

# Cognitive Interviewing at the National Center for Health Statistics

Paul Beatty

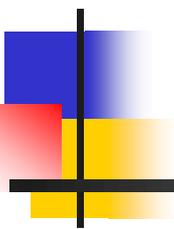
Mario Callegaro

Karen Whitaker

Kristen Miller

Alfredo Calvillo

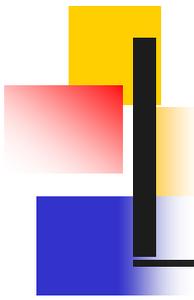
# Cognitive Interviewing at the National Center for Health Statistics:



---

Current Practice and New  
Advancements

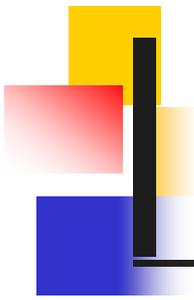
NCHS Cognitive Methods Staff



# Session Outline

---

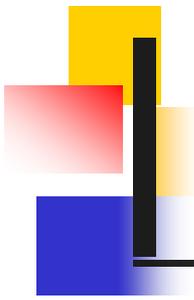
- What is Cognitive Interviewing?
- Cognitive Interviewing in Practice:  
Examples of identifying questionnaire problems
- Cognitive Interview Samples
- Quality Standards
- Extending the Methodology



# Questionnaire design problems

---

- Survey data appear precise and factual, but are actually complex estimates
- Some possible threats to accuracy derived from the questionnaire:
  - Questions not understood as intended
  - Don't adequately capture respondent experience
  - Pose an overly challenging response task
- Problems may not be visible in the actual survey data
- How can we find these before data collection?

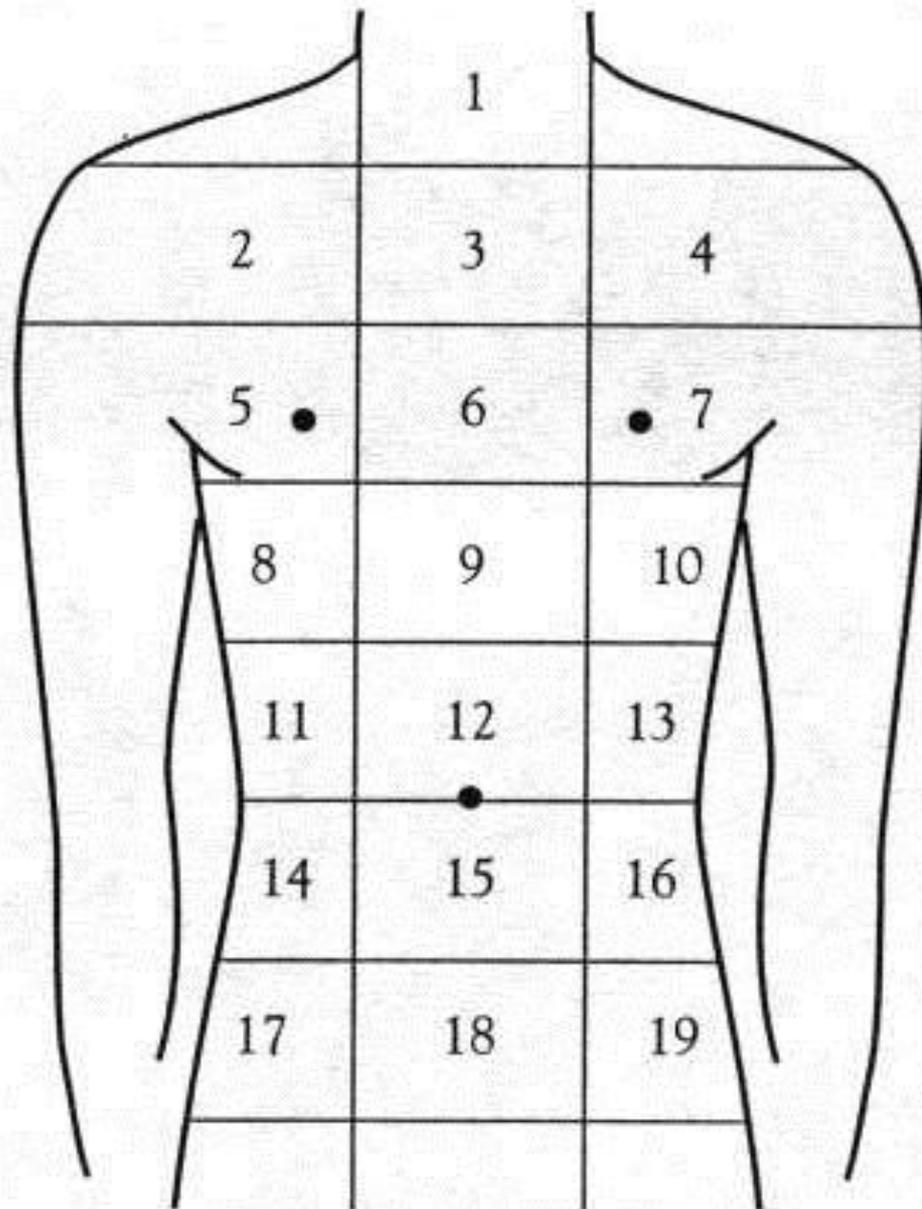


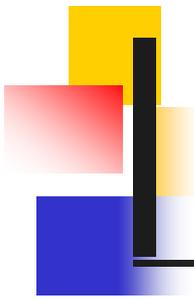
“In the last year, have you been bothered by pain in the abdomen?”

