

Not Your Grandparent's Cognitive Testing: Exploring Innovative Methods in Cognitive Evaluation of Questions

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ABSTRACT

Cognitive testing of questions has become one of the many tools used by survey researchers in pre-survey evaluation. What we learn about how the cognitive tasks of answering a question are handled helps us write better questions, helps the interview flow more smoothly, and helps decrease measurement error. Who does the interview, how structured the protocol is, when the cognitive probes are asked, and how information is retrieved from cognitive interviews all play a role in what we learn from the experience. The Center for Survey Research (CSR) has been experimenting with altering some of these features of the way testing is done. CSR has experimented with the structure of the cognitive probes - comparing a totally standardized cognitive instrument to a more flexible style - as well as the placement of the probes - comparing prospective and retrospective placements. Our latest endeavor has been to try to standardize the extrapolation of the results of the cognitive interview, comparing how outside observers understand the results of the interview with the results gathered through an interviewer debriefing.

As we approach the 20th anniversary of the first CASM conference, thoughts naturally turn to the changes, advances, and continued integration of cognitive psychology into survey research. For example, researchers now take into account the cognitive aspects of usability, such as how a respondent proceeds through a self-administered instrument or how interviewers handle a CATI program. Cognitive evaluation of questions helps us understand whether the questions we ask are understood consistently and provide the information we assume they do.

The 1980's brought to the forefront in survey research a new concept of the "three-stage response process" - that between hearing the question and providing an answer the respondent must perform some cognitive tasks (Sirken & Schechter, 1999). However, the idea of asking follow-up questions to try to find out what respondents were thinking was already decades old (Cantril, 1944). Today, the field of pre-survey evaluation has grown to embrace cognitive interviewing as an important partner of methods such as expert review, usability tests, and behavior coding. Other evaluation methods can provide information about whether skips are followed or if a question is too long or difficult to read. Cognitive interviewing is the only evaluation tool that allows researchers to understand how the cognitive tasks posed by the question are handled. These tasks - comprehension of the question, retrieval of information, and formation of an answer - all can be asked about, observed, and evaluated in a cognitive interview.

For years the term "think-aloud interview" was used as a generic term to mean any kind of intensive or cognitive interview. In a think-aloud interview, respondents are instructed to talk out loud and explain what they are thinking as they formulate their answers (Forsyth & Lessler,

1991; DeMaio & Rothgeb, 1996). It was believed that this method was the only way to understand cognitive processing. However, the pure think-aloud interview, despite its benefits, has some major drawbacks and is now not often used without other, more structured probes. It is no longer the only style of cognitive interviewing available. Survey researchers know that cognitive interviewing, like all other parts of survey research, is not a “one-size-fits all” process.

When cognitively testing questions, there are many variables to consider. Who does the interview influences not only how the interview is conducted, but may also be a factor in what we learn from the interview. Depending on the interviewer’s experience and professional training, there could also be time and cost implications.

The structure of the protocol and cognitive probes can be viewed on a continuum. On one end would be the completely unstructured interview, where interviewers have no pre-scripted probes and can ask whatever follow-ups they want, whenever they want. The other end of the continuum would be a totally structured interview, with a pre-scripted and tailored protocol, where the interviewer has no leeway in what follow-up probes are to be asked or in what order they should occur. The structure of the interview can also include how often, or in what context, follow-up probes get asked (Conrad & Blair, 2001) .

When probes get asked in relation to the test questions must also be a considered. Cognitive information can be obtained after, during, or even before the test question. Think-alouds, by

getting information while the respondent is answering, is the only truly concurrent form of cognitive interviewing. Retrospective probes can be placed immediately after a question, following a series of questions, or even at the end of the entire interview. Prospective questions are also an option. Using this method, before the actual test questions get asked, the interviewer elicits some background information about the respondent that is not based or tied directly to any one specific question. This “story” provides information that may give some insight to the researchers about how a subsequent question is answered.

How researchers get “results” from cognitive interviews also varies. It usually consists of, either alone or in some combination: interviewer debriefings, individual summaries of each interview written by the cognitive interviewer, reviewing audio or video tapes, and coding the interview (Willis, DeMaio, & Harris-Kojetin, 1999; Tourangeau, Rips, & Rasinski, 2000).

