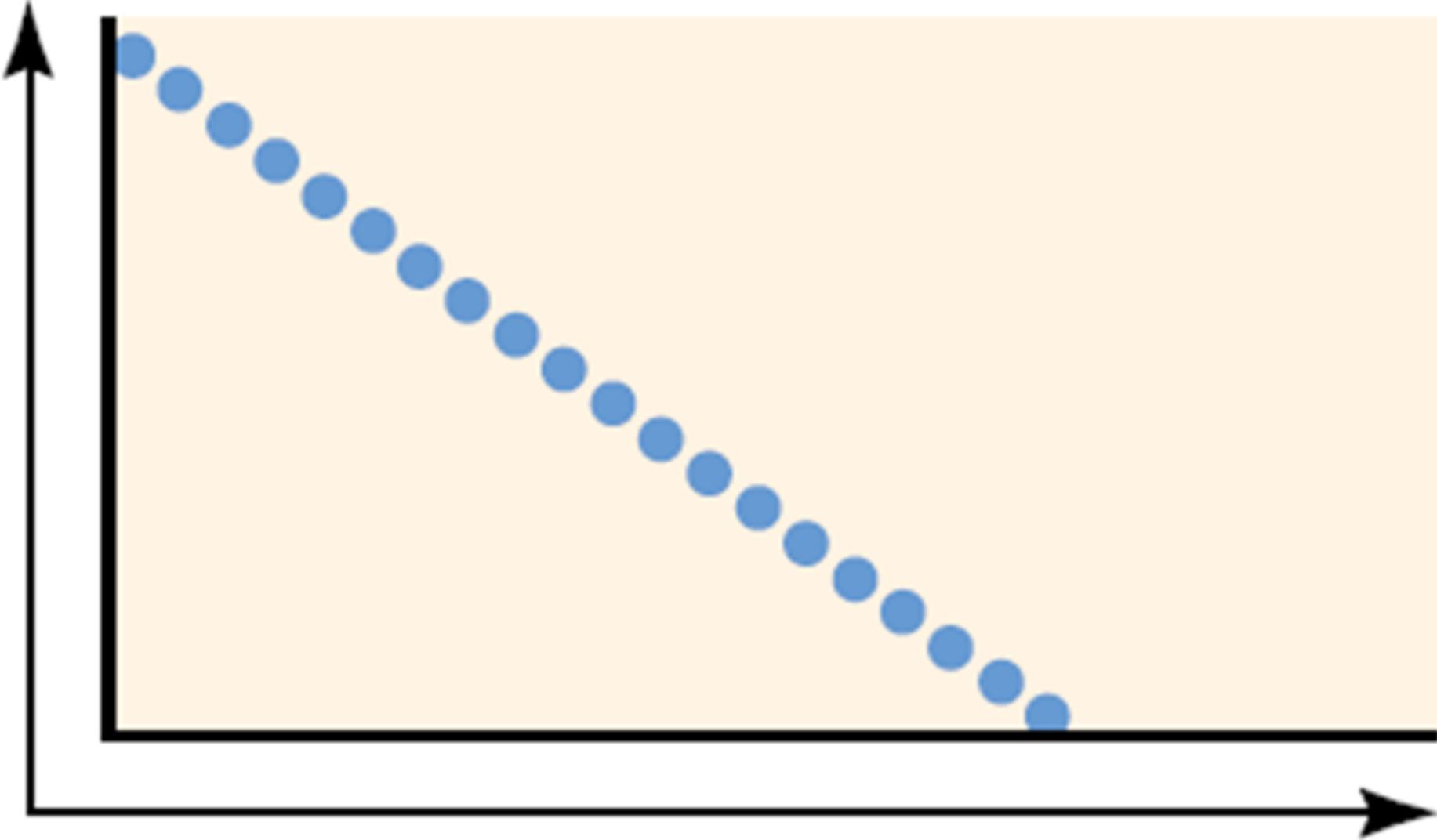
Perfect positive correlation (+1.00)

Correlation



Perfect negative correlation (-1.00)

Correlation



Perfect negative correlation (-1.00)

Correlation

Correlation and Causation

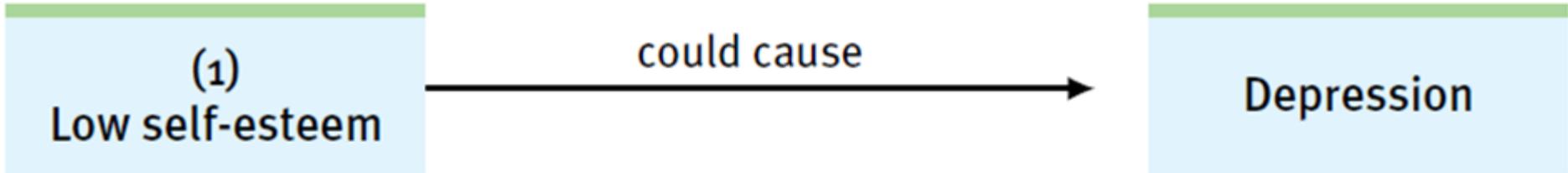
- Correlation helps predict
 - Does not imply cause and effect

Correlation

Regression toward the mean—
falling back to the norm. It can
fuel the illusion that
uncontrollable events
correlate with our actions.