---

- Seems to be straightforward
- But suppose we ask:
  - What, to you, is your abdomen?

# What, to you, is your abdomen?

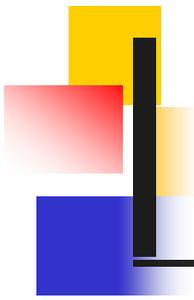




“In the last year, have you been bothered by pain in the abdomen?”

---

- Seems to be straightforward
- But suppose we ask:
  - What, to you, is your abdomen?
  - What does it mean to be “bothered by pain” in the abdomen?
  - What period of time are you thinking about here specifically?

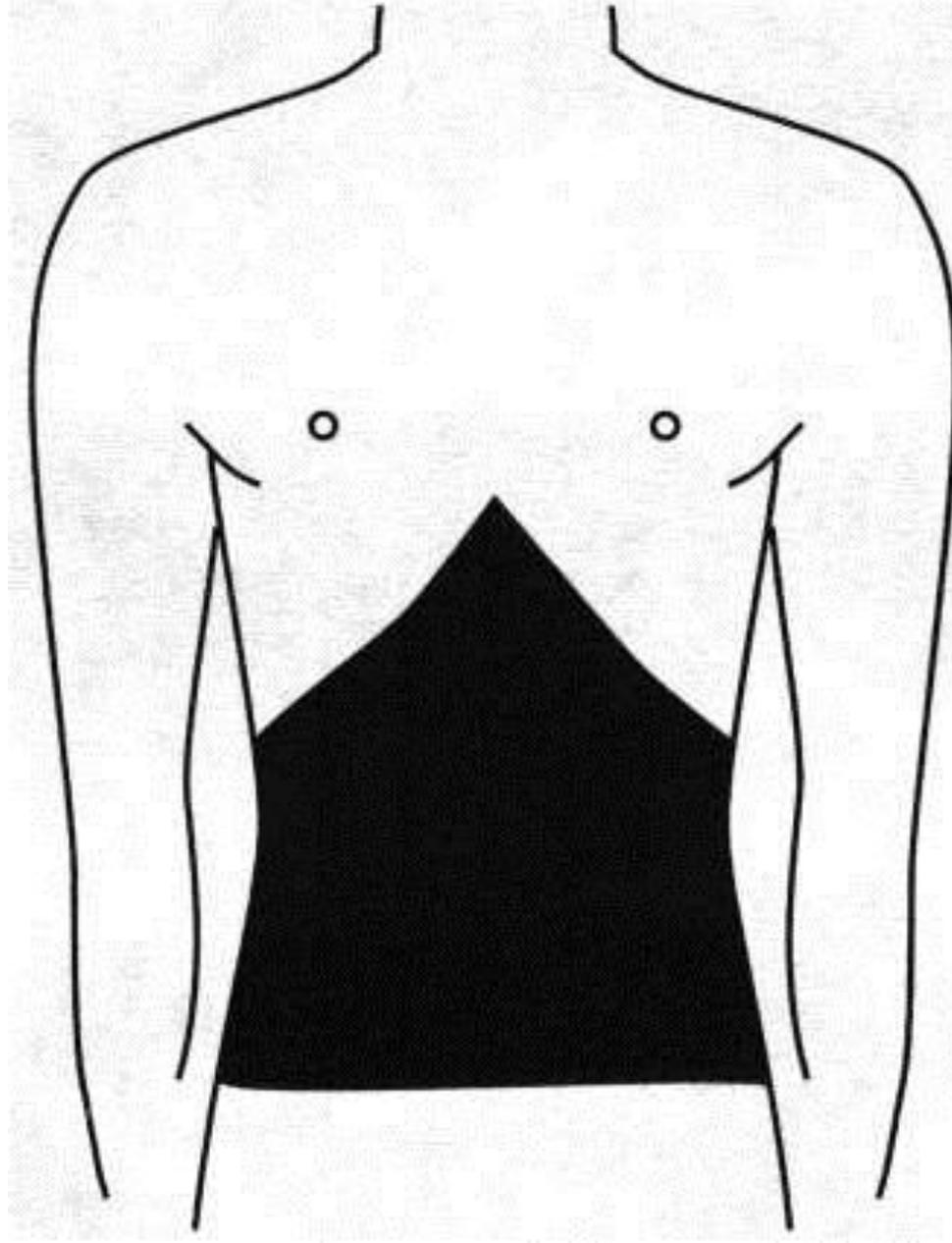


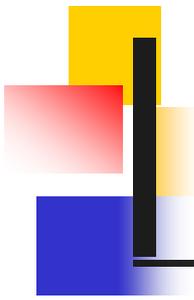
“In the last year, have you been bothered by pain in the abdomen?”

