

# Questionnaire Design II



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# Overview

- Formulation
- Validity and Reliability
- Translation
- Preparation
- The Pretest and Pilot

# Introduction

- Purpose
- Difficulties
- Proper Planning

# Formulation

- Defining the Domain
- Types of Questions
- Vocabulary
- Formulating the Questions

# Defining the Domain: Class Discussion

Proposed Research Study:

Graduates of Vanderbilt University School of Medicine (VUSM) are successful.

- The Research Question
- Literature Search
  - Existing Questionnaires

# Types of Questions: Open-ended

- Examples
  - How would you describe success?
  - What are the primary tasks you perform at work?
- Advantages
- Disadvantages



# Types of Questions: Closed

- Examples

1. What is your annual salary?
2. On a scale of 1 - 10, where 1 is dislike and 10 is like, rate how well you like your job.

- Advantages

- Disadvantages



# Types of Questions: Semi-closed

- Example

1. What role have you taken the most in published research?

- Author
- Reviewer
- Other (specify)  

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- None
- Don't Know





# Defining the Domain: Brainstorming Session for Questions

In small groups on a sheet of paper, write one open, closed, and semi-closed questions and the choices of answers for graduates of VUSM that would help us understand the proposed research study: Graduates of Vanderbilt University School of Medicine have a strong impact on published research.

# Vocabulary

- Appropriate Language
  - Slang
  - Ethnic
  - Regional
- Familiar Language

Fixin' to

Wuz up?

Y'all I recon'

Cocodrie

Props

Dot gone

# Formulating the Questions: Class Discussion

Discuss the following questions requested to be answered by graduates of Vanderbilt University School of Medicine:

- a. Are you an editor of a journal or a reviewer?
- b. Have you recently had an article published?
- c. Don't you believe receiving grant money is the most important aspect of successful research?
- d. Out of the published research that you have contributed to, what was the highest impact factor?
- e. How often have you bribed someone in order to be published?

# Formulating the Questions: Class Discussion on Biases

a. Are you an editor of a journal or a reviewer? Double-barrelled

Solution: Make two separate questions.

b. Have you recently had an article published? Vague words

Solution: Try different words and ask others for feedback.

c. Don't you believe receiving grant money is the most important aspect of successful research? Leading

Solution: Reword the question. On a scale of 1-10...

# Formulating the Questions: Class Discussion on Biases

- d. Out of the published research that you have contributed to, what was the highest impact factor? *Ambiguous/Technical jargon/Relies on memory*

*Solution: Reword. Try not to rely too much on recall.*

- e. How often have you bribed someone in order to be published?  
*Sensitive*

*Solution: If you must ask sensitive questions, try giving a lead sentence such as: Some researchers have admitted buying lunch, sending a gift.....*

# Formulating the Questions: Other Biases

- Complex
- Insensitive measure: Scale of 1 – 2 – 3 vs. 1 – 10
- Too few categories
- Missing and/or overlapping intervals
- Horizontal vs. vertical response format
- Length of questionnaire
- Placement of questions
- Skipping questions and branching
- Cultural differences
- Avoid hypothetical questions

# Formulating the Questions: Other Biases (Dillman, 2007)

- Do not use, check-all-that-apply question formats
- Choose question wordings that are comparable to previous collected data
- Consider questionnaires as conversations. Do not switch topics often. It gives the appearance of not listening to the responder.
- Choose the first question carefully. It should apply to everyone and be easy and interesting.
- Ask one question at a time. Ex: Moral Distress frequency and occurrence
- Use spacing
- Use bold for questions and light print for answer choices

# Group Activity:

Revise your questions





# Validity and Reliability

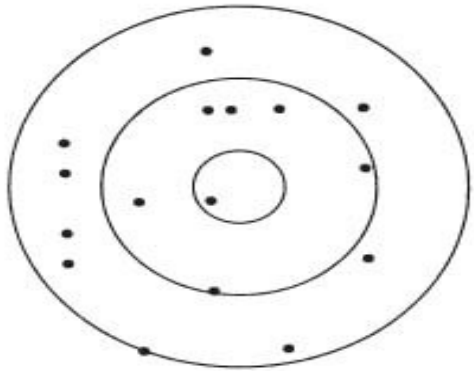
- Reliability
  - Test-Retest Method
  - Equivalent Form
  - Internal Consistency
- Validity
  - Internal and External
  - Face
  - Content
  - Criterion
  - Construct

# Reliability and Validity

- There are different definitions for the types of reliability and validity
- Reliability refers to the consistency of a set of measurements.
- Validity refers to what degree the research reflects the given research problem.
- A measure may not be valid if it is not reliable.