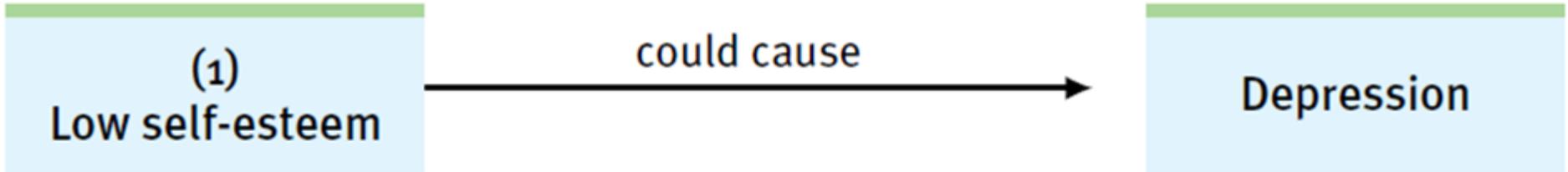
or

or

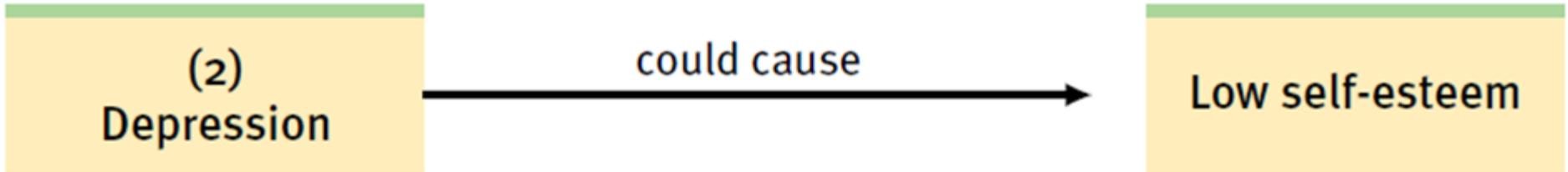


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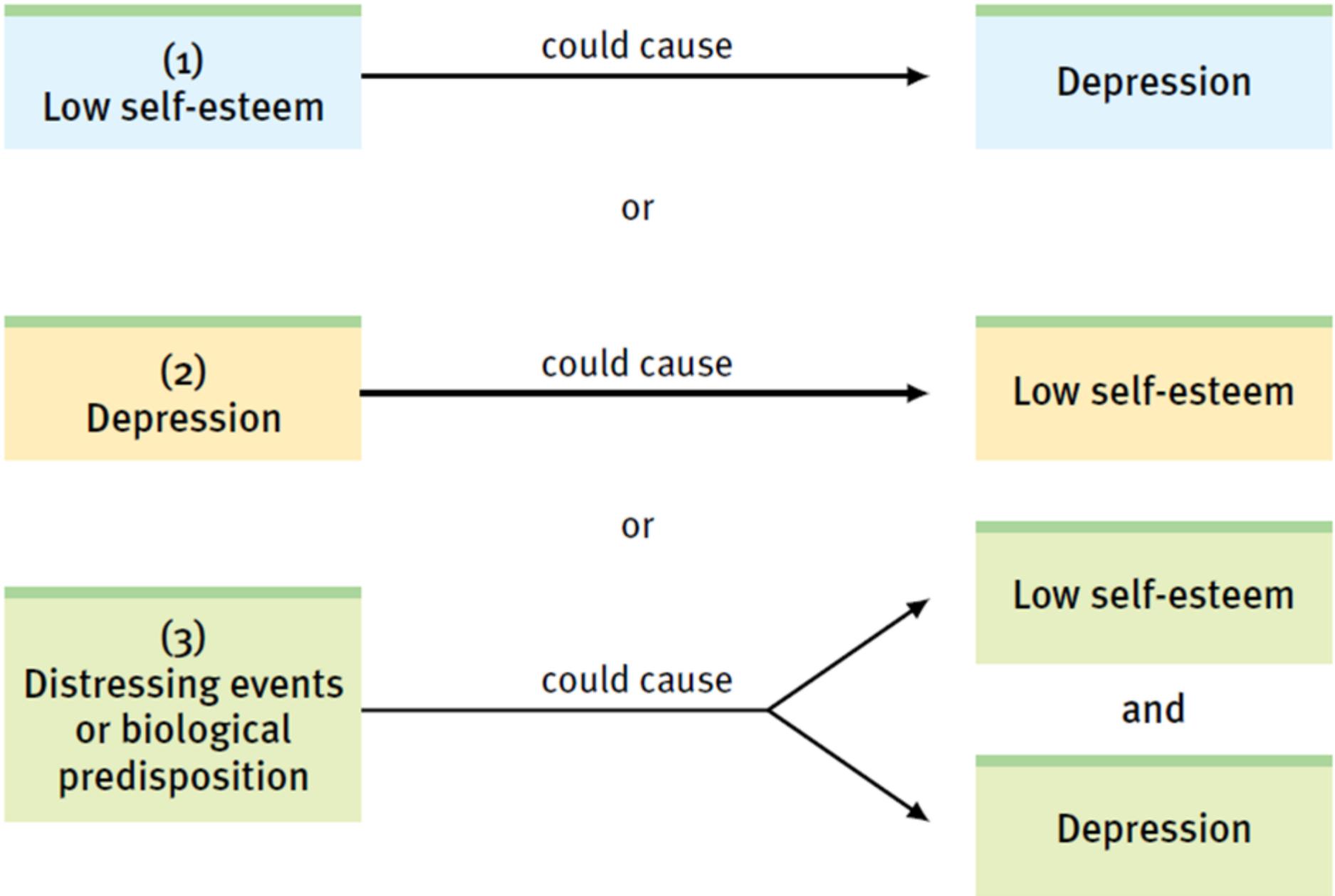
or



or



or



Correlation

- Illusory Correlation

- Perceived non-existent correlation
- A random coincidence

Example: Parents conceive children after adoption:

	Conceive	Do not conceive
Adopt	confirming evidence	disconfirming evidence
Do not adopt	disconfirming evidence	confirming evidence

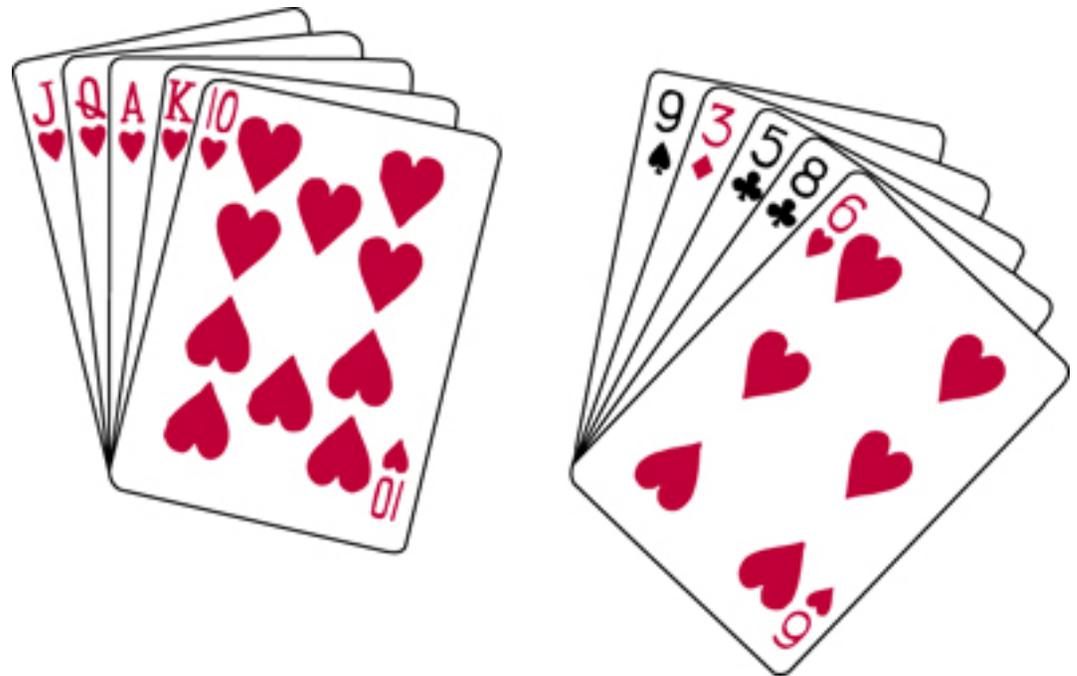
Michael Newman Jr./PhotoEdit



Correlation

Perceiving Order in Random Events

- Comes from our need to make sense out of the world
 - Coin flip
 - Poker hand



Order in Random Events

Given large numbers of random outcomes, a few are likely to express order.



Jerry Telfer / San Francisco Chronicle

Angelo and Maria Gallina won two California lottery games on the same day.

Experimentation

- Experiment
 - Can isolate cause and effect
 - Control of factors
 - Manipulation of the factor(s) of interest
 - Hold constant (“controlling”) factors

Experimentation

Random Assignment

- Random assignment
 - Eliminates alternative explanations
 - Different from random sample

Experimentation

- Experiment
 - an investigator manipulates one or more factors (independent variables) to observe their effect on some behavior or mental process (the dependent variable)
 - by random assignment of participants the experiment controls other relevant factors

Experimentation

Random Assignment

- Blind (uninformed)
 - Single-Blind Procedure
 - Double-Blind Procedure
- Placebo Effect

Experimentation

- **Placebo**
 - an inert substance or condition that may be administered instead of a presumed active agent, such as a drug, to see if it triggers the effects believed to characterize the active agent
- **Double-blind Procedure**
 - both the research participants and the research staff are ignorant (blind) about whether the research participants have received the treatment or a placebo
 - commonly used in drug-evaluation studies

Experimentation

Random Assignment

- Groups
 - Experimental Group
 - Receives the treatment (independent variable)
 - Control Group
 - Does not receive the treatment

Experimentation

Independent and Dependent Variables

- Independent Variable
 - Confounding variable
 - Effect of random assignment on confounding variables
- Dependent Variable
 - What is being measured

Experimentation

- Independent Variable
 - the experimental factor that is manipulated
 - the variable whose effect is being studied
- Dependent Variable
 - the experimental factor that may change in response to manipulations of the independent variable
 - in psychology it is usually a behavior or mental process

Experimental Design

- **Random sample**— every member of the population being studied should have an equal chance of being selected for the study
- **Random assignment**— assigning subjects to experimental and control conditions by chance.
- **Randomization helps avoid false results**

Experimental Design

Random assignment
(controlling for other variables
such as parental intelligence
and environment)