---

- Possible revisions:
  - Show shaded picture of abdomen
  - Drop “bothered”
  - Use “In the past 12 months”
- Clear alternatives address these problems, with no apparent drawbacks

# Shaded picture of the abdomen

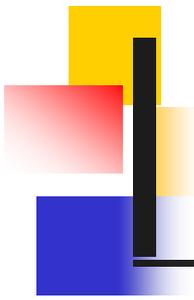




# Old ideas about questionnaire design and the response process

---

- Originally seen in terms of “stimulus/response” – all we need to do is standardize the stimulus
- Questionnaire design as art, not science
- But more recently, productive collaborations between psychologists and survey methodologists have changed these ideas...

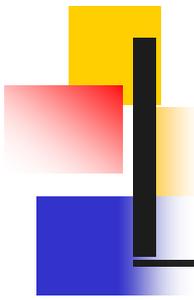


# Cognitive stages involved in responding to survey questions

---

- Comprehension: Respondent interprets the question
- Retrieval: Respondent searches memory for relevant information
- Estimation/Judgment: Respondent evaluates and/or estimates response
- Response: Respondent provides information in the format requested

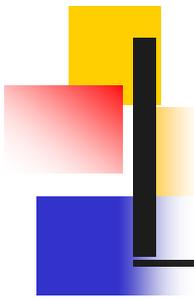
(see references at the end of this presentation)



# Probes in cognitive interviews

---

- Comprehension: What does 'dental sealant' mean to you?"
- Frame of reference: What were you thinking about while answering? (Basis of response)
- Encourage narrative: To learn what the short response to the question means
- Recall: How did you figure your answer to that?
- Confidence: How certain are you about that?
- Paraphrase the question



# General characteristics of cognitive interviews

---

- Conducted one-on-one
- Interviewers are questionnaire design specialists-- investigators, not just data collectors
- Questionnaire followed, but also used to generate discussion
- Participants paid for their time and effort

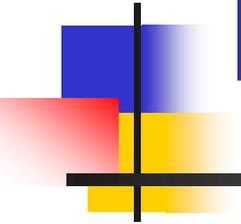
# QDRL laboratory

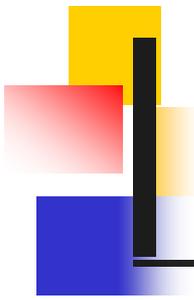


# Ceiling mounted camera



# Cognitive Interviewing in Practice





# Examples of respondent's tasks

---

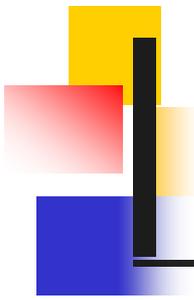
- For pedagogic reasons we discuss the respondent's four basic tasks as if they are sequentially ordered. However the respondent may in fact go back and forth among different tasks



# Examples of respondent's tasks

---

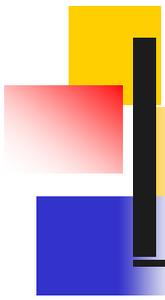
- We selected 4 examples trying to get each task as “pure” as possible, but you’ll see how all these tasks are strongly interrelated



# Cognitive interview instruction

---

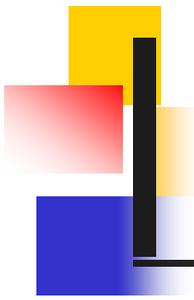
- A cognitive interview is different from a standardized interview and from an everyday conversation
- The researcher asks the questions in the standardized way but also asks the respondents to think aloud, highlight problems, express their opinion, make judgments on the questions...



# Training the respondent for a cognitive interview

---

Each cognitive interview begin with a short training session where we illustrate the characteristic of the task. We also encourage the respondent to think out loud, to feel free to express his/her problems and difficulties in answering the questions.



# Comprehension task

---

Do you use any assistive devices to help with mobility, communication, self care, accessing your workplace?

- Yes
- No

Source: 1972/74 Social Security Administration Survey of Disabled and Non Disabled Adults

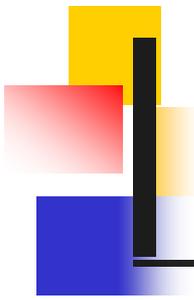
# Comprehension Transcription:

That's a mouthful of questions. Assistive device??

... Well, I guess **we all could be classified.** **We use glasses.** I guess glasses are assisted devices and so I guess **almost everyone has to say yes to that** and in my case I wear glasses and I also have hearing aids. That's it. I don't use a cane or anything...

I think a lot of people may have trouble with that question though because **it's kind of stiff and formal**. Like if you would say assistive devices such as ... and give some examples, maybe a person might pick up on it a little bit...

...because **right off**, the first thing I think about is a walker or cane or something but you are telling about hearing, communication which includes hearing and speaking, seeing, all of those are communication devices. Anyhow.

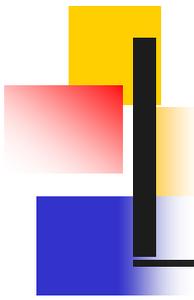


# Retrieval task

---

How old were you when this (high blood pressure) was first diagnosed?

