

Principles of Survey Research

Shari Lawrence Pfleeger

Barbara A. Kitchenham

Presented by: Justin Erenkrantz, ICS 280

Turning Lemons into Lemonade

- *What is a survey?*
- *Definition in catalogue for CS PhDs*
 - *Provide overview of specific field*
- *Series in Software Engineering Notes*
 - *Focus: human-focused questionnaires*
- *Learn from prior mistakes: “lemons”*

What is a Survey?

- *Collect information intended to describe*
- *Can be supervised or unsupervised*
- *Compare knowledge, attitudes, behaviors*
- *Set clear statement of expected outcome*
- *Provide clear and measurable objectives!*
- *Analyze and produce meaningful results*

Designing a Survey

- *Similar to a scientific experiment*
- *Describe a phenomenon of interest*
 - *Provide more details about a process*
- *Assess impact of some intervention*
 - *Examine effectiveness of technique*
- *Bias resilient, appropriate, cost-effective*

Descriptive Survey Designs

- 1. Cross-sectional: Ask for information once*
- 2. Cohort: View change over time*
- 3. Case control: Retrospective examination*
 - SE usage is combination of #1 and #3*
 - Ask developers about prior projects*

Experimental Designs

- *Concurrent control studies*
 - *Randomly assigned to groups*
 - *Not randomly assigned to groups*
- *Self-control studies*
 - *Pre- and post- testing in a class*
- *Historical comparison to previous results*

Sample Size / Response Rates

- *Not feasible to get all to respond*
 - *Want a representative sample size*
 - *Prevent sampling inaccuracies*
 - *Constrained by cost*
- *Should always disclose response rates*
 - *Important to understand non-responses*

Constructing a Survey Instrument

- *Search literature for similar surveys*
 - *Easier to re-validate prior surveys*
- *Selection of questions crucial*
 - *Appropriate target and length*
 - *Be wary of open-ended questions*
 - *Closed answers should be clear*

Questionnaire Evaluation

- *Motivation: why should people respond?*
 - *Help by clarifying purpose of survey*
 - *Be direct about your intentions*
- *Researcher bias invalidates survey!*
 - *May be unintentional, if not trained*
 - *Must provide balanced questions*

Pre-Testing

- *Helps identify problems or biases early*
- *Start out small*
 - *Focus groups: mediated discussions*
 - *Pilot studies: small distribution*
- *Contributes to validity and reliability*
 - *SE: weak validity and reliability*

Types of Reliability

- *Confidence in results if repeated*
- *Alternate form: Multiple phrasings*
- *Internal consistency: Repeat questions*
- *Intra-observer: Same answer each time*
- *Inter-observer/inter-rater reliability*
 - *Similar answers for same conditions*

Types of Validity

- *Ensures survey measures what it should*
- *Face validity: Extremely subjective*
- *Content validity: How appropriate*
- *Criterion validity: How compares to others*
- *Construct validity: How behaves in practice*

The Need For Sampling

- *Large population can be cost prohibitive*
- *Using a subset reduces the cost*
- *Exercise caution to select representatives*
 - *Otherwise, invalidates reliability*
- *Easier follow-ups with fewer people*
 - *Follow-ups can be critical*

Probabilistic Sample Methods

- *Known, non-zero chance for inclusion*
- *Simple random: Equal probability*
- *Stratified random: Separate into groups*
- *Systematic: Select every X member*
- *Cluster-based: Belong to specific group*

Non-Probabilistic Sampling

- *When people are hard to identify or rare*
- *Convenience: Available and willing*
- *Snowball: Leverage recommendations*
- *Quota: Stratified until reach proportions*
- *Focus groups: Representative of a group*

Data Validation

- *Post-mortem examination of data*
- *Check for consistency and completeness*
 - *Poor questions could be obvious*
- *May need to partition responses*
 - *Group respondents via demographics*
 - *Helps alleviate design errors*

Risks of Ordinal Data

- *Ordinal: choose from specific response set*
- *Tempting to convert ordinal to a number*
- *Presents serious challenges*
- *Scale violations*
 - *Unnecessary conversion*
 - *Inappropriate conversion*

Questionnaire Size

- *Most dislike answering long surveys*
- *Long surveys present analysis challenges*
- *May introduce spurious results*
 - *Margin of error can overwhelm data*
- *Inappropriate statistical analysis*
 - *Yield desired, but insignificant results*

Discussion

- *When should a survey be conducted?*
- *What is the takeaway for SE?*
- *How much expertise in psychology for SE?*
 - *One or two courses **not** enough!*
 - *Is equivalent of giving a loaded gun?*
- *Could we lose focus on building systems?*