Striving for Consistency

Like other research organizations, the Center for Survey Research (CSR) is very concerned about the consistency of the “results” of our cognitive interviewing. Are cognitive interviews so subjective that what we “learn” from a cognitive interview is simply a result of what we ask, or how we ask it? Does using different interviewers or varying the degree of structure in an interview change our results? Over the last several years, CSR has experimented with some of these variables. This paper will provide an overview of some of the things we have tried and what we have learned.

STRUCTURED/RETROSPECTIVE VS. FLEXIBLE/PROSPECTIVE COGNITIVE INTERVIEWING (Cosenza & Fowler, 2000)

Background: Concurrent and retrospective probing are usually tied to specific questions and help the researcher find out how those questions were answered. Prospective probing is a method that allows the interviewer to know a little more about the respondent in order to better understand whether the respondent's answers actually fit their reality.

Research Questions

1. Will a pre-written structured protocol and a flexible unstructured protocol provide different information about the test questions?
2. Will we learn anything different from prospective questioning than we will by using a solely retrospective approach?

Research Design

Interviewers: Three trained cognitive interviewers used a structured, pre-scripted cognitive instrument to complete 4 interviews each. In the test condition five senior staff members, with content area knowledge, completed a total of 7 interviews using an unstructured format, focusing on getting a “story” before asking the test questions.

Test questions: The test instrument was a subsection of the Consumer Assessment of Health Plans (CAHPS®) survey. The questions asked about experiences getting health care, including interactions with providers and health plans.

What We Learned from This Study

1. Retrospective, pre-scripted probes

As seen in Example 1, we found that retrospective, pre-scripted probes worked well for pre-identified, concrete concerns. Concerns about the first cognitive tasks - comprehension and retrieval of information - can easily be identified before the cognitive interview and a specific probe written to address it.

EXAMPLE 1:

TEST QUESTIONS:

In the past 12 months, did you look for any information in written materials from your health plan?

In the past 12 months, how much of a problem, if any, was it to find or understand information in the written material?

Structured Cognitive Questions:

1. What kind of “information” were you thinking about?
2. Where would you/did you look for these materials?
3. Was it ever difficult to find or understand the information?

What we learned:

- Several respondents included health awareness pamphlets found in waiting rooms in this question (when it actually was meant to be information from the plan ABOUT the plan)
- People distinguish a “problem” from “being difficult.” For some respondents, if they could eventually solve the problem, even though it was difficult, they answered that it was not a “problem” (because it did not prevent them from attaining the desired result).

Using pre-scripted probes made the interview easy to administer. Being able to use field interviewers who were specially trained in cognitive interviewing, instead of senior research staff, also made the interviews more cost-efficient. The drawback, however, is that pre-written probes allow little flexibility for unanticipated problems that might occur during the interview.

2. Unstructured, prospective probes

Example 2 shows one of the benefits of using unstructured, prospective questions.

EXAMPLE 2

The Interviewer had the Respondent talk about her health care utilization in the past year. She talked about her health plan, her health conditions and which doctors she had seen in the past year (including an ophthalmologist, OB/GYN, internist, dentist, and an upcoming appointment with a brain surgeon)

TEST QUESTION: In the last 12 months, did you see a specialist?

(Respondent answered “No”)

What we learned:

Since we already knew that she had seen an ophthalmologist and an OB/GYN, we were able to probe specifically as to why she answered “no.” The unstructured format allowed the interviewer to discuss her thought processes directly. We found that she knew the doctors were “specialists” but since her visits to them were for generic, check-up reasons, she did not include them in her answer. She was categorizing the reason for the visit (general or specific problem) rather than the type of doctor.

The information the respondent talked about earlier provided a context that the interviewer could use later in the interview. It allowed the interviewer to see how the last cognitive task - formation of an answer - was handled. Knowing something about the respondent’s relevant background gave the interviewer additional information, usually not available in a cognitive interview. Although post-interview checks, such as analyzing medical records could have been done, having that sort of verification information available during the interview was invaluable. A retrospective probe, in this case, probably would not have uncovered the problem, since the respondent could correctly identify a “specialist.” She retrieved the necessary information, but

was unable to correctly fit her “reality” into the question-and-answer structure that the question designer expected.

