Numerate Skepticism: Questioning Quantitative Data

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Data Heap
Some relevant skills

- Evaluating sources
- Evaluating surveys
- Selecting data
- Analyzing data
Analyzing data

- Forming ballpark figures
- Looking for patterns and meaning
- Questioning constituent data
- Questioning surprises
- Questioning conclusions
Evaluating sources

- Authors
- Objectivity
- Information
- Currency
Authors

- What people or organization provided the data?
- What credentials do the authors have?
Objectivity

- Do the authors give evidence to support claims?
- Is the surrounding prose professional and unbiased?
Information

- How complete is the information?
- What is it based on?
Currency

- How current is the information?
- Is the currency good enough?
Evaluating surveys

- Who did the survey and who paid for it?
- How many people were surveyed and how were they chosen (sampling)?
- How was the survey conducted (techniques)?
- What was the response rate?
- What questions were asked?
Sampling

- Convenience samples
- Random samples
Survey techniques

- Face-to-face surveys
- Telephone surveys
- Online surveys
- Mail surveys
Response rates

- Response rates are dramatically dropping.
- To generalize to the entire population, researchers need information from non-respondents.
Surveys and interviews can be useful only if the questions are well designed.
Good questions have these characteristics

- They ask only one thing.
- They are phrased neutrally.
- They are asked in an order that does not influence answers.
- They avoid making assumptions about the respondent.
- They mean the same thing to different people.
Selecting data

- Uses the best data
- Uses data that measure the desired characteristics
Analyzing data

- Forming ballpark figures
- Looking for patterns and meaning
- Questioning constituent data
- Questioning surprises
- Questioning conclusions
Forming ballpark figures

- Check for well-supported explanations of variation from expectations.
- Check spreadsheets.
Looking for patterns and meaning

- Look for patterns
- Use easy clarifications
- Check the logic
Look for patterns

- Have things changed over time?
- Does geography account for differences?
- Do demographics such as gender, age, or income account for differences?
- What similarities do you see?
- What differences do you see?
Use easy clarifications

- Round large numbers
- Combine similar elements
- Calculate average, mode, median, range
- Chart data
- Examine actual numbers as well as percentages
- Check context
Check the logic

- State accurately what the data show.
- Clarify definitions on which data are based.
Questioning constituent data

- Note what is included/omitted.
- Note assumptions that are made.
- Question news reports. Go back to original sources when possible.
Questioning surprises

- Remember that numerous studies in scholarly journals challenge the data-based conclusions of earlier articles.
- Recognize that even authorities can differ on the numbers they offer, or on the interpretations of the same data sets.
Questioning conclusions

- Correlation is not causation.
- “Known” “facts” and figures are frequently wrong.