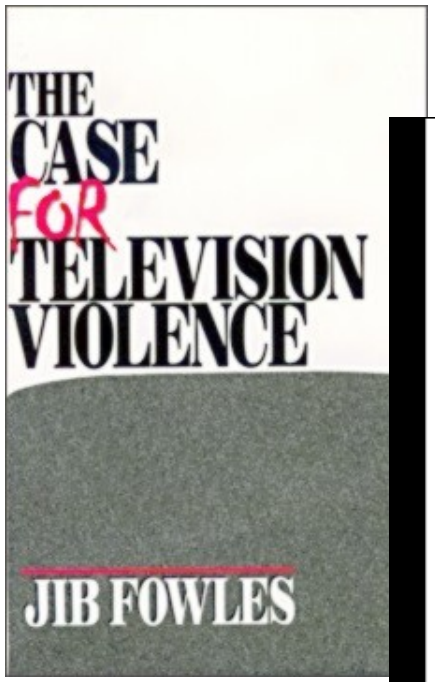
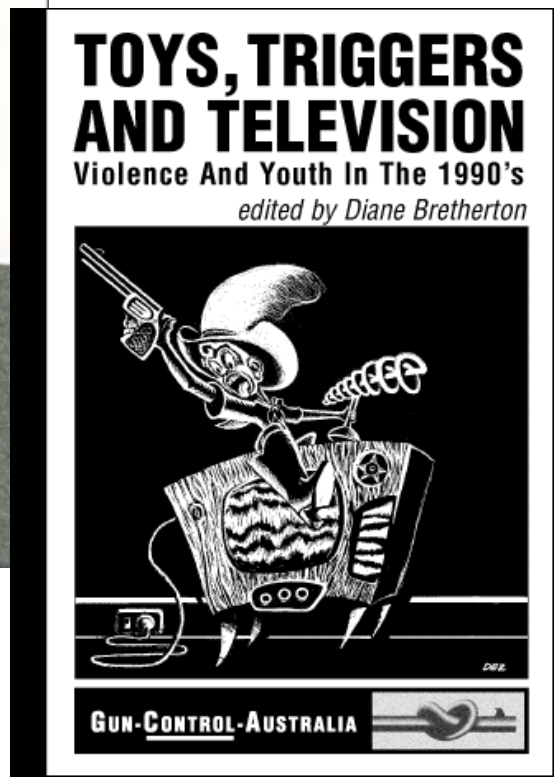
Probabilistic Science





- Correlational Research
- Experimental Research
- Statistics
- Errors and Biases
- Probabilistic Causation

Today's Music Selections:

Goals of Psychological Science

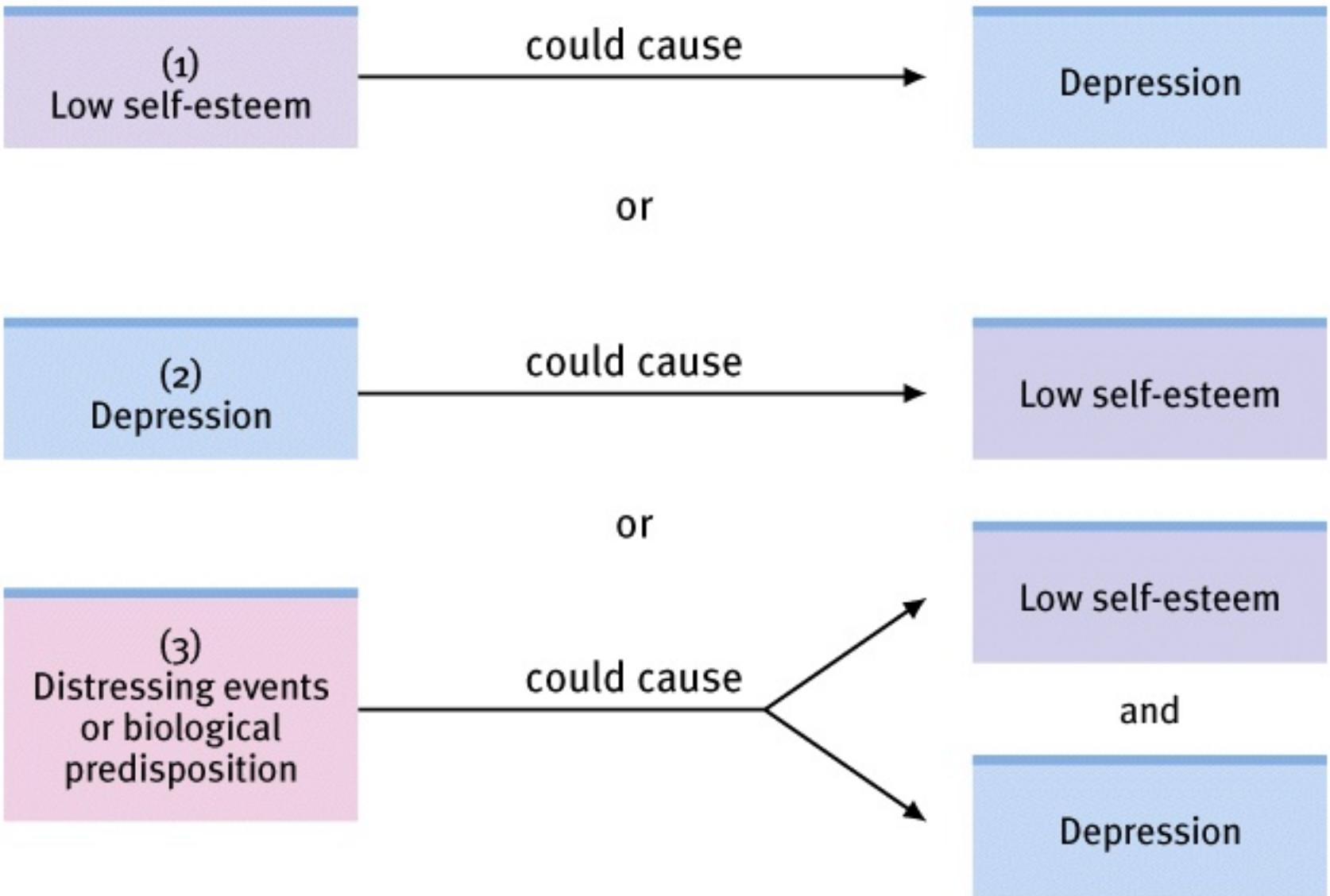
- Description: Characterize a construct (concept)
- Prediction: Identify relationship between two concepts
- Explanation: Identify underlying causes of relationship
- Control: Alter behavior based on understanding of underlying causes