Critics of cognitive testing have claimed that cognitive interviewing creates an unrealistic situation. For example, think-aloud interviews ask respondents to verbalize thought processes that are not usually expressed. Prospective questioning, no doubt, has this same kind of drawback. By changing the context of the interview, are we “priming the pump” and leading respondents to think differently than they might do in a “regular” interview situation? While we are not advocating the use of only prospective questions to cognitively test a questionnaire, the knowledge gained by understanding a little more about the respondent’s background, provides valuable insights into part of the cognitive process rarely explored in traditional cognitive interviewing.

II. NARRATIVE/OPEN-ENDED VS. STANDARDIZED/CLOSED-ENDED COGNITIVE INTERVIEWING (Cosenza, 2001)

Background:

Consolidating and synthesizing data from a traditionally qualitative, narrative interview is a difficult task for researchers. In 2000, Prüfer & Rexroth wrote a paper describing ZUMA’s (the Center for Survey Research and Methodology in Mannheim, Germany) two-stage standardized question evaluation process, which used regular production interviewers and a totally

standardized cognitive instrument. CSR used this paper as a starting point to think about the potential benefits of standardizing cognitive interviews.

Research Question

Will a traditional narrative cognitive interview and a standardized cognitive interview provide different information about the test questions?

Research Design

Interviewers: There were two groups of interviewers. Three trained cognitive interviewers conducted 10 in-person cognitive interviews. They used our standard semi-structured protocol which provides interviewers with some follow-up probes, but gives them freedom in which probes to ask and when to ask them. Most probes were open-ended, and respondents answered them in a narrative form. Interviewers participated in a group debriefing session with project staff, which was the main source of information about how the interview, and question-answering process went. In the test condition, four members of CSR's professional interviewing staff completed 11 interviews by telephone. The instrument consisted of the test questions followed by totally scripted and mostly closed-ended cognitive probes. The probe questions were to be read exactly as worded - just like any other question in a standardized interview. Since the answers would be given in a structured format, that would be the "results" of the cognitive interviews. The telephone interviewers were not debriefed.

Test questions: The questions being tested were part of a survey instrument to measure people's attitudes and beliefs about the benefits and risks of screening tests for cancer.

What We Learned from This Study

1. Pre-identified concerns

Once again, we found that pre-identified concerns could be found and addressed by either method.

EXAMPLE 3:

TEST QUESTION: How much do you worry about getting heart disease?

COGNITIVE GOAL: Is "heart disease" consistently understood?

What we learned in the debriefing:

Respondents included everything from "clogged arteries," to "high cholesterol," to "leaky valves," and "heart attacks."

Standardized Probe:

Would you say "worrying about heart disease" is the same as or different than "worrying about a heart attack?"

answered "SAME" - 5 respondents

answered "DIFFERENT" - 6 respondents

As we can see in Example 3, in the test question, we were concerned that respondents would hear "heart disease" and think about "heart attack." This allowed us to write a specific question that addressed our concern. The fact that almost half of the respondents answered the standardized probe as "same" and that the interviewers in the debriefing also mentioned it as a

problem, both provided evidence that the phrase, and thus the question, was not consistently understood.

2. Standardized cognitive interviewing

EXAMPLE 4

TEST QUESTION: Again, thinking about your most recent mammogram, did you make a decision about whether to have that mammogram?

COGNITIVE GOAL: Did the Respondent really make a decision about having her last mammogram?

What we learned in the debriefing:

Respondents easily answered the question and said they made a decision, but after discussing it, we found that most simply had the mammogram their doctor suggested. Many actually had automatic appointments set up for yearly mammograms. The interviewers felt that for most it was not a real “choice.”