Source: US/Canada Joint Health Survey



# Retrieval Transcription

---

Huh, shoot I was in my forties but **I don't remember exactly when ...**

**Because you said that it was in 1996**

Yeah, I remember this so good  
because I moved back here in 95 ...  
I know I was in my forties

(interviewer speech is written in blue)

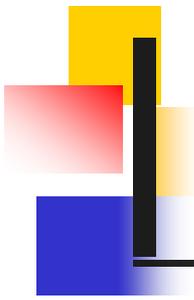
# Judgment task

*Some people who have health conditions, impairments, or disabilities get help from other people in order to get around, lift or carry things, communicate, keep track of things, or remember things.*

As a result of your compression fracture, or your hearing or your shoulder, do you require help from other people?

- Yes
- No

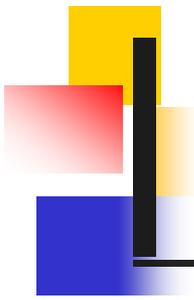
Source: Disability Statistics Institute



# Judgment Transcription

---

I hate to say **require**, but of course I did **require it** when that compression fracture happened first but now I'm **back doing everything myself** and I do have the neighbors come in and I have my lawn mowed instead mowing it and I have my gardening done instead of doing it and so forth... **so I guess I required help...**

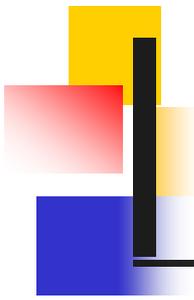


# Response task

---

- Does a physical condition or mental health problem reduce the amount or the kind of activity you can do at home?
- Yes, sometimes
- Yes, often
- No

Source: Canadian Cooperative Survey



# Response Transcription

---

Hmm there's something I can't do so  
hmmm and there's things that I can but  
with difficulty or with aid hmm so  
actually I don't have an answer to that  
I guess I would be if I have one always  
I guess we fall in the always

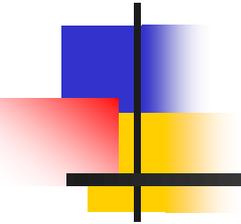
You really would like an always category

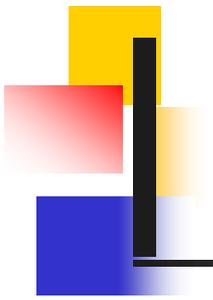
Yes

Part 3:

# Cognitive Interview Samples

---

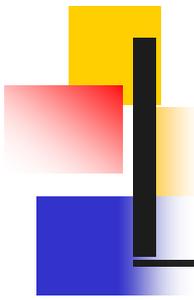




# Cognitive Interviewing Samples

---

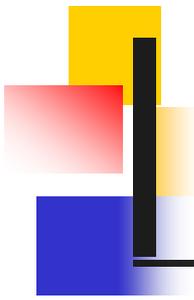
- Generally small and focused (sometimes 12 interviews). Reasons:
  - Intensive labor effort
  - Rich data, time consuming to analyze
- But with such samples, how can we infer to the population?
- Need to select people with the characteristics of greatest interest



# Some sample considerations

---

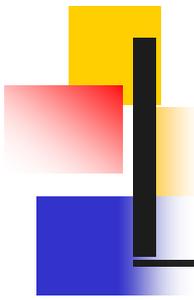
- Keep the overall goal in mind: maximize chances of discovering problems, rather than inference
- Glaring problems can be discovered quickly, with more subtle problems captured later
- The value of “one significant case”



# How many interviews should be conducted?

---

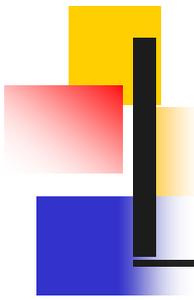
- More is better; but there are diminishing returns
- Useful to get:
  - Participants with average (or below) knowledge and experience
  - Some demographic variety
  - Coverage of questionnaire rather than population



# Possible sources of participants

---

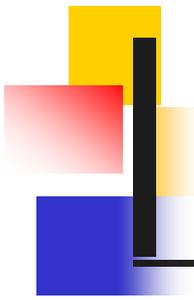
- Newspaper advertisements
- Flyers
- Special interest organizations, trade organizations, non-profit groups
- Word-of-mouth
- Database of previously used participants



# Source pros and cons

---

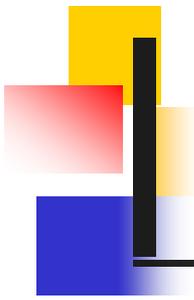
- Newspaper advertisements
  - Able to reach a large number of people
  - Tend to get a high-volume of calls over a short period of time
  - Advertising rates can be expensive
  - Have to screen for and weed-out “professional” research participants
  - People who read the newspaper tend to be better educated



# Source pros and cons cont.

---

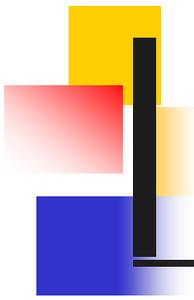
- Flyers
  - Able to target people in specific geographic locations
  - Tend to get a low-volume of calls trickling in over a period of weeks
  - Inexpensive
  - Often need permission to post flyer which can tap into resources/time



