Numbers in the News: A Survey

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Abstract

Some 250 number-focused news articles have been analyzed for the prevalence of statistically-related content. Ninety-five factors were analyzed for each story. These included (a) elements of study design (controlled, control for related factors, longitudinal, cohort, experi-ment and random assignment), (b) statistical measures (ranging from simple counts and percentages to confidence intervals and p-values) and (c) types of grammar used to describe and compare ratios (percent, percent-age, rate, chance, and likely). Of these articles, 65% involved assembly in constructing categories or measures (e.g., bullying), 55% presented associations that implied causation and 41% used percents. While about half (42%) gave the sample size, only 6% mentioned that the sample was random. While 10% used the word "significant", only 2% mentioned "statistically significant." None mentioned p-value. Articles were classified as study-focused, study-related, surveys, diagnostic tests and others. Of the survey articles, only a third (35%) gave the margin of error. Hopefully this kind of empirical data will be useful in determining the emphasis of these topics in teaching statistical literacy as applied critical thinking.

1. Introduction

The ASA GAISE College Report suggested that teachers assess statistical literacy by students "*interpreting or critiquing articles in the news and graphs in media*."

Statistics of all kinds are omnipresent in the media. But there has been no comprehensive study of which kinds of statistics are present along with their prevalence.

Gal (2002) noted that "*What is basic knowledge cannot be discussed in absolute terms, but depends on the level of statistical literacy expected of citizens, on the functional demands of different contexts of action (e.g., work, reading a newspaper), and depends on the larger societal context of living.*" "*Unfortunately no comparative analysis has so far systematically mapped out the types and relative prevalences of statistical and probabilistic concepts and topics across the full range of statistically-related messages or situations that adults may encounter and have to manage in any particular society.*" "*Hence no consensus exists on a basis for determining the statistical demands of common media-based messages.*"

Gal (2003a) noted that "*although statistical literacy is touted as a key educational goal, reform efforts in statistics education usually emphasize teaching methods that can advance learning of "core" topics in introductory courses, and do not elaborate on the importance of using real-world materials (e.g., from the media), or on issues involved in developing the dispositions subsumed under statistical literacy. For instance, in a survey of more than 240 instructors of introductory statistics (Garfield 2000) less than 25% said they "frequently used" discussions of statistics in the media, and roughly half indicated they never ask students to critique news articles in classroom assessments. It seems that many instructors neither teach for statistical literacy nor assess it.*"

Carol Schneider (2004), President of the AAC&U, recommended, "*identify the ways in which quantitative literacies are actually used in contemporary society.*"

If statistical literacy is to be empirically based, the use of numbers in everyday venues must be analyzed. The goal of this paper is to survey the use of various kinds of statistics and associated factors in news articles.

1.1. Articles Selected and Analyzed

The articles studied appeared primarily on the front page or health sections of Yahoo. Most were released between 8/2005 and 10/2006. The news articles are typically one or two pages (1.4 pages on average). Articles involving sports, weather, stock prices or original research studies were excluded.

News articles were considered if they involve numbers and they:

- have "study," "survey" or "report" in the title,
- involve or reference a study, survey or report,
- involve diagnostic tests (medical or otherwise),
- involve longitudinal data or subject manipulation.
- involve random assignment or random selection,
- involve a sample, sample size or margin of error
- have "significantly" or "(in)significant" in the text
- involve taking into account a confounder, or
- use statistics as evidence for causation.

1.2. Data Tabulation

Each article was analyzed based on 95 characteristics. Appendix B shows the data entry form and indicates how each of the 95 fields was handled. Note that the choice and definitions of the statistical categories may result in some topics being omitted (non-exhaustive) while others may be obscured either by having two topics grouped under a single heading or by having one topic split between two headings (non-exclusive).

2. Overall Findings

The following tables give the percentage of all articles that involve the characteristic studied. See Appendix C.

Table 1: Prevalence of study design characteristics

32%	Controlled study (2 or more groups)
16%	Longitudinal (multiple result measures)
11%	Subject manipulation (experiment)
9%	Additional factor controlled
7%	Cohort based (e.g., high school class)
5%	Subject blinded (placebo)
4%	Referenced a plausible confounder
2%	Random assignment
<1%	Evaluator blinded (double-blind)

Table 2: Prevalence of simpler numbers

48%	Percents (part-whole or % change)
35%	Numbers (counts, sums or measures)
5%	Ratios (e.g., miles per gallon)
4%	Average/Mean
4%	Percentage points
4%	Rates (prevalence, incidence or #/time)[1]
2%	Ranks or percentiles

Table 3: Prevalence of more complex numbers

3%	Slope or components thereof
1%	Range or components (high and low)
1%	Correlation (qualitative or numeric)
<1%	Standard deviation
<1%	Effect Size or all elements thereof

Table 4: Prevalence of statistics compared

5%	Arithmetic compare: percentages
4%	Arithmetic compare: rates
4%	Arithmetic compare: counts or measures
1%	Arithmetic compare means/averages
<1%	Arithmetic compare: other ratios.

