



## Chapter 2

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# Reading the News

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# Thought Question 1:



Advice columnists sometimes ask readers to **write and express their feelings** about certain topics.

Ann Landers asked whether they thought engineers make good husbands.

Do you think the **responses** she got are **representative of public opinion**? Explain why or why not.

## Thought Question 2:



**Taste tests** of new products are often done by having people **taste both the new product and an old familiar standard.**

Do you think the results would be **biased if the person handing the products to the respondents knew which was which?**  
Explain why or why not.

# Thought Question 3:

Nicotine patches are attached to the arm of someone who is trying to quit smoking and dispense nicotine into the blood.

Suppose you read a study showing **nicotine patches were twice as effective in getting people to quit smoking as “control” patches** (made to look like the real thing). Further, suppose you are a smoker trying to quit.

**What questions would you want answered about how the study was done and its results before you decided whether to try the patches?**



# Thought Question 4:



For a **door-to-door survey** on opinions about various political issues, do you think it **matters who conducts the interviews?**

Give an example of how it might make a difference.

# 2.1 The Educated Consumer of Data



## What Are Data?

**Data** = plural word referring to a *collection of numbers* or other pieces of information *to which meaning has been attached*.

**Numbers 1, 3, and 10** are not necessarily data, but **become data** when told these were **weight gains** in grams of 3 infants in Salk's heartbeat study.

# Don't Always Believe What You Read



Newspapers *rarely* present actual data.

**Meaning** attached to data and results **depends on how well info was obtained and summarized.**

## 2.2 Origins of News Stories



- Academic Conferences
- Published Articles in Scholarly Journals
- Government and Private Agency Research Reports
- University Media Office



## 2.3 How to be a Statistics Sleuth: Seven Critical Components



### Component 1:

The *source* of the research and of the *funding*.

### Component 2:

The *researchers* who had *contact* with the participants.

### Component 3:

The *individuals* or objects studied and how they were *selected*.

# Seven Critical Components *(cont.)*



## Component 4:

The exact nature of the *measurements* made or *questions* asked.

## Component 5:

The *setting* in which the measurements were taken.

## Component 6:

*Differences* in the groups being compared, *in addition* to the factor of interest.

## Component 7:

The *extent* or *size* of any claimed effects or differences.

## **Component 1:**

The *source* of the research and of the *funding*.

### **Three main reasons studies are conducted:**

1. By Government/Private Companies to make wise policy decisions.
2. Universities/Institutes paid to ask/answer questions about the world around us.
3. Companies to convince consumers their program or product is better.

**Not always easy to discover *who* funded research.**

**Ask: Would funding organization have a strong preference for a particular outcome?**

## Component 2:

The *researchers* who had *contact* with the participants.



- Know who actually had contact with participants and what message they conveyed.
- Participants often give answers or behave in ways to comply with desires of researchers.
- If possible, ‘blind’ interviewer and respondent.

**Example of bad method:** Sending uniformed police officers door to door to survey about illegal drug use.

## Component 3:

The *individuals* or objects studied  
and how they were *selected*.



- Results extend only to individuals similar to those in the study.
- Know how participants were enlisted for study.
- Responses from *volunteers* may differ in relevant ways from responses of non-volunteers.
- Voluntary responses to surveys often *biased* as only those who feel strongly likely to respond.

## Component 4:

The exact nature of the *measurements* made  
or *questions* asked.

- Some things *difficult to measure* precisely.
- Need to know the *exact definitions* used.
- *Wording/ordering* of questions influences answers.
- Need to know the exact wording used.

**Examples:** How to define ‘eat breakfast’?  
What if just juice or if eat snack at 11 am?  
Question about ‘street people’ versus ‘families  
with no home’ might yield different responses.

## Component 5:

The *setting* in which the *measurements* were taken.



**Setting** → *when* and *where* measurements taken and *how* respondents were

### Examples:

- Opinions about locking away criminals would change after highly publicized murder case.
- Telephone calls in early evening would exclude those who work evenings or often eat out.
- Research in a lab or university office may not extend to a natural setting.

## Component 6:

*Differences* in the groups being compared,  
*in addition* to the factor of interest.



If two or more groups are compared on a factor of interest, important to *consider other ways the groups may differ* that might influence the comparison.

**Example:** *Smoking marijuana and academic performance*

- Researcher may find people who smoke have *lower* test scores than those who do not.
- Difference might be explained by other *extraneous factors*, such as motivation – those who smoke also less motivated to study even if they didn't smoke.



## Component 7:

The *extent* or *size* or *causal nature* of any claimed effects or differences.



