Presenting Survey Data and Results

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Reading Assignment: None
Goals for this Lecture

• Discuss a bit about how to display survey data and results in a briefing
  – How to structure slides
  – What to include
  – Displaying margins of error
• Learn about a couple of useful new plots
• Discuss how to calculate response rates and possible issues
A Bit About Briefing Survey Results

• When briefing survey results:
  – DON’T just present the data question-by-question in the order asked in the survey – boring!
  – DO tell a story
    • Focus on the questions that
      – Answer the survey objective
      – Give results interesting to the “client”
        » Sometimes it’s the outliers or tails…
    • Order the presentation of results so that it’s logical and interesting to the listener
A Good Briefing Outline

- Survey objective(s)
- Outline of the survey instrument
  - Perhaps a brief discussion of design development
- Fielding methods and details
  - Response rate(s)
- Comparison of sample to population
  - Demonstrate how representative (or not) sample is
- Results (see next slide)
- Conclusions & discussion
Displaying Survey Results

• For results slides, use a small number of standardized formats
  – Put the “take away” summary in slide header
  – Give actual survey question verbiage and number who answered the question
    • When giving percentages, show the $n$ as well, and vice versa
    • As appropriate, display uncertainty due to sampling (i.e., the margin of error)
  – Use actual quotes (e.g., from open-ended questions) to reinforce graphs and plots
Almost 50% of DL Students (313 of 633) Agree Library Critical to Their Studies

- “I believe that the NPS library is an essential tool that should always be available to DL students.”
- “The NPS Library is a valuable resource. Not every class requires need for use, however, some do.”
- “I have used the NPS Library for a good deal of my day job work as well. It has provided me an easy avenue to periodicals and journals that are often difficult to get access to through local research streams.”

“How much do you agree or disagree with the following statement: ‘Library research is a critical part of my NPS Distance Learning Studies.’”

0 5 10 15 20 25 30 35 40

Percent

Strongly Agree  Agree  Neutral  Disagree  Strongly Disagree

n=95  n=218  n=196  n=86  n=27

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Those Who Disagreed Were Largely Engineering and OR Disciplines

“How much do you agree or disagree with the following statement: ‘Library research is a critical part of my NPS Distance Learning Studies.’”

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Some Majors Did Not Disagree at All, But Small Numbers Not Definitive

“How much do you agree or disagree with the following statement: ‘Library research is a critical part of my NPS Distance Learning Studies.’”

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Neutrals Are Largely Outside (Hard) Engineering Disciplines

Program | Percent
--- | ---
MSES (n=47) | 51
Contract Management (n=18) | 47
HSI (n=9) | 37
EMBA (mil & civ) (n=148) | 35
Program Management (n=68) | 34
Systems Engineering (n=230) | 32
Electronic Systems Engineering (n=47) | 21
Cost Estimating and Analysis (n=12) | 18
Systems Analysis (n=27) | 17
Systems Eng. Management (n=31) | 10

“How much do you agree or disagree with the following statement: ‘Library research is a critical part of my NPS Distance Learning Studies.’”
How much do you agree or disagree with the following statement: ‘Library research is a critical part of my NPS Distance Learning Studies.’

Most Disciplines Had Substantial Percentage of Students Who Agreed

<table>
<thead>
<tr>
<th>Program</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space Systems (n=6)</td>
<td>100</td>
</tr>
<tr>
<td>Systems Eng. Management (n=31)</td>
<td>87</td>
</tr>
<tr>
<td>Space Systems Operations (n=6)</td>
<td>83</td>
</tr>
<tr>
<td>HSI (n=9)</td>
<td>63</td>
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</tbody>
</table>
On Displaying Margins of Error

• “Do I have to display margins of error on every plot?”
  – No, sometimes it’s overkill and/or distracting
  – But they should be communicated somehow

• If not included on every plot and table, give the reader/audience some general guidelines:
  “For analyses of the entire DL student population, the margins of error in this survey are approximately
  – two percent for questions with a binary scale (e.g., yes/no),
  – five percent for questions with a Likert scale (e.g., strongly agree, agree, neutral, disagree, strongly disagree).
  When analyzing smaller groups the margins of error will be larger, perhaps substantially.”
Barcharts and Histograms Not Optimal for Comparing Between Groups or Subsets

- Neither plot particularly good at allowing visual comparison between groups.
Barcharts and Histograms Not Optimal for Comparing Between Groups or Subsets

• Converting to percentages does not really help:
Likert-scale Data: Diverging Stacked Bar Charts

Is your job professionally challenging?

