

Statistics/Research Methods

Perspectives of Psychology

- biological- neurons/brain/physiology
- cognitive- memory/intelligence/language
- social- effect of group

Intuition and common sense

rosenthal and jacobson pygmalion effect (1968)

- 18 classes of students (K-6th) “intelligence test”
- chose 20% kids at random and said they were gifted
- retested at end of year
- gifted kids showed more growth

how many times can you
fold a piece of paper?



Errors of Common Sense

If you were to fold a piece of paper (0.1 mm thick) 42 times, how large do you think its thickness would be?

it would reach the moon

Hindsight Bias

Hindsight Bias is the “I-knew-it-all-along” phenomenon.

We tend to believe, after learning about an outcome, that we would have foreseen it. We knew that the dot.com stocks would plummet, only after they did.

Overconfidence

We tend to think we know more than we actually do.

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

People said about 10 seconds. On average they took about 3 minutes (Goranson, 1978).

Anagram	
WREAT	WATER
ETYRN	ENTRY
GRABE	BARGE

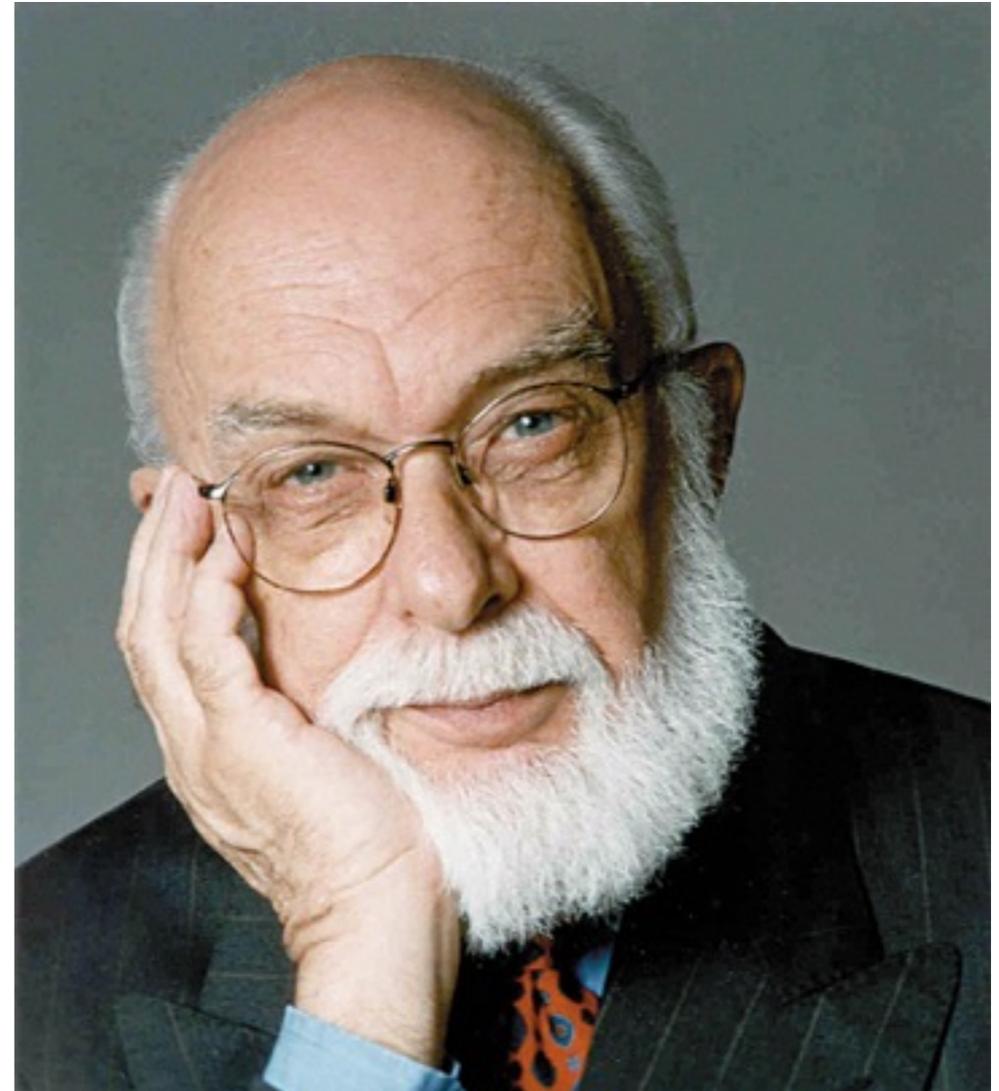
The Scientific Attitude

The scientific attitude is composed of curiosity (passion for exploration), skepticism (doubting and questioning) and humility (humbleness to accept when wrong).

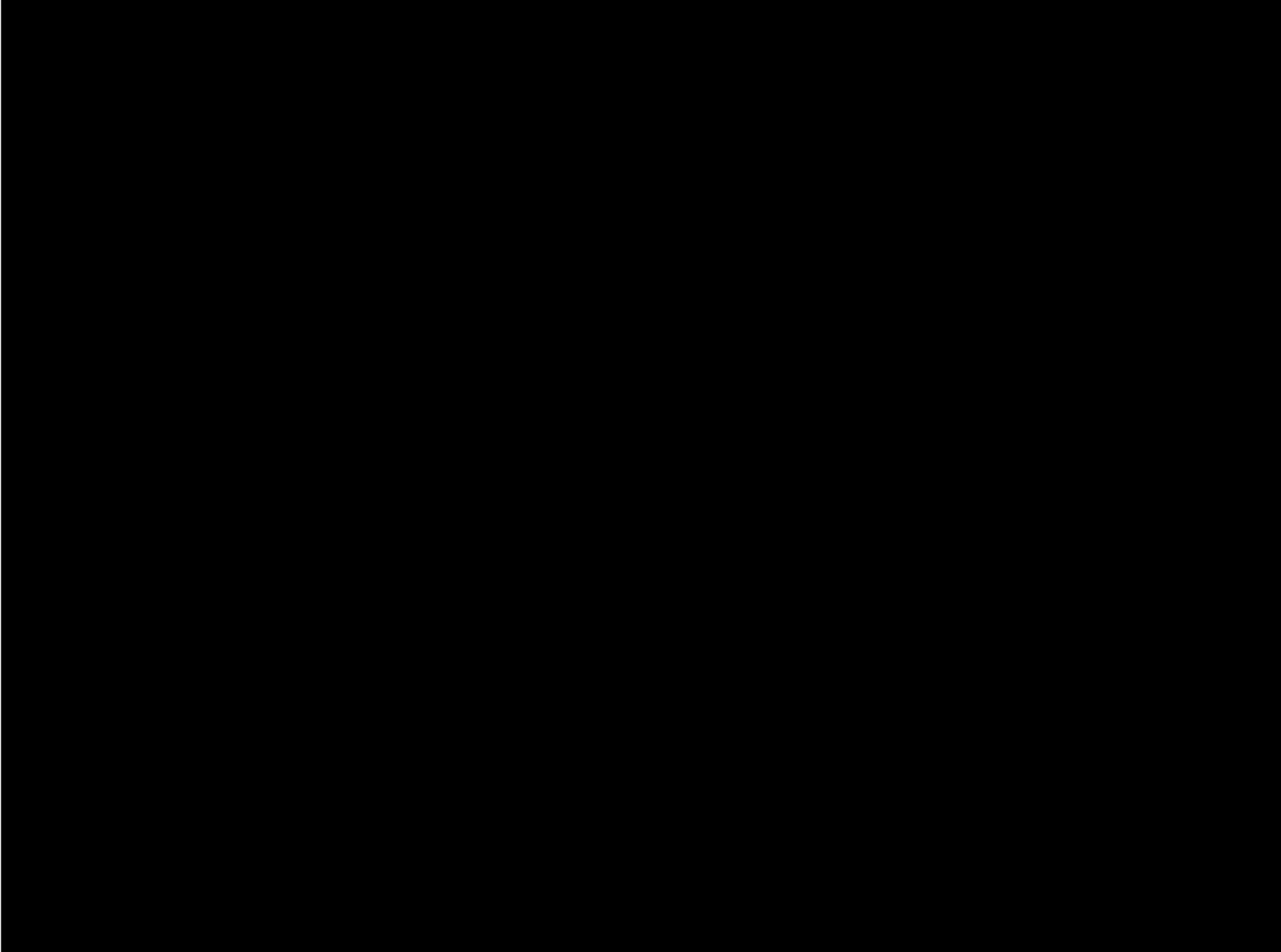
Critical Thinking

Critical thinking does not blindly accept arguments and conclusions.

