AN EXAMINATION OF MODE EFFECTS IN COGNITIVE LABORATORY RESEARCH

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1.   Introduction

Survey researchers are becoming increasingly familiar with the use of cognitive laboratory methods to detect non-sampling errors before survey administration. These methods entail administering survey questions to laboratory subjects in conjunction with probes that explore how the subjects answer questions. The probes are designed to identify difficulties such as misinterpretation of questions, problems remembering relevant information, and so on.   Cognitive interviewers analyze the responses to the survey questions and probes, interpreting the answers through cognitive models of the response process-- for example, the four-stage model of comprehension, retrieval, judgement, and response (Tourangeau, 1984). The cognitive interviewers then use this framework to understand the source of the problems and recommend solutions.   These methods appear to be effective in detecting questionnaire flaws not usually diagnosed in field pretests (Willis, Royston, and Bercini, 1991; Lessler, Tourangeau, and Salter, 1989).

Cognitive interviews, like the survey questionnaires they test, can be administered in a variety of ways, and researchers must carefully consider a series of design decisions. These decisions may include: who will do the interviewing, where will the interview take place, what kind of interview protocol will be used, how will laboratory subjects be recruited, and so on (see Forsythe and Lessler, 1991, for a taxonomy).   One decision that is often taken for granted, however, is the mode of administration the cognitive interview will take place in.   Cognitive interviews are generally conducted face-to-face, in a laboratory setting, regardless of the intended mode of survey administration.

In this paper, we investigate whether researchers are in danger of drawing incorrect conclusions when the cognitive interview mode does not match the survey mode. Survey research literature contains examples of the relevance of mode to survey response (for example, Dillman and Tarnai, 1991; Krysan, Schuman, Scott, and Beatty, in press), and there is also a growing literature on the methods of cognitive interviewing-- but there has been very little overlap. We attempt to bridge that gap, discussing why cognitive interviewing has been predominantly face-to-face, why the choice of mode for cognitive interviewing should not be considered trivial, and whether cognitive interviews are feasible in modes other than face-to-face. This approach will require exploring both theoretical and practical issues, the latter based on our experience in the Questionnaire Design Research Laboratory (QDRL) at the National Center for Health Statistics (NCHS).

2.   Current interviewing in cognitive laboratories

Most cognitive interview projects are carried out face-to-face, regardless of the intended mode of survey administration. This uniformity has probably come about for practical reasons-- cognitive interviews are simply easiest to carry out in that mode. Cognitive interviewing requires communication from both the laboratory subject and the interviewer that can become quite complex.   Laboratory subjects must not only answer questions, but also explain how answers were chosen, elaborate on their thought processes related to answering, and describe difficulties they encountered when answering questions. Interviewers must not only record the answers, but also judge subject difficulties through verbal and non-verbal cues the subjects provide. They also guide the discussion and choose topics for further probing.   Also, interviewers and lab subjects may work together to define the meanings of questions. All of this calls for what we label "communicative flexibility."   More communication resources are available face-to-face than through any other mode, so it is logical that cognitive interviews are primarily carried out that way.

The availability of communication resources make conducting survey interviews in the face-to-face mode attractive as well (Lyberg and Kasprzyk, 1991). However, there are other important factors that impact the choice of survey mode. Most prominent among these is cost-- surveys by telephone or mail can be much less expensive than face-to-face (see Groves, Biemer, Lyberg, Massey, Nichols, and Waksberg, 1988; Dillman, 1978). Furthermore, face-to-face contact may be less crucial for the communication demands of survey interviews. While cognitive interviews require communicative flexibility, survey interviews are systematic and largely standardized: rules of the exchange are given by the interviewer, and answers are

given in a specified format by the respondent. It is not a conversation, though it draws upon conversational norms (Schaeffer, 1991)-- rather, it is primarily a measurement activity, designed to obtain quantifiable information (Fowler and Mangione, 1990). Depending on the specific questions and topics, the needs of such interactions can often be met adequately by other modes of administration (sometimes, in fact, survey data collection can be accomplished without an interviewer at all, as is evident by the successful use of self-administered questionnaires).