Research Design

- Correlational research
- Experiments

Correlation or causation?

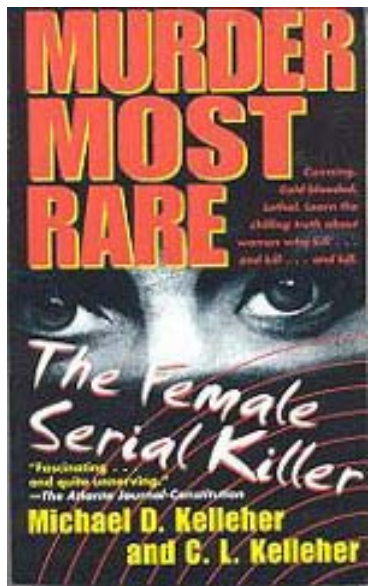
Problem	Solution
Coincidence	multiple observations comparison group
X→Y or Y→X	temporal priority
Z →X and Y	experimentation


(1)
Low self-esteem
could cause
Depression
or
(2)
Depression
could cause
Low self-esteem
or
(3)
Distressing events or biological predisposition
could cause
Low self-esteem
and
Depression

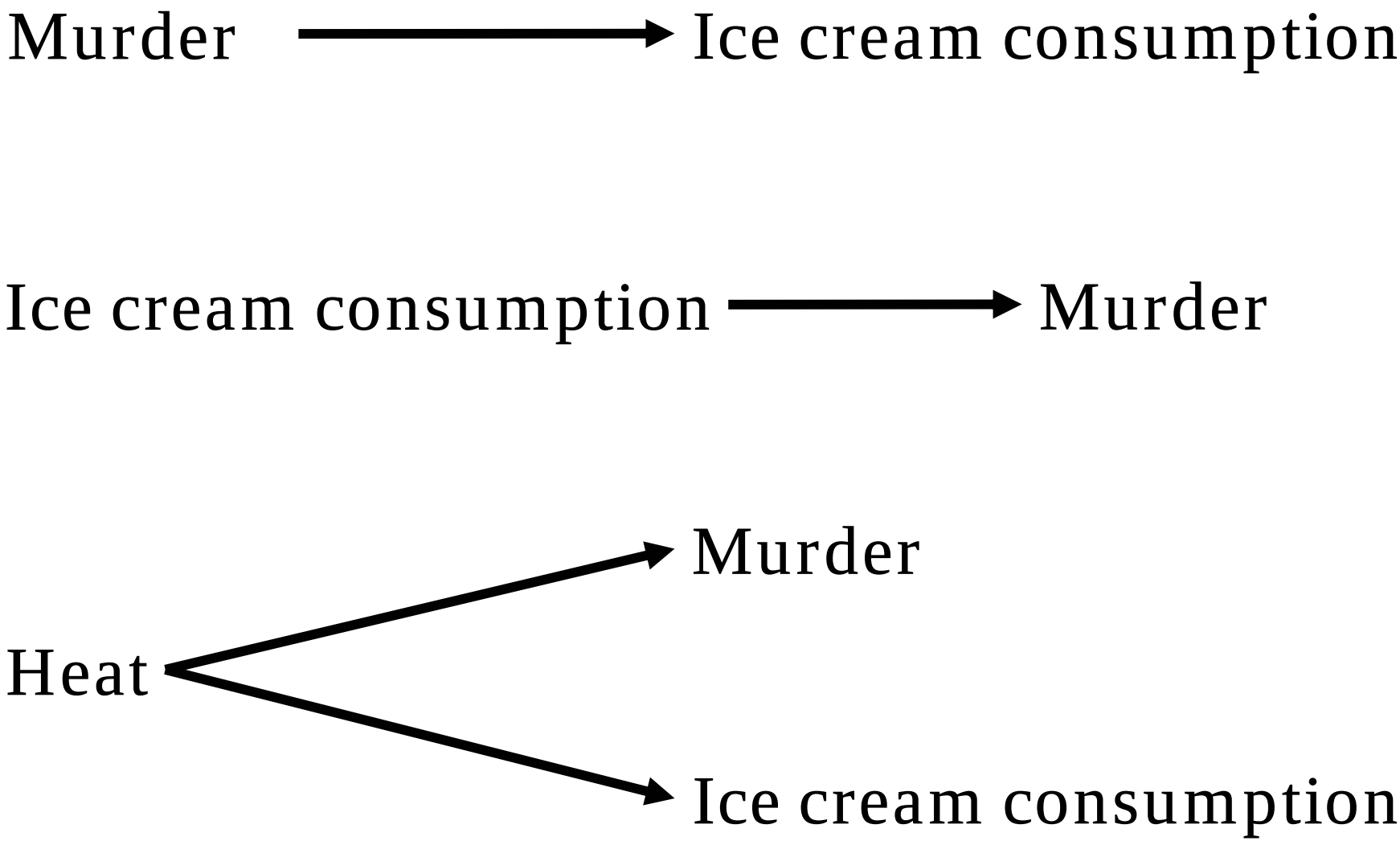
A third factor can cause a correlation between unrelated factors