Experimental Design

Random assignment
(controlling for other variables
such as parental intelligence
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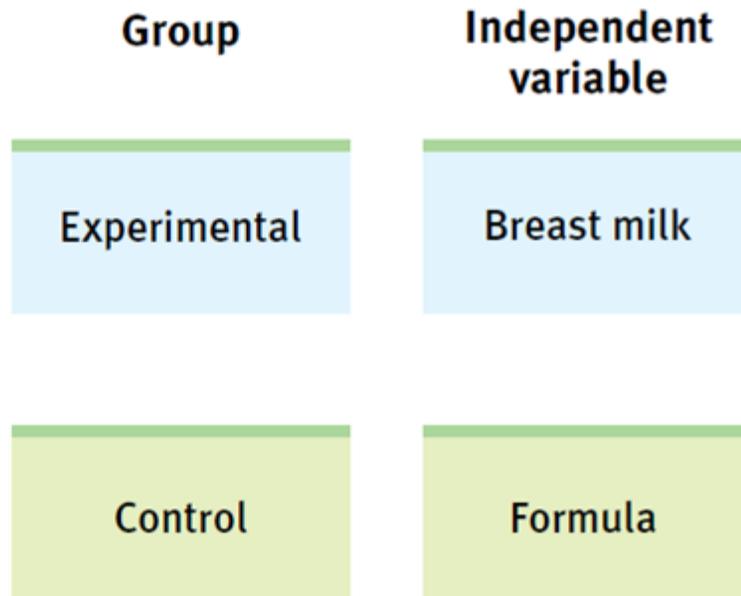
Group

Experimental

Control

Experimental Design

Random assignment
(controlling for other variables
such as parental intelligence
and environment)



Experimental Design

Random assignment
(controlling for other 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

Comparing Research Methods

COMPARING RESEARCH METHODS					
Research Method	Basic Purpose	How Conducted	What Is Manipulated	Strengths	Weaknesses
Descriptive					
Correlational					
Experimental					

Comparing Research Methods

COMPARING RESEARCH METHODS					
Research Method	Basic Purpose	How Conducted	What Is Manipulated	Strengths	Weaknesses
Descriptive	To observe and record behavior	Case studies, surveys, or naturalistic observations	Nothing	Case studies require only one participant; surveys may be done fairly quickly and inexpensively (compared to experiments); naturalistic observations may be done when it is not ethical to manipulate variables.	No control of variables; single cases may be misleading
Correlational					
Experimental					

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Experimental					

Comparing Research Methods

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Experimental	To explore cause and effect	Manipulate one or more factors; use random assignment	The independent variable(s)	Specifies cause and effect, and variables are controlled	Sometimes not feasible; results may not generalize to other contexts; not ethical to manipulate certain variables

Basic Ethical Guidelines for Psychological Researchers

- **Do no harm.**
- **Accurately describe risks to potential subjects.**
- **Ensure that participation is voluntary.**
- **Minimize any discomfort to participants.**
- **Maintain confidentiality.**
- **Do not unnecessarily invade privacy.**
- **Remove any misconceptions caused by deception (debrief).**
- **Provide results and interpretations to participants.**
- **Treat participants with dignity and respect.**

Evaluating Media Reports

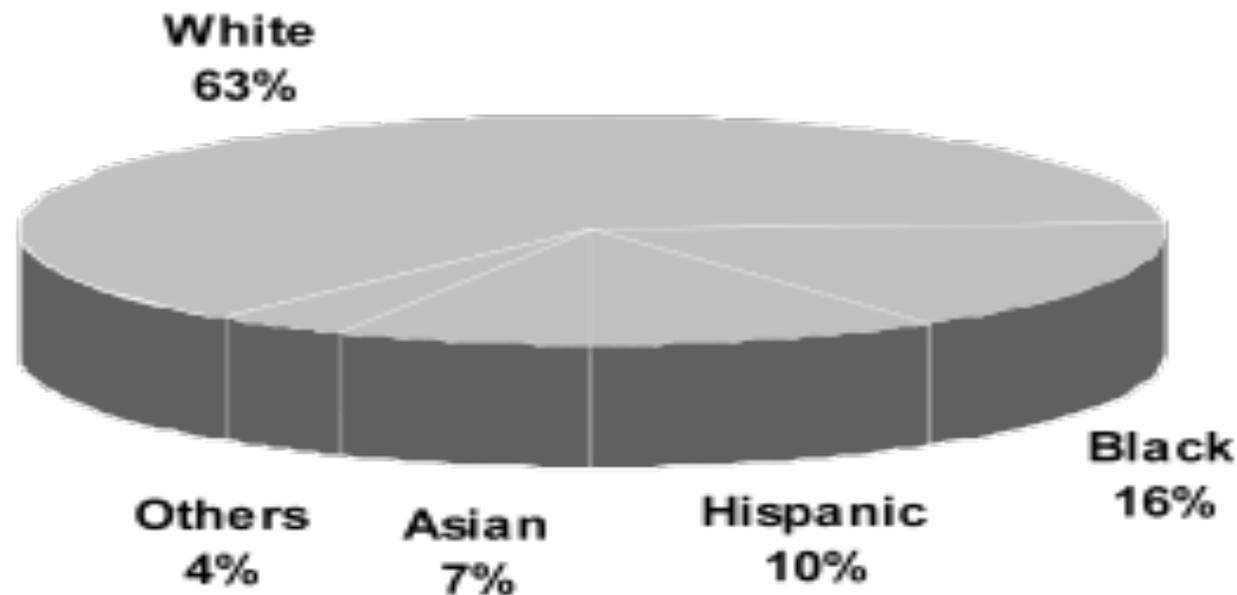
- Be skeptical of sensationalist claims
- Goal of “shock” media is ratings
- Look for original sources
- Separate opinion from data
- Consider methodology and operational definitions
- Correlation is not causality
- Skepticism is the rule in science.

Statistical Reasoning in Everyday Life



Statistical Reasoning

Statistical procedures analyze and interpret data allowing us to see what the unaided eye misses.



Composition of ethnicity in urban locales

Frequency Distribution

Frequency Distributions

- 1. What are they?
 - Tables
 - Graphs
 - Bar
 - Histogram

Table 3.1 Simple Frequency Distribution Table

The left-hand column identifies each score, and the right-hand column contains the frequency with which the score occurred.

<i>Score</i>	<i>f</i>
17	1
16	0
15	4
14	6
13	4
12	1
11	1
10	1
Total: 18 = N	

Distributions

Percentile Rank--the percentage of scores that fall below a particular score. You can never have a percentile rank of 100 because you are part of that 100. (You can't exceed yourself!)

Bar Graphs (histograms)-- Percentile ranks and distributions can be represented in bar graphs or histograms.

Histogram

Table A.4

GROUP FREQUENCY
DISTRIBUTION OF SCHOLASTIC
APTITUDE TEST SCORES FOR
50 COLLEGE STUDENTS

Class Interval	Frequency
1300-1399	1
1200-1299	1
1100-1199	4
1000-1099	5
900-999	5
800-899	4
700-799	7
600-699	10
500-599	9
400-499	4
Total	50