Media may state a **treatment had an effect** or a difference was observed, but often **don't tell you the size** of effect or difference → hard to assess if results are of *practical importance*.

### **Example:** *Aspirin and Heart Attacks*

- Media reported taking aspirin every other day reduced the risk of heart attacks. Is it worthwhile to take aspirin?
- Better to say rate was reduced from 17 attacks per 1000 without aspirin to about 9.4 attacks per 1000 with aspirin.

## 2.4 Four Hypothetical Examples of Bad Reports



1. “Study Shows Psychology Majors Are Smarter Than Chemistry Majors”
2. “Per Capita Income of U.S. Shrinks Relative to Other Countries”
3. “Researchers Find Drug to Cure Excessive Barking in Dogs”
4. “Survey Finds Most Women Unhappy in Their Choice of Husbands”

# Hypothetical News Article 1



## **STUDY SHOWS PSYCHOLOGY MAJORS ARE SMARTER THAN CHEMISTRY MAJORS**

A fourth-year psychology student, for her senior thesis, conducted a study to see if students in her major were smarter than those majoring in chemistry. She handed out questionnaires in five advanced psychology classes and five advanced chemistry labs. She asked the students who were in class to record their grade-point averages (GPAs) and their majors. Using the

data only from those who were actually majors in these fields in each set of classes, she found that the psychology majors had an average GPA of 3.05, whereas the chemistry majors had an average GPA of only 2.91. The study was conducted last Wednesday, the day before students went home to enjoy Thanksgiving dinner.

# “Study Shows Psychology Majors Are Smarter Than Chemistry Majors”



**Component 1:** The *source* of the research and of the *funding*.

- Senior thesis project conducted by psychology major, probably paid for by the student.
- Would she have reason to want the results come out the way they did?
- If properly conducted, motives of experimenter should be minimized.

# “Study Shows Psychology Majors Are Smarter Than Chemistry Majors”



**Component 2:** The *researchers* who had *contact* with the participants.

- Appears only student conducting study had contact with respondents.
- Unclear if she told purpose of study.
- Any clues to desired outcome could bias results.

# “Study Shows Psychology Majors Are Smarter Than Chemistry Majors”



**Component 3:** The *individuals* or objects studied and *how* they were selected.

- Measurements on advanced psychology and chemistry students that were in class/lab *day before a holiday*.
- Less conscientious students more likely to leave early and miss class.
- Easier to make up class than a lab ➡ larger proportion of students with low GPA absent from psychology class than from chemistry lab.
- Missing students ➡ overestimate average GPA for psych. students more so than for chem. students.

# “Study Shows Psychology Majors Are Smarter Than Chemistry Majors”



**Component 4:** The exact nature of the *measurements* made or *questions* asked.

- GPA was “self-reported” and some students may not know GPA or one group may be more likely to know exact value than the other.
- Better method → obtain GPA from registrar.
- Is GPA a standard measure? Is grading more competitive on one department than other?
- Does GPA measure intelligence?

# “Study Shows Psychology Majors Are Smarter Than Chemistry Majors”



**Component 5:** The *setting* in which the measurements were taken.

- Measurements taken on *day before a holiday* and many students may have left early.
- Students with low grades more likely absent from psychology class than from chemistry lab.
- Students’ responses were anonymous
  - ➡ no accountability for incorrect answers.



# “Study Shows Psychology Majors Are Smarter Than Chemistry Majors”



**Component 6:** *Differences* in the groups being compared, *in addition* to the factor of interest.

- Factor of interest = student’s major (psych vs chem)
- Would the surveyed students *differ* in ways other than choice of major?
- At some universities, students required to have certain GPA before they can become a psych major.
- Universities with a premed major might have the better science students in premed and not chemistry.

# “Study Shows Psychology Majors Are Smarter Than Chemistry Majors”



**Component 7:** The *extent* or *size* of any claimed effects or differences.

## **Reported:**

- 3.05 GPA for psychology
- 2.91 GPA for chemistry.

## **Not Reported:**

- how many students in each group
- what % of all students in each major were represented
- how much variation among GPAs within each group

# Hypothetical News Article 2



## PER CAPITA INCOME OF U.S. SHRINKS RELATIVE TO OTHER COUNTRIES

An independent research group, the Institute for Foreign Investment, has noted that the per capita income of Americans has been shrinking relative to some other countries. Using per capita income figures from the *World Almanac* and exchange rates from last Friday's financial pages, the organization warned that per capita

income for the United States has risen only 10% during the past 5 years, whereas per capita income for certain other countries has risen 50%. The researchers concluded that more foreign investment should be allowed in the United States to bolster the sagging economy.

