

CASM II: CURRENT AND FUTURE DIRECTIONS IN INTERDISCIPLINARY RESEARCH

Susan Schechter and Monroe Sirken, National Center for Health Statistics; Judith Tanur, State University of New York at Stony Brook; Elizabeth Martin, Census Bureau; Clyde Tucker, Bureau of Labor Statistics
Susan Schechter, NCHS, 6525 Belcrest Rd., Hyattsville, MD 20782

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Introduction

CASM I refers to the first Advanced Seminar on the Cognitive Aspects of Survey Methodology which was held in 1983 to stimulate interdisciplinary research. The second Advanced Seminar, referred to as CASM II, was held in Charlottesville, Virginia in June 1997 and sought to reinvigorate, expand and accelerate the CASM movement. The seminar was structured to facilitate intensive participation and discussion from all attendees. Attendance was by invitation only; fifteen commissioned papers were presented at four plenary sessions. In addition, eight working groups met daily to develop an agenda for future cognitive research in survey methods.

An invited panel session was held at the 1997 Joint Statistical Meetings in Anaheim, CA in order to provide highlights of the CASM II seminar to meeting attendees. This paper contains summaries of the five panelist presentations. We begin with Monroe Sirken, who gave an overview of CASM research. Judith Tanur follows with a summary and commentary on papers given in Session 1; Susan Schechter provides highlights of Sessions 2, 3 and 4 (the papers given in these four sessions are not individually referenced here; they are forthcoming in Sirken, Herrmann, Schechter, Schwarz, Tanur & Tourangeau (eds.) Cognition and Survey Research). Betsy Martin summarizes the recommendations of 4 of the 8 working groups and Clyde Tucker presents his thoughts about the remaining 4 (the reports of these working groups, as well as other Seminar-relevant reports, are forthcoming in Sirken, Jabine, Willis, Martin, & Tucker (eds.), A New Agenda for Interdisciplinary Research on Survey Measurement Methods: Proceedings of CASM II).

Monroe Sirken: The Future of CASM Research - An Overview from CASM II

I refer to the sustained and deliberate efforts that have been underway in recent years to foster interdisciplinary research on the cognitive aspects of survey methodology as the CASM movement. In this overview, I'll briefly describe what appear to me to be important achievements of the CASM movement and current needs for new thrusts of CASM research.

Achievements of the CASM Movement

Benefits to Survey Measurement Research: The emergence of the cognitive laboratory and its impact on methods of designing survey questionnaires were outstanding

developments in survey research during the past decade. Several large official statistics agencies in this country and abroad established permanent laboratories, and laboratory methods of designing and testing survey questionnaires have been widely adopted.

The cognitive research laboratory is an in-house facility used primarily by the survey's staff to investigate cognitive aspects of designing survey questionnaires of ongoing surveys. Key elements in this definition are the phrases in-house facility, organization's own staff, and ongoing surveys. The laboratory applies cognitive methods of designing data collection tasks as part of the survey pretesting process. Using a variety of qualitative interviewing methods on small samples of purposively selected subjects, the laboratory, rather cheaply and quickly, detects problems with questionnaires that are missed in field pretests.

The CASM movement fostered the transfer of the cognitive paradigm from psychology to survey research. Adoption of the paradigm led survey researchers to (1) propose cognitive theories of survey response (Tourangeau, 1984; Royston, 1989), (2) apply qualitative interviewing techniques that discern the mental tasks performed by survey respondents (DeMaio, Mathiowetz, Rothgeb, Beach, & Durant, 1993; Willis, 1994), and (3) design the cognitive laboratory as an in-house facility with capabilities of designing and testing questionnaires of ongoing surveys in a timely and cost-effective manner (Sirken, 1991).

Benefits to Cognitive Psychology: Though cognitive psychology has not benefitted as much as survey research from the CASM movement, its benefits have been significant. Arguably, the most important benefit resulted from exposing cognitive psychologists to survey response phenomena. Curiosity and puzzlement with some survey phenomena persuaded cognitive psychologists to undertake basic research on cognitive phenomena that apply beyond the survey context (Schwarz, forthcoming). For example, exposure to the survey phenomenon of forward telescoping stimulated basic cognitive research on autobiographical memory (Bradburn, Rips, & Shevell, 1987). If ultimate benefits of interdisciplinary research are measured in terms of impact on applications, the benefits of the CASM movement to cognitive psychology are not yet fully assessable. It's too early to judge whether basic cognitive research stimulated by survey phenomena will contribute

fundamental knowledge about cognition that ultimately benefits survey research.