Standardized Probe:

Do you think the decision was about when to have a mammogram or whether to have one at all?

answered “WHEN TO HAVE IT” - 8 respondents

answered “WHETHER TO HAVE IT” - 1 respondent

Example 4 shows a situation where the standardized probe gave us additional information that was not gathered by the less structured interview. We found that even though the question asked about “whether” to have the mammogram, respondents were hearing - and answering - about “when.” Although the interviewers reported that they felt the respondents had no real choice, it was still just their perception, since the respondents told us that they did have a choice. The

standardized question gave an objective answer and removed the subjective feelings of the interviewers from the picture.

Just as a semi-structured interview is easier to administer than a completely unstructured one, this totally standardized interview was easier to administer than a semi-structured one. It allows more interviewers, even those without cognitive training, to be able to do cognitive interviewing. Thus, more interviews could be done in a shorter amount of time, providing more data to help evaluate the questions at less cost. Standardization also makes it easier to compare results across interviews without relying on more subjective interviewer reports or debriefings. It also sometimes provides information in a clearer format than a more narrative approach.

3. Narrative/Flexible cognitive interviewing

The less structured interviews, and the interviewer debriefing, provided the researchers with insights about how the process of the interview actually went. It also allowed for the potential of unexpected occurrences. When the interviewer is not prohibited from exploring spontaneously, there is the possibility to learn something new, that was not previously thought of and identified.

III. INTERVIEWER DEBRIEFING VS. “CODING” COGNITIVE INTERVIEWS (Cosenza & Fowler, 2001)

Background

CSR’s standard method for consolidating information about what happens in cognitive interviews, and that of many other survey organizations, is a group interviewer debriefing. These debriefings usually consist of a systematic review of each test question. This gives the researcher a chance to hear about all the interviews at once, allows questions to be asked of the interviewers as a group, and also allows interviewers to hear how the other interviews went. While this process appears to work, we were aware of the subjectivity of this process. What was learned in a debriefing was dependent on what questions were asked of the interviewers and, more importantly, what each interviewer chose to report on in the debriefing. The “conclusions” also may vary depending on what messages the researcher does and does not hear.

Research Questions

1. How reliable and consistent are the conclusions from cognitive interviews? Would an “objective” listener uncover the same results with what we normally learn from interviewer debriefing?
2. Does the training or education of the listener affect what conclusions are reached?

Research Design

For comparability purposes, we used a study where the final cognitive report was written based solely on the interviewer debriefing and was not written by this author. From that study, we reviewed nine cognitive interview audio tapes. Our goal was to see if the interview could be “coded” and information extracted by only listening to the audio tape. We believed that a person not associated with the study, would be able to listen to the tape and report on what actually happened during the interview, not what they “felt” happened or what “seemed” to occur, but what was actually said by the respondent. We decided to call these listeners ‘cognitive coders.’”

Coders: Six cognitive coders were used. Three members of CSR’s staff of trained data coders listened to 4 tapes each. None of these coders had a college degree. Three of our research assistants, all with at least a college degree, and 2 of whom have advanced degrees, also coded tapes. They listened to 2 tapes each. Each of the nine tapes was listened to by two cognitive coders.

The Coding Form: A form was created so that the cognitive coders could systematically code the results of the interviews. (An example of parts of the form are shown in Example 5.) Each coder had one form, so all of the interviews that they coded were on the same page. The form listed questions that the coder had to answer about each test question. Some questions were specific to the test question, some were based on the follow-up probes the interviewer was originally supposed to ask, some required the coder to summarize across questions or make

judgements. There were also several overarching cognitive concerns in the survey. These included an attempt to figure out how difficult the question was for the respondent to answer (operationalized by asking the coder to mark whether or not the question was answered “cleanly” - that is using the given answer categories, without any additional comments, clarifications, or qualifications); whether the question fit the respondent’s reality; and whether the respondent’s answer accurately described what he/she had to say.

Results: Results from this “cognitive coding” were analyzed and a new cognitive report was written and then compared to the original report.

Test Questions: The test instrument was a subsection of the Consumer Assessment of Health Plans (CAHPS®) - Medicare version survey.