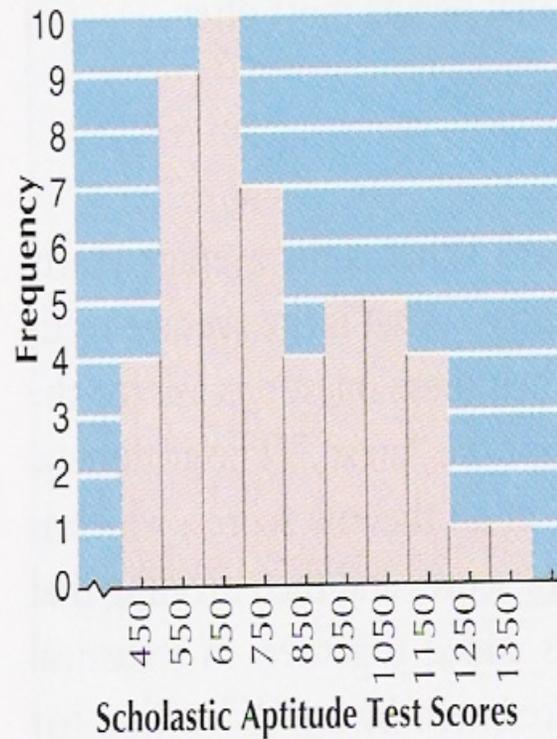
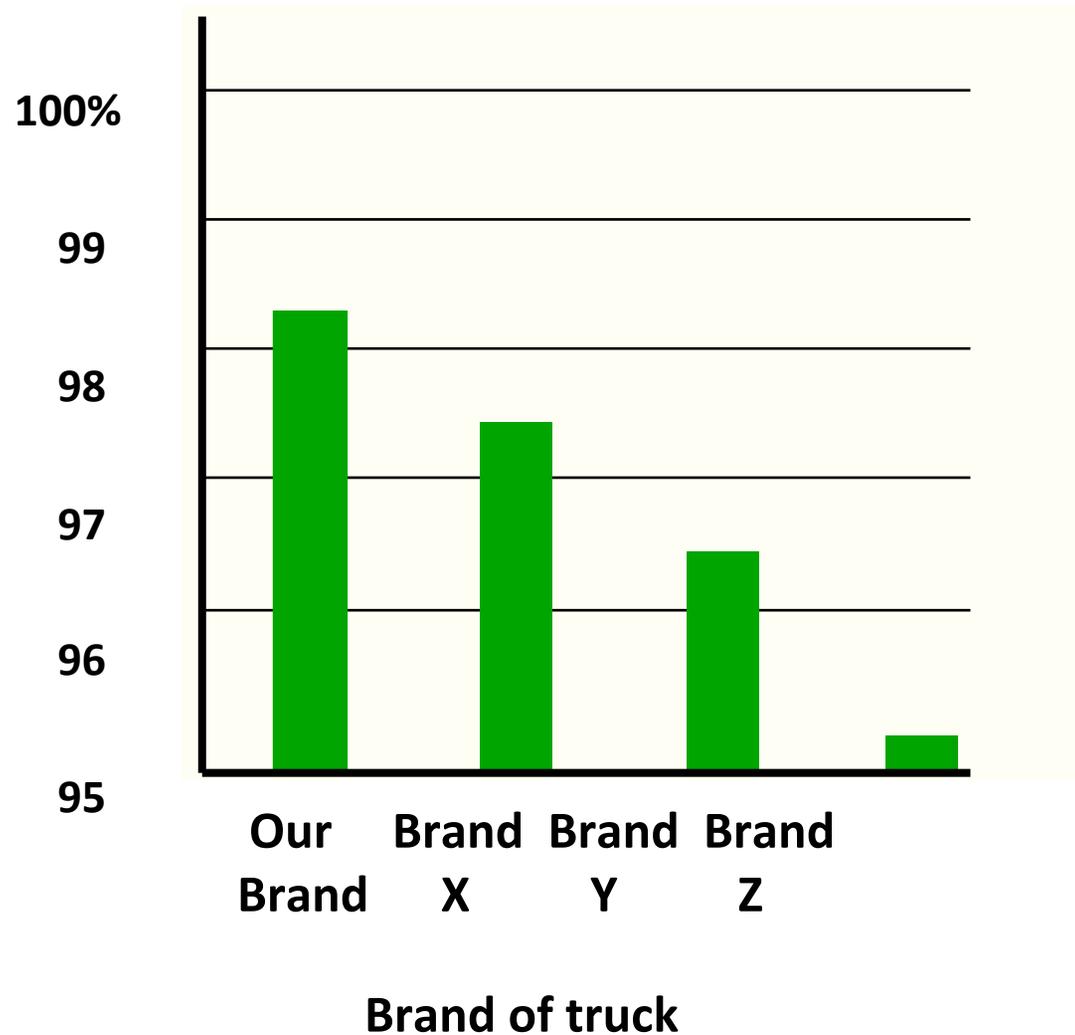


Figure A.1 A histogram illustrating the information found in Table A.4

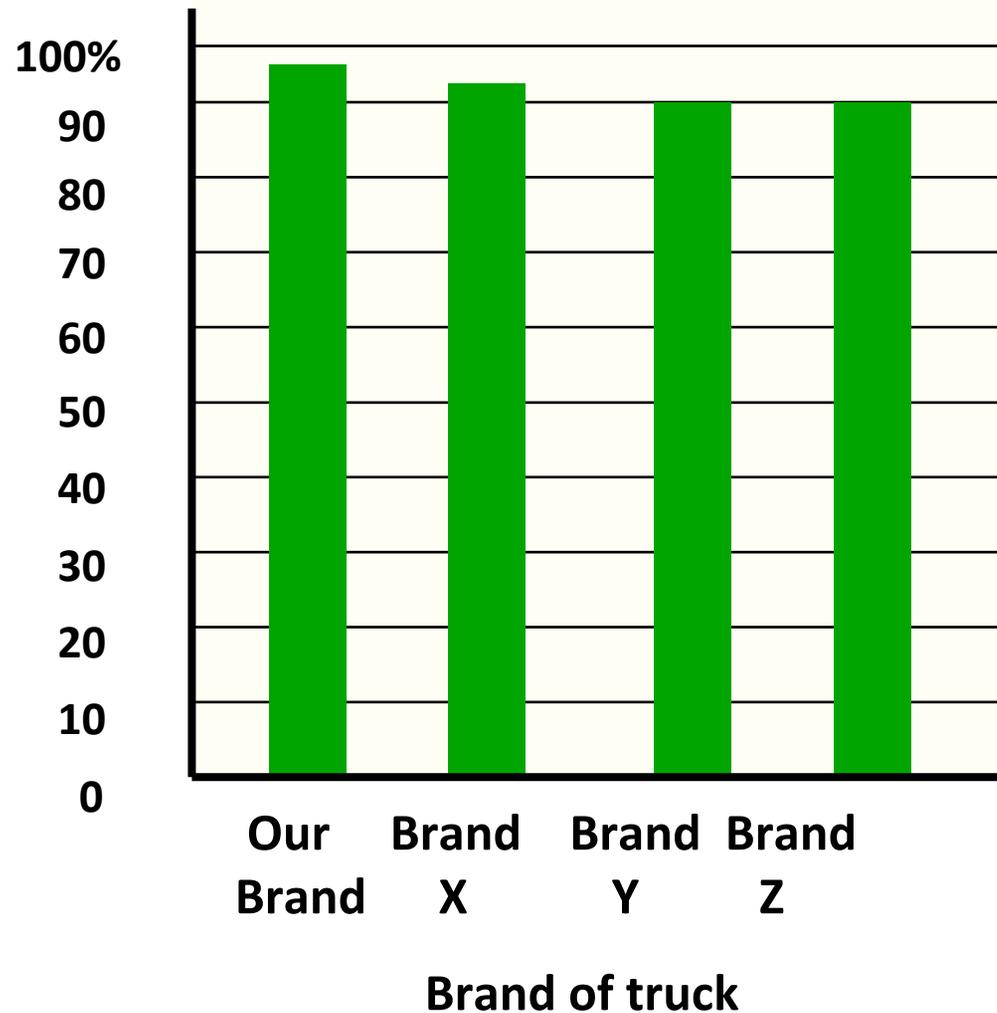
Statistical Reasoning

Percentage
still functioning
after 10 years



Statistical Reasoning

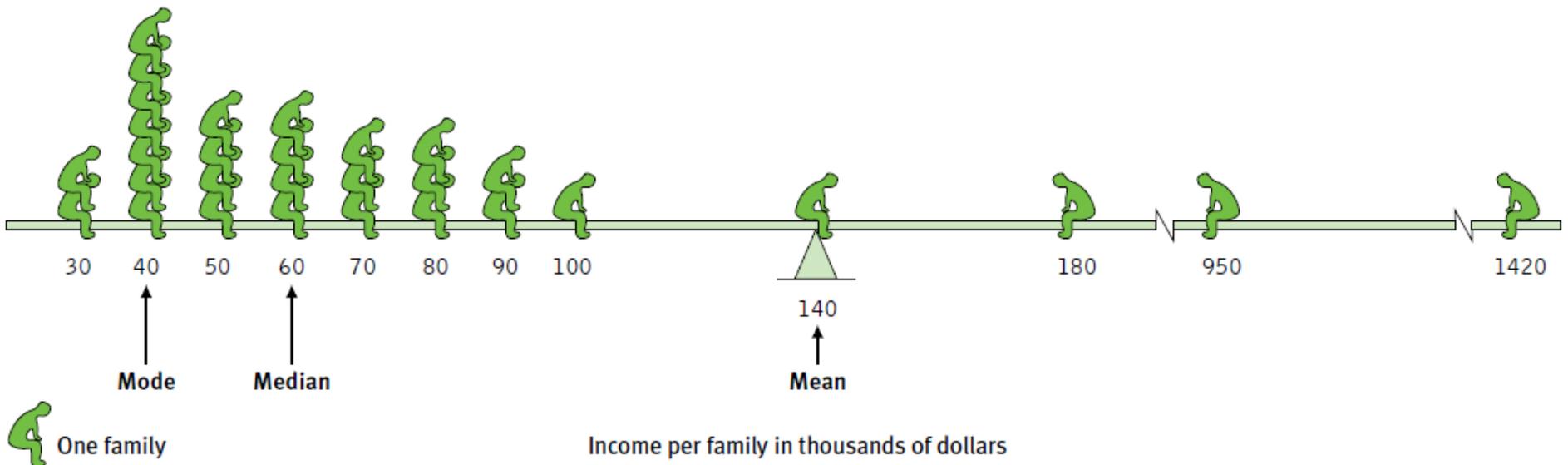
Percentage
still functioning
after 10 years



