

1

Introduction

Statistical Literacy 2009
Chapter Summaries

by
Milo Schield

www.StatLit.org/pdf/2009StatLitText-Ch0.ppt
www.StatLit.org/pdf/2009StatLitText-Ch0.pdf

Statistical Literacy:

Statistical literacy is the ability to **read and interpret** summary statistics in the everyday media: in graphs, tables, statements and essays.

Statistical literacy is needed by ‘data consumers.’

Schild (2010) in *Assessment Methods in Statistical Education*

3

What is Statistical Literacy?

Statistical literacy is:
 >> critical thinking about statistics in the everyday media.

The math—mainly arithmetic—is not as central as the words. Words carry more of the action than the numbers.

If a company has a 60% market share in the Eastern U.S. and a 70% market share in the Western U.S., do they have a 130% market share in the entire U.S.?
 No! The phrase, “market share in ...,” is the key.

4

Audience

Primary audience is college students in majors that do not require a math course: English, political science, journalism, history, music, art, philosophy, etc.

Secondary audience is college students in majors that require a statistical-inference course (e.g., business, psychology or sociology) but who need a bridging course to prepare them for introductory statistics.

5

Wired Magazine: Oct 2010

COURSE LISTINGS

| | | |
|-----------|-----------------------------|--|
| 1. | STATISTICAL LITERACY | Making sense of today's data-driven world. |
|-----------|-----------------------------|--|

FALL SEMESTER 2011

WIRED
UNIVERSITY!

6

THE STANFORD REVIEW *Since 1987*

Front Page News Opinion Features World Blog Search all articles.

Elam In as New Vice Provost
BY CATHERINE LOWELL — SEPTEMBER 12, 2010 — FEATURES — VOLUME XLV, ISSUE 1

“People who are engaged in [the] humanities ... need to have quantitative reasoning to survive...”

<http://stanfordreview.org/article/elam-in-as-new-vice-provost>





Importance of Statistical Literacy

I've been increasingly impressed by how important statistical literacy has become for all of us around the globe.

Statistical literacy has risen to the top of my advocacy list, right alongside numeracy, and perhaps even ahead of "algebra for all."

J. Michael Shaughnessy, NCTM President
www.StatLit.org/pdf/2010Shaughnessy-StatisticsForAll-NCTM.pdf

Small Change in Syntax; Big Change in Semantics



Edison 2009/09/26

Context: "Confusion of the Inverse"

AP: 9/30/09. Too much candy could lead to prison
 LONDON, England —
 Of children who ate candies daily at age ten, **69% were arrested** for violent offenses by age 34.

The real statistic:
69% of those arrested for violent offenses by age 34 ate candies daily at age ten.

Context: Making small things big

7 nanograms per gram = 7 parts in a billion



4/2010 National Geographic

Conclusion

To make intelligent decisions in a data-driven democracy, *citizens must understand the different types of science they encounter in everyday life.*

Students must be given a wide variety of science-related news stories. They must learn how to

- analyze the arguments,
- understand the influences on the numbers, and
- reach a reasoned, nuanced conclusion.

Once this skill is acquired, it can be used on a daily basis throughout their life.

STATISTICAL LITERACY : STATISTICS
 AS
ART APPRECIATION : ART



www.StatLit.org

13

**Appendix:
To Teachers**

This book is different—very different! But that is because statistical literacy is very different from traditional inferential statistics. Statistical literacy is more about context than calculation, more about literacy than about the statistical tests, more about taking into account and confounding than about chance.

Statistical literacy:

- focuses more on how groups are defined and statistics are measured. .
- focuses more on the type of study than on the details of the data.
- focuses more on what is not in the data than what is in the data.
- focuses more on alternate explanations (hypothetical thinking) than on deductive thinking.
- focuses more on large observational studies and confounding (e.g., Simpson’s Paradox) than on small randomized experiments and chance.
- focuses more on systematic sources of variation than on randomness.

14

 **SUMMARY
Peter Holmes (2003)**

W. M. Keck Statistical Literacy course

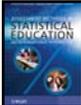
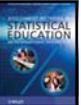
- “is *different*”: “different emphasis”, “different background”, “a different package”
- “goes beyond Numeracy”
- is more in line with the statistical literacy “needed by most people in everyday life to read the news, by those in business commerce or management, and by policy makers.”

15

**2009 MAA Survey Results from
US Four-year Colleges**

87% have college-wide quantitative requirement
 68% have a quantitative support center
 43% can satisfy QR requirement outside math
 QR assessment: 32% have entry; 20% have exit

90% listed specific QR graduation courses:
 Of these, 19% offer “statistical literacy”

 **Statistical Literacy** 

Statistical literacy is **the ability to read and interpret summary statistics in everyday life.**

Statistical Literacy studies

- (1) the relation between statistical associations and causation, and
- (2) the full-range of influences on a statistic or a statistical association. [Take CARE]

17

**QL Big Idea #1
Numbers in Context**

Two interpretations:

- 1. From numbers to context.**
 Many math word-problems:
 “A train travels west at 40 mph....”
 The birthday problem, voting paradoxes.
- 2. From context to numbers.**
 “Circumcised men were two to three times less likely to contract HIV.” AFP 5/28/2009.

18

**QL Big Idea #2:
Numeracy Across the Curriculum**

Two approaches:

- 1. Embed within many courses**
 Pro: Can’t learn QL in just one course.
 Con: Everybody means “nobody”
- 2. Offer a separate course:**
 Pro: Distinct content, outcomes.
 Con: What content? How much math? Who will teach? What department?