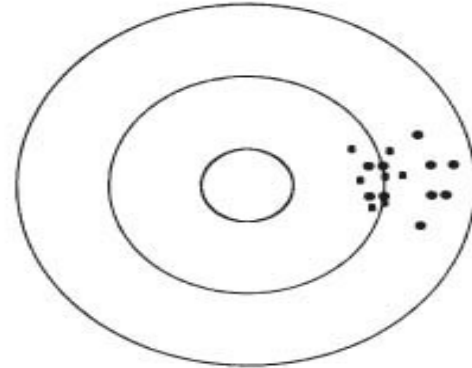
<http://www.experiment-resources.com/research-methodology.html>

# Reliability and Validity



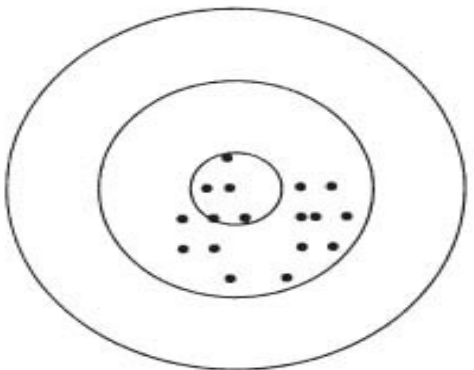
## Neither valid nor reliable

The research methods do not hit the heart of the research aim (not 'valid') and repeated attempts are unfocussed



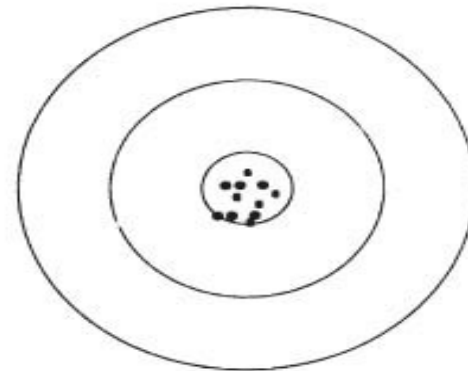
## Reliable but not valid

The research methods do not hit the heart of the research aim, but repeated attempts get almost the same (but wrong) results



## Fairly valid but not very reliable

The research methods hit the aim of the study fairly closely, but repeated attempts have very scattered results (not reliable)



## Valid and reliable

The research methods hit the heart of the research aim, and repeated attempts all hit in the heart (similar results)

# Reliability: Test-Retest

- The same instrument is provided to the same subjects twice.
- The instrument should produce similar results.
- An issue with this method is finding the appropriate time to re administer the instrument.
  - Ex: If a pre-survey is administered regarding knowledge of HIV before an intervention workshop, the post-survey will most likely give very different results. However if a post survey is given and the same survey is given in three weeks, you would expect the results to be similar.

# Reliability: Equivalent Form

- Different versions of the instrument are created
- Results should be similar

# Reliability: Internal Consistency

- Items on the measure should provide consistent scores.
- Split-halves Test
  - Compare the odd questions to the evens
  - Should correlate well

# Validity: Internal and External

- Internal
  - Measures the confidence in which there is a cause-effect relationship.
  - “Could there be an alternative cause, or causes, that explain my observations and results?”
- External
  - Can the results be generalizable to a larger population
  - “To what populations, setting, treatment variables and measurement variables can this effect be generalized.”

<http://www.experiment-resources.com/external-validity.html>

# Validity: Face

- At “face value” does the instrument make sense.
- Does not require expert opinion.
- Arguably the weakest type of validity
- Sometimes it is difficult to measure or get experts opinion
- Ex of Face Validity: A survey may be given to patients with irritable bowel syndrome regarding the syndrome. They may be asked to comment on if the relevant questions were asked.



# Validity: Content

- How well does the instrument represent every characteristic of the construct
- Usually requires expert opinions
- Statistical analysis should be considered

# Validity: Criterion

- Criterion Validity: How well does a measurement estimate or predict certain abilities
  - Concurrent
  - Predictive
- The major differences deal with the time of administration

# Validity: Concurrent

- Concurrent Validity – How well does a measure correlate with another measure of the same type?
- Concurrent suggest that the measures should be given (approximately) at the same time.
- Ex: If two different IQ tests are given, they should correlate well.

# Validity: Predictive

- Predictive Validity – How well does a measure predict a construct in the future?
- Ex: A survey may be given to understand if medical students receiving this lecture will be inclined to create a survey later in their careers. We may see if there is a correlation with the number of surveys designs they participate in once they have worked as a physician for 10 years.