It examines assumptions, discerns hidden values, evaluates evidence, assesses conclusions.



James Randi



Scientific Method

Psychologists, like all scientists, use the scientific method to construct theories that organize, summarize and simplify observations.

Theory

Theory is an explanation that predicts behaviors or events.

For example, low self-esteem contributes to depression.

descriptive statistics

Measures of Central Tendency

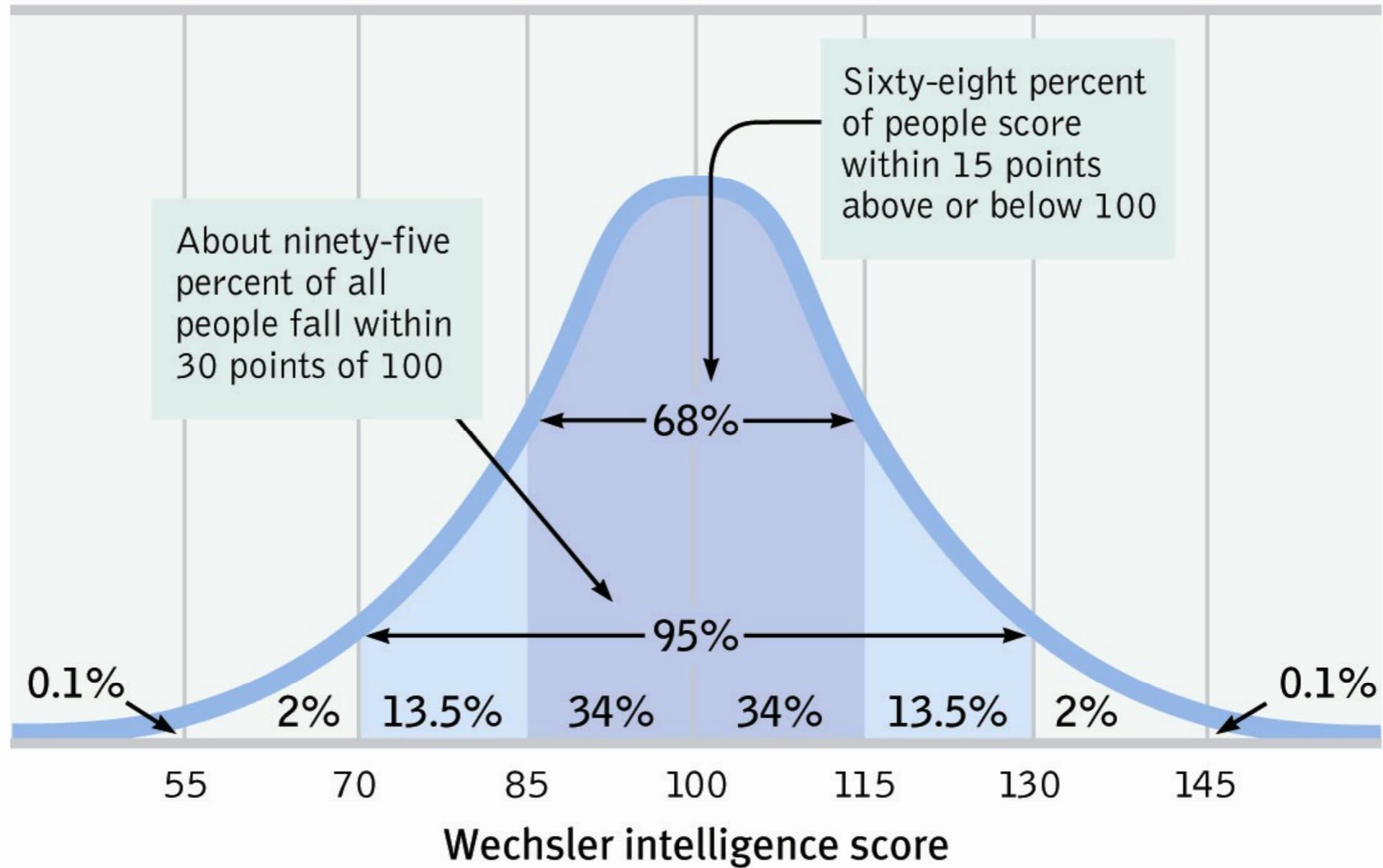
Mean: The arithmetic average of scores in a distribution obtained by adding the scores and then dividing by their number.

Median: The middle score in a rank-ordered distribution.

Mode: The most frequently occurring score in a distribution.

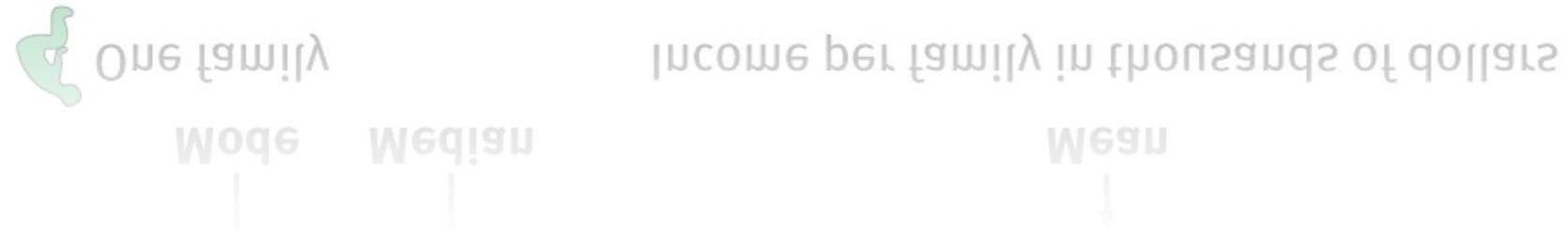
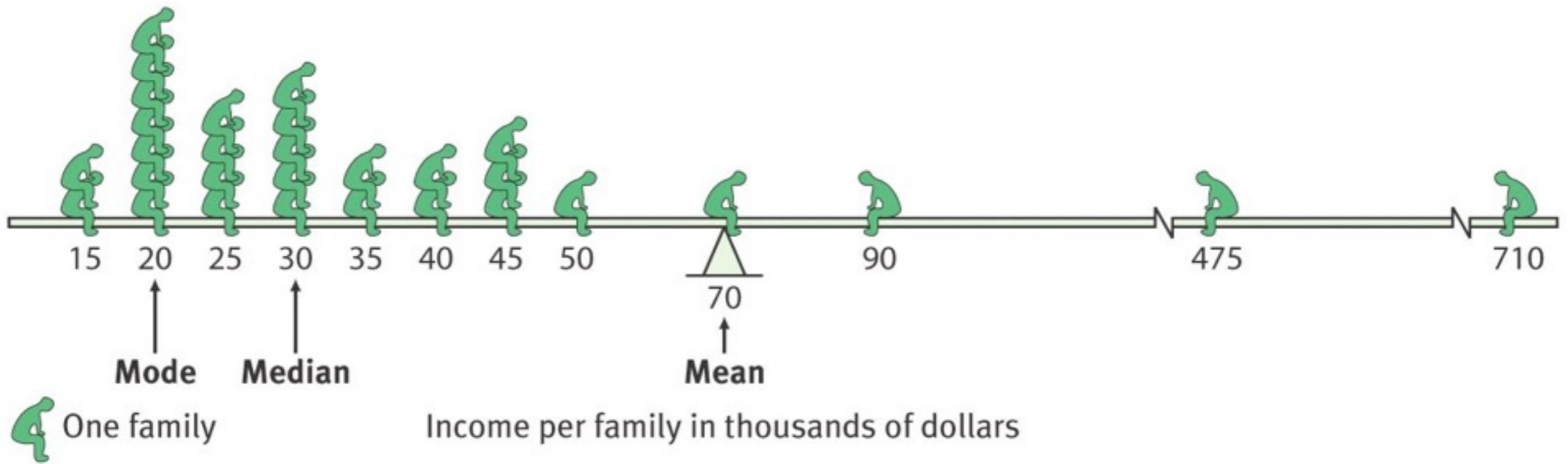
Normal Distribution

