

# A MIXED-METHODS APPROACH TO QUESTIONNAIRE DEVELOPMENT

Understanding Students' Interpretations of Library Survey Questions

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# OUTLINE

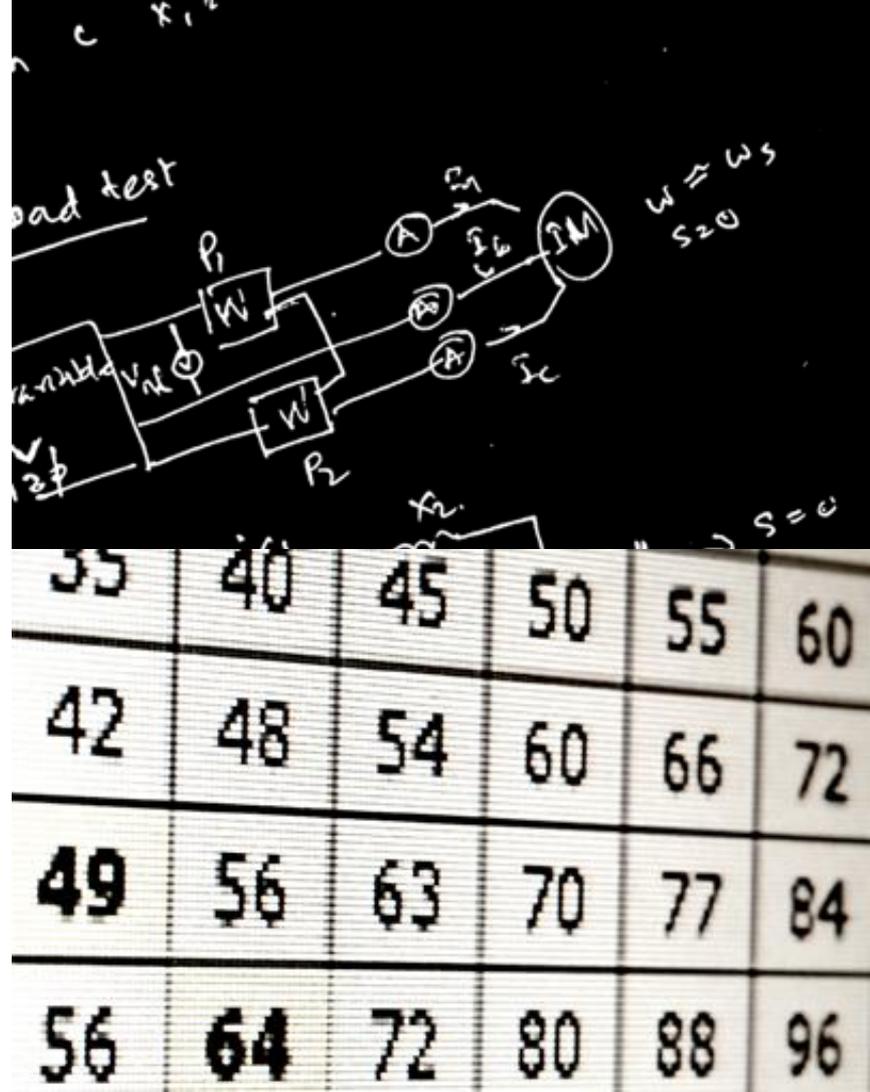
1. Questionnaire Development:  
Best Practices (Validity)
  2. Cognitive Interviewing
  3. UNC Chapel Hill Qualitative Pre-  
Test Phase
  4. Factor Analysis
  5. UNC Chapel Hill Pilot Study –  
Quantitative Test Phase
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# QUESTIONNAIRE DEVELOPMENT

# BEST PRACTICES: VALIDITY

## *Developing the Ithaca S+R Student Survey instrument:*

- » Advisory committee (face and content validity)
- » Qualitative pre-testing (response process validity)
- » Quantitative pilot testing (construct validity – factor analysis)



# COGNITIVE INTERVIEWING

“The poodle has 9 puppies. The collie has 5 puppies. How many more puppies does the poodle have?”



“How many more  
puppies does the  
poodle have *than*  
*the collie?*”

Willis, Gordon B. *Cognitive interviewing: a tool for improving questionnaire design*. Thousand Oaks, CA: SAGE Publications, Inc., 2005. doi: <http://dx.doi.org/10.4135/9781412983655>.