EXAMPLE 5

Test Questions (from instrument)

C1.	<u>Specialists</u> are doctors like surgeons, heart doctors, allergy doctors, skin doctors and others who specialize in one area of health care. In the last 6 months, did you or your doctor think you needed to see a specialist?
C2.	In the last 6 months, how much of a problem, if any, was it to get a referral to a specialist that you needed to see - a big problem, a small problem, or not a problem?

Original Cognitive Probes (from cognitive instrument)

1.	(IF SAW SPECIALIST) Tell me in your own words about your experiences with seeing a specialist in the last 6 months.
2.	Was there anyone you weren't sure whether to include as a "specialist"? (Why?)
3.	In order to see a specialist do you need a referral? (From whom?)
4.	Thinking about your situation, in your own words, could you tell me what C2 is asking?
5.	(IF <u>NO</u> PROBLEMS) In the last 6 months, did you have any kind of nuisance or hassle in getting to see a specialist when you needed to? (Did it ever take too long?/Did you ever go to see a specialist that was not satisfactory to you?)

Cognitive Coding Form

C1. Did R have any trouble deciding who to include/not include as a specialist? Explain.

ID	Any trouble with "specialist"	Explain
	<input type="checkbox"/> YES <input type="checkbox"/> NO	

C2. Was answer to C2 "clean"? Explain.

ID	Was it "clean"?	Explain
	<input type="checkbox"/> YES <input type="checkbox"/> NO	

C2. Does C2 fit with R's reality? /Does "problem" work? Explain.

ID	Does R need referral to see specialist	Answer C2	Any difficulties?	Explain
	<input type="checkbox"/> YES <input type="checkbox"/> NO		<input type="checkbox"/> YES <input type="checkbox"/> NO	

What We Learned from This Study

1. “Cognitive Coding” worked.

Overall, the cognitive coders reached the same conclusions that were reached based on the interviewer debriefing alone. This was especially true for concerns such as definition of concepts, what was included in ratings, and how certain questions “worked” overall. Thus, despite the subjectivity of debriefings, the conclusions seemed to be reliable.

2. Who listened to the tapes did not affect the conclusions reached.

Inter-coder reliability was extremely high. There was great agreement on the answers to questions about cognitive issues. There were no significant differences between the results of the research assistants and the data coders.

3. Setting up this process and training coders was not inexpensive.

This first attempt at cognitive coding was not economically efficient for us. It took an average of almost 3 hours to code a 75 minute tape. Possibly it was because it was very different from any other coding assignment they ever had and each coder only coded a few tapes, so they didn’t have much time to improve in speed. Future attempts will most likely be easier to do.

How This Research Has Changed CSR

CSR, like most other research organizations, has created its own hybrid way of doing cognitive interviews. We do mostly retrospective probing, with some think-aloud and prospective questions thrown in. We have specially trained senior field interviewers in cognitive testing techniques, and we also use senior staff people to conduct some interviews. We debrief our interviewers, yet have them audio or video tape so we can go back to them if necessary. We create what we consider to be a semi-structured interview, which provides interviewers with some follow-up probes, but allow them the leeway to modify or add to them as needed.

One of the most important things that we have learned over the past few years is the value of having clear cognitive goals for each test question. At CSR, we currently embed the cognitive goal for each question in the instrument itself. CSR's, cognitive instruments have evolved over time. We now use a protocol that we think helps the interviewer not only during the interview, but also helps them prepare for the debriefing. Originally, cognitive interviewers were briefed the same way as production interviewers, with a blank copy of the survey and a project staff member going through the interview and pre-written probes. The intent of the test question was explained and the interviewers were told that they could supplement or replace the cognitive probes as the situation arose. Not surprisingly, most interviews were completed exactly as written, and debriefings often consisted of the project staff attempting to find out how the survey and address specific concerns about questions that the interviewers were unprepared to answer.

This was followed by a period where we gave interviewers a debriefing interview to complete before the actual debriefing meeting. It contained the questions that the project staff thought

were important and that would be asked about at the debriefing. In effect, all we did was add paper that interviewers had to have with them when they were doing the interview. They had to split their attention between the respondent, the test question, the cognitive probe, and making sure they had the answers to the debriefing questions.