Describing Data

Measures of Central Tendency

- Mode (occurs the most)
- Mean (arithmetic average)
- Median (middle score)



Statistical Reasoning

- Mode

- the most frequently occurring score in a distribution

- Mean

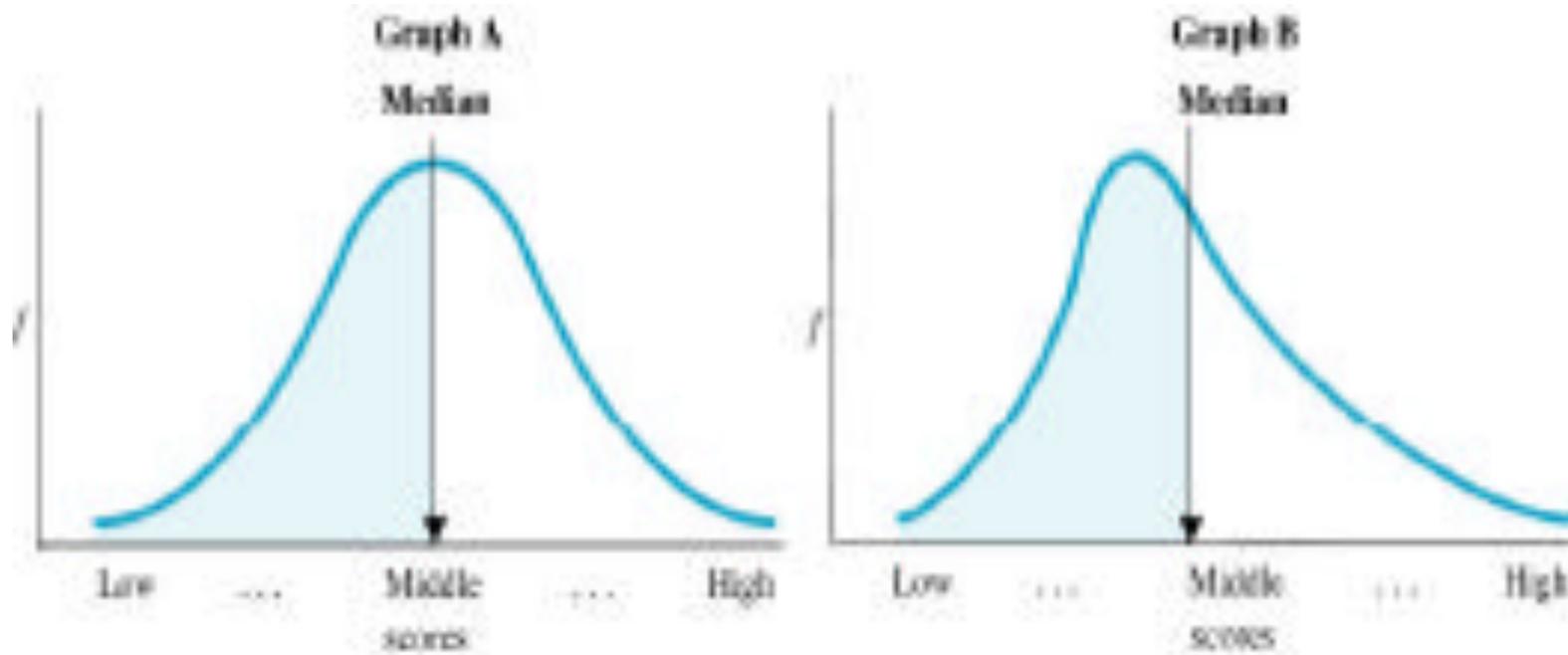
- the arithmetic average of a distribution
- obtained by adding the scores and then dividing by the number of scores

- Median

- the middle score in a distribution
- half the scores are above it and half are below it

Median

- Separates the upper and lower half of distribution
 - 1) mean and median not necessarily equal
 - 2) median much less sensitive to extremes



Mode

- Most common value
- Always present in the distribution
- May be more than one mode
- Used mainly with nominal data
- Plays minor role in statistical inference

Describing Data

Measures of Variability

- Range
- Standard Deviation

$$\text{Standard deviation} = \sqrt{\frac{\text{Sum of (deviations)}^2}{\text{Number of scores}}}$$

Measures of Variation

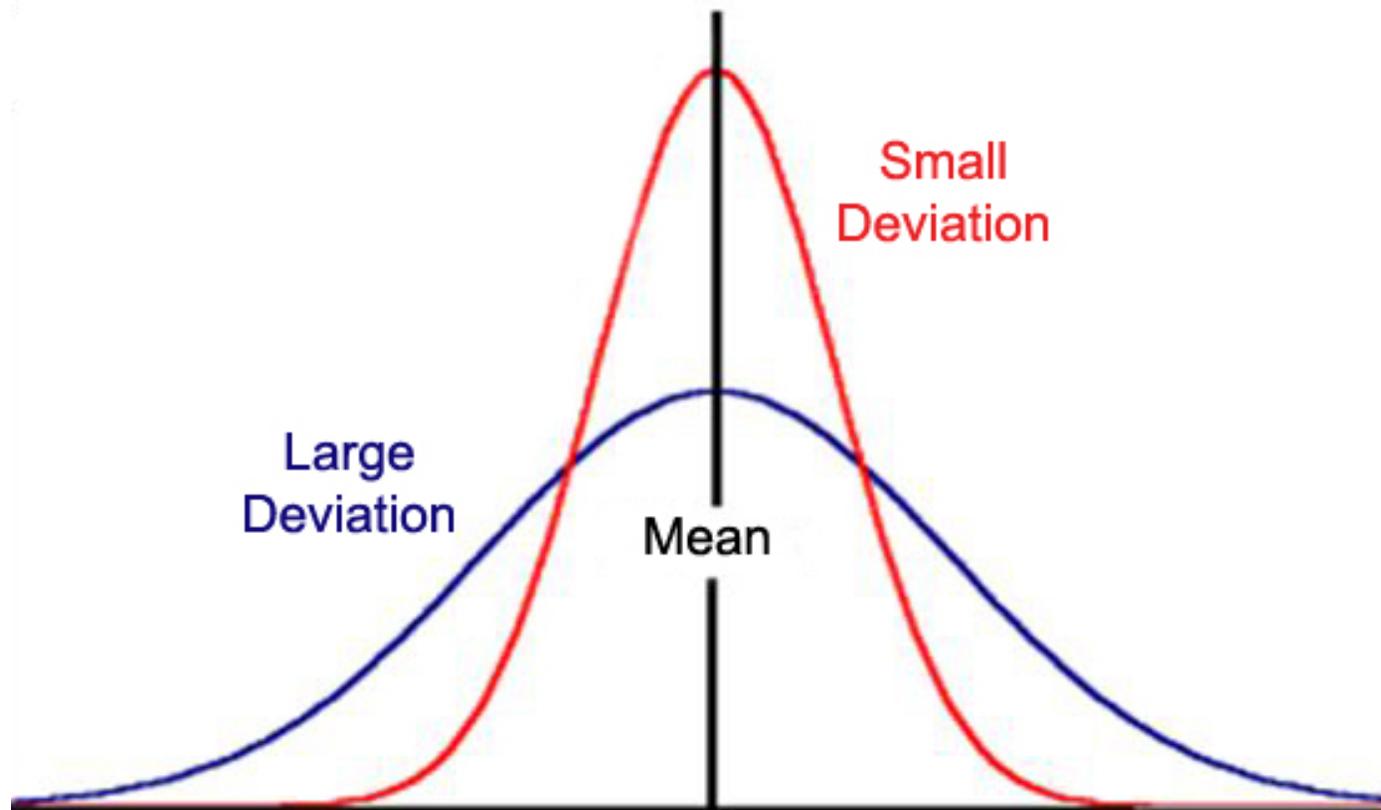
- Range
 - the difference between the highest and lowest scores in a distribution

THE FORMULA FOR COMPUTING THE RANGE IS

$$\text{Range} = \text{highest score} - \text{lowest score}$$

Measures of Variation

Standard Deviation: A computed measure of how much scores vary around the mean.