# *What is a “cognitive interview”?*

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*A qualitative method for testing questions that may be problematic, due to the cognitive processing involved in answering those questions.*

*Iterative process that uses think-aloud exercises and verbal probing.*

# APPLICATION OF COGNITIVE INTERVIEWS

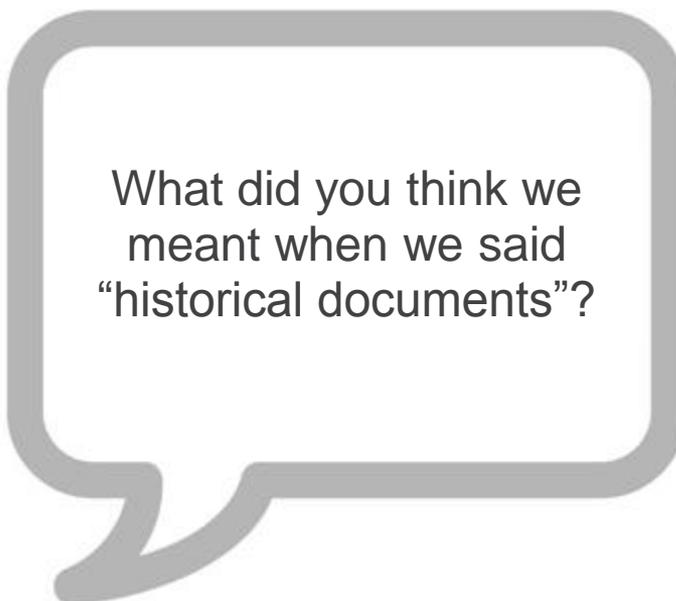
*Use this process reveal  
latent problems &  
improve upon known  
problems, leading to  
better design of:*

- » Interview questions
- » Focus group questions
- » Survey questions
- » Poll questions
- » Instructions for participants

# CATEGORIES OF C.I. QUESTIONS

*(Willis, 2005):*

- » Instructions
- » Clarity of question wording
- » Assumptions
- » Knowledge and memory
- » Sensitivity and bias
- » Response categories
- » Other problems (e.g. “Can you tell me more about that?”)



What did you think we meant when we said “historical documents”?

# BASIC STEPS TO C.I.

1. *identify potentially problematic questions in your questionnaire draft & develop probing question(s) for each*
2. *write a script for interviewers*
3. *conduct interviews*
4. *analyze responses (written summary, group discussion)*
5. *revise questionnaire*
6. *interview participants to test your revised questions*

# MULTIPLE APPROACHES

## *Whole or Partial?*

1. *Participant completes whole survey.*
2. *Participant completes only select survey questions.*

## *Timing of C.I.*

1. *Conduct interview **after** participant takes survey.*
2. *Conduct interview **as** participant is taking survey.*

# C.I. INTERVIEW TIPS

1. *Encourage interviewees to be as specific as possible:*

*“What are you reflecting on right now?”*

*“What event were you thinking about when you said...?”*

2. *Use visual (nodding, eye contact) and verbal (hmm, uh-huh) cues*
3. *Note-taking vs. recording*
4. *Pace yourself*

UNC CHAPEL HILL  
**QUALITATIVE PRE-TEST**

# UNC CHAPEL HILL STUDY: PRE-TEST

## *Prior to study:*

- » Ithaka S+R draft survey questions
- » Survey already conducted at 1 institution
- » Trained graduate student assistant
- » Pre-tested our C.I. instrument on 3 students (2 grad, 1 undergrad)

## *Methodology:*

1. Sample: 20 students (5 Ph.D., 5 Master's, and 10 undergraduates)
2. IRB reviewed and approved
3. Incentives provided – gift cards (compliments of Ithaka S+R)

*Survey draft: answer choice included “historical documents”*

*C.I. Question: What did you think we meant when we said “historical documents”?*

*(Undergrads)*

- » “I wasn’t sure about that. I thought maybe speeches people had given or old laws, I do little with history so that threw me for a loop.”
- » “I thought it was referring to a facsimile or copy of a historical document. A really old historic news article or something that was super noteworthy. I’m not a 100% sure. I’ve not taken a History class in 4 years.”
- » “ I think of the Declaration of Independence and Anne Frank’s diary.”
- » “Anything that’s fact and really old, at least way out of my generation. I don’t use anything super old so I don’t...I didn’t think much of it. If it isn’t recent to me, it’s somewhat historical I guess.”

# **New Wording:**

“Collection(s) of historical documents or records (such as rare books, hand-written letters or diaries, artifacts, etc.)”

*Survey draft: “The library has an archive that I use for my coursework or research”*

*C.I. Question: “What did you think we meant by ‘an archive’?”*

*(Undergrads)*

- » “I was just thinking that there’s a sector of nursing coursework, an online database where I can look for nursing related things. I’m not sure if an archive is physical or virtual.”
- » “I thought of the reserve reading books. I’m sure there is an actual archive of historical docs or art pieces the typical definition. Things set aside to a certain collection.”
- » “I thought of the reserve reading books. I’m sure there is an actual archive of historical docs or art pieces the typical definition. Things set aside to a certain collection.”

# **New Wording:**

“The library stores, organizes, and keeps track of books, articles, data, images, or other resources”

*Survey draft: “Librarians or library staff provide assistance or guidance about coursework or research at any time of day or night (24/7)”*

*C.I. Question: “How did you decide to answer this question the way you did?”*

*(Graduate students)*

- » “I was thinking about chatting online with a librarian if I run into a wall and need help finding a resource. (I answered ‘important’) instead of very important because it doesn’t need to be at 2am”
- » “I don’t always need 24/7. I don’t work in the middle of the night – some people do.”
- » “Seems silly to me to have librarians on call 24/7.”