Note that these percentages tabulate only those cases where an explicit comparison was made. They exclude those cases where the data for making the comparison was presented without making the actual comparison.

[1] Includes prevalence (a part-whole ratio that doesn't involve a time interval such as unemployment), incidence (e.g., a ratio per time interval such as "births per 10,000 women per year") or a "velocity" (the number of something per time interval such as "births per year").

Table 5: Prevalence of arithmetic comparisons

22%	Qualitative compare: "more/less"
20%	Quantitative compare: "% more/less"
14%	Quantitative compare: "times as much"
10%	Quantitative compare: "times more/less"
6%	Mention "attributed to" or "due to"
5%	Quantitative compare: "# more/less"
4%	Number of cases attributed to something
<1%	Quantitative compare: percentage points

Table 6: Prevalence of ratio grammars.[2]

41%	Percent grammar[3]
18%	Rate grammar[4]
17%	Likely or prevalent comparisons[5]
14%	Chance, risk, odds or probability
12%	Ratios (e.g., miles per gallon)
4%	Percentage grammar[6]

Table 7: Prevalence of sample-related characteristics

46%	Mention using a sample
42%	Sample size
10%	Mention "significant" or "significantly"
8%	Margin of error
6%	Mention "random sample"
2%	Mention "statistically significant"
1%	Confidence interval

Statistical measures that never appeared in these news articles include: median, Gini index, relative risk, odds ratio, Z-score, coefficient of variation, comparison of medians, R^2, % attributed, % explained by, or p-value.

3. Critical Thinking Characteristics

Tables 1 – 7 summarize various statistical characteristics. However they do not present two ways that statistics relate to critical thinking. One is how the statistics are constructed or assembled; the other is how these statistical associations are presented to imply causation.

Isaacson (2005) and Schield (2007) have argued they are pivotal in evaluating the nature and strength of any argument using the statistics. As will be shown, these two elements are found in most news articles. Thus they should be central to any statistical literacy course.

[2] Schield (2000) analyzes the keywords and syntax used to describe and compare selected ratios.

[3] E.g., "24% of men smoke" or "Among men, 24% smoke."

[4] E.g., "the death rate of men" or "men's rate of death."

[5] E.g., Among high school students, "Smokers are twice as prevalent among whites (26%) as among blacks (13%)" or "whites are 100% more likely to smoke than blacks."

[6] E.g., "The percentage of men who smoke is 24%," "Among men, the percentage who smoke is 24%" or "Among men, the percentage of smokers is 24%."

3.1. Assembly or Construction of Statistics

Joel Best (2001) noted that all statistics are socially constructed in that they are selected, defined, counted/measured, summarized and presented by people that have interests in seeing a number be larger or smaller.

Of these articles, 65% use words that have considerable latitude in their definition or measure. We call such words instances of "assembly." See Schield (2007).

Here are examples of assembly from articles studied:

- Many children display *excessive* activity.
- More children have *persistent* asthma.
- *TV watching* is increasing.
- Housing is *unaffordable* for many.
- Teens drive more *dangerously*.
- Nun's *writing style* predicts Alzheimer's

Other words lacking generally accepted definitions: excessive, discrepancy, dangerous, rich, poor, unhealthy and dysfunctional.

3.2. Using Association to Imply Causation

Of the articles, 55% use words that imply or assert causation when it is highly disputable.

Implying causation can be done through action verbs (e.g., help, change, alter, increase, improve, save, prevent, reduce, cut, kill or hurt), adjectives: (e.g., harmful, safe or effective) or nouns (e.g., fighter, protection, defense). Examples of phrases implying causation taken from the articles studied include:

- Improving writing skills may *prevent* Alzheimer's
- Schools discouraging soft drinks *reduce* obesity
- Placebos *Make* People Feel Better
- Eating fish regularly *delays* dementia

Asserting causation when it is highly disputable occurs often in popular-cause issues. For example, "Second-hand smoke *causes* cancer." In this instance randomized trials are unethical, before-after studies are not repeatable and – unlike actual smoking – the relative risks are so low that their susceptibility to confounding makes the causal claim highly disputable.