??



- Ice cream consumption is higher in June, July, and August than other months
- The murder rate is higher in June, July, and August than other months
- Does eating ice cream cause murders?


Murder
Ice cream consumption
Ice cream consumption
Murder
Heat
Murder
Ice cream consumption

Causal Statements about data

Marriage Keeps Ex-Cons Out of Trouble

By Serena Gordon
From HealthScoutNews

Sept. 19 -- **If you want to avoid a life of crime, get married.**

Related Webcasts

- Heroin and Its Cousins: Recognizing Opioid Abuse
- Kicking Heroin: Is Methadone the Answer?

Ex-convicts who tied the knot were less likely to commit another crime, says a new study from University of Florida researchers. Those who couldn't make the commitment and simply lived with their significant others didn't fare as well.

The findings appear in the September issue of *Social Science Quarterly*.

"There is something about marriage that leads offenders to turn away from crime," says lead author Alex Piquero, a professor of criminology and law at the University of Florida. "But common-law relationships [or living together] actually led to more crime among non-white offenders."

Piquero says he suspects marriage brings stability and a positive routine to ex-cons' lives, along with accountability to another person. Conversely, those who just live together don't feel that same sense of responsibility and may live more erratic lifestyles, Piquero explains.

Piquero and his colleagues followed the lives of 524 young men for seven years after they had been paroled from the California Youth Authority (CYA). The CYA, according to Piquero, is the last stop for serious youthful offenders. The men -- who were in their teens and early 20s -- had been jailed for crimes such as burglary, auto theft, assault, rape and even murder. Almost 50 percent were white, 33 percent were black and nearly 17 percent were Hispanic.



After parole, the researchers followed the men's lives for seven years, keeping track of things such as marriage, employment, repeat arrests and drug or alcohol abuse. About 23 percent got married during that time period, Piquero says.

Marriage was the only lifestyle factor studied that appeared to deter crime, while living together and heroin dependency emerged as two factors that made it more likely for ex-convicts to break the law again.

Piquero says his results are encouraging because they show criminals can change and that "once an offender does not necessarily mean always an offender."

Dr. Hiten Patel, a psychiatrist at William Beaumont Hospital in Royal Oak, Mich., says he isn't surprised by the study's findings.

Marriage → Staying out of trouble

Staying out of trouble → Marriage

Responsibility? → Staying out of trouble

Responsibility? → Marriage

Savvy criminal skills?
Job opportunity?
Education?
Traditional values?

Conclusions – Correlational Research

- Always possible for ‘unseen’ variables to be influencing correlation
- Researcher task:
  - identify plausible alternative explanations
  - Measure alternative variables and show that they can’t explain relationships

Experiments

- Independent variable (IV)
- Dependent variable (DV)

- The critical feature of an experiment:

Random Assignment

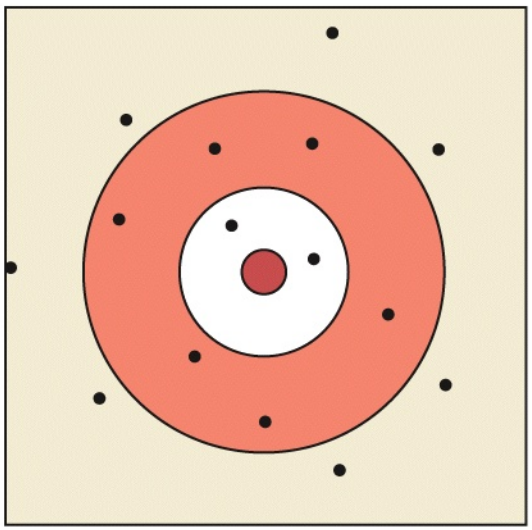
When to use experiments?

