COMP 7036
Applied Research Methods in Software Development

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Observations, surveys and sampling

Overview

- Observation studies
- Surveys
- Sampling

Observation studies

Characteristics:

- might involve humans, animals, plants, nonliving objects
- tends to have particular prespecified focus
- behavior being studied quantified in some way
- considerable advance planning, meticulous
- attention to detail; great deal of time
- provides quantitative alternative to qualitative approaches

Observation studies

Maintaining objectivity:

- Define behavior precisely & concretely so that it is easily recognized when it occurs
- Divide observation period into small segments; record whether behavior occurs in each segment
- Use rating scale to evaluate behavior in terms of specific dimensions
- Have 2-3 people rate behavior independently
- Train raters to use specific criteria; continue training until consistent ratings obtained for any single occurrence of behavior

Surveys

- Acquire information about 1+ groups of people: ask questions & tabulating answers
  - characteristics, opinions, attitudes, etc.
- Goal: learn about large population by surveying sample of that population
- Also called descriptive or normative survey
- Simple design: researcher poses series of questions, quantifies responses, draws inferences about particular population from responses of sample

Surveys

- Captures fleeting moment of time
- By drawing conclusions from transitory collection of data, extrapolation can be made about state of affairs over longer period of time
- Relies on self-report data

Face-to-face interview

- Structured
- Enables researcher to establish rapport with participants
- Yields highest response rates in survey research
- Time and expense involved may be prohibitive

Telephone interview

- Structured
- Less expensive and time-consuming than face-to-face interviews
- Accessible participants
- Response rate lower than for face-to-face interviews but higher than for mailed questionnaires

Questionnaires

- Can be sent out to large groups over large geographical area
- Participants can respond to questions with assurance of remaining anonymous and thus may be more truthful than in face-to-face or telephone interviews
- Have a low return rate
- Often make use of checklists and rating scales

Questionnaires

- **Checklist**: list of behaviors, characteristics, or other entities under investigation

- **Rating Scale**: used when behavior, attitude, or other phenomenon of interest needs to be evaluated on continuum ("never" to "always")

Guidelines (Interviews)

- Identify questions in advance
- Consider how participants' cultural backgrounds may influence responses
- Make sure interviewees are representative of group
- Find a suitable location
- Get written permission
- Establish and maintain rapport

Guidelines (Interviews)

- Focus on the actual rather than on the abstract/hypothetical
- Don’t put words in people’s mouths
- Record responses verbatim
- Keep your reactions to yourself
- Remember you’re not necessarily getting the facts
- As you write questions, think about how to quantify responses

Guidelines (Interviews)

- Consider asking questions that will elicit qualitative information
- Pilot-test questions
- Restrict each question to a single idea
- Save controversial questions for latter part of interview
- Seek clarifying information when necessary

Guidelines (Questionnaire)

- Keep it short
- Keep respondent's task simple
- Provide clear instructions
- Use simple, clear, unambiguous language
- Give rationale for any item for which the purpose is unclear
- Check for unwarranted assumptions implicit in the question

Guidelines (Questionnaire)

- Word questions in ways that don't give clues about preferred or more desirable responses
- Determine in advance how t code responses
- Check for consistency
- Conduct one or more pilot tests to determine validity of your questionnaire
- Scrutinize almost-final product one more time to make sure it addresses your needs
- Make questionnaire attractive and professional looking

Sampling designs

- **Probability Sampling**: researcher specifies in advance that each segment of population is represented in sample

- **Nonprobability Sampling**: researcher has no way of forecasting or guaranteeing that each element of population will be represented in sample. Some members of population have little or no chance of being sampled

Probability sampling

Random selection:

- Choose sample in such a way that each member of the population has an equal chance of being selected

- Assumes characteristics of sample approximate characteristics of total population

Probability sampling

- Simple random sampling:
  - least sophisticated
  - sample chosen by simple random selection
- Stratified random sampling:
  - sample equally from each layer in overall population
- Proportional stratified sampling:
  - sample proportionally from each layer in overall population
- Cluster sampling:
  - population of interest spread over large area
  - large area subdivided into smaller units
  - subset of identified clusters randomly selected
- Systematic sampling:
  - Select individuals according to predetermined sequence, which must originate by chance

Nonprobability sampling

- Convenience sampling:
  - also known as accidental sampling
  - take samples that are readily available
  - for less demanding research problems
- Quota sampling:
  - variation of convenience sampling
  - select participants in same proportion found in general population, but randomly
- Purposive sampling:
  - select participants for particular purpose
  - always provide rationale explaining selection of particular sample

Sample size

- The larger the sample, the better
- For smaller populations (N=100 or fewer), survey entire population
- If population is around 500, sample 50%
- If population is around 1,500, sample 20%
- If population > 5,000, 400 is fine
- The larger the population, the smaller the percentage needed for a representative sample

Sampling bias

- **Bias**: any influence, condition, or set of conditions that singly or in combination distort the data

- **Sampling Bias**: any influence that may disturb randomness by which choice of sample population has been selected

Sampling bias

Strategies for identifying sampling bias:

- Scrutinize questionnaire for items that may be influenced by factors that distinguish respondents from nonrespondents
- Compare responses that were returned quickly with those that were returned later (may reflect the kinds of responses that nonrespondents would have given)
- Randomly select small number of nonrespondents and match their answers against those of respondents

Summary

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- Surveys
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