Our current practice (see Example 6) combines the test question, the cognitive goal, and possible follow-up probes into one instrument. The inclusion of the cognitive goals serves two needs. First, it forces the question designer to think about the questions before the interviews and to articulate why the question is being tested. It could be a concern about comprehension or vocabulary, or it could be as simple as whether or not respondents have the knowledge to answer the question. This format also helps the interviewer to have everything in one place during the interview. Now, during briefings, the cognitive goals for each test question are discussed and interviewers are told that they can ask anything they need to, starting with the example probes provided (if they wish), as long as they can come to the debriefing with the answers to the cognitive goals in hand.

EXAMPLE 6 (2 pages)

TEST QUESTIONS

16. Did you have chemotherapy to treat your breast cancer?
- YES
 NO (SKIP TO 23)
17. Did you complete all the chemotherapy that was originally planned?
- YES (SKIP TO 19)
 NO
18. Was your chemotherapy stopped because of the way it made you feel?
- YES
 NO
19. Did you experience any nausea or vomiting during any of your chemotherapy cycles?
- YES
 NO (SKIP TO COGNITIVE Q's)
20. For the most serious episode, how long was it before your nausea was under control?
- 1-2 days
 3-6 days
 A week or more

(Goal for #17) Did R know how much chemo was planned?

Does this question measure curtailed or shortened chemotherapy?

(Goal for #18) How broadly does R interpret “make you feel”?

Why was it stopped?

(Goal for #20) How did they determine “most serious episode”?

What did it mean to be “under control”?

In your own words, what is question 17 asking?

What was the plan for your chemotherapy? (How long was it supposed to last? How many sessions?)

Did your chemotherapy plan change at all during the course of chemotherapy? (Tell me about how and why it changed.)

Please tell me a little about how chemotherapy made you feel. Did that affect how much chemotherapy you had? (How?)

(IF 19=YES) Questions 19 and 20 asked about nausea and vomiting you may have experienced during your chemotherapy treatment for you breast cancer. Tell me more about your “most serious episode”? (What made this your “most serious episode”?)

In your own words, what does it mean to you to have your nausea “under control”?

Some Things We Now Know About Cognitive Interviewing

Throughout our cognitive methodology work, we have learned, or maybe just confirmed, several important findings. First, if you know what problem the question might have - ask about it. Interview after interview has shown that for **pre-identified concerns**, a pre-scripted follow-up probe provides the most useful information about the potential problem. We have also found that production **interviewers**, with training, are capable of conducting cognitive interviews. Not having to rely solely on senior research staff or cognitive psychologists to do interviews has shown us that the cost of cognitive interviewing doesn't have to be prohibitive - either in money or time. This has allowed cognitive testing to be a routine part of our pre-survey evaluation on most studies.

Structured cognitive probes are a useful tool, especially for pre-identified concerns. By asking the right probe question, we can learn about a test question in a clean, neat, objective manner. For the purpose of documenting problems you think exist, structured probing may be the best method to use. The use of structured cognitive interviews allows interviewers who are not specifically trained in cognitive interviewing to conduct cognitive interviews. By using production interviewers, researchers can conduct cognitive testing less expensively and collect more data in a shorter amount of time than when using other strategies. One of the benefits of structured cognitive interviewing is having "results" presented in an objective and standardized way.

Yet, important, and sometimes unique, information can be discovered through interviewer debriefings. It was heartening to learn that not only could we reliably extract data by “**coding**” **the cognitive interview** tapes, but that the data were consistent with what we learned through debriefing the interviewers.

Cognitive interviewing, by its nature, is subjective. We will probably never know the “truth” about how a respondent’s cognitive processes actually work, but by allowing the interviewer some **flexibility** in asking follow-up or prospective questions, a researcher is less likely to learn only about what they expected or pre-identified.

All in all, there is no one correct way to cognitive interviewing. As survey methodologists we will continue to experiment and compare modes and styles. We will vary the degree of structure and flexibility in interviews and see what we learn. We will compare results of what happens when different survey organizations test the same questions. We will compare what we learn from cognitive interviewing to what we learn when using other methods of pre-survey evaluation. And we will continue to work towards writing the best survey questions we can.

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