New Thrusts of Interdisciplinary Survey Measurement Research

Table 1 subdivides CASM research projects into twelve research areas based on the nature of the research problem addressed, and the kinds of interdisciplinary collaboration involved. The table stub classifies research projects according to six stages in the survey measurement process. The table banner distinguishes between research projects involving collaboration of social scientists only, and those involving collaboration of social scientists with computer scientists and statisticians. In this table, the cognitive sciences are considered a subdomain of the social sciences.

TABLE 1: CASM RESEARCH AREAS

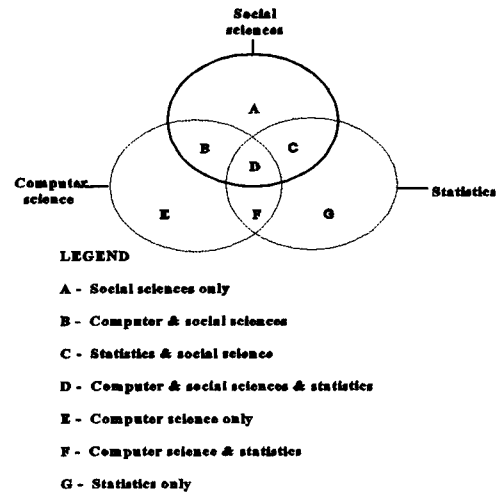
Survey Tasks	Interdisciplinary Domains	
	Social Sciences	Social Sciences Intersected by Computer Science and/or Statistics
Data Specification	1	2
Data Collection	3	4
Data Reduction	5	6
Data Analysis	7	8
Data Presentation	9	10
Data Dissemination	11	12

Types of Research Problems: New thrusts of survey research are needed at every stage of the survey measurement process. They are needed to develop innovative ways of designing survey tasks, and to compare benefits of alternative survey design options. So far, the CASM movement has been most successful in fostering data collection research. Even within the realm of data collection, CASM research has been rather narrowly focused on population surveys. The CASM movement needs to give more attention to establishment surveys and to computer assisted interviewing modes of data collection. Cost and error effects of cognitive methods of designing and testing questionnaires are largely absent, and are urgently needed (Willis, DeMaio & Harris-Kojetin, forthcoming).

Interdisciplinary Domains of CASM Research

The Venn diagram in Figure 1 partitions interdisciplinary survey measurement research into seven domains. The domains are formed by intersections of three disciplines that have contributed most to survey research namely, social science, computer science, and statistics.

FIGURE 1: INTERSECTION OF DISCIPLINES IN SURVEY MEASUREMENT RESEARCH



The combined areas A, B, C, and D in Figure 1 represent the entire domain of CASM research. Area A, the domain of the first column of Table 1 represents CASM research performed solely by social scientists. The combined areas B, C, and D, the domain of the second column of Table 1, represents CASM research performed by social scientists in collaboration with computer scientists and statisticians. Until recently, CASM research was conducted primarily by survey researchers in collaboration with cognitive psychologists and without much collaboration with other social scientists, computer scientists or statisticians. Thus, Figure 1 would represent the interdisciplinary realm of current CASM research as a subarea within area A.

Emerging Areas of CASM Research

CASM research is currently nested in Research Area 3 of Table 1. However, current needs for new thrusts of CASM research require expansion to all twelve research areas. The expansion is likely to evolve in three ways:

- Research Area 3: more social science disciplines including linguistics, social anthropology, and neuropsychology collaborate in data collection research.
- Research Area 4: social scientists collaborate with computer scientists and statisticians in data collection research
- Other Research Areas: social scientists collaborate with computer scientists and statisticians in research on other stages of survey measurement, starting perhaps with the data presentation stage (Pickle & Herrmann, 1995).

TABLE 2: EXAMPLES OF EMERGING AREAS OF CASM RESEARCH

Research Area in Table 1	Research Theme	Research Project
1	Conversational aspects of survey response	Applying ethnographic data collection methods in surveys
4	Computer assisted interviewing	Cognitive testing of CAPI questionnaires
4	Pretesting survey questionnaires	Optimum resource allocations in constructing questionnaires
8	Estimating survey measurement errors	Response error models based on cognitive theories
10	Statistical map design	Representing data quality measures in choropleth maps
12	Improving utility of official surveys	Customer satisfaction surveys on the Internet

Table 2 lists several research themes and projects that illustrate current needs for expanded interdisciplinary CASM research. For example, the second listed project in Table 2 involves collaboration of social scientists and computer scientists research in redesigning the cognitive research laboratory into a human-computer-interaction worksite with capabilities for designing and testing questionnaires involving computer assisted interviewing (Cooper, forthcoming). The fourth listed project involves collaboration of social scientists and statisticians in developing statistical models of survey response errors that are based on cognitive theories (Groves, forthcoming; Press, 1996). The last listed project in Table 2 involves collaboration of social scientists, computer scientists, and statisticians in designing Internet customer satisfaction surveys with users of Internet disseminated data sets.