In the case of cognitive interviews, however, moving to a different mode is unlikely to affect costs, and could sharply reduce their effectiveness due to the loss of communicative flexibility. The communication needs of a cognitive interview usually exceed those of survey interview measurement. Cognitive interviewers play two roles at once-- survey interviewer, and cognitive evaluator. The task can be tricky, and thus far has been carried out face-to-face, where communicative flexibility is presumably greatest.

3. Mode and the response process

Yet, an important question remains: could researchers draw incorrect conclusions from mismatching the survey mode and the cognitive interview mode? We do know that the response process-- the primary focus of the cognitive laboratory interview-- works differently in different modes. A recent article by Schwarz, Strack, Hippler, and Bishop (1991) discusses how mode influences this process. The following aspects of surveys vary when switching from face-to-face to telephone mode:

• Question presentation-- There are only auditory stimuli on telephone; there are auditory and visual stimuli in the face-to-face mode. Visual stimuli could include intentionally presented visual aids, visual scales, and flash cards, as well as unintentional points of reference such as respondents glancing at the questionnaire for reference. Question length is usually shorter, and the maximum number of acceptable response categories is lower.
• Time pressure and pace-- Respondents feel more time pressure over the phone; silence is less comfortable; telephone interviews move faster. Respondents may be more likely to use estimation heuristics in this mode, or give "top of the head" answers due to such pressures.
• Interviewer explanations-- These are more available in face-to-face interviewing.
• Verbal/non-verbal communication-- The telephone allows verbal communication only; face-to-face interviewing includes both verbal and nonverbal

communication. This impacts how problems are detected and solved. It also impacts how feedback is administered and understood; feedback can influence quality of data by providing encouragement when respondents answer questions completely or in the desired format.
• Respondent/interviewer relationship-- The level of interaction and type of information available about the interviewer can affect several factors, including: How is cooperation obtained? How is trust earned? How is a task-oriented relationship forged?

This is not a complete list, but it demonstrates that some important differences exist in the response process across modes.

4. The impact of crossing modes on conclusions from cognitive interviewing

Since we know something about how the response process differs across mode, we can use that knowledge to explore the consequences of "crossing modes"-- using one mode in cognitive interviewing to look for response difficulties in a survey administered in a different mode. If the response processes in the cognitive interview mode are different from those in the survey interview mode, incomplete or inaccurate conclusions could result from the cognitive interviews. Below, we continue to focus on one type of mode-crossing: using face-to-face cognitive interviews for a telephone survey.

Consider first the problems researchers look for regarding comprehension. Suppose researchers test a survey question face to face and do not observe any comprehension problems. Additional problems could surface when switching to the telephone mode-- for example, the subject would have to rely solely on auditory stimuli, whereas before both auditory and visual stimuli were available. Conclusions could be incorrect because the researcher presented subjects with stimuli unlike what respondents would receive in the survey.

Also, because the phone creates more time pressure than face-to-face interviews, crossing modes could cause researchers to assess retrieval difficulties incorrectly. For example, based on face-to-face interactions, researchers may believe that respondents will provide carefully thought out answers; however, when the telephone is introduced, answering strategies may change considerably for some questions. The researchers may be unaware of the extent that estimation occurs, and this estimation may prove to be unacceptable.

Different levels of respondent motivation may

also exist across modes, arising from different types of interviewer/respondent relationships. As a result, interviewers on the telephone may have more difficulty providing the encouragement necessary for respondents to answer complex questions, search for specific memories of events, and so on. Interviewers may also be unable to provide guidance for respondents to perform these tasks as intended. Laboratory subjects may have a more difficult time explaining their answers without engaging directly with interviewers, and may become frustrated more easily. Face-to-face cognitive interviews could fail to capture these problems.