## Source pros and cons cont.

---

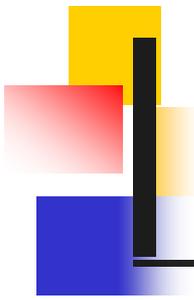
- Special interest organizations, trade organizations non-profit groups, etc.
  - Able to target very specific people
  - Tend to get a low-volume of calls trickling in over a period of weeks
  - May need their IRB approval before recruiting for participants
  - Participants may be biased



# Source pros and cons cont.

---

- Word-of-mouth
  - Tend to get a low-volume of calls trickling in over a period of weeks
- Database of previously used participants
  - Good for when you need a few people with very specific characteristics
  - Shelf-life of a participant ranges from 6-12 months



# What goes in the advertisement/flyer

---

- Catchy header
- Description of who you are looking for with what specific characteristics/conditions
- What the study is about
- Time involved (1 hour; 1 ½ hours, etc)
- Amount of payment/token of appreciation
- Contact name & phone number
- Affiliation

## **Participants Needed for Injury and Poison Study**

The National Center for Health Statistics is looking for adults, 18 years of age or older, to test questions for a health survey. We are looking for people who have been injured or poisoned in the past 6 months

**OR**

whose household family members (such as child, spouse or live-in parent) have been injured or poisoned in the past 6 months.

Participants will receive \$30.

**FOR MORE INFORMATION,**

Please call: **301-458-4676**

**U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention**

## **Participants Needed for Health Study**

The National Center for Health Statistics is looking for adults, 18 years of age or older, to test questions for a health survey.

We are looking for people who have experienced any of the following in the past 6 months:

broken bones

bad cuts or bruises

bad burn

taken/exposed to poisonous substance  
medication overdose

other type of serious accident

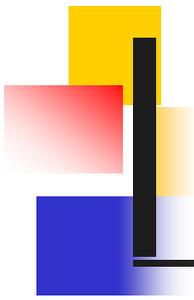
**OR**

whose household family members (such as child, spouse or live-in parent) have experienced any of these.

Participants will receive \$30.

**FOR MORE INFORMATION,**

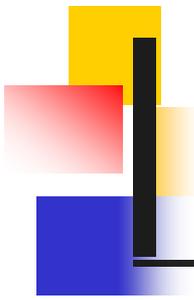
Please call: **301-458-4676**



# The telephone screener

---

- Comprised of a series of questions designed to elicit both demographic information, as well as information specific to the study
- Needs to be concise, yet long enough to determine eligibility



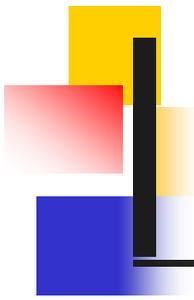
# Videotaping interviews

---

- Great for illustrating question problems to the sponsor. “A picture is worth a thousand words.”
- Valuable analysis tool (supplement interviewer notes, behavior coding, timing of sections, etc.)
- Participants may not wish to be taped and decline to participate in the study

# QDRL control room





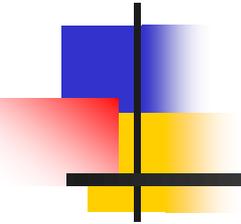
# If you...they will come

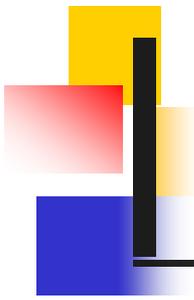
---

- Design a good ad/flyer
- Get them “bought-in” during the initial screening call
- Make reminder calls a few days ahead of the scheduled appointment
- Greet participants
- Pay them well

# Part 4: Quality Standards for Cognitive Interviewing

---

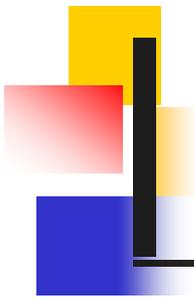




# Probing and “think alouds”

---

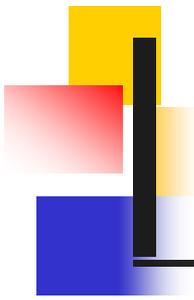
- Our examples focus on probing, but another option is to encourage think-alouds (“tell me what you’re thinking while answering”)
  - Pros: interviewer more free to listen and less potential for bias
  - Cons: Unnatural; may not reflect actual cognitive processes, and may actually interfere with them



# Concurrent vs. retrospective probes

---

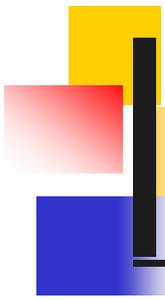
- Concurrent probes: between questions
  - Pros: Question is very fresh on the mind
  - Cons: Potential bias; switching of tasks can be distracting
- Retrospective probes: probe only at end of questionnaire
  - Pros: Avoids bias and task-switching
  - Cons: Long gap btw question and probe



# Mode of cognitive interview

---

- Cognitive interviews designed to be intensive and face-to-face; most survey interviews used to be that way
- Now many surveys carried out by phone—should cog interviews also be?
  - Pros: Realism of cognitive task
  - Cons: Awkward interview situation
- Compromise: lab-based telephone interview with remote monitoring



# TEN BIGGEST COGNITIVE INTERVIEWING MISTAKES

---

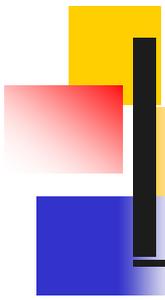
10. Not asking the question exactly as it is written.
9. Forgetting to get the participant to answer the question.
8. Not following up on an indication that the participant has responded incorrectly.
7. Not checking to see if the answer is indeed correct.