Judith Tanur: The Janus Session - Looking Backward and Forward at CASM

As the organizing committee planned the CASM II seminar, I found myself thinking of Session 1 as the Janus Session, drawing on the image of Janus as looking backward and forward at the same time. The first session reviews where we have come from in the history of the CASM movement and where we have not yet been and

might usefully go. As I explored the Janus myth, I was even more convinced that Janus was the appropriate patron for this session, and perhaps for the entire seminar. He was the ancient god of beginnings and activities related to beginnings. His blessing was asked at the beginning of the day, of the month, of the year--and perhaps of the seminar.

If we date the beginning of the CASM movement to the mid-1980's, we have had more than a decade of work officially labeled in that way. In the survey research community, "cognitive" (as in cognitive testing, cognitive processing, cognitive interviewing) has become a household--or office--word. We have made much progress. But we have also long worried about several issues. Are we just dealing with old wine in new bottles? Or, if we are doing things differently, is there any hard evidence that we're doing them better? We use ideas mainly from cognitive psychology, ignoring the other cognitive sciences--can or should that be changed? We are more likely to use tools of our sister discipline than to use cognitive theory to inform use of the tools or interpretation of results--couldn't we profitably take a more theoretical stance? Furthermore, CASM I envisioned a two-way street, with researchers in the cognitive sciences using large scale surveys as a means of testing the generalizability of their laboratory-based findings--why do we see so little traffic in that direction, and what can we do about it? Session 1 expanded on these ideas of where we've come from, suggested what we've missed along the way, and started to address where we might usefully go in the future.

The first speaker in Session 1 was Murray Aborn whose talk was entitled "CASM Revisited" to emphasize that it was not only a look back but a new look. CASM has a long past but only a short history--its roots can be traced back in three ways: to the study of non-sampling error (dating back to the work of Cantril, 1944), to the histories of interdisciplines, and to the history of movements in the social sciences.

Murray suggests that if CASM is considered a movement, its social science precursor was the social indicators movement. Two prime movers in the social indicators movement defined criteria for calling a collection of research and researchers a *movement*. First, it must have a social purpose--Murray sees the social purpose of CASM as derived from the vital role of surveys in modern life. Second, it must have a cause--he suggests that the cause of the CASM movement is to derive new methods of controlling error. Third, a movement must have political reality--for this criterion, I see CASM's political reality arising from the strong support of the National Science Foundation (NSF) and especially the NSF and other governmental support of the cognitive laboratories.

Turning to evaluation, Murray pointed out that the social indicators movement suffered OBI (obliteration by incorporation) as its ideas and measures became part of the ordinary armamentarium of the social sciences. He wonders

if CASM has suffered the same fate, or conversely, if the movement has spawned no significant improvements. In an evaluation presented in 1989, Murray noted few published papers relating to CASM; that situation has now changed, with an informal count yielding at least 94 published papers and 48 books. Murray also found extensive bibliographies of fugitive literature from the government laboratories. And, he cites a November 1996 NIH-sponsored conference on The Science of Self Report as significant because its papers related heavily to CASM. He was not able to find any impact of CASM on the cognitive science literature.

Murray ended with some words of caution. First, we should realize that if we encourage the two-way street by embedding “mind-probing experiments” in surveys, this could exacerbate general concerns regarding surveys as potential violators of privacy. And second, while cognition is extremely fashionable in psychology, fashions change and cognition may not be the wave of the future. It would be foolish, then, to put all the survey research eggs in the cognition basket.

Our second speaker was Colm O’Muircheartaigh. In his presentation “CASM: Successes, Failures, and Potential,” Colm concentrates on those parts of the CASM enterprise that have been less successful--not to denigrate but to guide future efforts. To evaluate the CASM movement, he proposes a framework of three dimensions: representation, control, and realism. Representation addresses the issue that no empirical relation between social variables is universal (or as I learned it, the answer to most social science questions is “sometimes yes, sometimes no, and besides, it’s more complicated than that”). Thus, effects vary by subgroups, and we must be sure that the target population is adequately represented in the sample. Control refers to the absence of confounding variables and realism has two aspects--realism in variables (akin to internal validity) and realism in environment (akin to external validity). Colm gives some examples of survey research and locates them using this three-dimensional space framework.

