Surveys in Support of Irregular Warfare: Important Analytic Considerations

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MORS Symposium
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Good Surveys

Design

Sample

Analyze
Good Surveys

“Good” survey:
Can do formal inference from sample to population
"Good" survey: Can do formal inference from sample to population
Good Surveys
Design

Challenge: Good Instrument and Question Design
- Goal is to collect accurate information
- Encourage honest response and minimize bias
- In TV, often with the added challenge of bridging language and cultural divides
- For a good question:
  - Fair enough with the right question
  - Requires more validation than questions
  - Requires more validation than online surveys

Challenge: Fielding Survey to Achieve Desired Response Rate But Within Budget
- How will respondents be contacted and complete the survey?
- There is often a trade-off between design and cost
- Goal is to maximize response rate (non-response chance of bias)
- In TV surveys, further challenges may include:
  - Choice of survey medium may be weighted
  - Surveys may face ethics issues, perhaps affecting intercultural studies

Challenge: Ethical Surveying
- Surveys should be conducted in a manner that maintains trust and confidence
- The survey should be an accurate reflection of the project
- Informed consent: Always necessary and clear
- The purpose of the survey should be clear
- Surveys should be designed to be as simple as possible
- If you guarantee confidentiality, keep your promises
- Human subject protection: Don’t forget your Institutional Review Board (IRB) if required
Challenge: Good Instrument and Question Design

- Goal is to collect accurate information
- Encourage honest response and minimize bias
- In IW, often with the added challenge of bridging language and cultural divides

- For a good question:
  - You must ask the right question
  - Respondents must understand your question
  - Respondents must know the answer
  - Respondents must be willing and able to tell you the answer
Solution: Careful, Rigorous, Repeated Pre-testing

- Throughout process of developing questions and instrument, pre-test with SMEs and likely respondents
- Use "think-aloud" and cognitive interviewing techniques
- Make sure survey questions easily and consistently understood, response scales work, etc.
- Pre-test, pre-test, pre-test!
Challenge: Fielding Survey to Achieve Desired Response Rate But Within Budget

• How will respondents be contacted and complete the survey?
• There is always a trade-off between design and cost
• Goal is to maximize response rate (to minimize chance of bias)
• In IW surveys, further challenges may include:
  • Choice of survey modes may be restricted
  • Surveyors may face extreme obstacles, perhaps affecting interviewer safety
Solution: Employ Professional Survey Company, Usually Local, That Uses Proven Methods

- Professional survey company knows the art and science of good fielding methods
- Local companies know the culture and language, can relate to respondents, etc.
Challenge: Ethical Surveying

- Surveys should be conducted in a manner that minimizes risks to participants
  - No one should suffer any adverse consequences because of participation

- Informed consent: Always honestly disclose:
  - The purpose of the survey
  - How the results will be used
  - Participation is voluntary (if it is)
  - Whether the responses will be kept confidential

- If you promise confidentiality, keep your promise

- **Human subjects protection: Don't forget your Institutional Review Board (IRB) if required**
Solution: IRB (if required) & Good Data Safeguarding Procedures

- If you collect personal information, you are ethically and legally obligated to safeguard it
  - DoD 5400.11-R, “Department of Defense Privacy Program”

- A good strategy:
  - Give all respondents a unique ID and remove identifying information (e.g., names, SSNs, addresses, etc) from the analysis file
  - Create a separate file that links IDs to identifying information
  - Store in a locked cabinet
  - Limit access to those with a need to know

- Once analysis is complete, link file with identifying information should be destroyed
Challenge: Appropriately Sampling from the Population
- Most fundamental requirement is a sample where each member of the population has a known, non-zero probability of selection.
- Sampling does not need to be a simple random sample (usually too expensive).
- Complex sampling usually required due to competing needs for budget and perhaps precision needs.
- Frame effects can be very complicated.

Challenge: Determining Size of Sample
- "Power calculations" important:
  - How big of a sample do I need to achieve margin of error X?  
  - Can I afford to do the survey?
  - Should be driven by analytical objectives
  - Often constrained by available budget.
Challenge: Obtaining a "Representative Sample"
Solution: Rigorous Random Sampling Minimizes All Types of Bias

- Result of random sampling is that it's highly unlikely to get a biased sample
  - Even on unobserved / unobservable characteristics!

- Sampling methods must not be based on human choice

- Good sampling preferred to bad "census"

Attempted census with 15% response rate

Sample with 3% margin of error and 75% response rate
Challenge: Appropriately Sampling from the Population

- Most fundamental requirement is a sample where each member of the population has a known, non-zero probability of selection
- Sampling does not need to be a simple random sample (usually too expensive)
  - Complex sampling usually required due to competing analytic and budget (and perhaps operational) needs
  - Trade-offs can be very complicated
Solution: Usually Some Sort of Complex Sampling Scheme

- Stratification: Used to ensure sufficient sample sizes for subpopulations
- (Multi-stage) cluster sampling: Useful when respondents naturally group
  - Often driven by budgetary considerations

- How to design a sampling scheme?
  Hire a sampling statistician and/or professional survey company
Challenge: Determining Size of Sample

- “Power calculations” important:
  - How big of a sample do I need to achieve margin of error “X”?
  - Can I afford to do the survey?

- Should be driven by analytical objectives
- Often constrained by available budget
Solution: Survey Sampling Statistician

• Key is to know what you want to get out of the survey
  • What are the analytical objectives?
  • At what level will the analysis be done (i.e., subgroups of the population)?
  • What is the necessary / desired margins of error?

• Use sampling statistician to calculate the options
Analyze
Challenge: Sample Design Drives the Correct Analysis

Population

Sample

Random Sample

Can’t observe directly

Population Parameter: Population Average

Inference

Sample Statistic: Sample Average
Solution: Know the Sample Design

• First question I ask when evaluating quality of a survey: "Can I see your sampling plan?"
• Second question: "Can I see your meta-data?"

Meta-data is documentation on:
  • How the sampling was done
  • How the survey was executed
  • Data definitions and any issues
  • Detailed statistical information

• Be sure to require a survey contractor to deliver a sampling plan and meta-data...then use it in your analysis!
Challenge: Correct Statistical Analysis More Complicated

- Weights for correct point estimates
- S.E.s must account for complex sampling
- Post-stratification adjustments
- Imputation for missing data
- Etc, etc...

\[ \bar{x} \neq \frac{1}{n} \sum x_i \quad \text{and} \quad s_{\bar{x}} \neq s_x / \sqrt{n} \]
Solution: References and Software

- Complex Surveys: A Guide to Analysis Using R by Thomas Lumley
- Sampling: Design and Analysis by Sharon L. Lohr
- R
- SAS
- Stata
Challenge: Making the Data Available to the Warfighter

- Analysis often done one time by ORSA and briefed
  - Canned analysis (i.e., PowerPoint slides) often of limited future use
  - Result is “data death:” Data filed onto hard drive and slides filed away

- Goal: Get the data into the hands of users so they can query it when and as needed
  - System must be user-friendly but also provide statistically and quantitatively rigorous results
One Solution: A Web-based Analysis Tool

- Interactive, web-based tool
- GUI interface, but running statistical software
- Result: Survey data is “live” & available to users anywhere (with credentials and Internet connectivity)
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In Conclusion...

FOR THE TENTH YEAR IN A ROW, THE EMPLOYEE SATISFACTION SURVEY SAYS MORALE IS LOW.

MANAGERS' BONUSES ARE LINKED TO THESE RESULTS, YOU CAN BE SURE WE'LL MAKE BIG CHANGES...

...TO THE SURVEY.