

2009 StatLit Text Chapter Summaries 1

Chapter 4: Overview

Statistical Literacy 2009 Chapter Summaries

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2

Ch 1. Review

Statistics are generally used as evidence to support an argument.

C	A	R	E
Confounding	Assembly	Randomness	Error

The influences on a statistic are of four kinds: Context, Assembly, Randomness or Error.

3

Context and Ratios

Context: Related factors taken into account; the confounders not taken into account.

An easy way to take into account a related factor is to form a ratio.

One of the most basic ratios is the part-whole ratio.

This ratio is typically expressed as a percentage.

The English grammar involved gets complex.

4

Percents: Two Kinds

Percent change:

- Can be bigger than 100%.
- Can be negative.
- Can NEVER be illustrated by a pie chart

Part-whole Percent:

- Can NOT be bigger than 100%.
- Can NOT be negative.
- Can ALWAYS be illustrated by a pie chart

A **part-whole percentage** gives the size of the part measured as a percentage of the whole

5

Part-whole Grammars: Two Kinds

Percent grammar is clause based:

- Simple; should be used whenever possible
- *Percent of* always introduces the whole
- Main verb separates part from whole.
- Cannot be used in making comparisons.

Percentage grammar is phrase based:

- *Percentage of* can introduce whole or part.
- Can be used in making comparisons.
- Often used in titles of tables and graphs.

6

(1) Percent Grammar: Statements

Four components:

- Leading prepositional phrase. Whole or whole delimiter.
- "Among" prepositional phrase: always whole.
- % of _____: always whole
- Verb or opposite side of verb from % of: always part.

Examples: Part is underlined

- 20% of men are smokers.
- **Among** men, 20% are smokers.
- Smokers are 20% of men
- 20% are smokers **among** men.

7

Determiners

Determiners are conditions that determine or delimit the size of the whole or part. Determiners might include date, place, race or sex. Here are two rules:

1. Leading prepositions such as *in* and *for* modify the entire statement and are components of the *whole*.
2. Modifiers take on the part-whole status of whatever they modify. Modifiers may be leading (adjectives) or trailing (relative clauses using *who* or *what*).

8

Percent Grammar: Examples

1. In the U.S. in 1997, 23% of 8th graders have tried marijuana.
2. Among US 8th graders, 17% have used smokeless tobacco.
3. In 1991, 17% of guys (10% of gals) were involved in an affair.
4. Of those 18-24 in 1991, 61% lost their virginity by age 16.
5. In 1950s, 58% of women were virgins when married (35% in 90s).
6. Women were 35% of the labor force in 1950s, (45% in 1990s).
7. LSD has been used by 5% of U.S. 8th graders.
8. Parents should stay in bad marriage. Agree: guys 46%, gals 25%

9

Forming Percents from Table of Counts

1. Decode the question; identify the whole and part.
2. In the table, identify the appropriate whole (draw a circle).
3. Identify the part of interest from within that whole.
4. Calculate the percent: (part/whole) times 100%.

Students	Men	Women	ALL
Humanities	28	72	100
Arts	4	36	40
Science	48	12	60
ALL	80	120	200

10

Describing a Percent in a 100% Table

1. Find the whole by finding the closest margin cell with a 100%. The relevant whole can be a column, a row, or the entire table.
2. Describe the associated part within that whole.
3. Describe the percentage using this whole and part.

Students [W]	-----SEX [W]-----		
Ⓢ MAJOR	[W] MALE	[W] FEMALE	[W] ALL
Ⓢ Business	↓ 60%	↓ 20%	↓ 40%
Ⓢ Economics	↓ 10%	↓ 50%	↓ 30%
Ⓢ MIS	↓ 30%	↓ 30%	↓ 30%
ALL	100%	100%	100%

11

Percents & Percentages

Percents and percentages are often confused. Percent should only be used when it follows a number, as in 38%. Otherwise use percentage. Percent is a unit of measure (20%); percentage is what is being measured. Percents are units like inches or volts; percentages are properties like height or voltage.