He then reviews some of the past achievements of the CASM movement. He sees progress in the application of the methods of cognitive psychology and the development of cognitive laboratories in government and other survey organizations. What is new is the framing of the work in theories drawn first from cognitive psychology and later also from other disciplines such as linguistics. Examples of these achievements are the inclusion/exclusion model of assimilation and contrast effects (Schwarz & Bless, 1992) and Krosnick’s model (1991) of the cognitive miser and satisficing.

He also points out that peripherally connected to the movement have been several non-cognitive approaches. For example, problems with the standardized survey interview concern both the artificiality of the situation and the constraints of the standardized questionnaire. Historically there have been two poles of interviewing--the

expert interviewer, often the researcher him or herself, who simply has a conversation to find out what she or he wants to know, and the questionnaire interviewer, essentially a hired hand, who goes out with a blank form and preset questions. Research focus has moved from the interviewer alone to the joint consideration of the interviewer and the respondent interacting; solutions range from empowering the respondent to giving ever more detailed instructions to the interviewer.

Meanwhile, there has been a drift away from considering the richness and complexity of the topics targeted by survey questions. Two theoretical stances offer alternatives. One is ethnography, where an interview is not standardized but depends on the interviewer not only understanding the questions, but understanding the answers in terms of the schemas used by respondents. The other perspective is that of social representation which would free research on social attitudes and cognition from the over-emphasis on the individual’s psychological organization and anchor those attitudes and cognitions in the social field. Colm suggests that both these perspectives recognize the importance of considering a question in a broader context; their strength is in the recognition of diversity. In the case of ethnography, there is a recognition that the results of an investigation are specific to the (small) population in which it is conducted. Social representations recognize explicitly that different subpopulations may have fundamentally different organizing principles. They both suffer, however, from being difficult to translate into instruments that will satisfy the needs of large scale survey research.

Noting that what is missing from many accounts of scientific developments is any appreciation of the fundamentally social nature of scientific activity, Colm cites Danziger’s (1990) notion that the fundamental issue in research is not (merely) whether the lone investigator can verify his hypothesis in the privacy of his laboratory but whether he can establish his contribution as part of the canon of scientific knowledge in his field. The issue is one of consensus, and consensus is not entirely a matter of logic. It involves vested interests and unexamined biases. This brings Colm to consider 3 obstacles to CASM innovation:

- The specialization of tasks and the separation of thinking and doing.
- The functional dependence of thinking. Unless we have a good way to measure improvement, we don’t know if the cognitive laboratories are doing a good job.
- The redistribution and recomposition caused by innovations threaten the stability of organizations.

Susan Schechter: Highlights of Sessions 2, 3, and 4

Judy Tanur has just described the highlights of Session 1. Sessions 2, 3, and 4 were organized and chaired by Norbert Schwarz, Roger Tourangeau, and Doug Herrmann, respectively. Unfortunately, these organizers were not able to participate in the ASA panel. Thus, I stand in for them to

present highlights of the types of theory and research that were discussed during these three plenary sessions.

Effects of CASM on Cognitive Theory and Survey Methods (Organizer: Norbert Schwarz)

Papers commissioned for Norbert Schwarz's session addressed theory and research related to the cognitive and communicative processes underlying survey response tasks. Michael Schober focused on the conversational aspects of the survey interview and illustrated the many things that can go wrong when a respondent misunderstands a survey question. Schober theorized that some non-sampling response error found in surveys may be due to the rigid and formal nature of the survey conversation. In particular, he suggested that audience design and grounding--two key elements of conversational discourse used every day to ensure understanding--are sometimes missing from the survey interview. Most of us with survey research experience are familiar with the standard interviewer response when asked by a survey respondent "What do you mean by that?" The interviewer is instructed to say "Well, whatever it means to you." This sort of response would not typically be found in everyday conversation. Schober's research has led him to conclude that when surveys are more flexible and allow interviewers and respondents to ground their understanding of questions, response accuracy can increase substantially.

Lance Rips presented a paper (coauthored with Michael Shum) on autobiographical memory and the cognitive processes involved when survey respondents answer retrospective reports. Rips described recent work on autobiographical memory as it informs and is informed by survey methodology. He then went on to address the different sorts of cues that survey questions can use which may lead to more accurate behavior reports. Roger Tourangeau gave a paper which focused on the cognitions involved in the formation of attitudes. He talked about the influence that context effects can have when survey respondents answer attitude or opinion questions. Tourangeau spent some time discussing assimilation and contrast effects. Generally, assimilation effects are seen when the respondent assumes that the question being asked refers to the same topic as the previous question; contrast effects occur when respondents infer that the intent of the question asked must be different from that of the preceding one.