Scoring Distance	Deviation From Mean (40 Yards)	Deviation Squared
36	-4	16
38	-2	4
41	+1	1
45	+5	25

$$\text{Mean} = 160/4 = 40$$

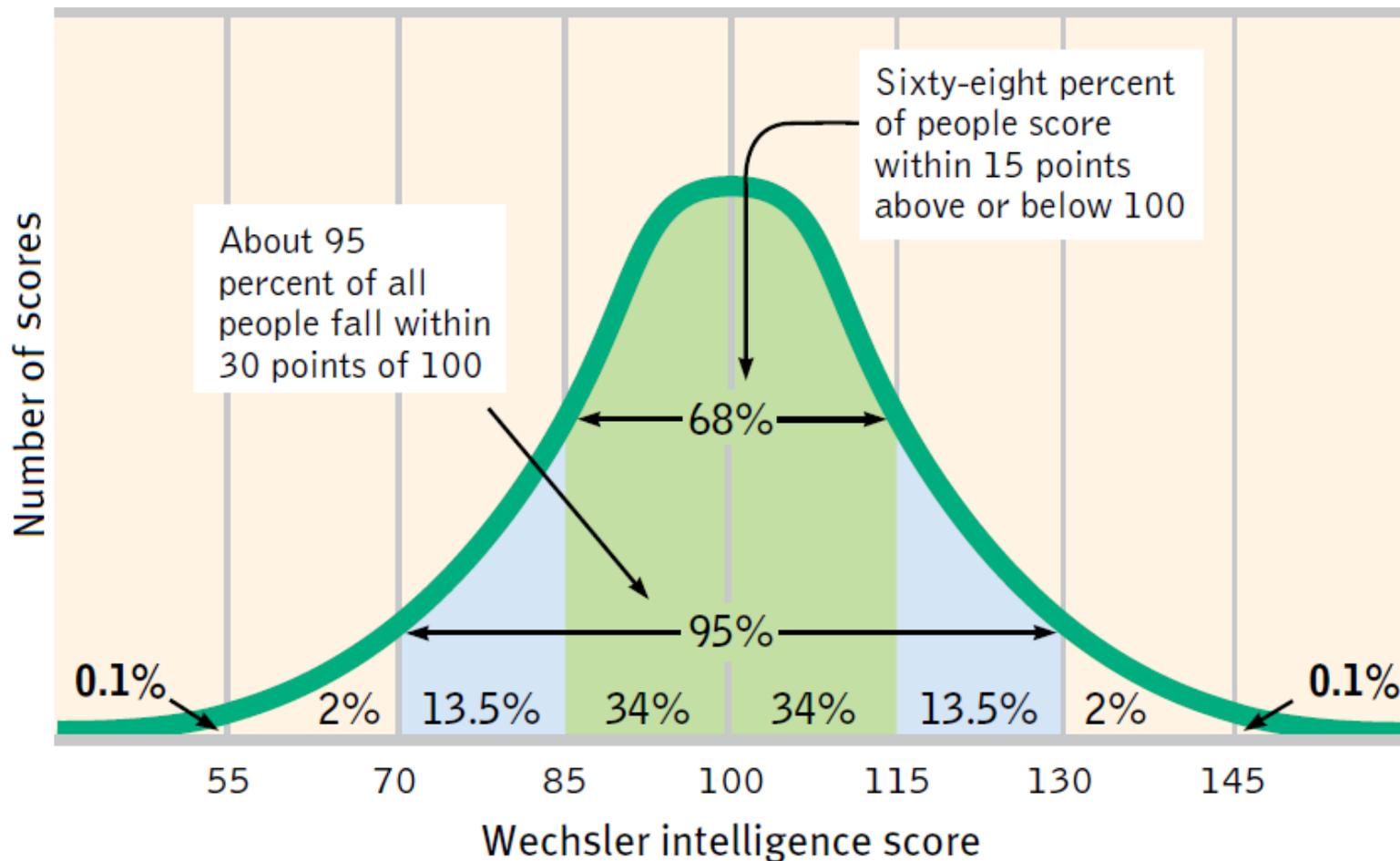
$$\text{Sum of (deviations)}^2 = 46$$

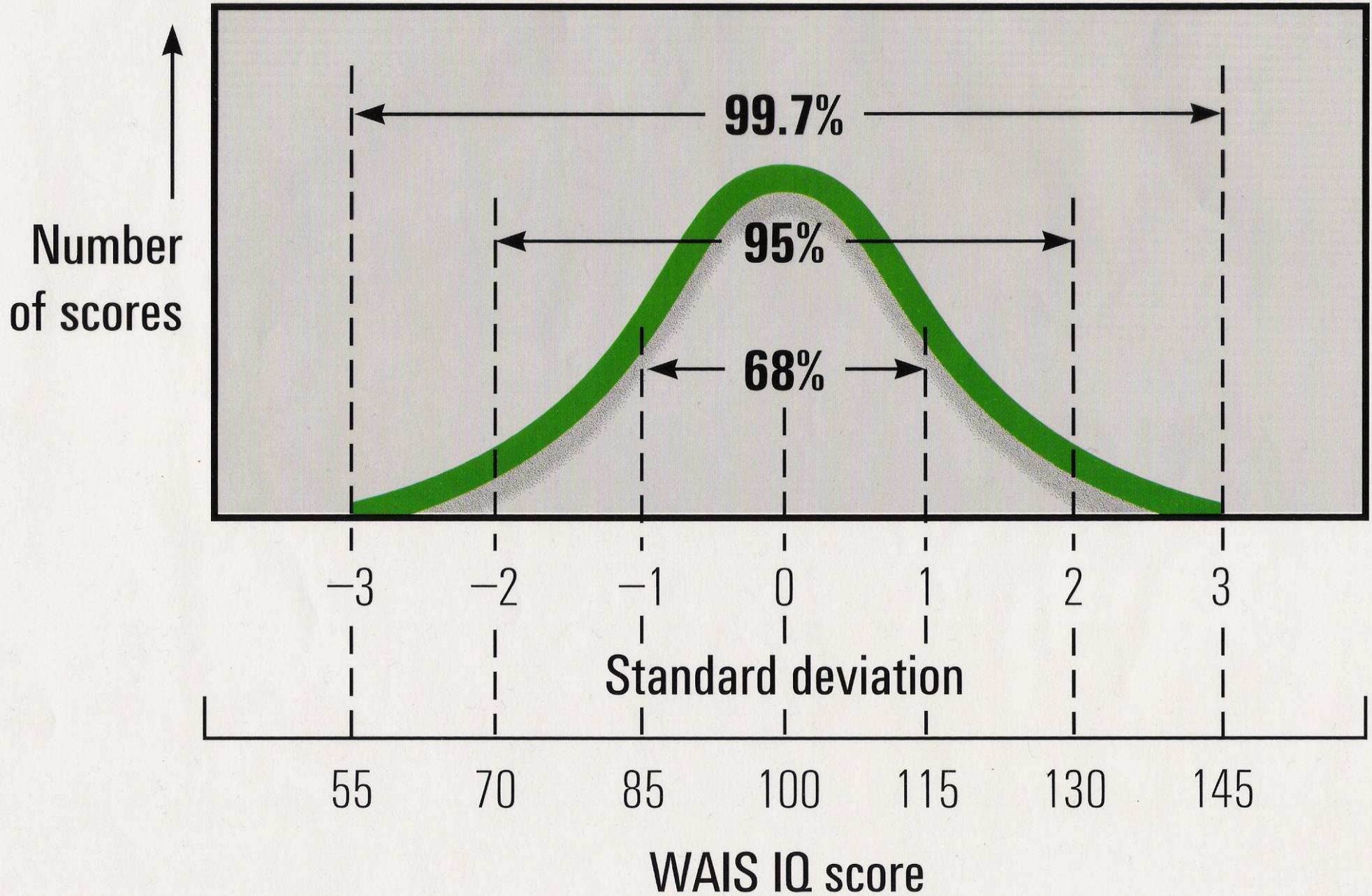
$$\text{Standard deviation} = \sqrt{\frac{\text{Sum of (deviations)}^2}{\text{Number of scores}}} = \sqrt{\frac{46}{4}} = 3.4 \text{ yards}$$