The experiment is the best method for determining cause-effect relationships, but is not always used because:

- Random assignment is impossible (e.g., sex, race)
- Random assignment is unethical (e.g., smoking, religion, parental styles)
- Random assignment is not practical or affordable (Does Oreo eating in childhood cause happiness in old age?)
- Essential realism cannot be achieved in an experimental setting (predicting marriage or divorce)

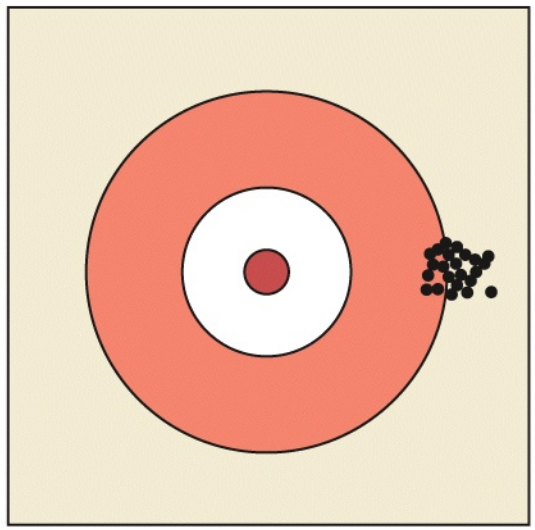
Error and Bias

- Error – random variability in effects (random error)
- Bias – non-random, systematic effects caused by a variable that is not part of the research process (systematic error)



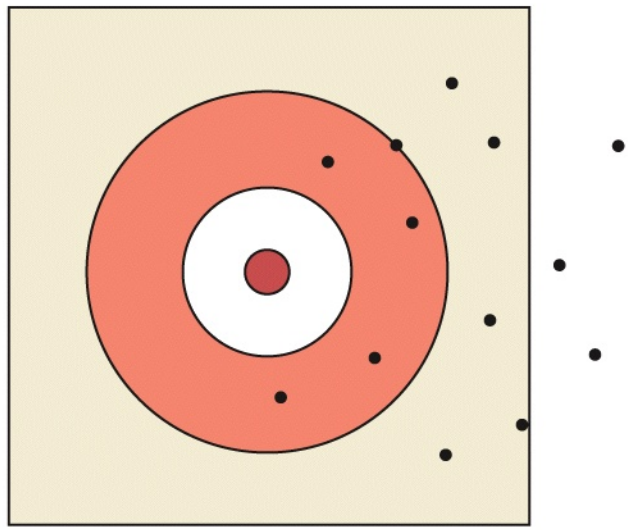
Target A
(error)

SAT performance



Target B
(bias)

Shoe Size



Target C
(error and bias)

Guess of shoe size
by height

Example: Measuring Intelligence

Study: 'Guys can afford to wait to marry'

June 27, 2002 Posted: 11:19 AM EDT (1519 GMT)

SAVE THIS EMAIL THIS
PRINT THIS MOST POPULAR

NEW YORK (Reuters) -- It's official. Men really are afraid of commitment.

Confirming what women have long known, an American study released on Wednesday shows men are dragging their feet on getting married.

Researchers say one of the biggest reasons that men are delaying marriage is that more and more couples are choosing to live together before marriage. As a result, sex -- traditionally one of the main reasons for men to marry -- is relatively easily available, they say.

"In a sense, with cohabitation he gets a quasi-wife without having to commit," said David Popenoe, co-director of the National Marriage Project at Rutgers University in New Jersey.

"Another big thing in addition to cohabitation is that these men are very, very concerned about divorce. It's not getting your heart broken ... the worst thing that could happen is that somebody could take their money," Popenoe adds.

The preliminary findings report on the attitudes toward marriage of 60 unmarried, heterosexual men, between the ages of 25-33. The participants, from different religious, ethnic and family backgrounds, were from four major metropolitan areas in northern New Jersey, Chicago, Houston, and Washington, D.C.

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Claim 1: Men (compared to women) are avoiding getting married because cohabitation provides easy access to sex

Claim 2: Men (compared to women) are avoiding getting married because they are afraid of getting divorced

Evidence:
Average age for men's first marriage is 27 (23 in 1960)
[average age for women = 25 (20 in 1960)]

Questionnaires about attitudes about marriage from:
60 unmarried, heterosexual men, between the ages of 25-33

