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The Emerging Importance of Mixed-Mode Surveys - A Methodological Standpoint

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Basic Methodologist Goals

The survey methodologist wants nothing more from a survey than (1) that respondents fully understand the questions and respond honestly, and (2) that there is a high response rate that represents the survey population including subgroups. The first goal concerns instrumentation (the questionnaire), while the second goal is all about survey management. Effective survey management allows the respondents to use their choice of technology. Thus the instrumentation must work across all technologies.

Like it or not, we field *mixed-mode surveys* because we have to. They have *emerging importance* because of the increasingly widespread adoption of diverse technologies. From a *methodological standpoint,* we are given many headaches (challenges or opportunities – take your pick) because there is so much to cope with all at once. Additionally, the social and technological milieus are continually changing at a rapid pace.

Methods research for surveys is all about what can be measured. This short white paper will give an overview of challenges and various tools that help assess instrumentation and survey management. Computerized survey-taking systems implement these tools.

Measures for Instrumentation Research

A significant difference in *survey administration* is whether the respondent is interviewed or self-completes. Many surveys use both methods meaning the questionnaire must work for both aural and visual presentation. This works well for many question types, but not for all. Pierzchala et al. (2004) give an outstanding example that required differences in wording and presentation. The aural presentation (for interviewing) differed from the visual display (for self-completion) in several sections of the 2004 National Survey of Recent College Graduates (NSRCG). When this happens, you have to test two or more forms of the same question.

Figure 1: Aural versus Visual Presentation of Question B14 (2004 NSRCG)

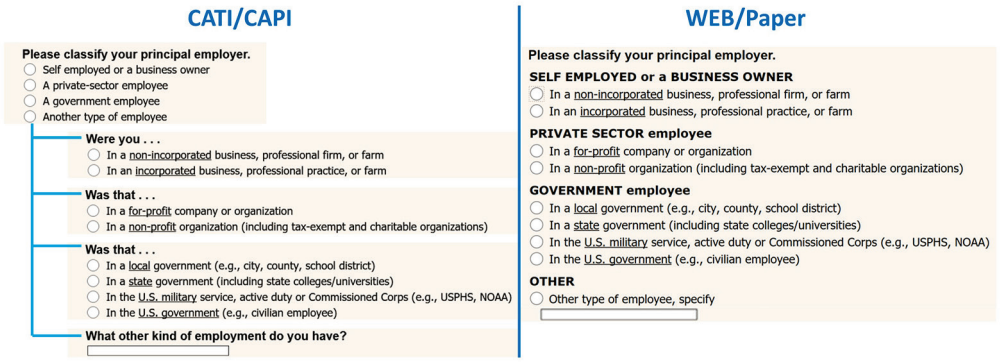


Figure 1 shows the aural (CATI) versus visual (paper or web) presentation of question B14 of the 2004 NSRCG. The code-all-that-apply format of the visual presentation (from the original design) became a series of Yes/No questions in CATI. The nine lengthy choice texts would have been too much to convey over the phone because the respondent would have had difficulty remembering the options and distinguishing between them.

Technical challenges stem mainly from wide varieties of screen size and how the user interacts with the device. If a questionnaire is a succession of simple questions with simple answer types, there is no problem. However, government and scientific surveys often feature complex questions and structures. The query structure in Figure 2, which is suitable for computers or tablets, would have to be rendered as a succession of (at best) one screen per person, or even 2 or more screens per person. The smaller the screen size, the more difficult the conversion of these intricate questionnaire designs becomes. Bakker et al. (2016) describe some challenges in adapting questions to smartphones or tablets.

Figure 2: A Complex Structure as it appears on a Tablet or Computer Screen

	Name	Gender	Age	Relationship to you
Person 1		◯ Male ◯ Female	Select a value	
Person 2		◯ Male ◯ Female	Select a value	Select a value
Person 3		◯ Male ◯ Female	Select a value	Select a value
Person 4		◯ Male ◯ Female	Select a value	Select a value

Whether due to differences in questionnaire administration or to differences in survey-taking technology the reality is that you have *many manifestations* (appearances) of the same questionnaire. Further, you cannot possibly know which devices respondents will use, and how the instrument will look and operate for each. The *problem for the methodologist*

is to make sure the questionnaire works as intended wherever it appears. To do this, the methodologist needs ready-to-use tools that measure how the instrument is used in testing and production.

Tools that help assess the Electronic Questionnaire

Several kinds of tools allow assessment of instrument performance. A few are described here.

Audit trails give timing, navigation, edit handling, and field completion data for a questionnaire. They record the user's total use of the instrument including use of function keys (for computers) and gestures (for devices). Audit trails help detect questions that give users issues, for example, if users linger too long at a screen. Royal (2016) provides an excellent example of using Blaise audit trails at Statistics Canada to determine the pace of interviewing.

Automated completion and screen capture are tools that automatically proceed through interviews and generate answers for each question that comes up. Automated screen capture records an image for each generated screen. It is far easier to review screen images than to work through many questionnaire paths manually.

CARI generates an audio or visual record of an interview. Review of the recordings can give insights on how the users interact with the instrument. Liu and Cheung (2013) show how the University of Michigan uses this Blaise capability.