Describing Data

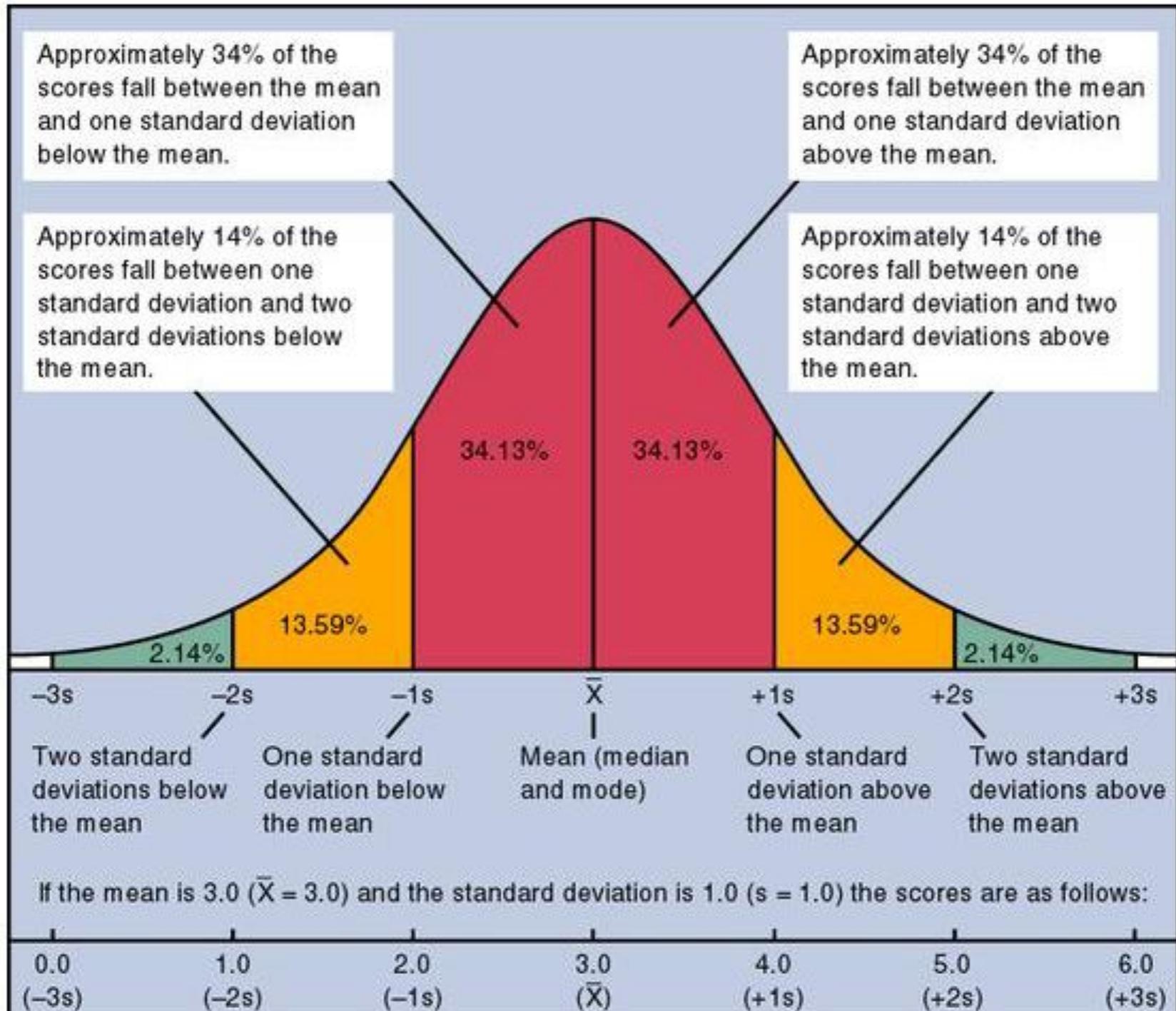
Measures of Variability

- Normal Curve (bell shaped)

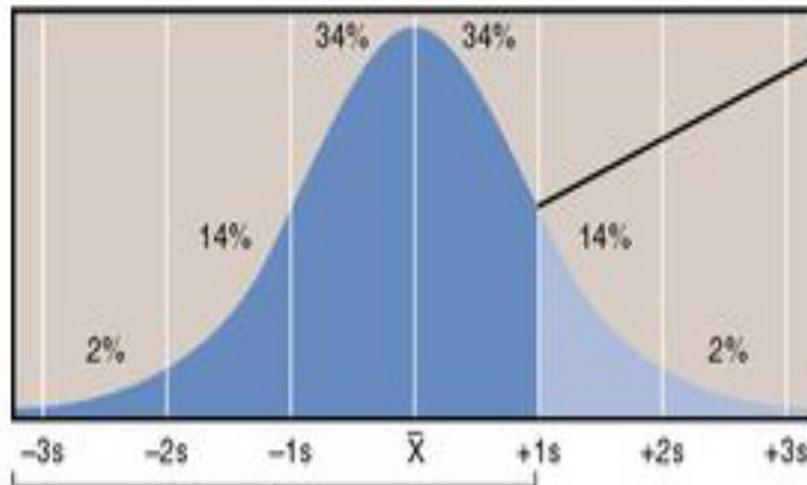




Normal Curve



Normal Curve Interpretation 1

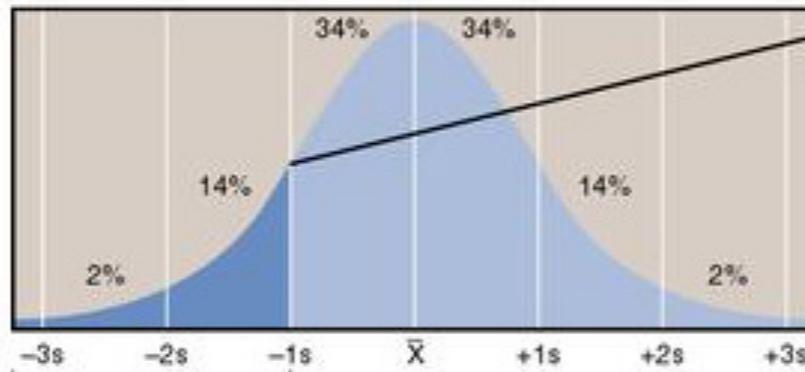


Susan scored one standard deviation above the mean.

Susan performed better than 84% of the class.

84% of the scores are lower than Susan's score.

Normal Curve Interpretation 2

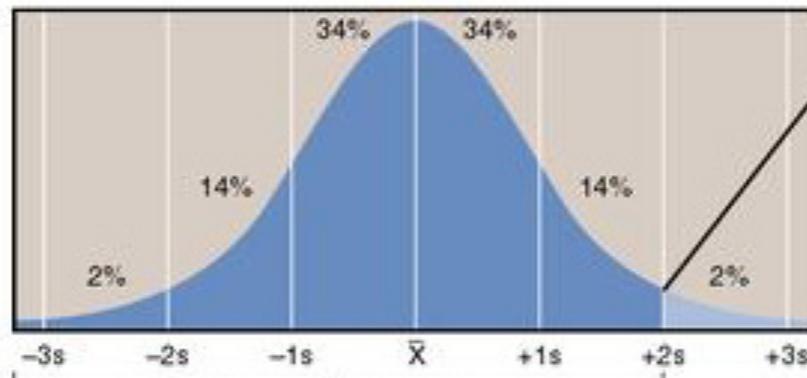


16% of the scores are lower than Tom's score.