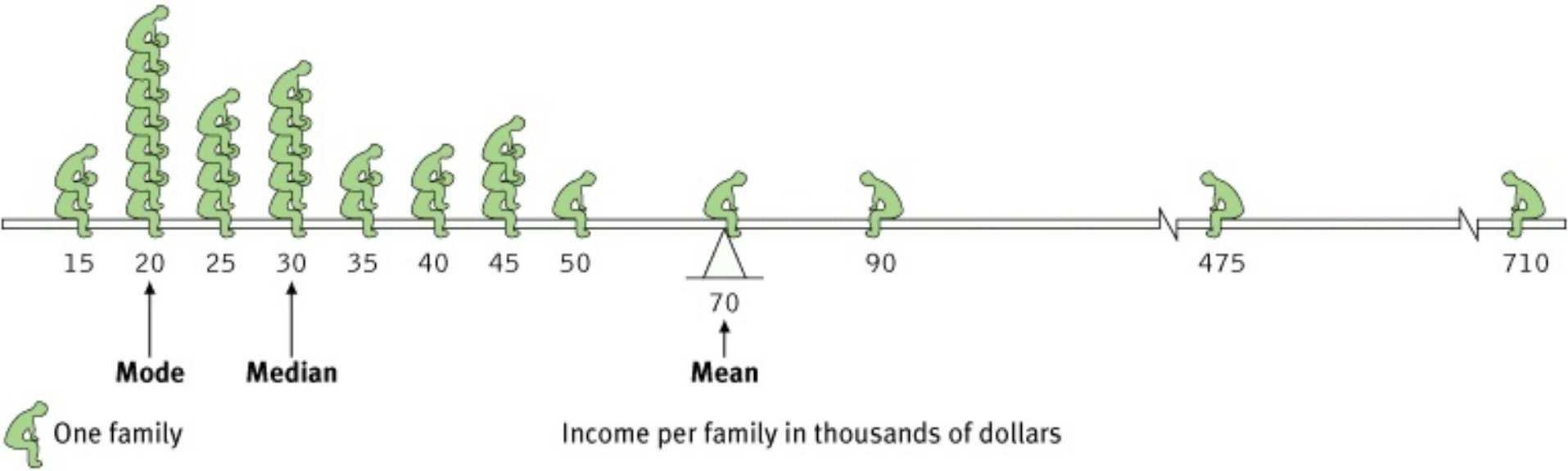
Questions:
Bias in sampling?
Comparison group?