4. Analysis by Type of Article

These number-related news articles were classified[7] as diagnostic tests, surveys, study-related, single study-focused and other. Surveys and studies are similar in that both may make comparisons between members of a given population. Studies differ from surveys in that studies typically focus on what factors are most closely associated with a particular result while surveys focus on a particular population or on a particular class of outcomes, but are not so directed at trying to identify which factor(s) are most closely related.

Of these number-related news articles, 56% involve studies, 22% involve surveys, 4% involve diagnostic tests and 17% involve other uses.[8]

Articles that mention studies were subdivided into "Studies" (articles that focus primarily on a single study) and "Study-related" (articles that focus on multiple studies or incidentally on a particular study).

4.1. Surveys

Of the survey articles, 56% involve assembly and 27% involved words implying causation. Only 5% control for a third factor. Fifteen percent involve longitudinal measurements. Forty-five percent mention using a sample and gave the sample size, 35% give the margin of error but only 20% indicate the sample was random. While 5% use "significant," none mentioned "statistically significant."

What might explain the failure to mention "statistically significant" when the sample size (45%) or margin of error (35%) is given? It may be that readers are presumed able to determine whether a difference involving the entire sample – or a subgroup – is statistically significant. When the margin of error is not given, there may be cases where the sample sizes or effect sizes are so large that finding differences that are statistically insignificant is very unlikely.

Of the survey articles, 7% involve predictors that were changeable for a given subject (such as smoking or eating nuts) while 2% involve outcomes that were recurring (e.g., presence of migraines or attitudes) or repeatable (e.g., measuring weight). Since only 2% of the survey articles have changeable predictors and recurring or repeatable outcomes, only 2% of the survey-based associations could be redone as before-after experiments.

4.2. Studies

The following data is based on those news articles that focus primarily on a single study. Of these, 74% involve assembly and 73% involve words that imply – but do not assert – causation. Only 16% involve experimental manipulation and only 2% mention random assignment. While 22% are longitudinal, only 12% take into account the influence of a related factor.

What might explain the low percentage of news articles focusing on a single study that fail to take into account any additional factor (12%)? It can't be the low percentage of studies that are observational. Only 2%

[7] In Appendix B, articles were classified as diagnostic tests (Type = 1), surveys (Type = 2), study-related (Type = 3), single-study focused (Type =4) and other (Type = blank).

[8] Of the 250 number-related news articles analyzed, 10 (4%) involve diagnostic tests, 55 (22%) involve surveys, 61 (24%) are study-related, 81 (32%) are single-study focused and 43 (17%) involve other.

involved random assignment. Is this because journalists are unaware that taking into account the influence of a related factor in an observational study can change an association or influence statistical significance? See Schield (2006).

Sixty three percent of these study-focused articles use a sample and 59% gave the sample size. None mentions a margin of error. While 19% use the phrase "significant," only 4% use the phrase "statistically significant."

Surprisingly, 38% of the study articles involve predictors that were changeable for a given subject, 20% involve outcomes that were repeatable for a given subject, 17% have both characteristics, and 10% have both characteristics and do not involve manipulation. So 10% of these studies could be done as before-after repeatable experiments which would strengthen the evidence for treating the association as being causal.

5. Conclusion

If statistical literacy is to be GAISE-based, it must focus on analyzing statistics in the news. Based on the prevalence of statistical terms and ideas found in this analysis of number-related news articles, topics in statistical literacy could be emphasized in the following order based on the percentage of articles involved.

- 60%: Assembly: social construction of groups and measures that lack generally accepted definitions.
- 50%: Association-like words that imply causation.
- 40%: Percents and percent grammar; sampling and sample size.
- 30%: Margin of error in surveys, controlled studies.
- 20%: Comparisons involving "times more than."
- 10%: Longitudinal studies, experimental manipulation and comparisons using "times as much as", grammar involving "rate," "likely" or "chance."
- 5%: "Significant," comparisons using "times more" and grammar using "percentage."
- 2%: Random assignment, "statistically significant."

Note that prevalence – or absence – in news articles should not be the sole criteria for determining the importance of a statistical topic. For example, percentage grammar is seldom used in news articles (4%), but is commonly used in the titles of tables and graphs. Random assignment is seldom mentioned (2%) yet this is the keystone for identifying causality in probabilistic situations where the result may be due to confounders.

Students completing a research statistics course should be able to determine if a difference in means or percentages is statistically significant given the margin of error. But to be statistically literate, they should also be able to estimate this for any subgroup in the study given the prevalence of that subgroup.

6. Future Activities

One project would be to expand this study. Here are some possible changes. Increase the number of these articles analyzed to insure broader representation. Eliminate those items that require much judgment such as the types of bias and taking into account relevant confounders. Break some of the existing fields into components[9] and create some additional fields.[10]

A second project would be to analyze the statistical content of articles in magazines such as The Economist.