# “Per Capita Income of U.S. Shrinks Relative to Other Countries”



**Component 1:** The *source* of the research  
and of the *funding*.

- An “*independent*” research group does not imply an *unbiased* research group.
- Last line illustrates *possible motive* for research.

**Component 2:** The *researchers* who had  
*contact* with the participants.

- Not relevant as no participants in the study.

# “Per Capita Income of U.S. Shrinks Relative to Other Countries”



**Component 3:** The *individuals* or objects studied and *how* they were selected.

- Countries were compared to U.S. but we don't know which countries were used, and why.

**Component 4:** The exact nature of the *measurements* made or *questions* asked.

- Current exchange rates used with older income figures.
- All figures should be adjusted to comparable measures of spending power, taking inflation into account.

# “Per Capita Income of U.S. Shrinks Relative to Other Countries”



## Components 5, 6, and 7:

The *setting* in which the measurements were taken. *Differences* in groups being compared, *in addition* to the factor of interest. The *extent* or *size* of any claimed effects or differences.

- Not relevant here, except as already discussed (adjusting for inflation, etc.).

# Hypothetical News Article 3



## RESEARCHERS FIND DRUG TO CURE EXCESSIVE BARKING IN DOGS

Barking dogs can be a real problem, as anyone who has been kept awake at night by the barking of a neighbor's canine companion will know. Researchers at a local university have tested a new drug that they hope will put all concerned to rest. Twenty dog owners responded to a newspaper article asking for volunteers with problem barking dogs to participate in a study. The dogs were randomly assigned to two groups. One group of dogs was given the drug, administered as a shot, and the other dogs were not. Both groups were kept overnight at the research facility and

frequency of barking was observed. The researchers deliberately tried to provoke the dogs into barking by doing things like ringing the doorbell of the facility and having a mail carrier walk up to the door. The two groups were treated on separate weekends because the facility was only large enough to hold ten dogs. The researchers left a tape recorder running and measured the amount of time during which any barking was heard. The dogs who had been given the drug spent only half as much time barking as did the dogs in the control group.

# “Researchers Find Drug to Cure Excessive Barking in Dogs”



**Component 1:** The *source* of the research and of the *funding*.

- Unclear *motive* for research. If funded by drug company, then incentive for favorable results.
- If properly conducted, motives should be minimized.

**Component 2:** The *researchers* who had *contact* with the participants.

- Not clear who or how long handlers were with dogs.
- If not the same handlers for both groups, differences in handlers could explain results.



# “Researchers Find Drug to Cure Excessive Barking in Dogs”



**Component 3:** The *individuals* or objects studied and *how* they were selected.

- Used dogs whose owners volunteered them as problem dogs → they may differ from general population.
- Problem behavior in dogs may have varied.
- Can't extend results to all dogs or even all problem dogs.
- Randomization to groups → can extend to all dogs similar to those in study.

# “Researchers Find Drug to Cure Excessive Barking in Dogs”



**Component 4:** The exact nature of the *measurements* made or *questions* asked.

- Measured amount of time barking as a group of dogs, so one barking dog in control group could get whole group barking and explain the results.
- Better to separate dogs and measure each individually.

**Component 5:** The *setting* in which the measurements were taken.

- Measured on separate weekends → could differ wrt weather conditions, traffic noise, etc.
- Measured outside of dogs’ natural environment.

# “Researchers Find Drug to Cure Excessive Barking in Dogs”



**Component 6:** *Differences* in the groups being compared, *in addition* to the factor of interest.

- **Randomization** → minimized overall differences in size, temperament, etc. for dogs in two groups.
- Experiment induced differences - measured on different weekends, no placebo shot to control group.

**Component 7:** The *extent* or *size* of any claimed effects or differences.

- Only told treated group barked *half as much*.  
10 minutes vs 20 minutes or 4 hours vs 8 hours?

# Hypothetical News Article 4



## **SURVEY FINDS MOST WOMEN UNHAPPY IN THEIR CHOICE OF HUSBANDS**

A popular women's magazine, in a survey of its subscribers, found that over 90% of them are unhappy in their choice of whom they married. Copies of the survey were mailed to the magazine's 100,000 subscribers. Surveys were returned by 5000 readers. Of those responding, 4520, or slightly over 90%, answered no to the question: "If you had it to do over again, would you marry the same man?" To keep the survey simple so that people would return it, only two other questions were asked. The second question was, "Do you think being married is better than being sin-

gle?" Despite their unhappiness with their choice of spouse, 70% answered yes to this. The final question, "Do you think you will outlive your husband?" received a yes answer from 80% of the respondents. Because women generally live longer than men, and tend to marry men somewhat older than themselves, this response was not surprising. The magazine editors were at a loss to explain the huge proportion of women who would choose differently. The editor could only speculate: "I guess finding Mr. Right is much harder than anyone realized."