Last in this session, Gordon Willis talked about the ways in which psychologists and survey researchers work together to test questions in cognitive laboratories. Willis works in the NCHS cognitive lab, and his two coauthors, Terry DeMaio from Census and Brian Harris-Kojetin from BLS, each work in their agencies' cognitive labs. Willis described the current state of the art in questionnaire design research laboratories and offered a critical view of why systematic evaluation procedures have not been

implemented to date and what can be done to improve evaluation of cognitive laboratory methods.

Potential Contributions of Other Disciplines to CASM (Organizer: Roger Tourangeau)

Roger Tourangeau's session included five papers, each of which offered a different interdisciplinary perspective to cognitive-oriented survey research. First was Charles Fillmore's paper which illustrated the talents and skills of linguists. Beyond issues related to semantics, syntax, and grammar, Fillmore effectively demonstrated how sensitive comprehension is to an individual's interpretation of meaning, and how meaning, reasoning, and the ultimate selection of a response to a survey question can be affected by subtle linguistic difficulties. Fillmore made an excellent case for collaborating with psycholinguists when conducting questionnaire design research.

Art Graesser and his colleagues embraced the concepts Fillmore discussed but their paper went in the direction of expert systems and artificial intelligence. Graesser envisions a day when survey designers will collaborate with psychologists, linguists, and computer scientists to feed a questionnaire to an expert system which will in turn, quickly and systematically identify many cognitive problems contained in the instrument. Graesser illustrated both the expected capabilities and advantages of such a system as well as limitations that a given system would have. He talked of his own computational cognitive model and others currently available that are able to identify question problems such as complex syntax, a working memory overload, or unfamiliar technical terms. He concluded by presenting evidence that analyzing a questionnaire by using these artificial intelligence models have led to measurable improvements over traditional pretesting outcomes.

Eleanor Gerber presented work on application of cognitive anthropological methods to survey research. This discipline uses ethnography to provide information about the beliefs and sociocultural practices of people. In survey research, ethnography is typically used as a way to learn about groups that are considered different by the experts who are designing the survey and writing the questions. Her paper identifies several benefits of consulting with ethnographers in conducting survey design and research. However, Gerber points out that we don't yet have an easy, systematic way of combining effective anthropological investigations with qualitative pretesting techniques such as those that are used in cognitive laboratories.

The paper by Bob Groves offered Seminar participants some insight into the practical issues methodologists face when developing survey estimators and suggested ways that survey researchers might utilize findings from CASM-related research. In line with Monroe Sirken's previous discussion which illustrated the impact to CASM research when interdisciplinary domains such as statistics are added, Groves looked at the cognitive theories of the

survey response process and suggested ways they could be used to develop better measurement error models. Perhaps survey methodologists would be able to get a better sense of the upper and lower bounds of measurement error by taking advantage of knowledge gained in cognitive research.

Last in this session was a paper by Eliot Smith on connectionism, a theory of how memories are organized. Connectionist theory strays from the paradigm that memories are stored in something analogous to a filing cabinet and one simply has to get to the right drawer and file to retrieve the specific memory. Rather, in connectionist models, memories are distributed patterns of activity across a large number of interconnected units. They are stored in these interconnected patterns rather than stored as discrete, static entities. Smith suggested that when asking for a retrospective report, memories are reconstructed rather than retrieved; respondents do not simply remember something exactly as it occurred. He illustrated in his paper how memory reports may be influenced by what occurred on a particular past occasion, by general knowledge and by what happened on many partially-similar occasions.

Potential Contributions of CASM Beyond Questionnaire Design (Organizer: Douglas Herrmann)

This final plenary session included four papers that looked at CASM research outside of the survey response domain. Mick Couper led off this session with a vivid portrayal of the effects of computerization on the interviewer and the respondent. In a video clip, the audience witnessed not only the various difficulties that an experienced interviewer had in administering a CAPI interview, but the disengagement of the interviewer from the respondent as undivided attention was given to the computer screen. Couper noted that much research and resources have been devoted to developing computer assisted interviewing capabilities while insufficient attention has been paid to issues of usability. He noted that interdisciplinary work in computer science and the field of human-computer-interface is growing and that survey research has much to gain from it.

Fred Conrad's paper presented an alternative way to think about survey measurement error. The CASM movement in general, and questionnaire design research specifically, have focused on response errors as outcomes of the question-answering task. Conrad shifted the focus to how respondents perform the task. His work evaluates respondent performance not just by the accuracy of answers, but by how much the survey task differs from the way survey designers originally intended it to be performed. Thus, rather than restrict measurement error to the deviation from the respondents answer and the "true value" (whatever that may be), Conrad suggested that the difference between the designer's plan and the respondent's action should also be thought of as measurement error. Drawing from the theories and practice of software development, where to

varying degrees designers customize plans they intend users to follow based on what they know or can determine about the users, he provided interesting examples of ways that we can use expert systems to model survey task performance.