Number of scores



Wechsler intelligence score

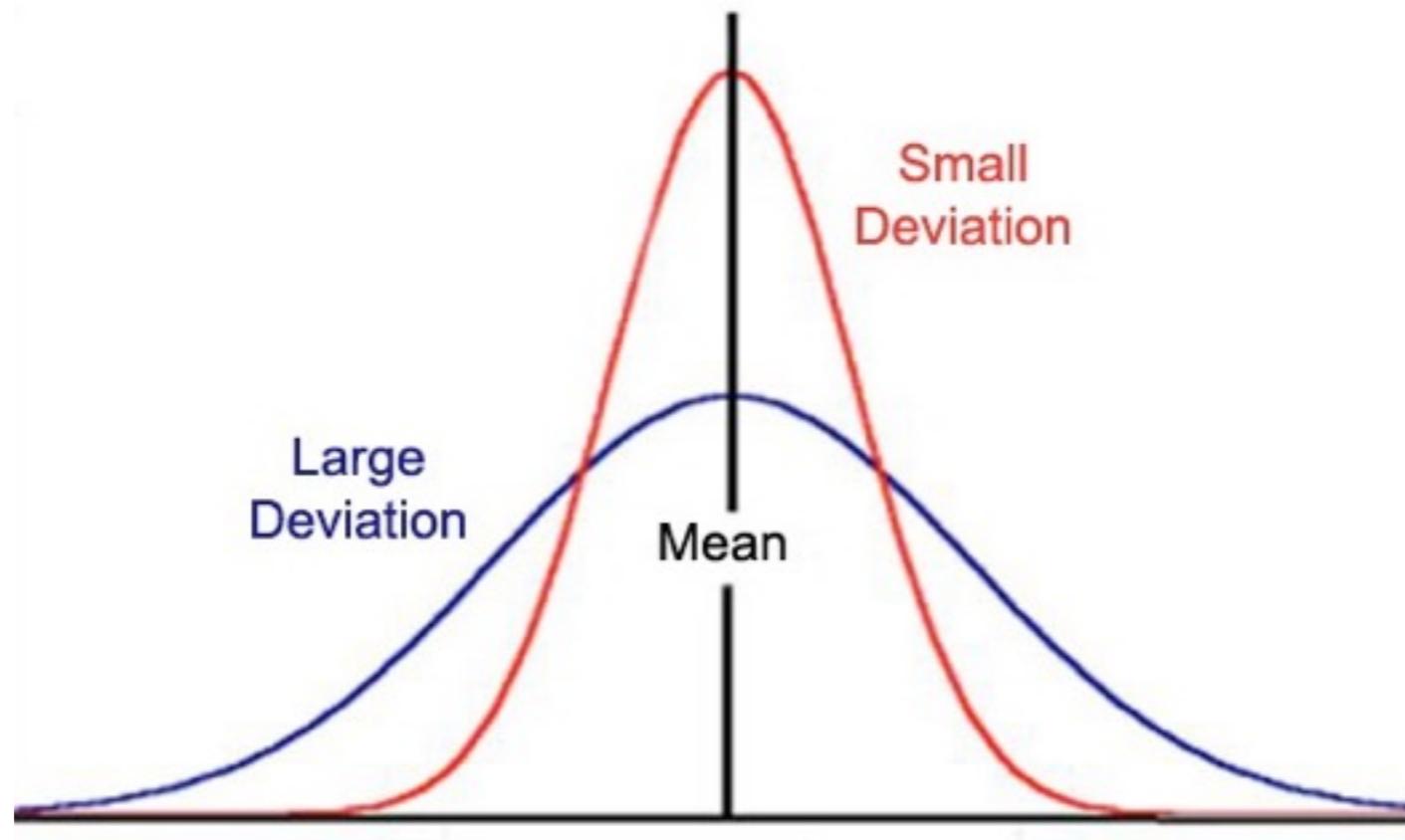
Measures of Central Tendency



Measures of Variation

Range: The difference between the highest and lowest scores in a distribution.

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



Standard Deviation

STANDARD DEVIATION IS MUCH MORE INFORMATIVE THAN MEAN ALONE

Note that the test scores in Class A and Class B have the same mean (80), but very different standard deviations, which tell us more about how the students in each class are really faring.

Test Scores in Class A

Score	Deviation From the Mean	Squared Deviation
72	-8	64
74	-6	36
77	-3	9
79	-1	1
82	+2	4
84	+4	16
85	+5	25
87	+7	49
Total = 640	Sum of (deviations)² = 204	

$$\text{Mean} = 640 \div 8 = 80$$

Standard deviation =

$$\sqrt{\frac{\text{Sum of (deviations)}^2}{\text{Number of scores}}} = \sqrt{\frac{204}{8}} = 5.0$$

Test Scores in Class B

Score	Deviation From the Mean	Squared Deviation
60	-20	400
60	-20	400
70	-10	100
70	-10	100
90	+10	100
90	+10	100
100	+20	400
100	+20	400
Total = 640	Sum of (deviations)² = 2000	

$$\text{Mean} = 640 \div 8 = 80$$

Standard deviation =

$$\sqrt{\frac{\text{Sum of (deviations)}^2}{\text{Number of scores}}} = \sqrt{\frac{2000}{8}} = 15.8$$

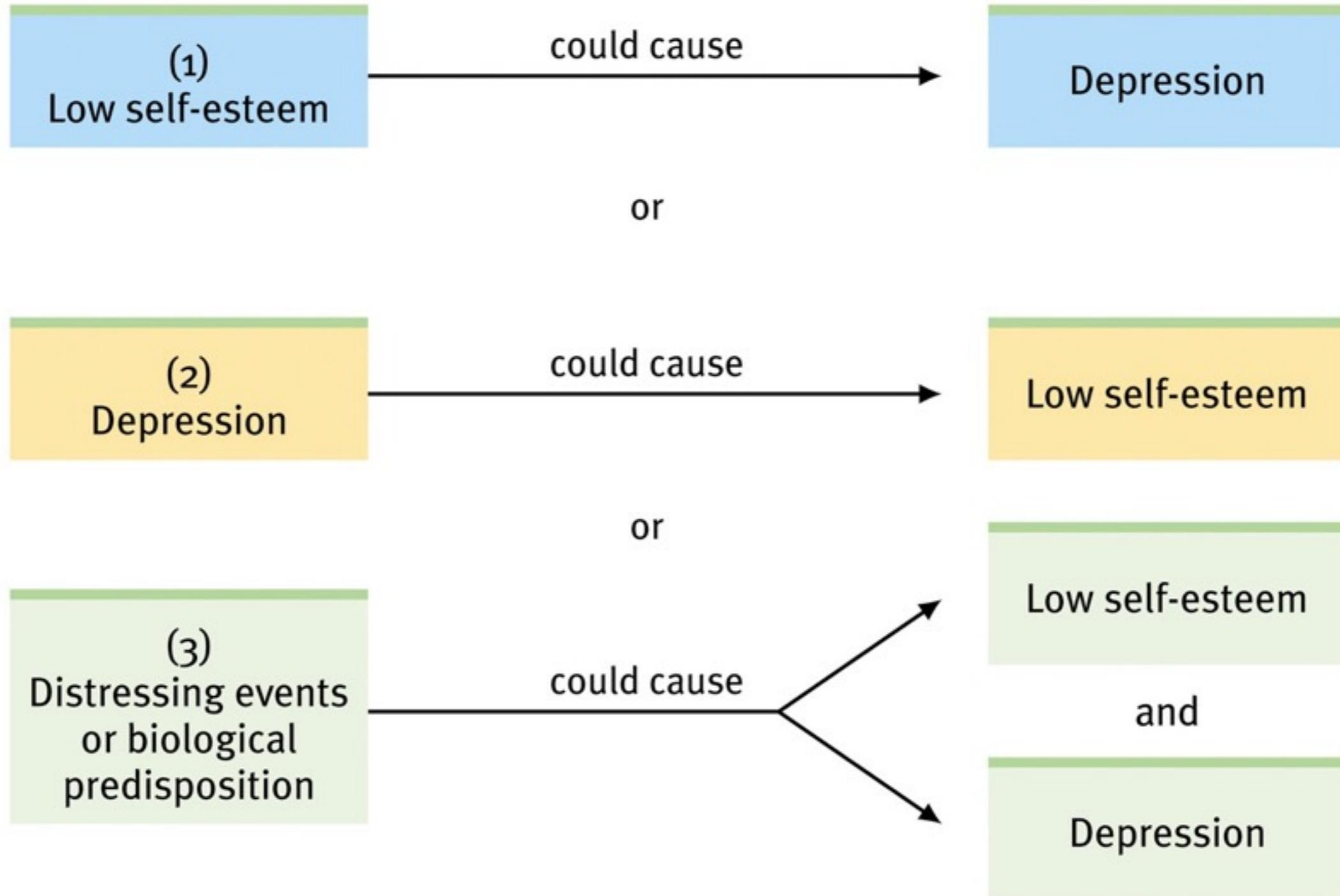
$$\sqrt{\frac{\text{Number of scores}}{\text{Sum of (deviations)}^2}} = \sqrt{\frac{8}{204}} = 2.0$$

