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MOVING SURVEY METHODOLOGY FORWARD IN OUR RAPIDLY CHANGING WORLD: A COMMENTARY

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Survey methodology now faces an unprecedented challenge for how to collect information from samples of people that will provide scientifically defensible estimates of the characteristics of the population they represent. Many decades of research have shown that in order for such estimates to be made with known precision four major sources of error—coverage, sampling, measurement and nonresponse—must be controlled (Groves, 1989). Subsequent research has produced a great amount of knowledge on how those sample estimates are affected by different survey modes, sample sources, sample sizes, the failure of certain types of people to respond to survey requests, and how questions are structured and worded.

Today's challenge stems from many considerations. Response rates for some survey modes, especially voice telephone in national surveys, have fallen precipitously and are not expected to recover (Dillman, Forthcoming). In addition, RDD landline surveys miss nearly half of all households, and adding cell phone numbers for public surveys requires asking questions about household member access to telephones. Thus, survey "adjustment" questions compete with substantive questions for the few minutes allowed for asking questions in most telephone surveys. In addition, internet surveys that rely only on emailed response requests, now used by many potential surveyors as a cost cutting measure, produce poor response rates. Requests for web responses also miss households without internet access and potential respondents who will not click on web links to surveys from unknown sources. In contrast to the past, U.S. Postal Service residential addresses now provide the best household sampling frame for providing the opportunity to be included in a scientifically defensible survey sample (Harter et al. 2016).

Surveyors interested in analyzing specific community, county, regional or agricultural populations, as is especially common among rural social scientists, face additional survey challenges. Telephone area codes are now portable so they often do not correspond to where one's residence is located. Internet coverage, although now about 85 percent, is significantly lower in rural areas, and especially those places with low incomes. Although the American Community Survey provides good

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estimates for states, as well as medium to large cities, the sample sizes are too small to provide information for smaller counties and towns. Thus, essential comparative data for analyzing nonresponse error in specific rural localities is not available, as it was until 2000 when for the last time the Decennial Census collected “long-form” demographic information from one in six residences in every community. Thus the survey design challenge facing those who wish to do surveys of rural populations includes not only the many challenges facing those who do national surveys, but additional concerns as well.

Three major trends in how survey designers are responding to changes in the technological and social aspects of the society in which we now live shape the context for needed research on how to improve survey quality. These macro-changes include, 1) the change from interviews to self-administration for most survey data collection, 2) greater reliance on mixed-mode rather than single mode surveys to improve quality while reducing costs, and 3) tailored survey design decisions that take into account population characteristics, survey topic, and survey burden to better target particular survey designs to the need.

FROM INTERVIEWS TO SELF-ADMINISTRATION

In-person and telephone interviews dominated survey data collection until the end of the 20th century. They were deemed the only acceptable modes of data collection because nearly all households could be accessed that way. These survey modes also suffered from measurement problems, i.e., eliciting socially desirable answers (e.g., “no, I have not smoked marijuana”) that would presumably place the respondent in a more favorable light to the interviewer and sometimes the survey sponsor. However, interviewers were considered by many if not most surveyors to be necessary for motivating respondents and guiding them through complex questions and branching patterns. That concern and the lack of adequate alternatives allowed survey sponsors to ignore the measurement challenges and the enormous pressures on surveyors to keep telephone interviews very short in the face of falling response rates.

Oddly, the current lack of interest in continuing to use voice telephone for most surveys has less to do with the declining response rates and difficult coverage problems, than with a societal shift in how activities once requiring voice exchanges with an intermediary are now done. Banking transactions, purchases of plane tickets and hotel rooms, mail delivery requests, job applications, and a long list of other activities no longer require talking to another person (Dillman, Smyth, and Christian 2014). Doing a telephone interview is now out of sync with transactions

that are increasingly done over the internet. In addition, people's understanding of how to block unwanted telephone calls and their willingness to simply ignore a ringing phone have become part of what cultural norms define as acceptable behavior.

Thus, voice contact with an interviewer to respond to a survey has shifted from being normal, to becoming an unnecessary nuisance. The decline of effective interviewing and the development of potential alternatives makes occasional declarations that "response rates don't matter" seem hollow and shortsighted. In a society where even surveyors admit to trying to avoid phone conversations with others and ignoring most phone calls, it is not surprising that the credibility of telephone interviewing for random household surveys has declined as steeply as the response rates that are now in single digits for many national surveys.

Meanwhile, the potential for conducting internet surveys has developed rapidly, as many of the same techniques that made internet commerce possible are applied to designing surveys. Internet methods also offer the potential of cost reductions if only people can be convinced to go to websites they may not have heard of, read the questions and, enter their answers. As the 21st century began a rapid transition appeared underway away from interviewing and toward self-administration.