A third project would be to analyze the content of articles generated by statistical agencies. Gal (2003b) classified these as indicators, press releases, executive summaries, reports and aggregate data. Gal (2002) noted that a problem is created by "*inattention to statistical reports or messages from sources other than the media. Although the media is a key communicator of statistical information, the information landscape to which citizens and workers in modern societies are exposed is broader. Statistical information is generated and reported through channels other than the media, such as statistics agencies or research organizations*."

A fourth project would be to identify those concepts that must be understood to be statistically literate. This might be done in a way similar to that for determining scientific literacy. See Appendix A for a review of one approach to being "scientifically literate."

A fifth project would be to study ways in which news articles can be used in the classroom. See Gal (2003c) and Dietz (2005). In going beyond using news articles as a source for word problems having a single numeric answer, Isaacson (2005) connects statistical literacy with critical thinking about arguments.

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[9] E.g., Breakout rate into velocity (#/time), prevalence or incidence. Break out types of association and causation. Break out "Factor Controlled" to distinguish between "taken into account" and "controlled by selection." Break out "attributed" to indicate colloquially or arithmetically.

[10] Add text boxes for names of specific items taken into account and sample size. Add check boxes on whether an article gives data for a ratio (e.g., "eight out of 10 doctors.") or for a comparison of ratios (e.g., "the unemployment rate is 10% for men, 8% for women") – even if the article never formalized the result. Add check boxes on whether subjects gave a verbal response, whether a qualitative compare is number based, whether the idea of "times as much" is used without the word "times" (e.g., "twice," "double"), whether an outcome is continuous or discrete, whether ratio words are used (e.g., "high risk") or whether cases attributable is implicit. Add check boxes for internal error, mistake and ambiguity. Add check boxes on whether subjects are non-human (e.g., lab rats or climate predictions), whether the study involves a projection/prediction and whether predictions involve an assumption-laden model or a data-driven projection. Add check boxes for measure and compare a measure.

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APPENDIX A. SCIENTIFIC LITERACY

To be classified as "scientifically literate," Miller (2007) argued that one must be able to understand approximately 20 of 31 scientific concepts and terms similar to those that would be found in articles that appear in the New York Times weekly science section and in an episode of the PBS program "NOVA."

"A slightly higher proportion of American adults qualify as scientifically literate than [of] European or Japanese adults, but the truth is that no major industrial nation in the world today has a sufficient number of scientifically literate adults," he said. "We should take no pride in a finding that 70 percent of Americans cannot read and understand the science section of the New York Times."

Approximately 28 percent of American adults currently qualify as scientifically literate, an increase from around 10 percent in the late 1980s and early 1990s, according to Miller's research.