# “Survey Finds Most Women Unhappy in Their Choice of Husbands”



## Components 1 through 7:

### **Fatal flaw = volunteer response survey**

- Of 100,000 who received survey, only 5% responded.
- Most likely to respond = those with strong opinion.
- Strong reaction to first question (women who are unhappy with current situation) would drive people to respond.
- Results not representative of ‘most women’ or even most subscribers to magazine.

# Case Study 2.1: *Who Suffers from Hangovers?*

**Source:** News Story 2 in Appendix, Original Source 2 on CD

**Component 1:** The *source* of the research  
and of the *funding*.

- News story states researchers were ‘a team at the University of Missouri-Columbia’ and study was ‘supported by the NIH’ [*National Institutes of Health*].

**Component 2:** The *researchers* who had  
*contact* with the participants.

- Not clear from news story.
- Journal states participants were enrolled in Intro Psych courses, so professors may have had contact.

## Case Study 2.1: *Who Suffers from Hangovers?*



**Component 3:** The *individuals* or objects studied and *how* they were selected.

- News story states 1,230 drinking college students, only 5 percent of whom were of legal drinking age.
- Journal adds participation fulfills a course requirement.

**Component 4:** The exact nature of the *measurements* made or *questions* asked.

- News story provides some detail, but Journal gives much more – listing the 13 symptoms, 5-point rating scale, and more.

## Case Study 2.1: *Who Suffers from Hangovers?*



**Component 5:** The *setting* in which the *measurements* were taken.

- Not specific and unclear if questions given to large group of students at same time or individually; or if responses were given anonymously.

**Component 6:** *Differences* in the groups being compared, *in addition* to the factor of interest.

- **Male/Female** was factor of interest.
- Possible extraneous variable is **body weight** – does weight difference, not gender, account for difference in hangover severity?



## Case Study 2.1: *Who Suffers from Hangovers?*



**Component 7:** The *extent* or *size* of any claimed effects or differences.

- News story does *not* report how much difference in hangover severity was found between men and women.
- Journal does *not* report a simple difference. Differences only emerged after controlling for other factors.

## 2.5 Planning Your Own Study: Defining The Components in Advance



### Question of Interest:

**Which of three local supermarkets  
has the *best* prices?**

Can't record/summarize prices  
for all items, so must sample.

# Which market has *best* prices?



**Component 1:** The *source* of the research and of the *funding*.

- Probably funding study yourself.
- Why do it? For routinely purchased items or many?

**Component 2:** The *researchers* who had *contact* with the participants.

- Who will visit stores and record prices? You or friends? If more than one person, must train them.

# Which market has *best* prices?



**Component 3:** The *individuals* or objects studied and *how* they were selected.

- Which items? Store brands or name brands?  
Include nonfood items?
- How many and how to select? The 20-30 you buy most often or a representative sample from long list?

**Component 4:** The exact nature of the *measurements* made or *questions* asked.

- Sale price or regular price? What size of product?

# Which market has *best* prices?



**Component 5:** The *setting* in which the *measurements* were taken.

- Certain times of year → certain items on sale.

**Component 6:** *Differences* in the groups being compared, *in addition* to the factor of interest.

- No additional differences wrt direct cost.
- Hidden costs? Distance to store, Longer lines, etc.

**Component 7:** The *extent* or *size* of any claimed effects or differences.

- Size of difference + hidden costs → better decision.

## Case Study 2.2: *Brooks Shoes Brings Flawed Study to Court*



**Source:** Gastwith, 1988, pp. 517-520.

1981: **Brooks sued Suave** for making shoes using a ‘V’ design used in Brooks shoes.

Brooks surveyed 121 people at track meets.

- When shown Brooks shoe (name masked), 71% identified it as Brooks and 33% of those said it was because they recognized the ‘V’.
- When shown Suave shoe (name masked), 39% identified it as Brooks and 48% of those said it was because they recognized the ‘V’.

## Case Study 2.2: *Brooks Shoes Brings Flawed Study to Court*



### **Flaws in Brooks Survey:**

- Funded/conducted by Brooks
- Untrained interviewers
- Respondents not representative of general public
- Wording of questions led to bias

### **Suave Survey:**

- 404 respondents properly sampled from population of all who bought an athletic shoe during previous year.
- Only 2.7% recognized a Brooks shoe on basis of ‘V’.

**Court:** Brooks could not claim legal rights to ‘V’ design.