# FACTOR ANALYSIS

# *What is “factor analysis”?*

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*A multivariate statistical technique used to determine if a set of questions all measure an underlying construct*

*Procedure to simplify a large number of variables (e.g. survey questions) into a smaller set of latent variables/factors (the “common denominators”)*

# APPLICATION OF FACTOR ANALYSIS

*Use FA to:*

- » Reduce the number of questions in a survey instrument
- » Determine the construct validity of a survey questionnaire
- » Determine the structure of variables (attitudes, behaviors, knowledge, etc. as operationalized by survey questions)
- » Provide evidence for theory-building or for testing hypotheses



*Example:*

*Agree/disagree scale:*

- » I love puppies
- » Puppies are my favorite
- » I hate puppies
- » Puppies are boring
- » Playing with puppies is a waste of time
- » I always look forward to playing with puppies
- » I would like to have more opportunities to play with puppies
- » Playing with puppies is energizing

Example adapted from the writing example in: Hof, Melanie. "Questionnaire Evaluation with Factor Analysis and Cronbach's Alpha: An Example"  
Accessed from [http://www.let.rug.nl/nerbonne/teach/remastats-meth\\_seminar/student-papers/MHof-QuestionnaireEvaluation-2012-Cronbach\\_Factor\\_Analysis](http://www.let.rug.nl/nerbonne/teach/remastats-meth_seminar/student-papers/MHof-QuestionnaireEvaluation-2012-Cronbach_Factor_Analysis)

# FACTOR ANALYSIS: EXAMPLE, CONT.

## *Factor 1*

- » I love puppies
- » Puppies are my favorite
- » I hate puppies
- » Puppies are boring

## *Factor 2*

- » Playing with puppies is a waste of time
- » I always look forward to playing with puppies
- » I would like to have more opportunities to play with puppies
- » Playing with puppies is energizing

UNC CHAPEL HILL  
QUANTITATIVE TEST  
PHASE

# PILOT STUDY

## *Ithaca S+R Student Survey pilot:*

- » UNC Chapel Hill one of six pilot sites to field the Ithaca S+R Student Survey in winter/spring 2014
- » Included a set of questions on the “role of the library” in support of students’ academic success

## *UNC Chapel Hill Methodology*

1. 1,792 undergraduate responses (10% response rate, invited all eligible students)
2. Web-based questionnaire
3. Invitation plus 2 reminders
4. Incentives provided

# Pearson Correlation Matrix of Librarian-Provided Support Services Questions

Librarians or library staff provide assistance or guidance about coursework or research at any time of day or night (24/7)	<b>1.00</b>					
Librarians or library staff go into classrooms and teach about how to find sources for course-specific research papers or projects	<b>0.48</b>	<b>1.00</b>				
Librarians or library staff provide assistance or guidance with tools used to mine or manipulate digital information	<b>0.51</b>	<b>0.61</b>	<b>1.00</b>			
Librarians or library staff provide assistance or guidance with managing data or datasets that I use for my coursework or research	<b>0.47</b>	<b>0.51</b>	<b>0.73</b>	<b>1.00</b>		
Librarians or library staff provide help for learning about technology, digital, or online tools that I need for my coursework or research	<b>0.50</b>	<b>0.57</b>	<b>0.70</b>	<b>0.71</b>	<b>1.00</b>	
Librarians or library staff provide support in learning and using online search engines, databases, or tools	<b>0.49</b>	<b>0.61</b>	<b>0.64</b>	<b>0.61</b>	<b>0.76</b>	<b>1.00</b>

n = 1,735

Sample: UNC Chapel Hill Undergraduates (pilot study February 2014)

Significance:  $p = 0.000$  for all correlations

24/7

Go into  
classrooms

Mine digital  
info.

Manage data

Help to learn  
about tech

Use search  
engines

Undergrad Component Matrix	Component (Factor)
Librarians or library staff go into classrooms and teach about how to find sources for course-specific research papers or projects	0.7681
Librarians or library staff provide assistance or guidance with tools used to mine or manipulate digital information	0.8721
Librarians or library staff provide assistance or guidance with managing data or datasets that I use for my coursework or research	0.8404
Librarians or library staff provide help for learning about technology, digital, or online tools that I need for my coursework or research	0.8876
Librarians or library staff provide support in learning and using online search engines, databases, or tools	0.8547

Eigenvalue: 3.58

Percent variance explained: 72%

Reliability (Cronbach's alpha): .90

Extraction method: principal-components factors (n = 1,737)

Item that reduces the alpha: Librarians or library staff provide assistance or guidance about coursework or research at any time of day or night (24/7)

# QUESTIONS AND DISCUSSION

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