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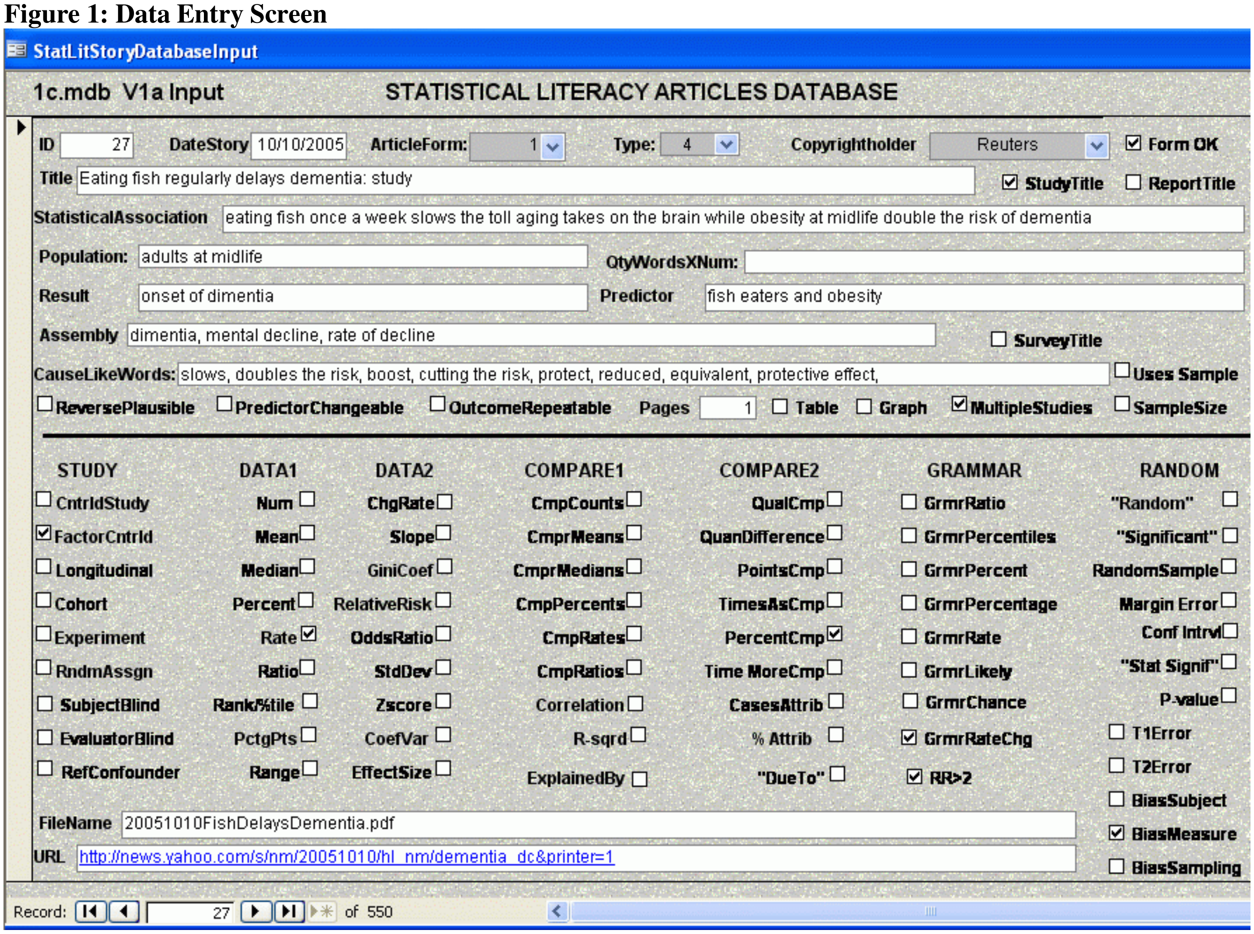
11 www.StatLit.org/Best.htm
12 www.causeweb.org/uscots/uscots05/spotlight/files/P8.pdf
13 www.stat.auckland.ac.nz/~iase/cblumberg/gal.pdf
14 www.stat.auckland.ac.nz/~iase/serj/SERJ2(1).pdf
15 www.stat.auckland.ac.nz/~iase/publications/3/3016.pdf
16 http://special.newsroom.msu.edu/aaas/scientificLiteracy.html
17 www.StatLit.org/pdf/2007SchieldMSS.pdf
18 Draft at www.StatLit.org/pdf/2006SchieldSTATS.pdf
19 www.StatLit.org/pdf/2007SchieldMSS.pdf
20 www.aacu.org/peerreview/pr-su04/pr-su04feature3.cfm or www.aacu.org/peerreview/pr-su04/pr-su04feature3.pdf
21 www.StatLit.org/xls/2007SchieldASA.xls
22 www.StatLit.org/pdf/2007SchieldASA.pdf

APPENDIX B: DATA ACQUISITION

Figure 1 illustrates the data entry form that was used to capture the data from each article. The resulting dataset of the associated articles is available.[23]

Figure 1: Data Entry Screen



These 97 fields (95 + ID and OK) were interpreted as follows:

- ID: Automatically generated by MS Access.
- Form: 1. News article; 2. Press release; 3. Detailed study
- Type: 1=Test, 2 = Survey, 3 = Study-related, 4 = Study, blank = Other.

TEXTBOXES (Top of form)

- Date Article: Publication date shown in the article.
- Copyright holder: Organization publishing the article.
- Title: Taken as-is from the title of the article.
- Statistical association: one taken from the article.
- Population: Group studied in the article.
- Quantity Words without Number: words such as "few," "some," "many" or "most."
- Result: Outcome or result of interest.
- Predictor: Related factor that might cause the result.
- Assembly: Something susceptible to choice in definition and whose value is easily influenced by this choice.
- Cause-like words: Words that imply or state causation when it is not warranted. E.g., Coffee cuts cancer.
- Pages: Number of pages in article.

CHECKBOXES: GENERAL (Top of form)

- Form OK: Article evaluation complete.

- StudyInTitle: "Study" appears in title.
- ReportInTitle: "Report" appears in title.
- SurveyInTitle: "Survey" appears in title.

- Reverse plausible: Difference in the results can cause the difference observed in the predictors.
- Predictor changeable: Predictor can be readily changed for a given subject. (E.g., smoker = Yes; Male = No)
- Outcome repeatable: Outcome event can be repeated for a given subject. (E.g., headache = Yes; Dying = No)
- Table: Article includes at least one table.
- Graph: Article includes at least one graph.
- Multiple studies: Multiple studies referenced.