Standard deviation =

$$\sqrt{\frac{\text{Number of scores}}{\text{Sum of (deviations)}^2}} = \sqrt{\frac{8}{2000}} = 12.8$$

Standard deviation =

Correlation and Causation



research methods

quantitative vs qualitative research

number based
objective
uses statistical tests
uses a hypothesis to test a theory
can be valid and reliable

Qualitative Research



interviews/observations

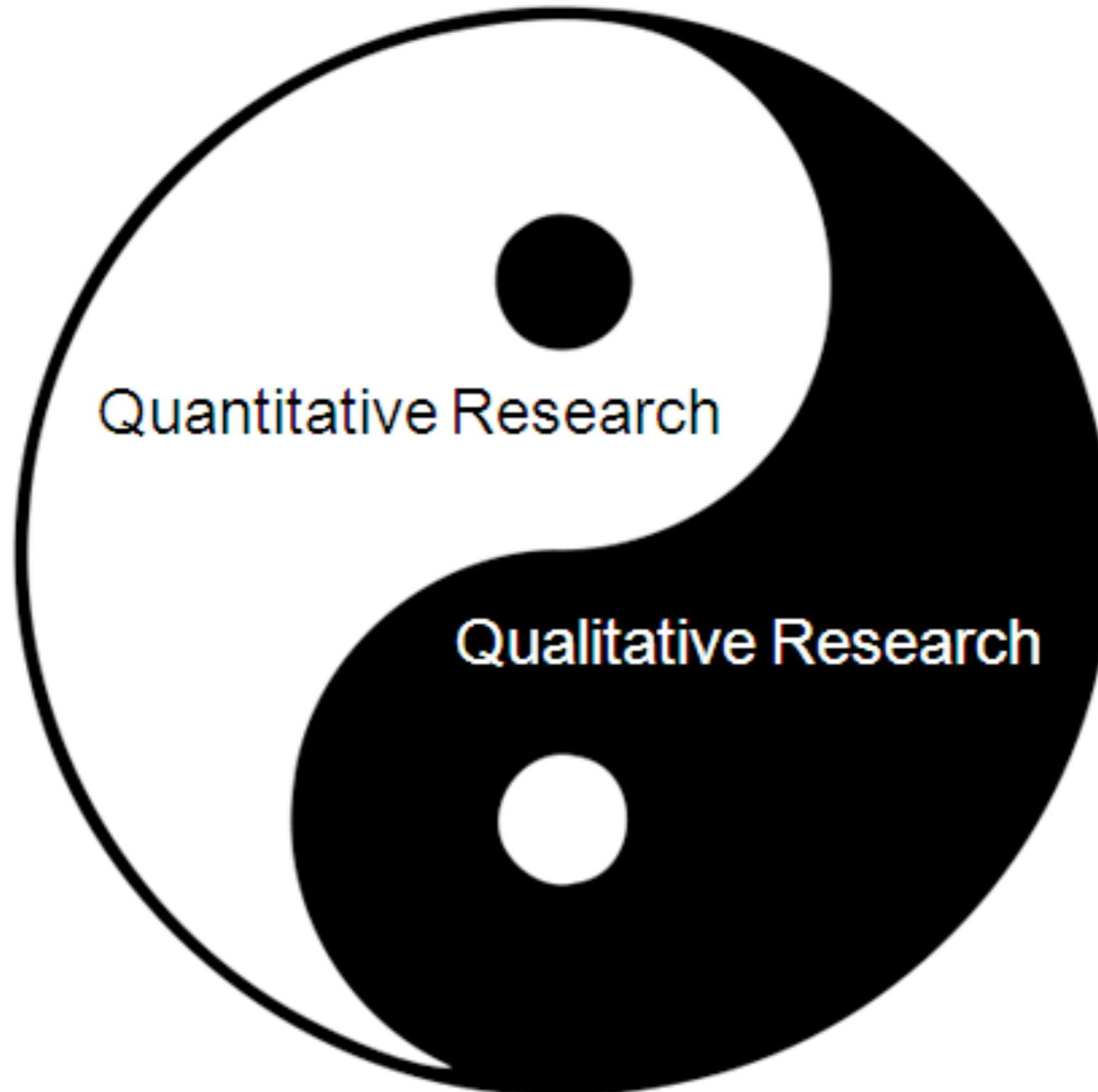
words and picture based
use interviews and observations
can be valid and reliable
asks the why and how

quantitative research

- number based
- objective
- uses statistical tests
- uses a hypothesis to test a theory
- can be valid and reliable



USE BOTH!



Describe this qualitatively
and quantitatively



experimental methods

aim/variables

- aim- to see if one variable has an effect on another (cause and effect- not correlation)
- independent variable (IV)- the one the researcher manipulates
- dependent variable (DV)- the one measured after the IV has been manipulated

practice

Below are examples of research studies. **Name the independent variable (IV) and the dependent variable (DV) for each one.** . A good tip for doing this exercise is to first name the 2 main variables in the study, then figure out which one influences the other. The one doing the influencing is the IV; the one being influenced is the DV.

1. Study examining if t.v. violence increases aggression in children.
2. Study predicting that alcohol drinking will decrease people's reaction time while driving.
3. Study examining if perspective taking improves with age.
4. Study predicting that high school sports build character.
5. How do changes in work space affect employee reaction?
6. Study predicting that pedestrians will walk faster on hot days versus cold days.
7. Are younger siblings treated better by their parents than older siblings?

answers

1. IV: tv violence

DV: children's aggression

2. IV: alcohol drinking

DV: people's reaction time
while driving

3. IV: age

DV: perspective taking

4. IV: high school sports

DV: character

5. IV: changes in work space

DV: employee reaction

6. IV: temperature (hot vs. cold)

DV: tempo of pedestrian
walking

7. IV: Sibling status (younger/
older)

DV: treatment by parents

operationalizing variables

- what is measured must be quantified
- noise- how to measure?
- time- how to measure?
- violence- how to measure?

operationalize aggression

discuss if these are examples aggression or not

- two men fight over a parking space
- a soccer player kicks the ball into a goal
- two girls give a boy the silent treatment on the playground
- a man kicks the back of his car when it won't start
- three students have a heated debate about whether global warming happening

types of experiments

- **field experiment**- takes place in natural environment
- **natural experiment**- no control over variables (ex- research on children raised in isolation)
- **laboratory experiment**- has control of variables, but not in a “real life” setting. questionable ecological validity/generalization.

yah... but

- **confounding variables**- other things that result in findings
- **demand characteristics** (solve by single blind)
- **researcher bias** (solve double blind)
- **participant variability**- sample affects variable

correlational studies

Correlation

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

Indicates strength of relationship from 0.00 to 1.00

Correlation Coefficient

→ **$r = +0.37$**

Correlation Coefficient is a statistical measure of relationship between two variables.