- All Survey Responses
- Private consultant/self-employed
- Academic (nonstudent)
- Business and industry
- Federal, state, and local government
- Other (including retired, students, not employed, etc.)

Employment sector:

- Asian
- White
- Other
- Black or African American

Race:

- Master’s and Above
- Associate’s and Bachelor’s

Education:

- Male
- Female

Gender:

- Important
- Not Important

Attitude toward Professional Recognition:

Freq: Strongly Disagree Disagree No Opinion Agree Strongly Agree

Compare to Traditional Bar Charts

• Much harder to distinguish differences:
  – Divided bar chart:

  ![Divided Bar Chart](image1)

  ![Side-by-Side Bar Chart](image2)

– Side-by-side bar chart

Creating Diverging Stacked Bar Charts

- In R, use the `likert()` function in the HH package
- Examples from QOL survey results:
Diverging Stacked Bar Charts

Q7: How would you rate your satisfaction with the following services:
Presidio of Monterey Army Health Clinic

![Bar Chart Image]

Number of Responses

Percent

Very Unsatisfied  Unsatisfied  Neutral  Satisfied  Very Satisfied

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Diverging Stacked Bar Charts

Q7: How would you rate your satisfaction with the following services:

Local Schools

Number of Responses

Percent

Very Unsatisfied  →  Unsatisfied  →  Neutral  →  Satisfied  →  Very Satisfied  →  Other

50
40
30
20
10
0

NPS
USA
USAF
USCG
USMC
USN
INTL
Other
GSBPP
GSEAS
GSOIS
SIGS
Provost
Other

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Other Thoughts on Survey Briefings

• Goal is to communicate to decision maker what the data say about the survey objective
  – Don’t make it a data dump

• Focus on effective graphical communication
  – Use graphics that effectively communicate the quantitative results
    • See Cleveland (1994, 1993) and Tufte (1990, 2001)
  – Save the mathematics, modeling, and technical details for the back-up slides / report appendix

• But do communicate the necessary details to convince the audience that the survey was done effectively and rigorously
  – Response rate (presumably high), margin(s) of error, etc.
Calculating the Response Rate

• In theory, the response rate is simple:

\[
\text{Response Rate} = \frac{\text{Number of completed surveys}}{\text{Number of surveys sent out}}
\]

• In practice, it can be more complicated to calculate
  – What counts as a “completed survey”?
  – What to do with those who could not be reached, say due to incorrect contact information?
  – Etc.
Other Potential Response Rate Calculation Complications

• When must screen frame members to determine sample eligibility
  – Hard then to determine denominator for response rate calculation

• When sample frame consists of clustered elements and full cluster nonrespondent
  – Unclear how many sample elements were really nonrespondent

• When using unequal sampling probabilities
  – Unclear whether to use weights in response rate calculation
One (Conservative) Approach

Response rate = \[ \frac{I}{I + R + NC + O + e \times U} \]

where

- \( I \) = number of complete surveys
- \( R \) = number of refusals and break-offs
- \( NC \) = number of non-contacts
- \( O \) = number of other eligible
- \( U \) = number of unknown eligibility
- \( e \) = estimated proportion of eligibility
If Only News Organizations (and Many Others) Followed These Suggestions…

Dear News Media,

When reporting poll results, please keep in mind the following suggestions:

1. If two poll numbers differ by less than the margin of error, it’s not a news story.
2. Scientific facts are not determined by public opinion polls.
3. A poll taken of your viewers/internet users is not a scientific poll.
4. What if all polls included the option “Don’t care”?

Signed,
-Someone who took a basic statistics course.

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What We Have Just Learned

• Discussed a bit about how to display survey data and results in a briefing
  – How to structure slides
  – What to include
  – Displaying margins of error

• Learned about a couple of useful new plots

• Discussed how to calculate response rates and possible issues
References on Good Graphics