Cognitive interviewing is also useful for judging the adequacy of response options. Response options that work well face-to-face may cause difficulties over the phone. This could be because individual response options are too long for the telephone, or there are too many responses to remember without visual aids. When listening to response options, respondents must either pick one while the interviewer reads the choices, or choose from the responses they can remember. In a face-to-face interview, respondents may be able to see all of the possible responses, viewing them as a cohesive set. In this manner, respondents can weigh the adequacy of various responses before making a final selection. Here, again, a face-to-face cognitive interview might not adequately simulate important psychological characteristics of real survey conditions.

This is by no means a comprehensive list of the problems that could arise from crossed modes in cognitive laboratory research. Researchers must be aware that they exist, and should actively attempt to anticipate such problems when designing these studies. Failing to do so threatens to reduce the external validity of the findings.

5. Implications for cognitive interviewing

In short, there may be reason to take mode into consideration when planning cognitive lab work. This ignores, however, the practical problem of how such research could be adequately conducted over the telephone. Central to the issue is this trade-off: mimicking mode may constrain what researchers can accomplish in the lab, but, in terms of important psychological factors, would make the interview more like the survey... not mimicking mode may create a cognitive experience far removed from real survey conditions, but would create conditions probably more conducive to studying cognitive issues.

Yet, we believe there are compromise positions that can maximize efficiency and external validity. The following observations and suggestions are based on initial investigation of these issues in a pilot study conducted at NCHS, in which we conducted cognitive interviews by telephone.

a. Conduct questionnaire testing in phases

It seems reasonable to conduct questionnaire laboratory testing in phases, varying techniques and modes used to both maximize communicative flexibility and create realistic testing conditions. In our pilot test, we conducted the earliest testing in the face-to-face mode. This worked well, because the most profound cognitive and structural problems will probably be discovered using tools allowing the greatest communicative flexibility. In subsequent rounds, however, it is desirable to mimic the actual survey conditions more closely (Converse and Presser, 1986; Lessler, Tourangeau, and Salter, 1989). Duplicating the mode is important to eliminate problems arising specifically from the manner in which the survey is carried out.

b. Techniques for telephone cognitive interviewing

Is it feasible to do cognitive interviews over the phone? We think that it is, under some circumstances. First, it is still advisable to recruit subjects and invite them to a laboratory setting rather than calling them at home. "Cold calling" would probably create several problems. It would be difficult to explain the purpose of the interview and obtain initial cooperation. To most people, the cognitive interview is a novel and complex task-- much more so than a typical survey interview. Even if the subject consented to do the interview, the interaction could suffer from low subject understanding and motivation. Furthermore, cognitive interviewers generally specialize in identifying questionnaire design problems, not the skills of convincing and training that survey interviewers must learn.

In our first investigation, we recruited subjects through advertising, invited them into the lab, and introduced them to the interviewer. Following brief instructions, they were placed in a room by themselves and called on the telephone. To be sure, this did not mimic a telephone survey exactly. It did, however, duplicate some of the "cognitively relevant" factors, such as having no visual references. Subjects had no observable difficulties understanding the procedure and were fully cooperative.

c. When to probe

Given our decision to administer the questions

by phone, we had several options regarding probing: concurrent probing (administering probes immediately following individual questions, as is usual practice at NCHS) or retrospective probing (administering probes after the questionnaire is completed). The retrospective option provided another choice: whether to probe while remaining on the phone, or to end the telephone portion of the interview and probe in a face-to-face debriefing. This last option was most appealing, as we could administer the questionnaire realistically in terms of timing, flow, and mode, but also enjoy the full benefits of face-to-face interaction during probing.

There was, however, a time lag between the response and the probe-- a possible threat to the accuracy of the probe responses, as subjects could forget details about how they originally answered the questions. In spite of that, lab subjects were quite talkative and expressed no difficulties remembering or explaining their previous answers. In this study the time lag was rather short (15 to 30 minutes between responses and probes); subjects may have experienced greater difficulty with a longer lag.

It seems reasonable that some probes would be more useful under these circumstances than others. For example, one type of probe we administered could be called an "elaboration" probe, which asked lab subjects to explain what they meant by their answers:

• You said you drove locally 75 miles a week. What does "local driving" mean to you?
• Could you tell me, in your own words, how strictly seat belt laws should be enforced?