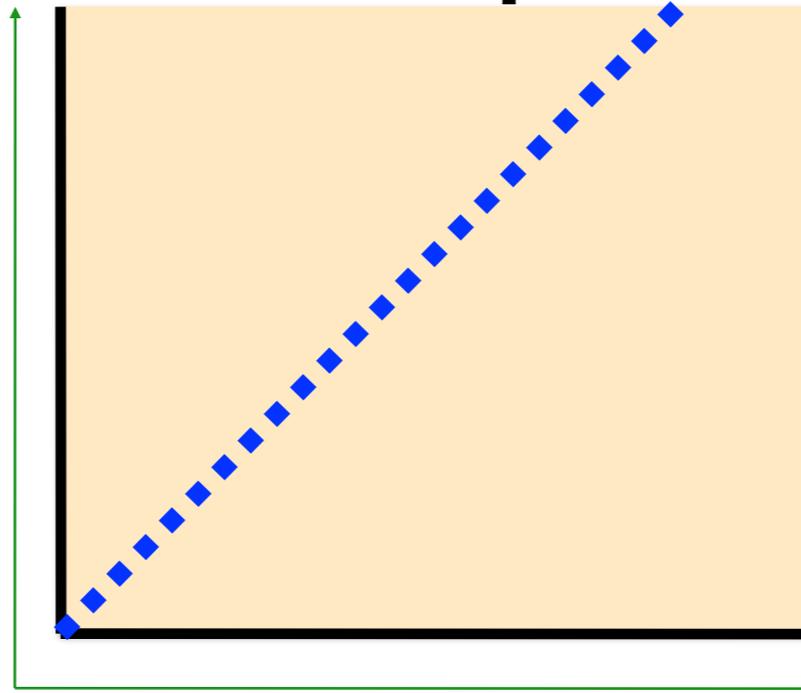
↑ Indicate direction of relationship (positive or negative)

Correlation Coefficient

Rule of thumb:

- Around .10 - weak
- Around .30 - moderate
- Over .50 – strong
- +1 is a maximum perfect correlation

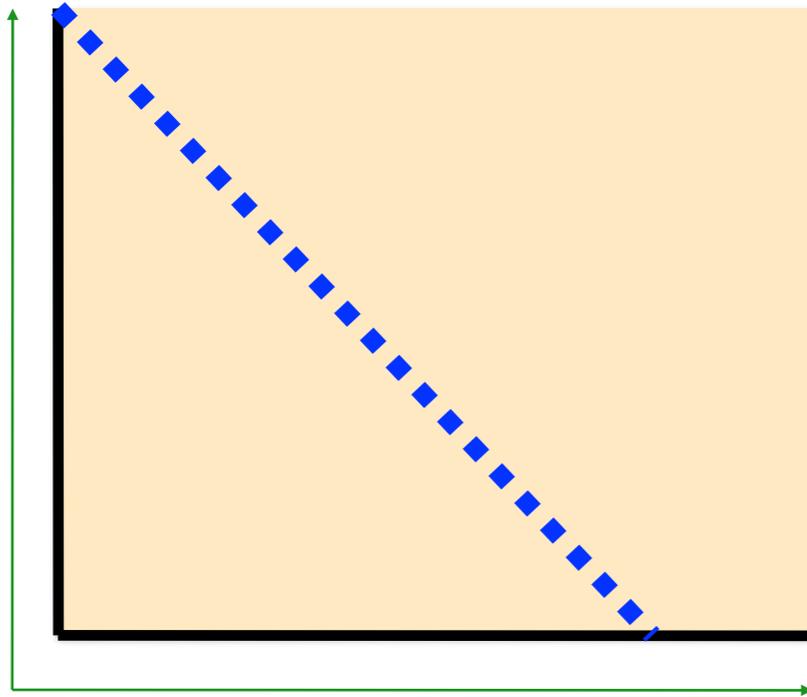
Scatterplots



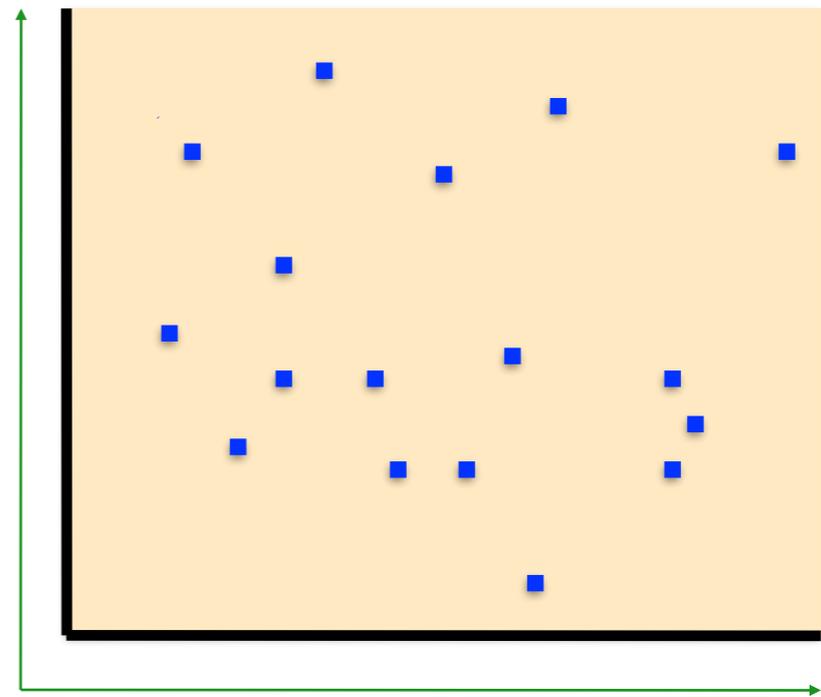
Perfect positive
correlation (+1.00)

Scatterplot is a graph that comprises of points generated by values of two variables. The slope of points depicts the direction, and the amount of scatter the strength of relationship.

Scatterplots



Perfect negative
correlation (-1.00)