Unfortunately, three major problems have made this transition difficult. Some households and individuals do not have internet access or use it regularly, thus making it impossible to survey them in this manner. A second problem is that there is no way to randomly select people or households from a comprehensive list of email addresses, as random digit dialing allowed for the nation's standardized telephone numbering system.

These problems are amplified by a third concern. Most people who have internet access and are contacted only by email are no more likely to respond to emails requesting they complete a web survey, than they are to complete a telephone interview. Thus, household internet surveys face the possibility of multiple errors, including incomplete coverage from the lack of internet access, email address lists that are incomplete, and some individuals having multiple email addresses. Random household selection is extremely difficult if not impossible under these conditions. In addition, low response rates raise the possibility that those who respond are different from those who do respond, a fear confirmed by multiple studies (Dillman et al. 2014).

THE SHIFT TOWARD MIXED-MODE SOLUTIONS

The solution to losing telephone as a sole mode of data collection and failure of internet developments to provide an immediate solution has produced a great deal of turmoil among survey sponsors. Part of the solution to this problem has come from a surprising source. Mail surveys had been considered inadequate as a sole mode of data collection through most of the 20th century, because of the difficulty in obtaining complete listings of households. However, in recent years the U.S. Postal Service began making available all residential addresses (without names) to surveyors and others, electronically and with frequent updates (Harter et al. 2016). Those lists appear to provide coverage of nearly 98 percent of all U.S. residences, thus making it by far the best sample source for U.S. households (Battaglia et al. 2016).

A study by Link et al. (2008) showed that addresses of households receiving Postal Service delivery could be used to obtain paper questionnaire response rates at least comparable to those achieved by telephone. Additional studies showed that a two-step survey that required screening of households to locate those with children, followed by a second paper survey focused on a particular child selected to represent that household, produced higher response rates and better quality data than was achieved through random digit dialing of households (Brick, Williams, and Montaquila 2011; Brick et al. 2012).

My research team undertook a series of experiments from 2007–2012 to see if address-based samples contacted by mail could be convinced to respond by web. These “web-push” studies asked people in the initial contacts only to respond over the web and provided a paper questionnaire alternative in a later contact. These studies were implemented in multiple states, on different topics, using 12-page questionnaires that asked for from 70–140 responses to individual questions, depending upon the branching patterns. Four to five mail contacts were used, with a token cash incentive of \$4–5 being included with the initial request. These web-push procedures produced a mean response rate for ten data collections in five states of 43 percent (range = 31%–55%), with nearly 62 percent of the responses coming over the internet, and the remainder via the mail questionnaire follow-up (Edwards, Dillman, and Smyth 2014; Messer and Dillman 2011; Smyth et al. 2010). We also found that the paper follow-up was essential for reducing nonresponse error that is the tendency for people who are younger with greater education and incomes being more likely to respond by internet. Individual comparisons with paper-only data collection showed that although mail-only responses could produce somewhat higher response rates, i.e., 53 percent (range = 38%–71%), the final

demographics were not significantly different. No telephone comparisons were made, but based upon published response rate trends (e.g., Dutwin and Lavrakas 2016) it seemed highly unlikely that data collected in this way would have approached the level of response achieved in the web-push data collection or improved the quality of the results.

This web-push methodology of sending postal requests to respond over the internet while withholding the offer of mail until later in the response process is now being used for major national surveys in multiple countries, including the American Community Survey from which major U.S. demographics are obtained (United States Census Bureau 2014). The 2015 Japanese Census (City of Sapparo 2015; Statistics Japan 2015), the 2016 Australian Census, and 2016 Canadian Census in which 68 percent of the households responded over the Internet (Statistics Canada 2016). These surveys have all used additional follow-up by telephone and/or in-person contact to achieve final response rates of about 98 percent. (Dillman, Forthcoming).

Traditionally, surveyors often thought of mixed-mode as synonymous with the use of different response modes. That remains an important consideration. However, it is apparent now that one main advantage of using more than one mode is that one contact mode can be used to send the survey invitation for receiving the response by a *different* mode. Herein lies the strength of using address-based sampling to push respondents to the web. The postal contacts help legitimize the survey, so respondents do not think it is an attempt to place malware onto their computer. Also, multiple mail contacts appropriately packaged and sent to households have a much greater likelihood of communicating the nature of a study to recipients than now occurs with the telephone, where though the first call is answered, the conversation may be only seconds long, and follow-up calls are ignored. Simultaneously these additional contacts can be used to introduce and legitimize a second or even third mode of responding (Dillman, Feng, and Millar 2016)

One consideration that has facilitated the mixing of paper and internet responses was learning that the process of comprehending survey questions is significantly different for aural (telephone) vs. visual (web and mail) surveys (Dillman, Smyth, and Christian 2009). A series of studies conducted around the turn of the century showed that the exact visual layout of questions can dramatically influence answers to survey questions (Christian and Dillman 2004; Christian, Parsons and Dillman 2009; Dillman, Gertseva, and Mahon-Haft 2005; Jenkins and Dillman 1997). This line of research showed that when the visual layout of

questions on web and paper questionnaires are the same, answers were usually the same.