# TEN BIGGEST COGNITIVE INTERVIEWING MISTAKES

---

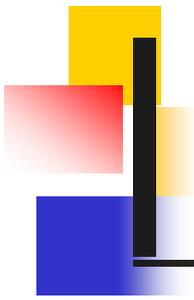
6. Cutting the participant off and encouraging them to say as little as possible.
5. Forgetting to pursue how participants are interpreting key words.
4. Waiting long periods of time before writing up notes.



# TEN BIGGEST COGNITIVE INTERVIEWING MISTAKES

---

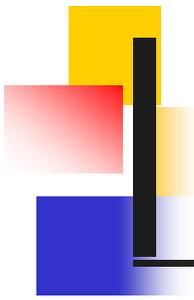
3. Asking hypothetical questions.
2. Asking probes that suggest there is a right answer. For example, “You only go to licensed tattoo parlors, right?”
1. Telling the participant that it is really they who have misunderstood the question.



# Cognitive Interviewing in Rural Mississippi

---

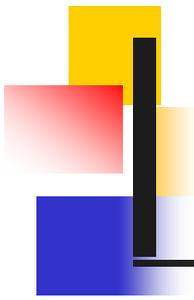
- Southern, rural county in Mississippi
- 21 Participants
- Poorer than typical lab participants
- Less education than typical lab participants
- All had telephones and televisions



# Why conduct cognitive interviews with the poor and less educated?

---

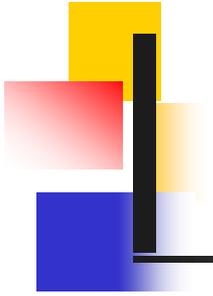
1. Practical: To improve estimates.  
Survey questions can be improved to be more inclusive.
2. Theoretical: To improve understanding of the question-response process.



# Joint Canada United States Survey of Health

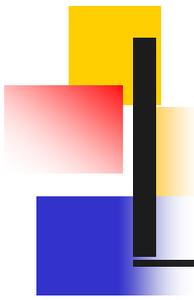
---

- Jointly conducted by the National Center for Health Statistics and Statistics Canada
- General Health Questions, including subjective health, access to care, chronic conditions, cancer screening, smoking and limitation questions



---

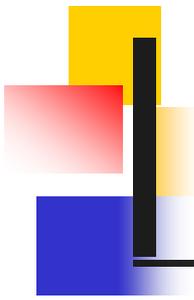
What we learned  
about the  
question-response  
process:



# Cannot expect a respondent knows how “to be a survey respondent”

---

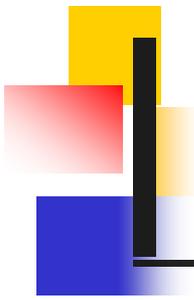
- That an impromptu response is required
- That their response must be categorizeable
- That the formality of the question-response process will be grasped



## Cannot expect respondents to make sense of vague or elusive words

---

- Incorrectly inferring the meaning of an abstract word
- Unable to respond to scaled items:  
“mild,” “moderate,” “severe,” “extreme”
- Completely misunderstand the entire question



# Cannot expect participants to make mathematical calculations

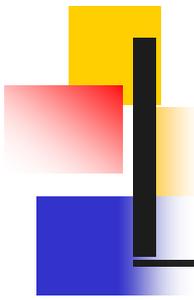
---

“How old were you when your high blood pressure was first diagnosed?”

Age--- no problem

Year---problem

Years ago---problem



# Cannot expect respondents to answer within another system of knowledge

---

- Chronic conditions:

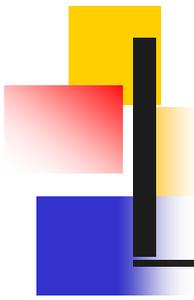
“Do you have chronic bronchitis?”

“Do you have asthma?”

“Do you have coronary heart disease?”

“Do you have angina?”

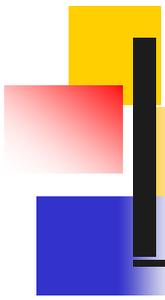
“Do you have congestive heart failure?”



# Why conduct cognitive interviews with the poor and less educated?

---

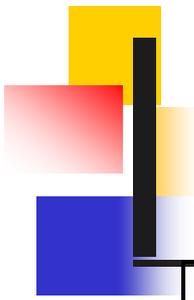
1. Practical: To improve estimates.  
Survey questions can be improved to be more inclusive.
2. Theoretical: To improve understanding of the question-response process.