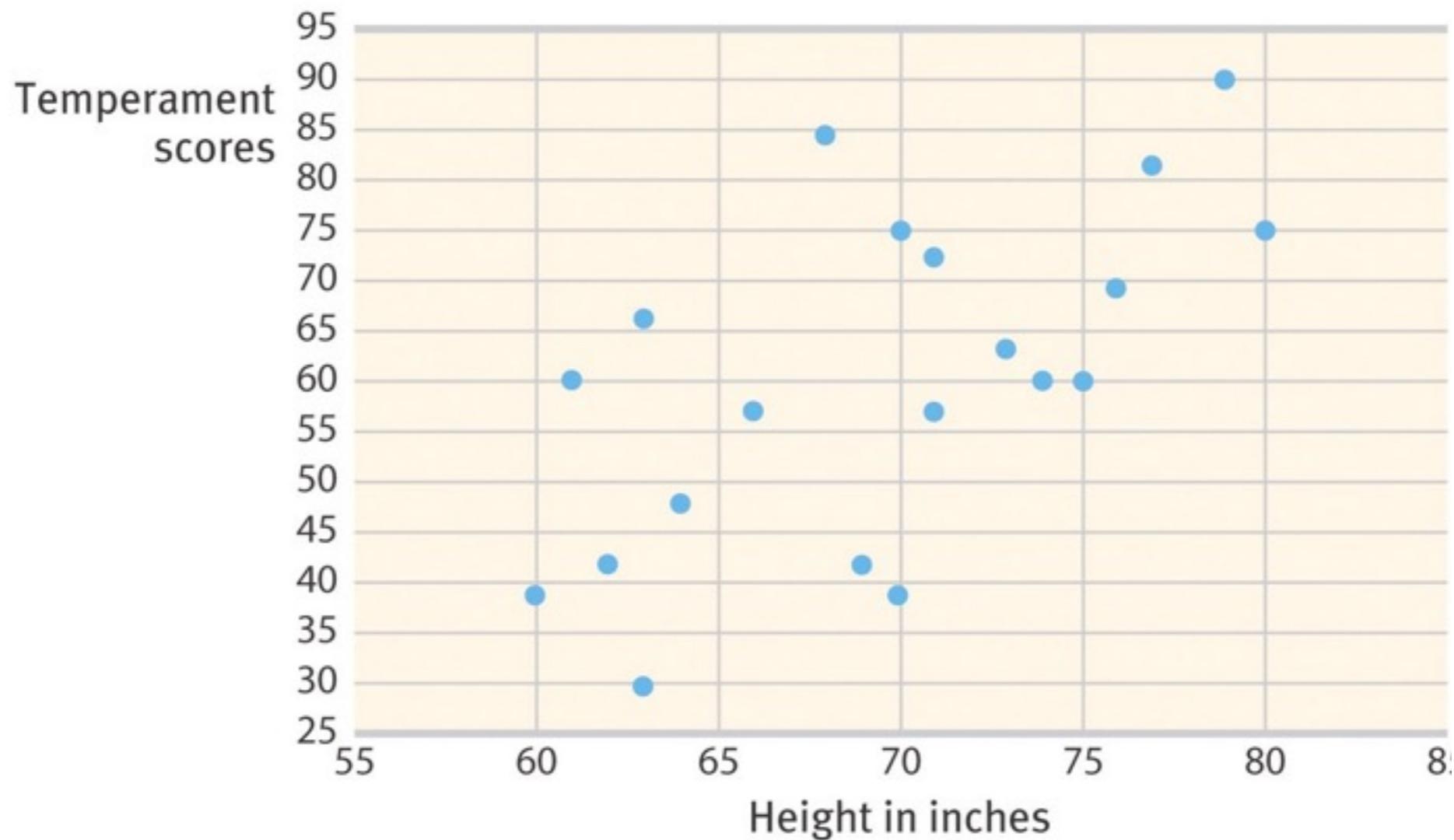


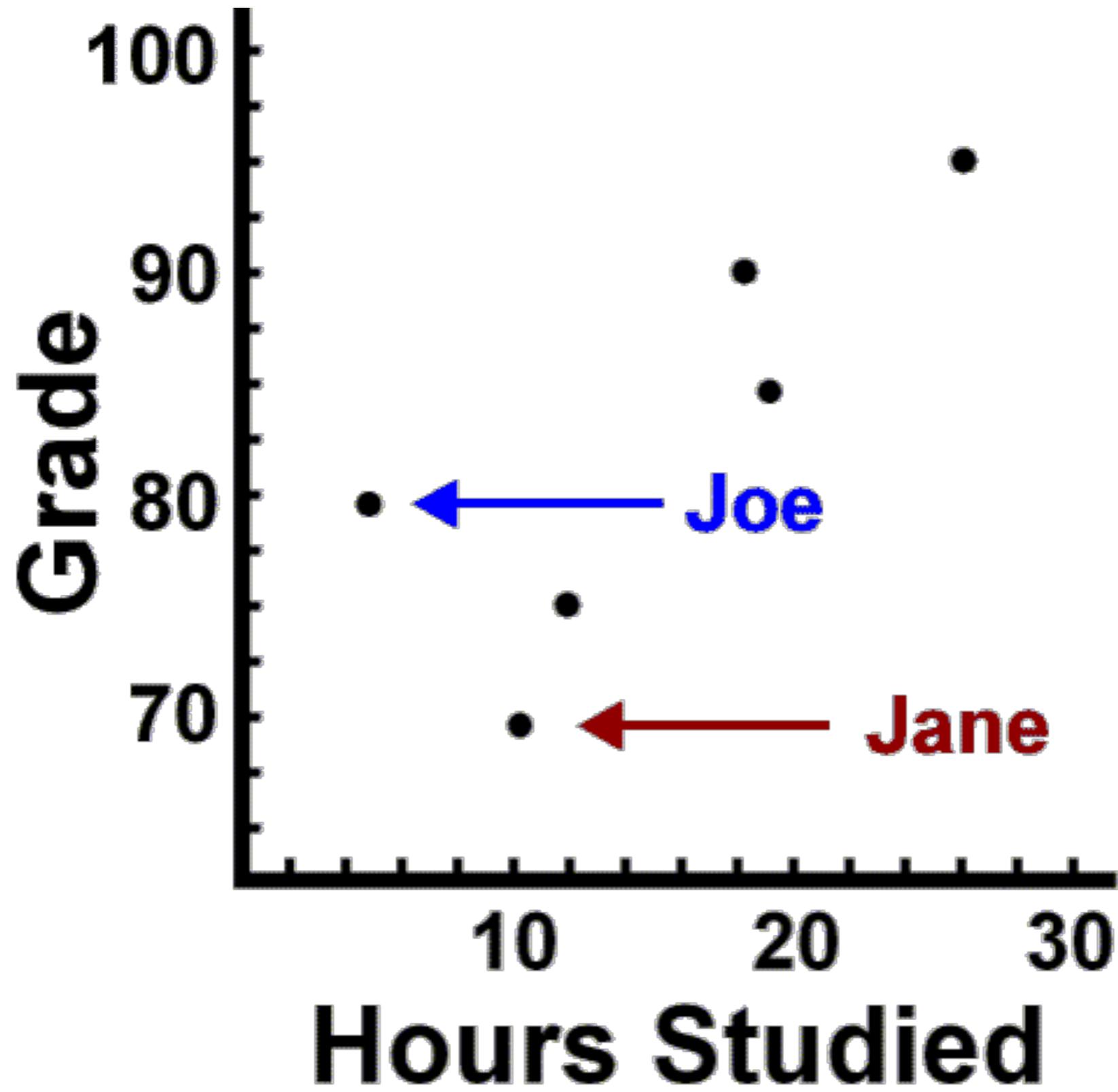
No relationship (0.00)

Scatterplot on the left shows a negative correlation, and the one on the right shows no relationship between the two variables.