12

(2) Percentage Grammar Introduction

Percentage grammar involves keywords: *percentage*, *fraction* or *proportion*. The rules are the same. Percentage grammar is commonly used in the titles for tables and graphs, and in comparisons of percentages. *Percentage grammar* is different from *percent grammar*.

- The word “percentage” never follows a number. E.g., “The percentage” or “The highest percentage”.
- The rules and clues for identifying part and whole in percentage grammar are more complex.

13

Percentage Grammar Rules

In sentences with *percentage*, the word *of* can introduce either a whole or a part.

If *percentage* is followed by a relative clause (who are, that are), the phrase is part and *of* introduces a whole.
 E.g., The percentage of men who smoke is 20%.

If *percentage* is not followed by a relative clause, then *percentage of* introduces a part.
 E.g., the percentage of smokers is 20% among men.

14

Percentage Grammar: Statements

1. Among U.S. college freshman in 2006, the percentage who thought abortion should be legalized was 57%.
2. In 2005, the percentage of U.S. male college students who were employed part time was 23%.
3. In 2005 among U.S. college students who are black, the percentage who were employed full time was 19%.
4. In 2005 among U.S. college students who attended a two-year college, the percentage of blacks was 16 %.
5. In 2006, the percentage of U.S. college students who are whites who attended four year colleges was 44%.

15

Percentage Questions

There are two kinds of *percentage* questions:

Percentage grammar:

- What is the percentage of <whole> who are <part>?

Percent grammar: What percentage ...

- of <whole> are <part>?
- of <whole> who are <whole> are <part>?

Bad form: What percent of <whole> are <part>?

16

Percent to Percentage Grammar

Converting from percent to percentage grammar is hard if there is a relative clause following “% of.”

Compare “10% of students who are blacks play sports” with “The percentage of students who are blacks who play sports is 10%.” This conversion is wrong. It makes *blacks* part when *blacks* was originally whole.

One way to avoid this problem is to convert the trailing relative clause to a leading adjective (black students) which gives “the percentage of black students who play sports is 10%.”

17

Sports Grammar

Sports grammar is common:

- percentage of completed passes, passes completed, subscriber renewals, loans denied, defective cans; tire failures, student dropouts, or overturned verdicts.

In each of these cases, there is a natural whole.

Without a natural whole, sports grammar is ambiguous.

- percentage of female smokers; working males, infant deaths, or single mothers.

Moral: Avoid sports grammar in your writing.

18

Half Tables

Half tables are common:

- Plus: save space, focus on essentials.
- Minus: harder to read.

Class	Percentage who are Retained	Percentage who are Not Retained	All
Last Year			
Freshman	60%	40%	100%
Sophomore	75%	25%	100%
Junior	90%	10%	100%
Senior	10%	90%	100%
ALL	70%	30%	100%

19

Margin Value Rules

Margin values are Total values at the edge of a table.

Margin values are always sums or averages.

- Sums if bigger than biggest value.
- Averages if smaller than the biggest value.

Margin Value Rules: If margin value of a group, ...

- is average then group is part and members are wholes.
- is a sum, then group is whole and members are parts.

20

Half Tables

Left table: Margin value is a sum.
Group is whole, components are parts.

Right table: Margin value is average.
Group is part, components are wholes.

Percentage Distribution Of Uninsured	U.S. 2002		Percentage who are Uninsured	U.S. 2002
ALL AGES	100%		ALL AGES	15%
Teens	12%		Teens	12%
Twenties	30%		Twenties	30%
Thirties	25%		Thirties	25%
Forties	18%		Forties	18%
Fifties	14%		Fifties	14%
Seniors	1%		Seniors	1%

21

Summary

Context involves what is (not) taken into account.

What is taken into account can influence

- Counts or totals (by forming ratios)
- Averages (by selection or standardizing)

Part-whole ratios are one of the most common ways of taking into account a related factor. In this case, the size of the group. Part-whole ratios standardize groups of different sizes.