# Validity: Construct

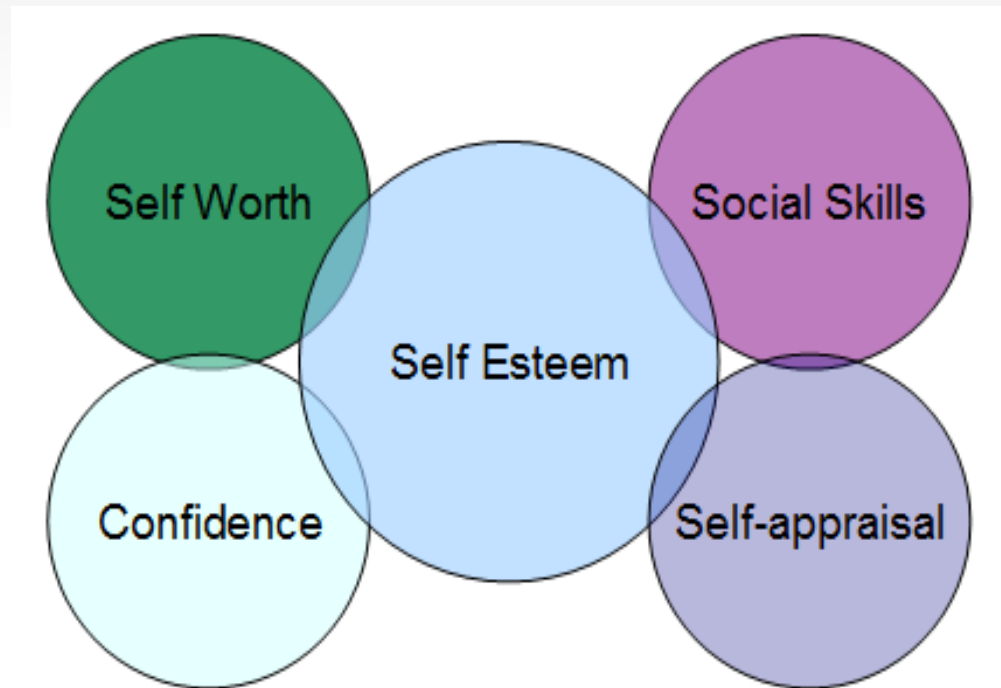
- Construct Validity – How well does the construct measure what it is suppose to be measuring?
- Arguably the most important validity and difficult to prove.
- Ex: A survey measuring medical students' *wellness*. Wellness is an abstract, theoretical construct.
- If you can prove convergence and/or divergence, this may be enough.

# Validity: Convergent and Divergent

- Convergent Validity – Do constructs relate to **expected** constructs they should be related to?
- Divergent Validity – Is the construct unrelated to construct **believed** to be unrelated?

# Validity: Convergent

- The construct, Self-Esteem, should relate with all other constructs. Self-worth and confidence should relate and social skills and self appraisal should too.



# Translation

“Out of sight, out of mind”

“Invisible and insane”



# Translation

- Preliminary Translation
  - Expert Evaluators
  - Back Translation
- Cross-language Equivalence

# Preparation

- Type of Analysis
- Establishment of Codes
  - Open-ended Questions
  - Closed Questions
- Code Book
  - Live Document
  - Precision and Completion
  - Record of Algorithms

# Preparation

- Clearly define the purpose of the study.
- Provide clear and concise instructions.
- Discuss the policy on confidentiality
- Discuss the person's right to refuse any question(s).
- Include identifying data on multi-page questionnaires.

# The Pretest

- Purpose

## Considerations

- Appropriate Wording and Questions
- Blank Answers
- Right Sample
- Skip Patterns
- Read Body Language
- Interpretations Similar
- Length
- Request Feedback from Subjects
- Listen to Feedback
- Software (Zoomerang, Adobe Live Cycle Designer, SurveyMonkey.com, REDCap Survey)

# Pilot Test

- The pilot test is a formalized small scale administration
- Some Questions
  - How is the response rate?
  - Are there questions that are not being answered?
  - Is relevant information being obtained from open-ended questions?
  - How much variability is occurring for each item?

# Conclusion

- Start as Soon as Possible (ASAP)!
- Don't Recreate the Wheel!
- Pretest and Pilot the Right Population
- Review, Revise, and Test

# References

Dillman, D.A. (2007). *Mail and internet surveys: The tailored design method*(2<sup>nd</sup> ed.). Hoboken, NJ: John Wiley & Sons, Inc.

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**Questions?**