Scatterplot

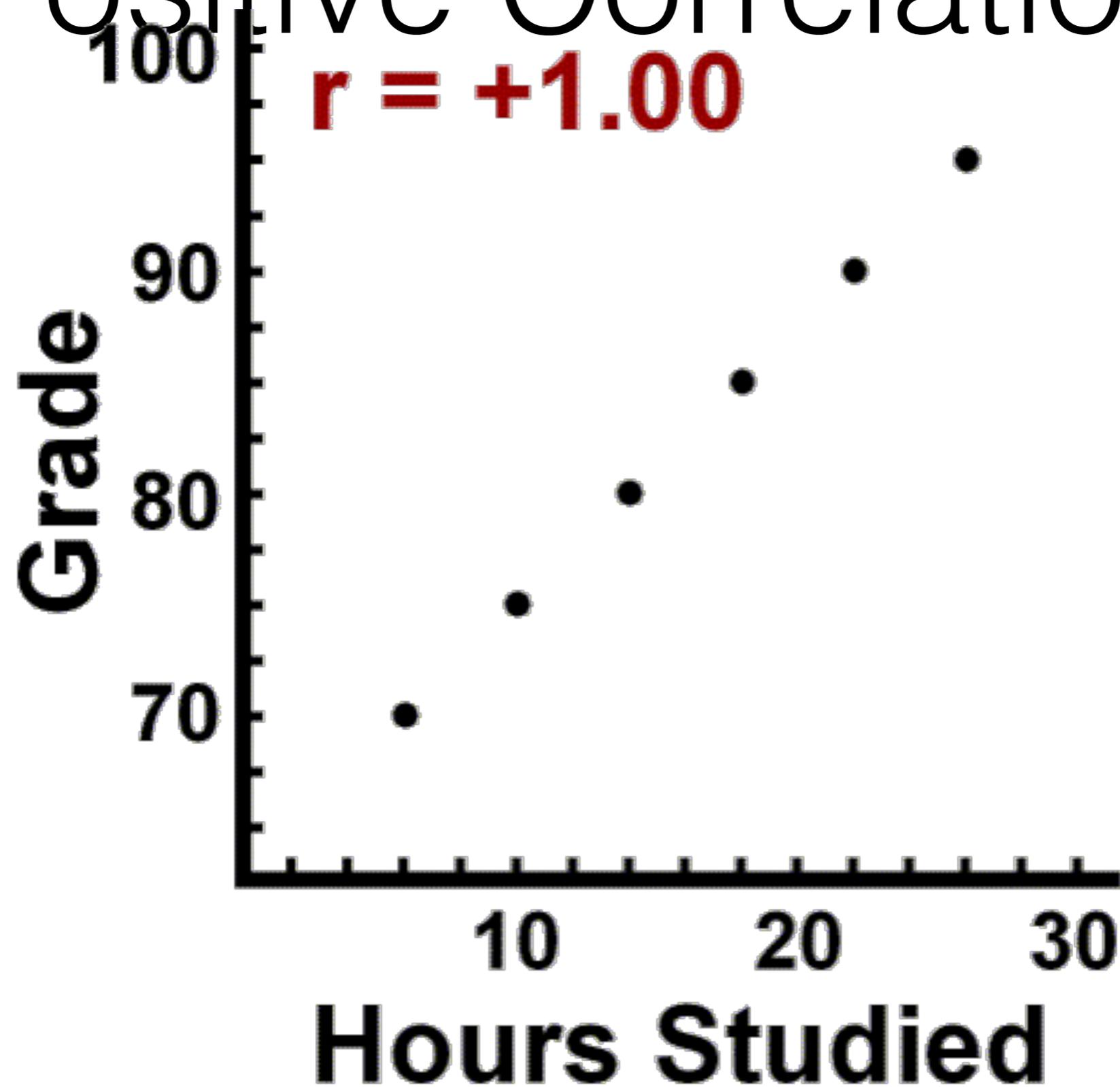
Scatterplot showing relationship between height and temperament in people with a moderate positive correlation of +0.63.



