

Numbers in the News

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GAISE Guidelines

The ASA GAISE College report recommended:

- *"introductory courses in statistics should, ...strive to emphasize statistical literacy"*
- assessing statistical literacy by students *"interpreting or critiquing articles in the news and graphs in media."*

Statistical Literacy: Lack of Data

“Clarity on the building blocks of statistical literacy are needed” before addressing “assessment and instruction...” Gal (2001)

“No comparative analysis has ... mapped out the ... statistical ... concepts and topics ... that adults may encounter...” Gal (2003)

If statistical literacy is to be empirically-based, the use of “numbers in the news” must be analyzed.

Numbers in the News

Selected 100 news articles using numbers if they:

- had the word ‘study’ in the title,
- involved samples (surveys) or medical tests,
- involved longitudinal data or random assignment,
- involved taking into account confounders, OR
- used statistics as evidence for causation.

Excluded articles: sports, weather & stock prices.

Analyzed 93 characteristics per story.

Content of Articles

SIMPLE DATA (69%)

Percentage of articles that have the following:

48%: Percentages

29%: Numbers (counts or sums)

4%: Mean/average

4%: Rates (c.f. unemployment rate)

3%: Ratios (e.g., miles per gallon)

2%: Ranks or percentiles

1%: Percentage points

0%: Median

Content of Articles

COMPLEX DATA (5%)

Percentage of articles that have the following:

4%: Slope

1%: Range

1%: Correlation (qualitative or numeric)

1%: Effect size or elements thereof

0%: Standard deviation, z-score

0%: Coefficient of Variation

0%: Relative risk or relative ratio

0%: Odds ratio or Gini coefficient

0%: R-squared

Content of Articles COMPARISONS (22%)

Percentage of articles that compare these:

8%: Numbers (counts or measures)

7%: Cases attributed (statistical deaths)

5%: Percentages

4%: Rates

1%: Means/averages

0%: Change in numbers

0%: Medians

0%: Ratios

0%: Percentage attributable

Content of Articles

RATIO GRAMMAR (68%)

Percentage of articles by type of grammar:

40%: Percent (X% of <whole> are <part>)

22%: Likely/Prevalent

18%: Ratios (miles per gallon)

15%: Chance/risk/probability

15%: Rates (the birth rate, the rate of births)

6%: Percentage*

4%: Attributable

- * The percentage of <whole> who are <part>
Among <whole>, the percentage of <part>

Content of Articles

Statistical Inference (49%)

Percentage of articles that involve inference:

44%: Use sample

40%: Give sample size

11%: Mention “significant” or “significantly”

9%: Give Margin of Error

7%: Mention random sample

1%: Give a Confidence Interval

1%: Mention “Statistically significant”

0%: Give p-value

Content of Articles: DESIGN OF STUDY (45%)

Percentage of articles that indicate study design:

- 25%: Controlled study (two or more groups)
- 20%: Observed several times (longitudinal)
- 10%: Subject manipulation (experimental drugs)
- 9%: Cohort (high school graduating class)
- 8%: Subject blinded (placebo)
- 7%: Factor controlled or taken into account
- 5%: Plausible confounder indicated
- 1%: Researcher blinded
- 1%: Random assignment

Content of Articles: CAUSATION & ASSEMBLY

Percentage of stories that imply causation (60%)

Action verbs: Change, alter, explain. Increase, improve, save, prevent. Reduce, cut, kill, hurt

Adjectives: Harmful, safe, effective

Percentage of articles that use assembly* (68%)

affordable, excessive, discrepancy, dangerous

*** Choice of definition, groups or measures**

Conclusion

The goal of statistical literacy is to help people analyze numbers in the news.

Statistical Literacy must focus on:

- assembly / construction of categories (68%)
- ratio grammar (68%): percent and likely
- association versus causation (60%)
- study design (45%): longitudinal & manipulation.
- significant (11%) vs. statistically significant (1%)
- margin of error (9%) and cases attributable (7%)

Types of Statistical Articles

- 1: **Study Results** (32%) Results of experiments or observational studies where statistical association is used as evidence for causation.
- 2: **Study Related** (14%). References another study without giving the details.
- 3: **Surveys** (23%). Associations may be presented but are not used to argue for a causal connection.
- 4: **Medical Tests** (6%). E.g., Blood and paternity tests
- 5: **Other** (25%). None of above.