These probes seemed to work well in the pilot study. Another type of probe could be labelled a "reconstruct the answer" type probe, such as:

• How did you figure out that you drove ____ miles per week?

That type of probe, in a sense, required subjects to answer the question a second time; it seemed unlikely that they would remember this information based on their initial answer. Therefore, the choice of probes requires additional consideration when using this method. The appropriateness of probes according to mode of cognitive interviewing is an important issue for further research.

d. Interviewer and subject reactions to the method

Although the retrospective probing described here was a departure from usual practice, some interviewers found the uninterrupted interview with retrospective probing highly effective, and preferable in some ways to concurrent probing. Concurrent probing can be demanding, as it requires interviewers and subjects to move back and forth between administering survey questions and evaluating responses in a cognitive framework. Furthermore, it continually changes the interaction from formal questioning and answering to less formal conversation. Some interviewers felt it was easier to concentrate on one task at a time, and consequently that they were able to probe more efficiently during the retrospective debriefing.

Subjects may have found this method easier also, as they did not have to switch between comprehending questions and explaining their own answers in depth. Some interviewers noted that, in the debriefing, subjects were more talkative than usual when asked to elaborate on their questionnaire responses. This is admittedly a qualitative observation, but it is reasonable to suggest that the subjects were more focused since the task was divided into component parts. Another possibility is that subjects found the telephone interview restricting in terms of both responding to questions and interacting with the interviewer, and they may have found the debriefing somewhat of a "relief" in comparison. Subject reactions to the method are surely worthy of more attention in the future.

6. Discussion

It seems perfectly reasonable to advance cognitive laboratory interviewing to take these mode issues into account. Mode issues have often been ignored, or" left for the pretest." Unfortunately, field pretests, while essential, are a hit-or-miss means of finding problems. They rely on an unusual level of interviewer judgment and a great deal of luck; furthermore, it may be too late to make significant changes to a questionnaire at that point.

It is difficult to say whether the telephone cognitive interviews helped us find different "kinds" of errors, or just additional errors which might have been discovered just as easily through another round of face-to-face interviewing. This should be explored more systematically in the future. It does seem reasonable, though, that the introduction of the telephone to our pretest was responsible for discovering problems resulting from the mode of administration.

Additional research items for future studies on conducting laboratory interviews by telephone include: exploring the feasibility of probing concurrently over the phone; determining which types of probes work best over the phone; and investigating whether laboratory

subjects can be "trained" for cognitive interview techniques over the phone.

While this paper has focused on conducting cognitive interviews for a telephone survey, the same issues should be considered for self administered questionnaires. Regardless of the type of mode crossing, the following framework should help researchers decide whether matching the cognitive interview mode to the survey mode is important.

• Identify the major cognitive differences between responding to a face-to-face questionnaire, and responding to a questionnaire in the other mode of interest. (Examples: self-administered questionnaires rely on visual stimuli completely, the order or questions is not necessarily fixed, no interviewer explanations are usually available, the respondent may be less likely to worry about socially desirability, and so on).
• Evaluate whether face-to-face cognitive interviews could lead to flawed conclusions for non face-to-face surveys. (Example: researchers could overestimate a respondent's willingness to search their memories to answer questions-- without that interviewer present, respondents may feel less compelled to give a "good" answer.)
• If the decision is made to match modes for at least some testing, decide:
  -- Can pretesting/cognitive interviewing be done in phases?
  -- Is there a feasible way to match modes for the cognitive interviewing (for example, allowing the subject to fill out the questionnaire in private followed by a debriefing)?
  -- When should the probing occur? (Note that concurrent probing would be difficult in a self-administered interview.)
  -- What is the best way to duplicate the "cognitively relevant" conditions while maximizing probing efficiency and communicative flexibility?

The cognitive issues involving mode that we discuss are relevant to questionnaire design, and cognitive interviewing provides an excellent opportunity to examine them. Our earliest attempts at expanding cognitive interviews into different modes suggest that such interviews are feasible to carry out as well.

8.   References

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