- Uses sample: Sample or sampling is referenced.
- Sample size: Sample size given.

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[23] www.StatLit.org/pdf/2007SchieldASA2.pdf

CHECKBOXES: TYPE OF STUDY

- CntrldStudy: Article references multiple groups.
- FactorControlled: A factor is noted as being controlled or taken into account other than the predictor.
- Longitudinal: Multiple measures of outcome over time. This was not checked for a prospective or retrospective study that had only one measure of a continuing outcome. It was not checked if the outcome was binary (alive/dead).
- Cohort: Subjects are a closed group (some may drop out).
- Experiment: Subjects intentionally manipulated.
- RndmAssign: Subjects randomly assigned.
- SubjectBlind: Subjects blinded as to their group.
- EvaluatorBlind: Evaluators blinded to a subject's group.
- RefConfounder: References relevant confounders

CHECKBOXES: DATA #1

- Num: Presents individual measures; presents counts of individual or sums of individual measures (amounts).
- Mean: Presents value of mean or average.
- Median: Presents value of median or middle.
- Percent: Presents a percentage (either part-whole or percentage change) or the components thereof.
- Rate: Presents a rate: prevalence (unemployment), incidence (# Deaths/year/1,000 men), velocity (# births/yr) or components thereof.
- Ratio: Presents a ratio (not percent or rate): e.g., deaths per million miles, miles per gallon or components thereof.
- Rank/%tile: Presents ranks or percentiles.
- PctgPts: Mentions percentage points.
- Range: Mentions range or components (e.g., high & low).

CHECKBOXES: DATA #2

- ChgRate: Mentions rate of change.
- Slope: Mentions value of slope or rise vs. run.
- Gini: Mentions value of Gini index (or Robin hood %).
- RelativeRisk: Mentions value of relative risk.
- Odds Ratio: Mentions value of odds ratio.
- StdDev: Mentions value of standard deviation (variance).
- Z-score: Mentions value of z-score or gives components.
- CoefVariation: Mentions value of coefficient of variation.
- EffectSize: Mentions value of effect size or components.

CHECKBOXES: COMPARE (What). A one sentence statement (e.g., Average height is 1" higher in 2007 than in 1907). This excludes the common cases that give the constituent values (e.g., Average height is 66" in 2007, 65" in 1907) to make an arithmetic comparison and it excludes qualitative comparisons (e.g., "Average height is higher" or "Average height increased").

- CmpCounts: Arithmetic compare of counts or measures.
- CmpMeans: Arithmetic compare of averages.
- CmpMedians: Arithmetic compare of medians.
- CmpPercents: Arithmetic compare of percentages. Can be a percentage change, two percentages or a statement.
- CmpRates: Arithmetic compare of rates.
- CmpRatios: Arithmetic compare of other ratios.
- Correlation: Mentions value of correlation coefficient.
- R-sqrd: Mentions value of R^2 from OLS regression.
- Explained by: Gives the percentage of outcome that is explained by taking into account a related factor.

CHECKBOXES: COMPARE (How)

- QualCmp: Has qualitative compare (more/less), no #.
- QuanDiff: Has "# more/less" difference compare.
- PointsCmp: Has percentage points more/less compare.
- TimesAsCmp: Has "times as much as" compare or equivalent (e.g., "double", "half.")
- PercentCmp: Has "percentage more/less" compare.
- TimesMoreCmp: Has "times more/less" compare.
- CasesAttrib: Has # cases attributable (explicit or implicit).
- %Attrib: Has percentage attributable.
- AttribTo: Uses "attributable to" or "due to".

CHECKBOXES: GRAMMAR

- GrmrPercentiles: Describes percentiles.
- GrmrPercent: Describes % using "percent of" grammar.
- GrmrPercentage: Describes/compares % using percentage grammar.
- GrmrRate: Describes/compares rates using "rate" grammar: prevalence. incidence or # per unit time.
- GrmrLikely: Compares using "likely/prevalent" grammar. Does not include "highly likely" without direct object.
- GrmrChance: Describes/compares "chance" using chance grammar: chance, risk, odds, likelihood and probability.
- GrmrRatio: Describes/compares ratios using ratio grammar.
- GrmrRateChange: Describes change in change.
- RR>2: Has relative risk more than 2.