The last two papers of the CASM II Seminar focused on ways in which cognitive theory could inform and improve data presentation. Michael Friendly's paper offered a framework for developing data visualization methods that incorporates psychological and graphical design principles. He showed an array of colorful, unique graphs, charts and tables in an attempt to demonstrate ways statisticians and other analysts can portray categorical data visually. Related to how one comprehends visual displays of categorical data, Stephan Lewandowsky's paper looked at the cognitive processes involved in understanding statistical maps and graphs. He noted that maps and graphs have become an indispensable tool for the analysis and communication of statistical data and suggested that expressing data in pictorial form capitalizes on sophisticated human cognitive processing capabilities. He pointed out that humans have the ability to perceive, classify, and understand complex visual patterns that we would otherwise have trouble describing in simple verbal terms.

Elizabeth Martin: Working Groups for Basic Survey Research Proposals

I will be reporting on four working groups which were asked to consider new areas of application of cognitive science to basic issues in survey methods research. I'll start with a brief statement of each group's view of its problem area, then describe briefly the research they proposed to address the issues. Then I'll note some common themes that cut across the different groups and topics.

CASM in a Changing Survey Environment (Chairs: Kent Marquis & Dan Kasprzyk)

This group was charged with considering cognitive aspects of surveys in a changing technological environment. In this group's view, the increasing applications of new technology to surveys provide great opportunities, but also present great challenges to interviewers and respondents as well as survey designers. They note that automated survey instruments place far greater cognitive and motor demands on interviewers, as well as respondents who are filling out computerized self-administered questionnaires. They point out that computerization has changed the role of the interviewer and the nature of the interview itself, which has become a 3-way interaction, between interviewer, respondent, and the computer. This group calls for research focused on respondent psychology in computer self-administered interviews. Additionally they note the need for research to design automated instruments which can be administered by interviewers or by respondents. They call for improvements in design and usability of automated

instruments, and increasing development and use of technological tools which can help interviewers.

Exploring the Interview Process (Chairs: Nora Cate Schaeffer & Patricia Royston)

A second group examined the dilemma posed by the fact that standardization of the questionnaire and interview process originally was intended to reduce variability in answers due to interviewers, but standardization may also interfere with respondents' ability of understand survey questions and provide accurate answers. As was pointed at in the first CASM conference, standardization may disrupt and inhibit the normal conversational tools that interviewers and respondents might otherwise use to establish common understandings. It is clear that we have only begun to tackle the issues involved in the degree of standardization that is needed and beneficial. This group calls for the excellent first step of documenting across survey organizations the current practice to determine both what interviewers are trained to do, and what they actually do in the field. This benchmarking study is needed to learn how standardization is interpreted and implemented. A followup study is proposed to evaluate the effects of different degrees of interviewer flexibility upon data quality.

Different Disciplinary Perspectives on Cognition in the Question and Answer Process (Chairs: Stanley Presser & Tracy Wellens)

A third group was asked to consider different disciplinary perspectives on the question and answer process. They note the growth in the application of cognitive methods to evaluate and revise questionnaires, and the tremendous amount of testing which has gone on in the government agencies and other organizations. Although these increased testing efforts have improved individual questionnaires, the findings have not been integrated and have contributed little to a general understanding of the question and answer process. The group calls for an archive of cognitive test findings which could be used to derive and test hypotheses about sources and solutions for response error. They also call for publicizing known survey puzzles, in the hope of attracting the interest of cognitive scientists in examining and hopefully explaining them. The group also notes that research on how respondents interpret the survey context more generally may be useful (how do respondents think their answers will be used, and how do these conceptions influence their responses?). They also calls for an ethnography of the survey interview, to examine these broader contextual understandings of the interview.

Applying CASM to New Areas of the Survey Process (Chairs: Cynthia Clark & Catherine Dippo)

The fourth group was charged with examining the potential contributions of cognitive methods to aspects of the survey process apart from data collection. They focused

on three: development of survey concepts, development of coding and classification schemes, and the dissemination and appropriate use of survey data and statistical information based on it. The group expressed concern with learning about, and designing new ways to facilitate, the dissemination of survey and census information to the public, especially through the Internet. Their focus is broadly on two areas: first, how to design interfaces so that the public (teachers, journalists, etc) can gain access to the data and use it effectively. Partly this entails research to investigate in how people might use the data, and how Internet dissemination can be designed to facilitate public access and use. More broadly, they are concerned with the critical issue of statistical literacy, and how the public may be educated to improve their understanding and use of statistical information. To address this issue, they call for research that would develop a broad spectrum of educational tools, in schools and libraries in attempting to develop better ways of communicating statistical understanding and information.