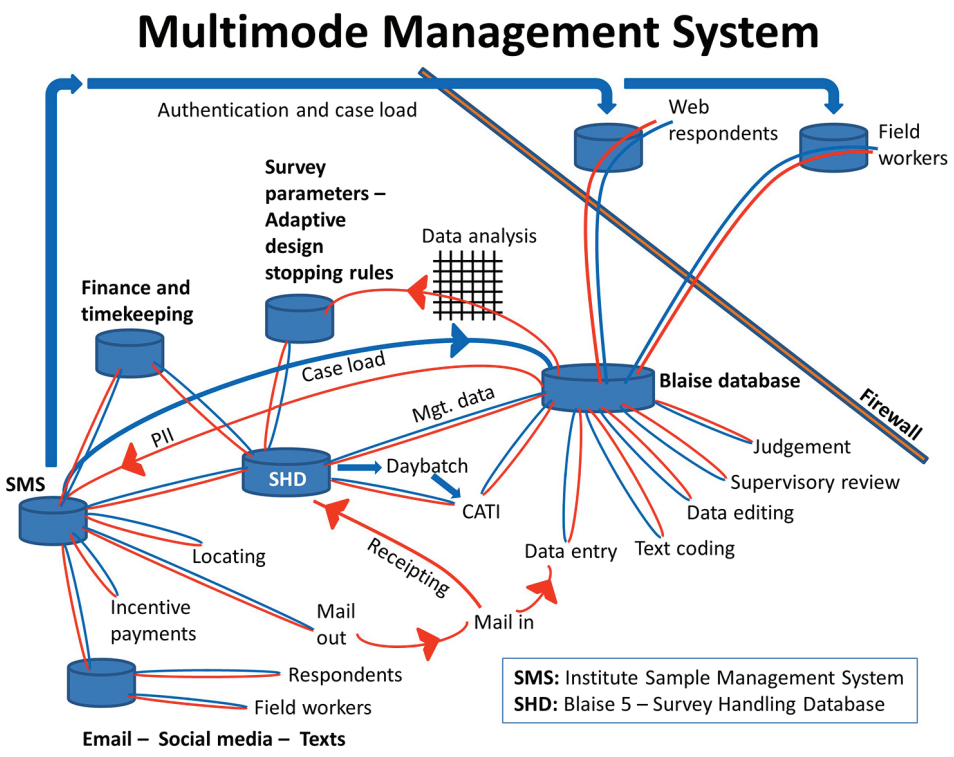
Data analysis of the survey data record involves reading out the data to a downstream data analysis software package, then reviewing the data records. It is possible to find odd combinations of data, or routing issues such as questions that were never asked.

Blind, vision-impaired, and motor-impaired users must be able to use the instruments. Commercial and free-use software tools can help assess the *accessibility* and *usability* of instruments.

Measures for Survey Management Research

Achieving an acceptable response rate for a population, including for subgroups, is ever more challenging. It involves keeping track of, and making sense of, many computer-generated data items. Figure 3 shows the systems architecture of a multimode survey system.

Figure 3: A Systems Diagram for a Multimode Survey System



The diagram shows that for a modern-day multimode survey numerous software modules come into play and they interact with each other many times. The number of transactions between the systems each day may number in the hundreds, thousands, or tens of thousands.

All transactions should be documented in various kinds of log files, each line containing date and time stamps, and a code or a description of each operation. Some examples of log files include:

- Logins to the web-survey authentication server
- Emails and texts sent out, and the kinds of responses received (automated or manual)
- Receipting of incoming paper questionnaires

These process data are known as paradata. For the most part, these paradata come free of charge with the systems. The challenge for the methodologist is to gather all these data files and then generate useful summary data from them.

Some of the transactions give valuable information to the methodologists and survey managers. For example, if for a case, an email is sent out and there is a login to the web server, then you know that you have reached the respondent, even if the questionnaire is not started.

Peng and Ostergren (2016) give a valuable example of capturing paradata from client devices. A wealth of information can be gathered from the device such as screen size, device model, and the location where the respondent answered the questionnaire. The use of client-side paradata will become ever more essential as the many capabilities of the

devices are used. It is possible to include location, weather, images, even blood samples as part of data collection. The paradata give critical insights into how the field workers use their device, without employing an observer.

Coping with Methods Research Data

Tools that enable methods research generate masses of paradata. It is up to the methodologist to organize the automated in-stream data capture, data reformatting, and summary of this mountain of information. Efficient analysis allows the methodologist to wrest truly revealing methodological insights from instrument use and survey process paradata. In particular, for multimode research, where you have different manifestations of the instruments, and where there are so many platforms, the ability to automate the processing is essential. Through sophisticated and automated comparisons, you can more easily see how any one mode compares to the others, and how your mode staging is working.

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Blaise® is a software platform for survey data collection and survey processing and is designed to handle governmental and scientific surveys. Statistics Netherlands (CBS) is a highly regarded National Statistics Institution and the producer of Blaise. Stationed at the CBS offices in Heerlen, Netherlands, a team of dedicated software engineers and survey specialists make up the heart of Team Blaise. Together with CBS' methodologists, data analysts, questionnaire developers and survey managers they continuously work on innovating Blaise® while supporting their vibrant user community.

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