# Cross Cultural/Cross Linguistic Testing

---

- Growing Needs
- Hispanic Groups
- Translation & interviewing problems



# Census 1990 data

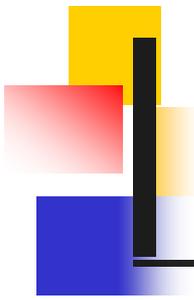
	<b>Universe:</b>	
<b>UNITED STATES</b>	<b>230,445,777</b>	
<b>ENGLISH ONLY Speakers</b>	<b>198,600,798</b>	
<b>Language/Ethnic groups:</b>		<b>Limited prof.</b>
<b>SPANISH</b>	<b>17,339,172</b>	<b>8,305,765</b>
<b>CHINESE</b>	<b>1,249,213</b>	<b>752,936</b>
<b>FRENCH</b>	<b>1,702,176</b>	<b>476,133</b>
	<b>31,844,979</b>	<b>13,982,502</b>

Language Spoken at Home and Ability to Speak English for Persons 5 Years and Over Ranked by Number Who Speak English Less Than "Very Well"

United States 1990 Ranked by Total Number of Speakers

# Census 2000 data

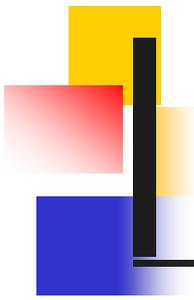
<b>REGION OF BIRTH OF FOREIGN BORN</b>		<b>%</b>
<b>Total (excluding born at sea) .....</b>	<b>31,107,573</b>	<b>100</b>
<b>Europe.....</b>	<b>4,915,557</b>	<b>15.8</b>
<b>Asia.....</b>	<b>8,226,254</b>	<b>26.4</b>
<b>Africa.....</b>	<b>881,300</b>	<b>2.83</b>
<b>Oceania.....</b>	<b>168,046</b>	<b>0.54</b>
<b>Latin America.....</b>	<b>16,086,974</b>	<b>51.7</b>
<b>Northern America.....</b>	<b>829,442</b>	<b>2.67</b>
<b>LANGUAGE SPOKEN AT HOME</b>		
<b>Population 5 years and over.....</b>	<b>262,375,152</b>	<b>100</b>
<b>English only.....</b>	<b>215,423,557</b>	<b>82.1</b>
<b>Language other than English.....</b>	<b>46,951,595</b>	<b>17.9</b>
<b>    Speak English less than "very well....."</b>	<b>21,320,407</b>	<b>8.13</b>
<b>    Spanish.....</b>	<b>28,101,052</b>	<b>10.7</b>
<b>    Speak English less than "very well....."</b>	<b>13,751,256</b>	<b>5.24</b>
<b>    Other Indo-European languages.....</b>	<b>10,017,989</b>	<b>3.82</b>
<b>    Speak English less than "very well....."</b>	<b>3,390,301</b>	<b>1.29</b>
<b>    Asian and Pacific Island languages..</b>	<b>6,960,065</b>	<b>2.65</b>
<b>    Speak English less than "very well....."</b>	<b>3,590,024</b>	<b>1.37</b>



# National Adult Literacy Survey --- 1992

---

- literacy tasks:
  - reading a bus schedule
  - using an automatic teller machine
  - understanding a judge's instructions to a jury
- Five proficiency levels
  - Level 1 being least proficient
  - Level 5 being most proficient.
- <http://nces.ed.gov/naal/>

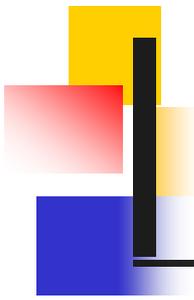


# What are the findings of the study?

---

- 21% to 23% at the lowest level= 40 to 44 million people
- Level 1 perform tasks involving “brief, uncomplicated text,” such as totaling the entry on a bank deposit slip or locating information in a short news article, but many do so with difficulty.

- 25 to 28% = 50 million American adults, functioning at Level 2.
- Interestingly, many respondents at Levels 1 and 2 did not consider themselves “at risk” because of their literacy skills.
- A majority of those at Level 1 and almost all those at Level 2 described themselves as being able to read English “well” or “very well”



# Typical cognitive problem

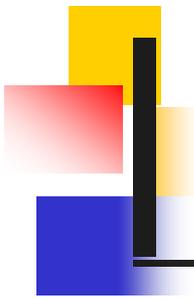
---

Original: EN LOS ULTIMOS 3 MESES, ¿asistió usted a una escuela o universidad?

Alt. Form: EN LOS ULTIMOS 3 MESES, ¿estaba tomando clases en una escuela o universidad?

At any time IN THE PAST 3 MONTHS, have you attended a regular school or college?

Both our respondents as well as our interviewers had a lot of problem with this syntax because they interpreted the word "***asistió***" in terms of "assisting" in the cognitive vein of being a teachers aide.



# Cross cultural referencing

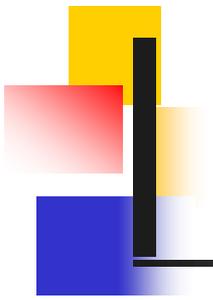
---

Spanish : ¿Cuál es él titulo o nivel de escuela mas alto que usted ha terminado?

English: What is the highest degree or level of school you have completed?

Answer: Llegue a la cuarta!

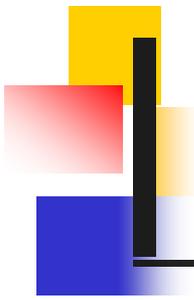
I got to the fourth!