Themes of Groups 1 -4

Several common themes and issues cut across these different groups. One common theme concerns statistical literacy and the importance of research to investigate how the public understands data use. Interestingly, this was viewed as critical at both ends of the survey process: we need to know more about how respondents interpret their role and the uses made of the data they provide because we believe it may influence the way they answer questions. At the other end it also affects public use, interpretation, and credibility of survey results. The decennial census is an example of just how critical public understanding and acceptance of survey methods are in affecting an organization's ability to carry out a survey. We know that respondents who understand the uses made of census data and the reasons for the census are more likely to respond. Even more critical at the current time is the fact that the public at large, including many members of congress, do not fully accept sampling, and are skeptical that it can be carried out in an objective and unbiased fashion. The current problems the Census Bureau is having in making its case for sampling would perhaps be lessened if statistical sampling were better understood.

A second theme is that there really does seem to be a critical need for research on interviewers and the interview process. This is not a new theme. In fact, it was a focus in CASMI and in the deliberations and recommendations of the NAS Panel on Surveying Subjective Phenomena. CASM I raised questions about whether the strictures of standardized interviewing should be relaxed to allow for more flexibility, but very little research on the topic ensued. Why not? There was some interesting discussion on this point. The bottom line was that we don't pay interviewers enough to attract large numbers of the highly trained and

skilled staff needed to carry out this type of interviewing. Unfortunately, we may be neglecting a critical area at our peril, since the interviewers are at the heart of any survey's ability to get response and quality data.

A third theme points to another area of relative neglect, namely, improvements in the process of documenting and cumulating knowledge about survey methods and practice. The proposal to document how standardization is actually implemented by interviewers is laudable, but in a way it's astonishing that it's necessary: not only do we in the survey business not know how interviewers actually administer questionnaires, but we aren't really very sure of what we mean by standardization in the first place. A second area in which a recommendation points to a lack of documentation is the call for an archive of results of pretesting questions. This surely makes good sense, and would provide a basis for building more general knowledge about the question and answer process. A side benefit would be it would help avoid survey researchers from asking and testing the same bad questions again and again.

A fourth theme concerns the broad applicability of a new kind of research focused on people's interactions with computers--usability testing, as it is sometimes called. This is a relatively new area combining aspects of psychology and operations research. It is needed to explore human-computer interface in areas such as respondents interacting with computerized self-administered questionnaires, interviewers administering questionnaires, individuals using and obtaining data via the Internet.

Clyde Tucker: Working Groups for Applied Cognitive Research Proposals

The ultimate purpose of the CASM movement as it pertains to government survey activities is the improvement of survey procedures resulting in the reduction of non-sampling errors. Much as the sampling statisticians of fifty years ago, those advocating the use of cognitive methods promised not only to reduce error but to do so economically. Four groups at CASM II worked on these problems and developed proposals for future research.

Improvement in Income Measurement (Chairs: Jeff Moore & Martin David)

Data on income, collected in many government surveys, are critical to the formulation and evaluation of economic policies. A number of difficulties are associated with obtaining income information from households including the sensitivity of questions that ask for reports of income from self-employment, dividends, interest, and gifts. Furthermore, respondent burden can be great. The interviews may be long, respondents may be asked to recall information over several months and respondents may not understand certain terms being used. Given these problems, several studies were proposed by the group.

- In-depth ethnographic studies should be done to improve data collection procedures, such as question wording, recall methods, and the scheduling of interviews. These studies would use both small, purposive samples and debriefings of respondents in ongoing, large-scale surveys.
- Studies of existing questionnaires using linguistic analysis should be undertaken to improve question wording. Recent technology for conducting linguistic analysis should be explored for this purpose.
- Experiments leading to the development of estimation strategies for respondents who do not have records are needed. These experiments should evaluate the accuracy of the alternative methods.
- Work should be undertaken to tailor protocols and/or questionnaires to the respondent's situation and cognitive framework.
- Studies should be conducted to develop indicators of data quality, and these indicators should be used to model the errors in income reports in various settings and under different survey designs.