CHECKBOXES: RANDOMNESS

- Randomness: Mentions random/ly or randomness.
- "Significant": Mentions "significant," "significantly" or "insignificant."
- RandomSample: Mentions use of a random sample.
- Margin Error: Mentions size of 95% margin of error.
- Conf Intrvl: Mentions size of 95% confidence interval.
- Statistical Significance: uses "statistical (in)significance," or "statistically (in)significant."
- P-value: Mentions p-value.

CHECKBOXES: ERROR or BIAS [Not tabulated]

- T1Error: Type 1 error (false alarm).
- T2Error: Type 2 error (alarm failure).
- BiasSubject: Subject bias likely.
- BiasMeasure: Measurement bias likely.
- BiasSampling: Sampling bias likely.

TEXTBOXES: BOTTOM

- Filename: File name for PDF file.
- URL: Source (may no longer be available on the web).

APPENDIX C: DATA SUMMARY

1=Test, 2 = Survey, 3=Study-related, 4=Study, Blank=Other.

Table 8: Counts Overall and by Type of Article

TYPE (OK=1)	ALL	blank	1	2	3	4	3+4
Number by Type	250	43	10	55	61	81	142
News article: Form=1	219	36	10	34	59	80	139
StudyInTitle	40	1	1	2	1	35	36
ReportInTitle	3	0	0	2	1	0	1
SurveyInTitle	2	1	0	1	0	0	0
Assembly	163	25	7	31	40	60	100
ImplyCause	138	20	5	15	39	59	98
ReversePlausible	13	2	0	0	1	10	11
PredictorChangeable	60	4	1	4	20	31	51
OutcomeRepeatable	36	4	2	1	13	16	29
Both of preceding	31	3	1	1	12	14	26
Experiment possible	20	2	1	1	8	8	16
Table	1	0	0	1	0	0	0
Graph	1	0	0	0	1	0	1
MultipleStudies	17	0	0	1	9	7	16
ControlledStudy	81	5	1	6	28	41	69
FactorCntrld	22	0	1	3	8	10	18
Multiple Times	39	3	0	8	10	18	28
Cohort	17	0	0	0	5	12	17
SubjectManipulated	28	2	0	0	6	20	26
RandomAssign	5	0	0	0	3	2	5
SubjectBlind	12	0	1	0	3	8	11
EvaluatorBlind	1	0	0	0	0	1	1
RefConfounder	11	1	1	0	2	7	9
Uses #	88	26	3	18	21	20	41
Average/Mean	11	0	0	5	4	2	6
Uses %	121	19	4	41	22	35	57
Rate	9	1	0	4	1	3	4
Ratio	13	1	0	2	4	6	10
Rank/%tile	4	0	0	3	0	1	1
PctgPts	10	0	0	9	1	0	1
Range	2	0	0	1	0	1	1
ChgRate	3	1	0	0	2	0	2
Slope	7	1	0	0	3	3	6
StdDev	1	0	0	0	1	0	1
EffectSize	1	0	0	0	0	1	1
CmprNum	10	2	0	3	4	1	5
CmprMeans	3	0	0	1	0	2	2
CmprPcnts	13	0	0	6	3	4	7
CmprRates	10	0	0	2	2	6	8
CmprOtherRatios	1	0	0	1	0	0	0
Correlation	1	0	0	0	0	1	1
QualitativeCompare	56	7	1	7	16	25	41
QuanDifference	12	0	0	3	6	3	9
CmprPoints	1	0	0	0	1	0	1
CmprTimesAsMuch	34	4	1	11	7	11	18
CmprPercentMore	51	4	1	13	12	21	33
CmprTimesMore	25	3	1	5	8	8	16
CasesAttrib	9	4	0	0	3	2	5
AttributableTo	15	2	0	2	7	4	11
GrmrRatio	30	2	2	12	4	10	14
GrmrPercent	103	19	4	36	16	28	44
GrmrPercentage	10	1	0	4	4	1	5
GrmrRate	44	3	1	11	13	16	29
GrmrLikely	43	8	2	13	6	14	20
GrmrChance	35	1	0	1	10	23	33
GrmrRateChg	1	0	0	0	0	1	1
RR>2	17	1	1	0	5	10	15
UsesSample	115	10	3	25	26	51	77
SampleSize	106	10	2	25	21	48	69
Randomness	2	0	0	1	1	0	1
"Significant"	24	0	0	3	6	15	21
RandomSample	14	2	0	11	1	0	1
MarginOfError	21	2	0	19	0	0	0
ConfIntrvl	2	0	0	2	0	0	0
StatisticallySignificant	4	0	0	0	1	3	4