# Translation conflicts

---

- Race, Hispanic Origin
- Education / reading ability
- Citizenship; acquiring citizenship; legal status
- Social Security – country specific
- Foster children



## Regional glossary needed:

---

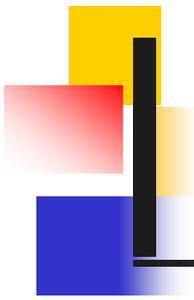
“you don’t know beans!”

Habichuela, frijol, poroto

Mexico vs others: Cigars, cigarettes?

Pavo versus guajolote;

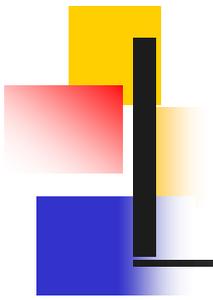
Rentar versus alquiler,



# Third world colliding with 1<sup>st</sup> world and its technology.

---

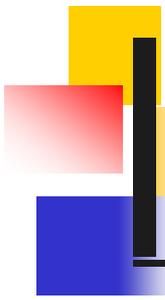
- ACASI with semi-literate groups
- The structured interview as an inquisition
- Interviewers often seen as agents of the government.
- As social workers or do-gooders.
- Interviewers often community leaders; help get access
- Are also as limited as the respondents in education and linguistic skills.



# Respondent “Response Bias”

---

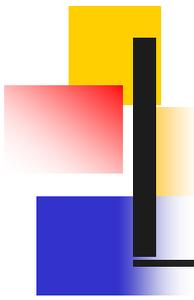
- Respondents fearful
- Respondents assume we already “know” the answers; tell us “the truth”?
- Interviewers often receive minimal training
- Often do not have bilingual supervisors to assess quality control.
- Interviewers will often not know why a problem exists but only that it does.
- Is this an interview?



# Parallel problem in English and in Spanish

---

- step #1: the question is originally asked very simply
- step #2: a review suggests “tweaking”—this often means adding clarification clauses in the sentence
- step #3: we use formal phrasing so as to have correct “English” (or Spanish)
- result: we come off as stilted or even incomprehensible to the respondent.
- KISS keep it simple (and understandable)



# Some final comments

---

- Questionnaire design is a slow process, done in stages (iterative expert reviews, cognitive tests, field pretests)– allow lots of time
- Don't ignore potential questionnaire errors just because they are less visible
- Solving problems up front is far preferable to discovering you've got problems with a questionnaire that has been used for years



nchs

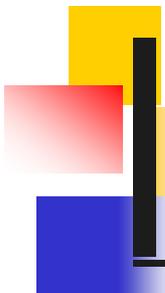
National Center for  
Health Statistics

...Monitoring  
the Nation's  
Health

QDRL

Working papers link

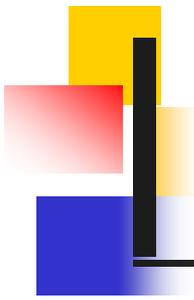
[www.cdc.gov/nchs/products/pubs/workpap/workpap.htm](http://www.cdc.gov/nchs/products/pubs/workpap/workpap.htm)



# References: books on Cognitive Aspect of Survey Methodology (CASM)

---

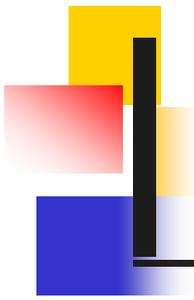
- Schwarz, N., Sudman, S. (Eds.) (1995). *Answering Questions: Methodology for Determining Cognitive and Communicative Processes in Survey Research*. San Francisco: Jossey-Bass.
- Sirken, M. G. et al (Eds.). (1999). *Cognition and Survey Research*. New York: Wiley
- Stone, A. et al. (Eds.) (2000) *The Science of Self-Report. Implications for Research Practice*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Sudman, S. Bradburn, N., Schwarz, N. (Eds.). (1996). *Thinking About Answers: The Application of Cognitive Processes to Survey Methodology* (Jossey-Bass Social and Behavioral Sciences Series). San Francisco: Jossey-Bass.
- Tanur, J. (Ed.) (1992). *Questions About Questions. Inquires into the Cognitive Bases of Surveys*. New York: Sage.
- Tourangeau, R., Rips, L.J., Rasinski, K.A. (2000). *The Psychology of Survey Response*. Cambridge: Cambridge University Press.



# Books on the interview process

---

- Fowler, F.J., Mangione, T.W. (1990) *Standardized Survey Interviewing. Minimizing Interviewer-Related Error.* (Applied Social Research Methods Series, Vol. 18). New York: Sage.
- Maynard, D. W. et al (Eds.) (2002) *Standardization and Tacit Knowledge. Interaction and Practice in the Survey Interview.* New York: Wiley.



# Books on Qualitative Research

---

- Glaser, B. G., Strauss, A.I. (1967) *The Discovery of Grounded Theory. Strategies for Qualitative Research*. Chicago: Aldine.
- Lincoln, Y.S., Guba, E. G. (1985) *Naturalistic Inquiry*. New York: Sage.
- Newman, I. and Benz, C.R. (1998) *Qualitative – Quantitative Research Methodology. Exploring the Interactive Continuum*. Carbondale, IL: Southern Illinois University Press