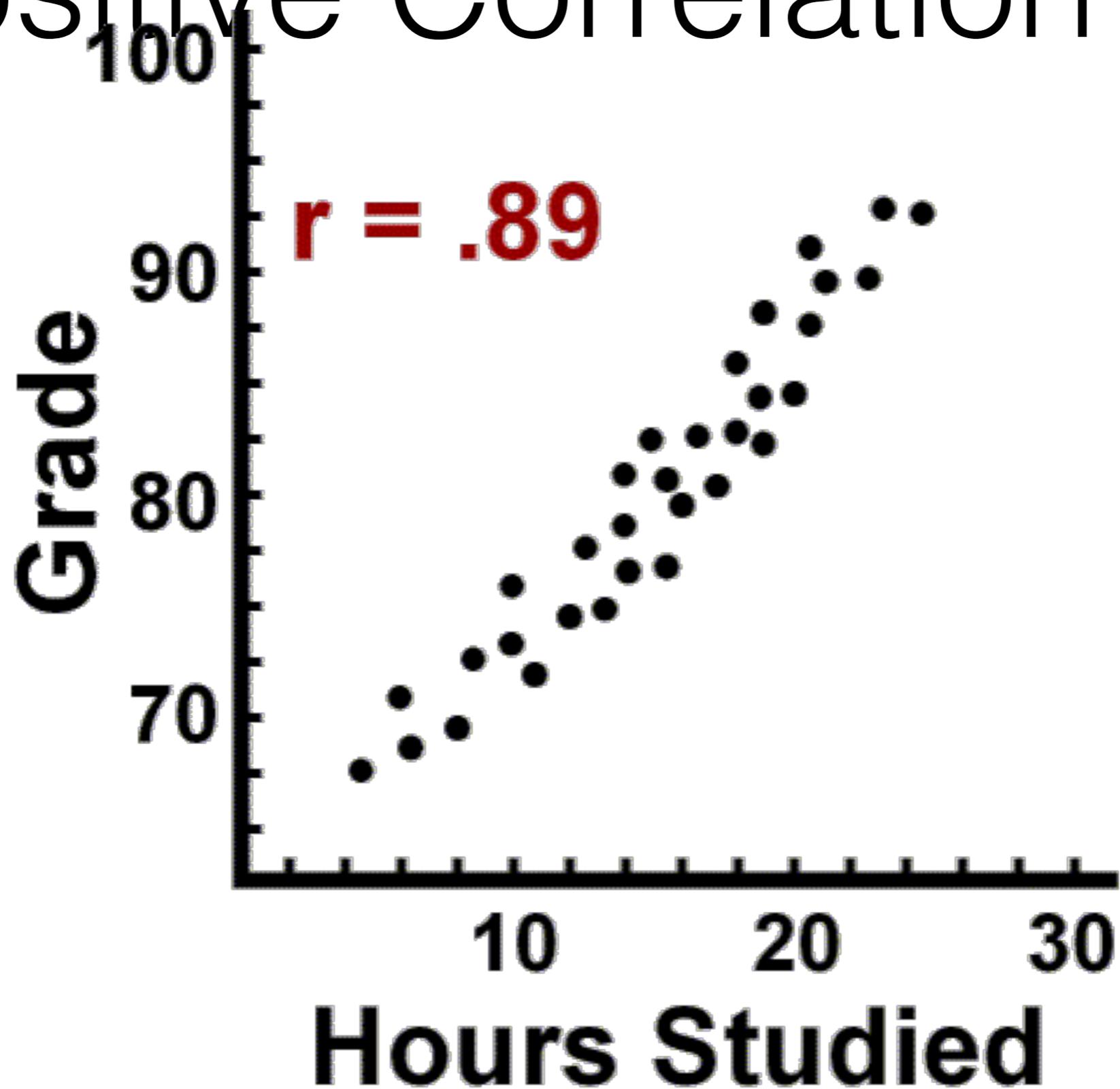


Hours Studied

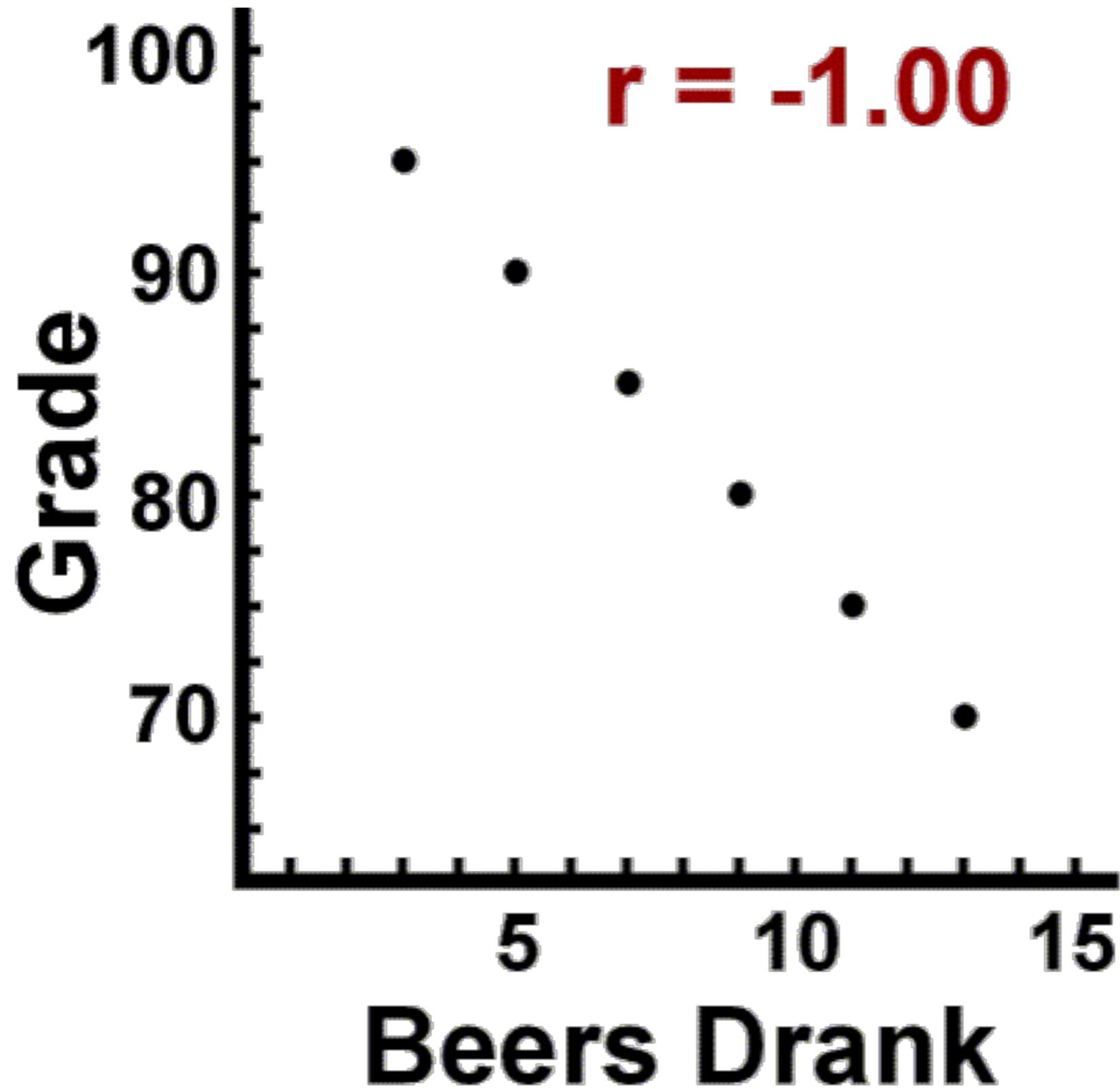
Positive Correlation



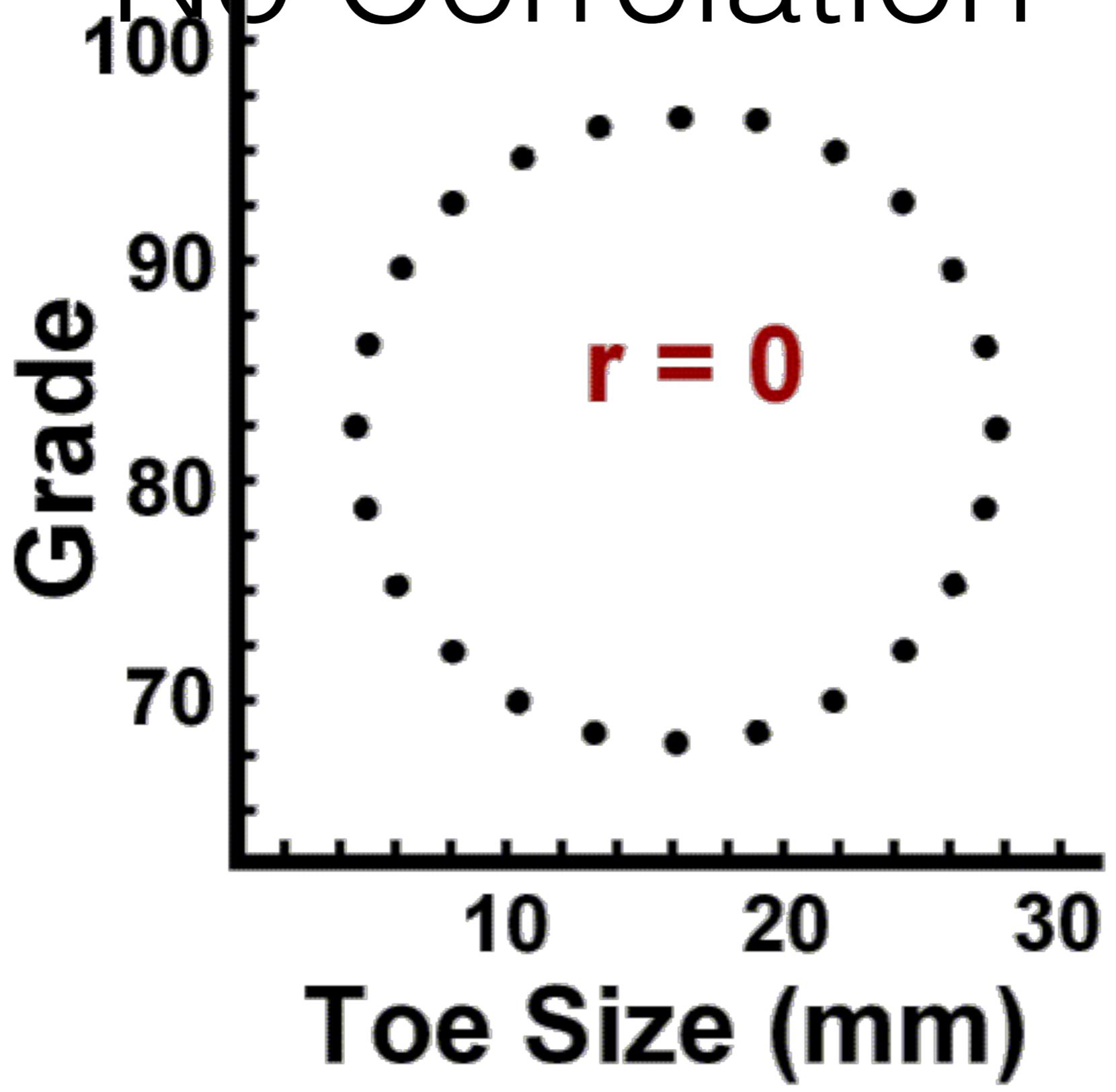
Positive Correlation



Negative Correlation



No Correlation



Remember!

- y axis (vertical) is the dependent variable (the effect)
- x axis (horizontal) is the independent variable (the cause)

correlation project necessities

- **Make a survey**- hide your “real” questions
- **informed consent** - “I _____(name) understand that I am participating in a psychology class survey and may quit at any time” x _____(signature)
- **Debriefing**- verbally or written- tell them the purpose of the survey. Give them a chance to give you their email for the results

qualitative research

case study

A technique in which one person is studied in depth to reveal underlying behavioral principles.

genie



Survey

- A technique for ascertaining the self-reported attitudes, opinions or behaviors of people
- questioning a *representative, random* sample of people.



SurveyMonkey®

Survey

Wording Effect

Wording can change the results of a survey.

Q: Should hats not be allowed at Lakewood High School?

Q: Should hats be forbidden at Lakewood High School?

How to Make a Survey

- **Likert Scale**- 1-5 scale used to score responses
- scale should be odd #s. 1-5, 1-7, 1-9 so that there is neutral

Ice cream is good for breakfast

1. Strongly disagree
2. Disagree
3. Neither agree nor disagree
4. Agree
5. Strongly agree

Naturalistic Observation

Observing and recording behavior of animals in the wild, to recording self-seating patterns in lunch rooms in a multiracial school constitutes naturalistic observation.



Sampling

- you need subjects.
- **a representative sample**- represents a population

Opportunity Sampling

- sample of who happens to be there at the time
- used in university research
- leads to biased results. why?

self-selected sample

- volunteers.
- easy to obtain and sample motivated
- doesn't reflect general population

Snowball Sampling

- like a snowball growing as it rolls
- recruit friends
- study heroin users- find one, then more follow
- low **participant variability**- so may not be generalizable. but... useful for hard to find subjects.

random sampling

- every member has a chance of being selected
- it should generalize well
- is not a guarantee that the sample will be representative

stratified sample

- to overcome a poor random sample
- draw from each subpopulation
- if 20% hispanic, then choose 4 hispanic on a 20 person sample

ethics

IB guidelines

- informed consent
- minimal deception
- debriefing
- withdrawal from study
- confidential
- no physical/mental harm

validity and reliability

validity

- does the research claim to do what it does?
- **ecological validity**- represents what happens in real life
- **cross-cultural validity**- can research be applied to all cultures?

reliability

- can the results be replicated?