Integrating Cognitive Research into Household Survey Design (Chairs: Judy Lessler & Jennifer Rothgeb)

The purpose of using cognitive methods in survey research is to improve the quality of data. The assumption is that by focusing on the respondent's cognitive processes, better survey methods can be developed. Given this context, and concentrating on the question-answering task in household surveys, this group considered two important questions: Does cognitive laboratory research improve the questionnaires used in household surveys? Can findings from cognitive science be used to construct measurement strategies that make use of multiple sources of information and models to more accurately estimate characteristics of the household population?

The group first recognized that independent measures of data quality would be needed. The ones they suggest are (1) level of item missing data, (2) inconsistencies within the same report, (3) level of non-substantive responses, (4) break-off rates, (5) response variances, (6) problems found in respondent debriefings, (7) level of reporting, (8) comparisons to external sources, and (9) the distribution of responses. The following research program then was proposed:

- Studies of the effectiveness of various cognitive techniques should be undertaken. These techniques include intensive interviews involving think-alouds, probing, and paraphrasing, focus groups, interaction coding, expert appraisals, vignettes, sorting and rating tasks, and small-scale laboratory experiments. The techniques would be used to evaluate different questions and predict the types of errors that would result. Questions then would be fielded and quality indicators would be used to evaluate prediction accuracy.

- A second set of studies would focus on the use of cognitive science to develop model-based adjustments for inaccuracies in data. Information gathered from laboratory studies, from indicators embedded in the survey itself, or from debriefings could be used to produce the adjustments.

Measurement of Disability (Chairs: Nancy Mathiowetz & Ron Wilson)

Given the variety of definitions of disability and the complexity of their conceptualization, accurate estimation in this area is difficult to achieve. Solving the problems with the measurement of disability, however, is important because the estimates are used to determine benefits and/or program eligibility. Both the presence and severity of disability must be measured, but the practical effects of impairments change over time and from one context to another. The group examined prior research on errors in the measurement of disability. Confining themselves to specific measures such as Activities of Daily Living, they identified three potential research areas:

- Work should be done to determine the sources of variability in responses to questions on work limitations and functional limitations. Studies which should be undertaken include a review of the relevant literature; the estimation of variability in current data; the use of ongoing surveys to test the effects of mode, respondent characteristics, and context; and experiments to evaluate the utility of different methods.
- Cognitive methods should be used to examine comprehension problems. These methods include paraphrasing, vignettes, and think-aloud protocols.
- Investigations of the limitations of working memory are needed. These limitations may be particularly acute when processing across multiple family members and multiple functional areas.

Adapting Cognitive Techniques to Establishment Surveys (Chairs: David Cantor & Polly Phipps)

Establishment surveys are largely the domain of the Federal government. These surveys tend to be done by mail, but, when interviewers are involved, they often are subject matter specialists interviewing business and farm personnel using a relatively informal format. Establishment surveys differ from household surveys in several other respects. They can be mandatory when done for regulatory purposes. The surveys can be quite complex and technical in nature, relying heavily on the use of records systems. The largest establishments often are selected with certainty, and the respondents to the survey actually may use the data from the survey.

Although establishment surveys are the sources for a number of key economic indicators, not much research concerning the accuracy of establishment data has been

done. There is certainly room for improvement, and the group identified the following possibilities:

- Survey methodologists and organizational theorists should collaborate on studies to determine where the point of contact should be in an organization for a survey—those with the data or those with the authority to release the data. These studies should consider the impact of organization structure on response to the survey request and features of the survey request most salient to those in authority and most likely to gain the commitment of data reporters.
- Research needs to be conducted to understand the interviewing process in establishment surveys. Experiments or field observations of expert interviewers using a conversational format should be done. An analysis of successful exchanges as well as conversational breakdowns could lead to codifying interviewing protocols.
- An examination of the use (and usefulness) of records in establishment surveys is needed. Using site visits, this examination should consider both what is in the records and how the information is retrieved.
- Using debriefings of respondents in conjunction with varying survey design features, methods for increasing participation should be evaluated. The effects of persuasion techniques, form designs, incentives, and the use of interviewers need to be measured.

Common Themes

Several common themes appear in the proposals from these groups. One is the importance of the evaluation of new survey methods that would result from the research suggested here. This points to the need for improved measures of data quality. A second theme is the concern for the respondent in the survey situation. Not only is there an interest in making sure that respondents understand the questions being asked, including the technical terms that are used, but also in finding out how much the respondent knows in the first place. This concern for the respondent extends to ways to increase participation in surveys. Not all of the attention is paid to the respondent, however, there is also the recognition of the importance of the interviewer in the survey process, especially in some establishment surveys. The question remains how cognitive psychology, as well as other disciplines, can help improve these aspects of survey research.

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