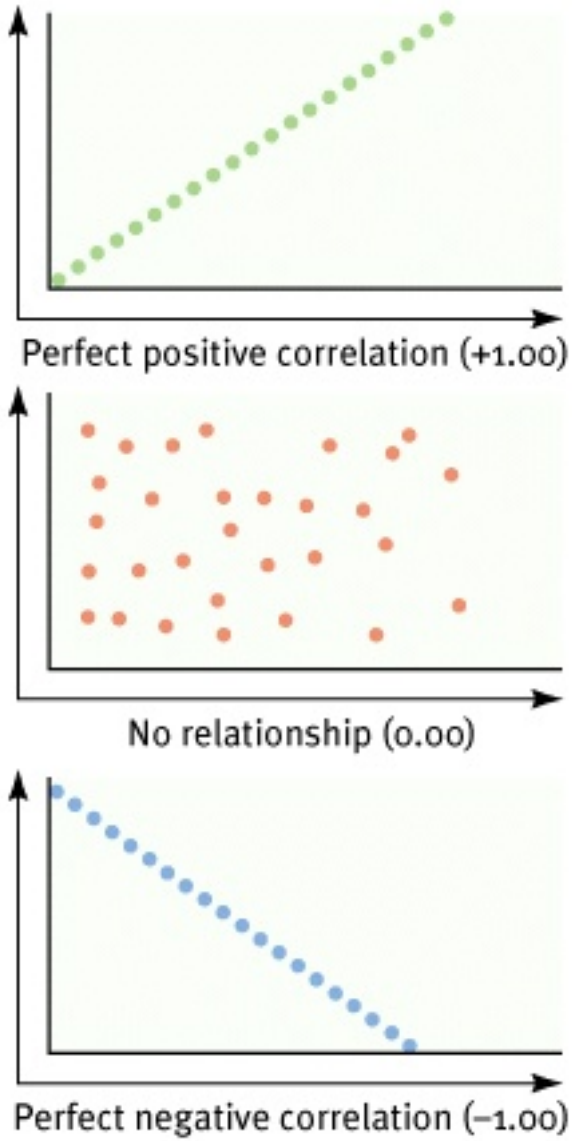
Avoiding Error and Bias

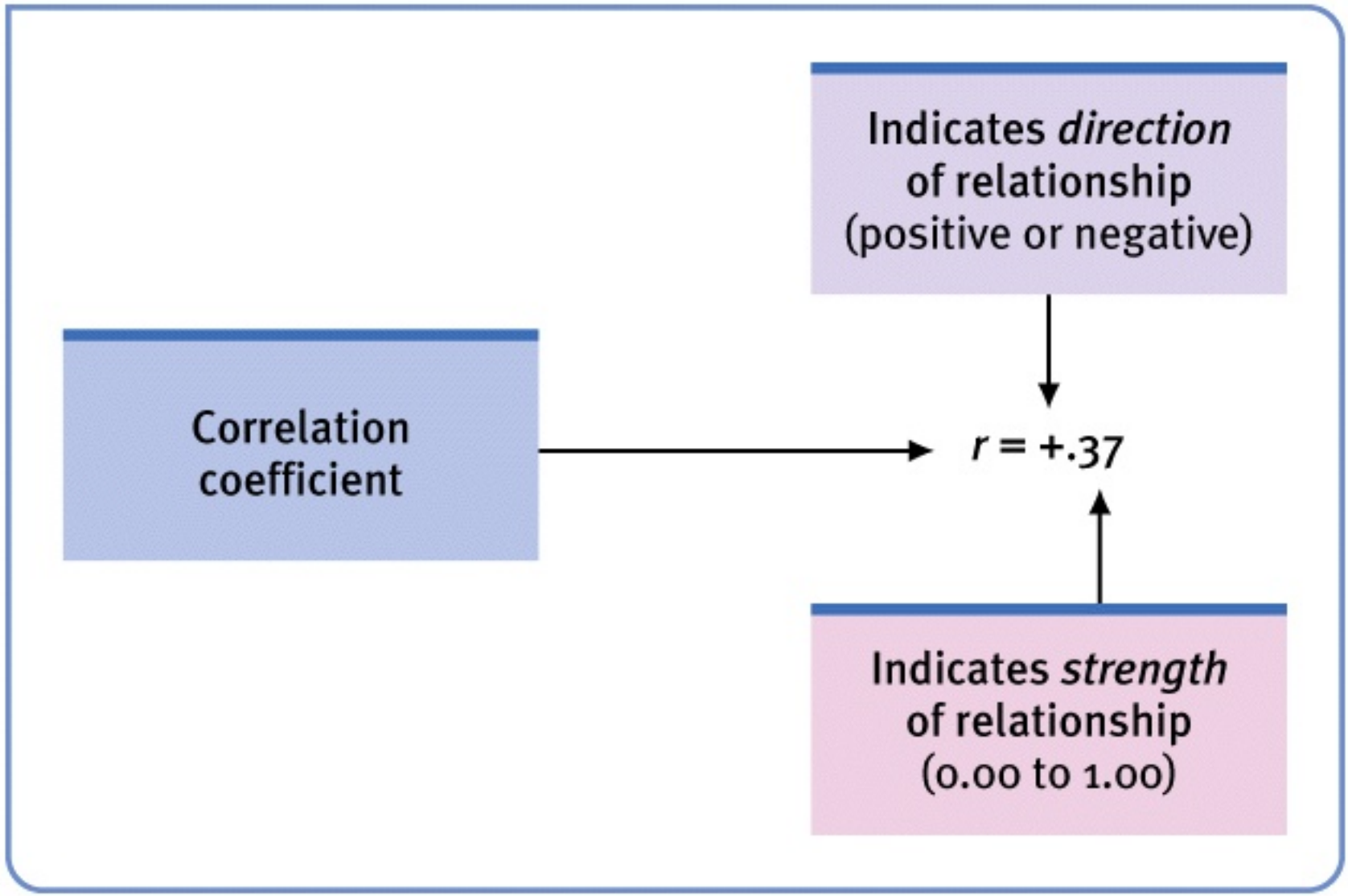
- Reliability – consistency of results over time
- Validity
  - Internal validity
  - External validity
    - Random selection

Statistics essentials

- Descriptive Statistics
  - Mean, Median
  - Variability
  - Correlations


15
20
25
30
35
40
45
50
70
90
475
710
Mode
Median
Mean
One family
Income per family in thousands of dollars


Perfect positive correlation (+1.00)
No relationship (0.00)
Perfect negative correlation (–1.00)


Indicates *direction* of relationship (positive or negative)
Correlation coefficient
$r = +.37$
Indicates *strength* of relationship (0.00 to 1.00)

Statistics essentials

- Descriptive Statistics
  - Mean, Median
  - Variability
  - Correlations
- Inferential Statistics
  - Statistical significance: Assumes the hypothesis is false, what is the likelihood that assumption is incorrect?