Table 9: Column Percentages Overall and by Type

TYPE (OK=1)	ALL	blank	1	2	3	4	3+4
Total by Type	100%	100%	100%	100%	100%	100%	100%
News article: Form=1	88%	84%	100%	62%	97%	99%	98%
StudyInTitle	16%	2%	10%	4%	2%	43%	25%
ReportInTitle	1%	0%	0%	4%	2%	0%	1%
SurveyInTitle	1%	2%	0%	2%	0%	0%	0%
Assembly	65%	58%	70%	56%	66%	74%	70%
ImplyCause	55%	47%	50%	27%	64%	73%	69%
ReversePlausible	5%	5%	0%	0%	2%	12%	8%
PredictorChangeable	24%	9%	10%	7%	33%	38%	36%
OutcomeRepeatable	14%	9%	20%	2%	21%	20%	20%
Both of preceding	12%	7%	10%	2%	20%	17%	18%
Experiment possible	8%	5%	10%	2%	13%	10%	11%
Table	0%	0%	0%	2%	0%	0%	0%
Graph	0%	0%	0%	0%	2%	0%	1%
MultipleStudies	7%	0%	0%	2%	15%	9%	11%
ControlledStudy	32%	12%	10%	11%	46%	51%	49%
FactorCntrld	9%	0%	10%	5%	13%	12%	13%
Multiple Times	16%	7%	0%	15%	16%	22%	20%
Cohort	7%	0%	0%	0%	8%	15%	12%
SubjectManipulated	11%	5%	0%	0%	10%	25%	18%
RandomAssign	2%	0%	0%	0%	5%	2%	4%
SubjectBlind	5%	0%	10%	0%	5%	10%	8%
EvaluatorBlind	0%	0%	0%	0%	0%	1%	1%
RefConfounder	4%	2%	10%	0%	3%	9%	6%
Uses #	35%	60%	30%	33%	34%	25%	29%
Average/Mean	4%	0%	0%	9%	7%	2%	4%
Uses %	48%	44%	40%	75%	36%	43%	40%
Rate	4%	2%	0%	7%	2%	4%	3%
Ratio	5%	2%	0%	4%	7%	7%	7%
Rank/%tile	2%	0%	0%	5%	0%	1%	1%
PctgPts	4%	0%	0%	16%	2%	0%	1%
Range	1%	0%	0%	2%	0%	1%	1%
ChgRate	1%	2%	0%	0%	3%	0%	1%
Slope	3%	2%	0%	0%	5%	4%	4%
StdDev	0%	0%	0%	0%	2%	0%	1%
EffectSize	0%	0%	0%	0%	0%	1%	1%
CmprNum	4%	5%	0%	5%	7%	1%	4%
CmprMeans	1%	0%	0%	2%	0%	2%	1%
CmprPcnts	5%	0%	0%	11%	5%	5%	5%
CmprRates	4%	0%	0%	4%	3%	7%	6%
CmprOtherRatios	0%	0%	0%	2%	0%	0%	0%
Correlation	0%	0%	0%	0%	0%	1%	1%
QualitativeCompare	22%	16%	10%	13%	26%	31%	29%
QuanDifference	5%	0%	0%	5%	10%	4%	6%
CmprPoints	0%	0%	0%	0%	2%	0%	1%
CmprTimesAsMuch	14%	9%	10%	20%	11%	14%	13%
CmprPercentMore	20%	9%	10%	24%	20%	26%	23%
CmprTimesMore	10%	7%	10%	9%	13%	10%	11%
CasesAttrib	4%	9%	0%	0%	5%	2%	4%
AttributableTo	6%	5%	0%	4%	11%	5%	8%
GrmrRatio	12%	5%	20%	22%	7%	12%	10%
GrmrPercent	41%	44%	40%	65%	26%	35%	31%
GrmrPercentage	4%	2%	0%	7%	7%	1%	4%
GrmrRate	18%	7%	10%	20%	21%	20%	20%
GrmrLikely	17%	19%	20%	24%	10%	17%	14%
GrmrChance	14%	2%	0%	2%	16%	28%	23%
GrmrRateChg	0%	0%	0%	0%	0%	1%	1%
RR>2	7%	2%	10%	0%	8%	12%	11%
UsesSample	46%	23%	30%	45%	43%	63%	54%
SampleSize	42%	23%	20%	45%	34%	59%	49%
Randomness	1%	0%	0%	2%	2%	0%	1%
"Significant"	10%	0%	0%	5%	10%	19%	15%
RandomSample	6%	5%	0%	20%	2%	0%	1%
MarginOfError	8%	5%	0%	35%	0%	0%	0%
ConfIntrvl	1%	0%	0%	4%	0%	0%	0%
StatisticallySignificant	2%	0%	0%	0%	2%	4%	3%