Tom scored one standard deviation below the mean.

Tom performed better than 16% of the class.

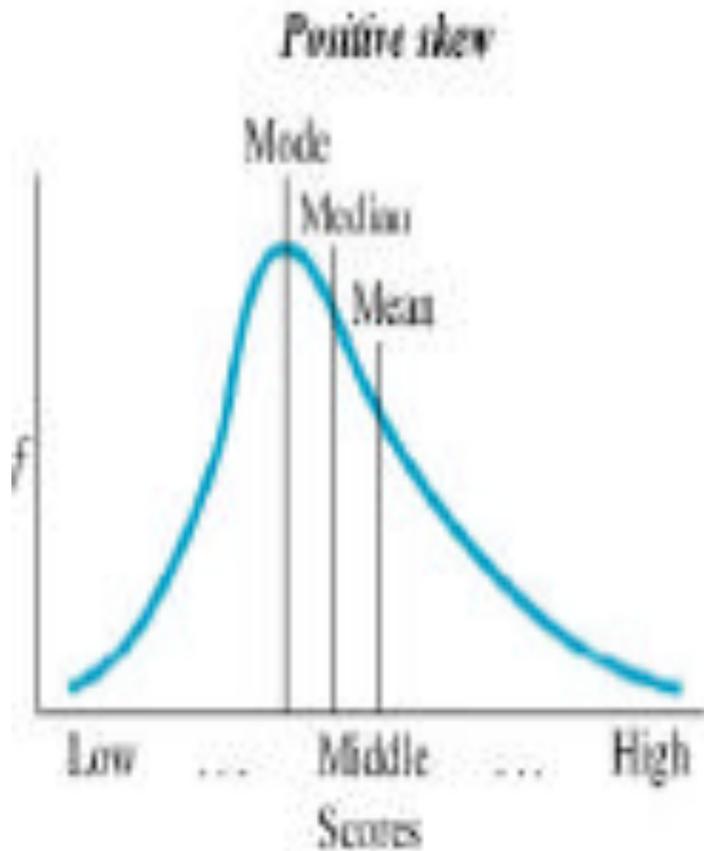
Normal Curve Interpretation 3



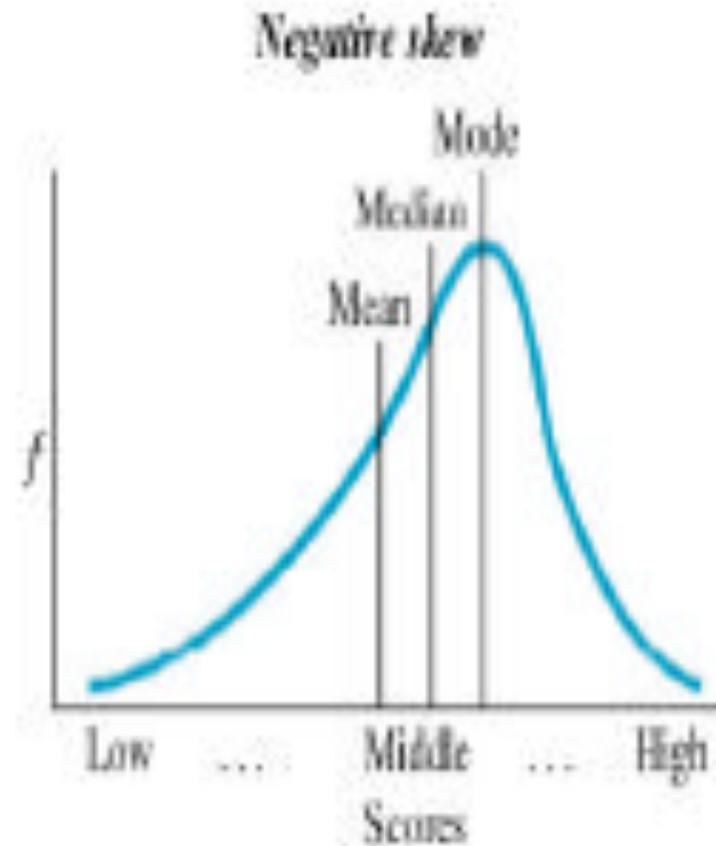
98% of the scores are lower than Mary's score.

Mary scored two standard deviations above the mean.
Mary performed better than 98% of the class.

Skewed Distributions



Positive
Mean > Median



Negative
Mean < Median

Making Inferences

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

Making Inferences

When Is a Difference Significant?

- Statistical significance
 - The averages are reliable
 - The differences between averages is relatively large
 - Does imply the importance of the results

When is a difference significant?

When sample averages are reliable and the difference between them is large we say the difference has **statistical significance** (it reflects a real difference not due to chance or variation between samples).

For psychologists this difference is measured through alpha level set at 5 percent.

Psychology Applied

Q1: Can laboratory experiments illuminate everyday life?

Answer: Artificial laboratory conditions are created to study behavior in simplistic terms. The goal is to find underlying principles that govern behavior

Psychology Applied

Q2: Does behavior depend on one's culture?

Answer: Even when specific attitudes and behaviors vary across cultures, as they often do, the underlying processes are much the same.

Psychology Applied

Q3: Does behavior vary with gender?

Answer: Yes. Biology determines our sex, and culture further bends the genders. However, in many ways woman and man are similarly human.

Ethics in Research

Q4: Is animal research ethical?

What are the reasons for using animals in research?

What safeguards are required for animal use?



Why do psychologists study animals?

Ans: Studying animals gives us the understanding of many behaviors that may have common biology across animals and humans.



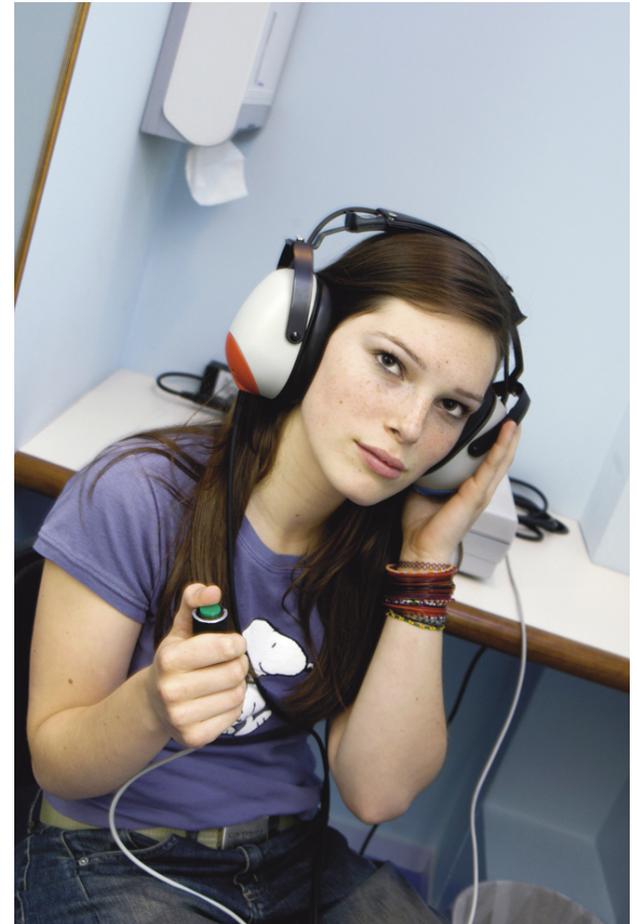
D. Shapiro, © Wildlife Conservation Society

Q5. Is it ethical to experiment on animals?

Ans: Yes. To gain insights to devastating and fatal diseases. All researchers who deal with animal research are required to follow ethical guidelines in caring for these animals.

Ethics in Research

- Ethics in human research
 - Informed consent
 - Protect from harm and discomfort
 - Maintain confidentiality
 - Debriefing



The End