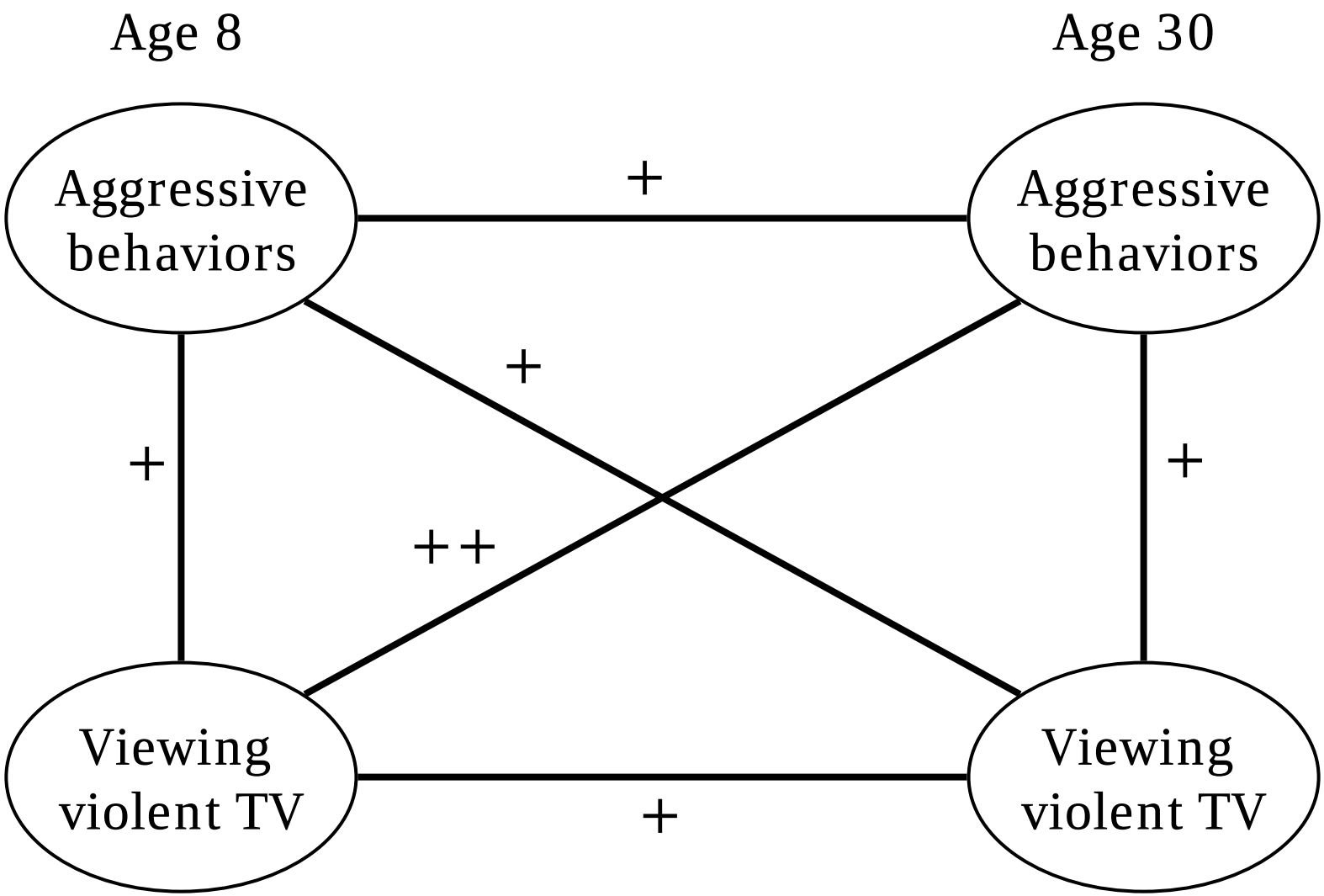
Probabilistic Causation

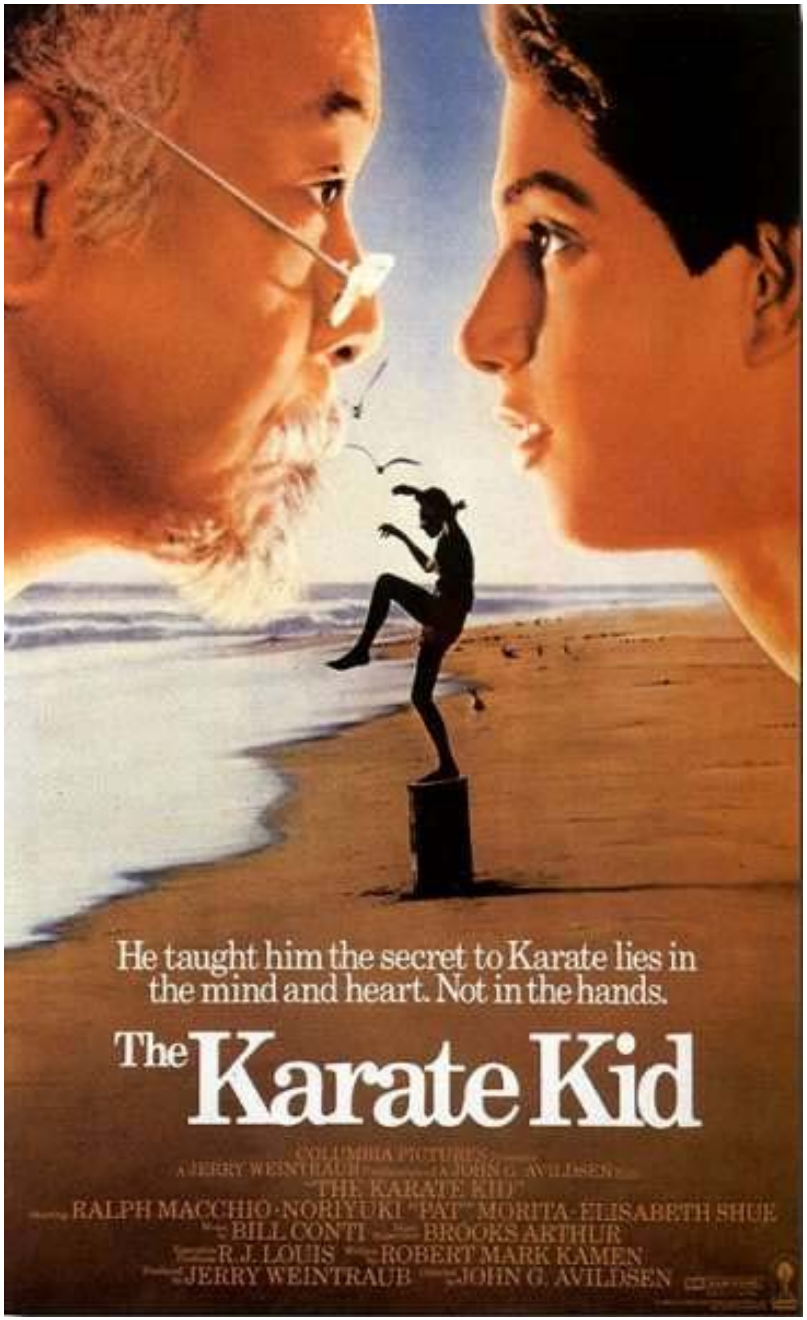
- Relations between cause and effect are not perfect, but probabilistic
- Statistical significance tests whether a relationship exists or not; effect size determines the practical significance of the effect
- Examples
  - Saccharin causes cancer
  - Television violence causes aggressiveness

Correlational evidence for TV-aggressiveness link

- Between 1957-1974 the homicide rate doubled
- During the same time period TV watching became a mainstay of society

Cross-lagged Correlation Design





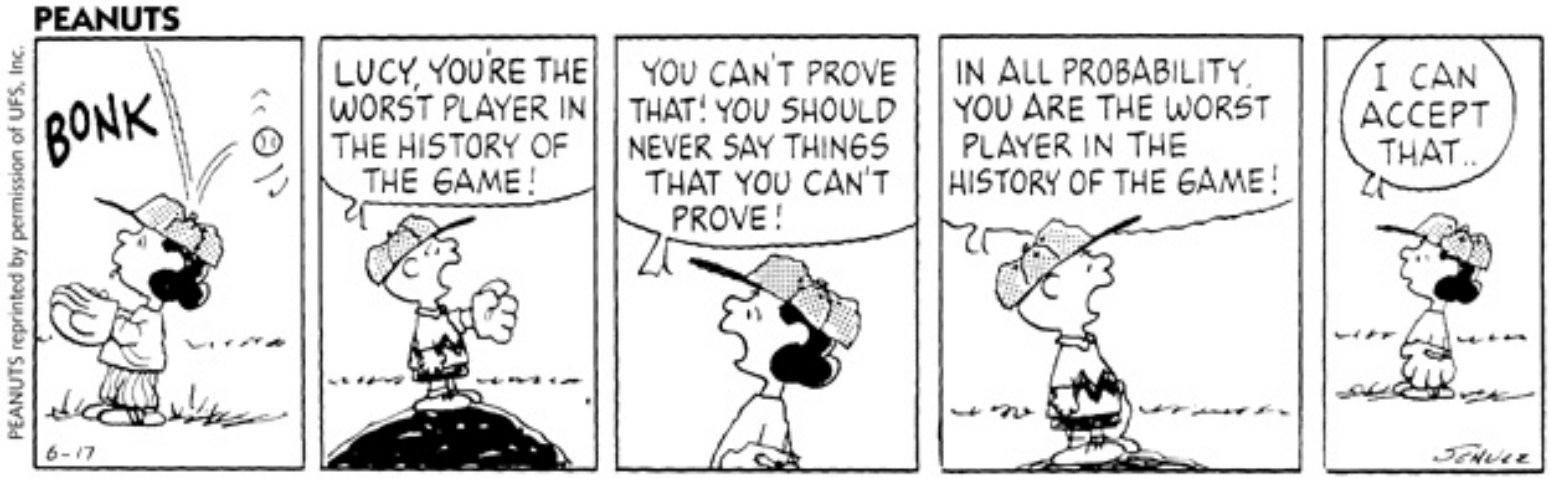
Experimental Evidence

- 4th and 5th graders
- Karate Kid or scenes from 1984 Olympics
- Watch two 6-year olds over video hookup
- Alert experimenter if they get concerned about kids behavior
- Children exposed to Karate Kid took twice as long to alert experimenter
- Claim: violent images desensitized children to violence

Conclusion – TV and aggression

- Evidence comes in many forms – no one study explains everything
- Violent TV/video games are associated (correlated) with aggressiveness
- Watching violent TV or playing violent video games appears to cause increases in aggressive tendencies and desensitizes viewers to violent acts

Summary



- Correlation does not necessarily mean causation
- Experiments are the best way to test for causation
- Causal factors are probabilistic, not definitive

Next Time: Jan 30th – Biological Basis of Behavior