These experiments have led to adopting the practice of “unified mode construction,” i.e., constructing items so they have the same structure and wording across survey modes. Unified mode construction is not a perfect solution (e.g., branching can be handled by technology in web surveys, but must be handled with graphical instructions in paper surveys (e.g., Redline et al. 2003). In addition, interview surveys clearly produce more extreme answers in telephone surveys to identically worded questions using vague quantifier scales (e.g., strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree) than they do in visual surveys (Christian, Dillman, and Smyth 2007). For behavioral questions unified mode construction can produce the same answers across visual and aural modes of surveying. However, adjustments are clearly needed for opinion questions. (Klausch, Hox, and Schouten, 2013).

TAILORED DESIGN

A third major trend evident in survey design is recognition that different situations call for different approaches to data collection. (Dillman, Forthcoming). In the 20th century one often heard surveyors addressing the question of which survey mode was best. Many survey sponsors were inclined to follow a practice of trying to use the same mode for all surveys. It would be as much a mistake to think of mixed-mode surveys as now being the only desirable mode of surveying, as single mode studies were thought of in the past.

We now have at our disposal more ways of conducting surveys than anytime in the past. Sometimes telephone numbers are available for all members of a population, and other contact information is not, so there is no alternative to telephone. Occasionally, the combination of topic and respondent characteristics is such that a particular mode is advantageous, e.g., surveying over the internet on a topic such as satisfaction of conference attendees with a professional meeting, using the email addresses provided during registration. In addition, the importance of survey results and requirements for accuracy, such as the U.S. Consumer Expenditure Survey used to make changes in the level of social security benefits, requires in-person interviews using household addresses for sampling. Surveys of participants in time use studies sometimes rely on text messages for achieving carefully timed responses on current activities. Different modes and combinations of modes are best suited for particular situations.

People can now be contacted and surveyed in so many different ways. They can also respond using different kinds of technology and devices, from smartphones and tablets to fax machines and in response to automated telephone calls. Thus, it is not surprising that surveyors work hard to identify the most desirable methods of contacting people and obtaining survey responses from them. By implication the research on how to improve surveys must be wide in scope to address all of the needs.

One of those needs is to address the decline in trust that now characterizes society and use of the Internet through tailored designs. The internet age produces fears that a wrong computer click will allow malware or even ransomware to be delivered to one's computer. When surveys are done of people who have no connections to or knowledge of who is requesting a survey response, avoidance may seem the only safe course of action. This situation has led to including in survey designs prior postal letters providing phone numbers and website information, contact from third parties, and phone calls the main purpose of which is to legitimize an internet survey request. (Dillman et al. 2016) Whereas surveys from known sources on topics the potential respondent immediately recognizes as legitimate may not benefit from such efforts, in other situations the returns may be substantial.

WHY THE SIX ARTICLES IN THIS JOURNAL ISSUE ARE IMPORTANT

It is appropriate that the six articles included in this issue of the *Journal of Rural Social Sciences* focus on a range of issues, which are relevant not only to survey science overall, but to the design and conduct of rural and agricultural surveys.

An Eight-Year Effort to Improve Procedures for a Biennial Statewide Survey

The article by Lesser et al. summarizes a multi-year effort to adapt a survey conducted biennially for the Oregon Department of Transportation to the changing times that now characterize survey methodology. The authors took advantage of the biennial timing of the survey to conduct multiple tests of how different modes and implementation procedures might affect results achieved for this regularly conducted 12 page (in mail format) 95–127 item survey. This approach allowed them to add potential response improvement features and subtract previously used ones in five data collections over eight years in pursuit of their goal of improving response achieved while reducing or at least keeping survey costs about the same. They hoped to accomplish this without the use of token cash incentives that have

been found so effective in other attempts to convince recipients to respond over the web (Dillman et al. 2014).

In the initial two years (2006, 2008) of testing, the telephone and mail-only samples produced equivalent response rates of 30–33 percent, resulting in a decision to drop the more expensive telephone mode from future testing. Tests were continued on mail-only data collection and web+mail (also known as web-push) procedures that produced somewhat lower response rates. Subsequent tests of these two approaches resulted in some changes in implementation being made. These included sending the pre-letter from the state agency that was sponsoring the survey instead of the survey research center trying to establish stronger legitimation. Also tested was the adding of a 5th contact to the web+mail approach, which improved the overall response rates. However, this final contact that followed the delivery of a mail response option also reduced the proportion of responses being submitted over the web. Overall, the authors found from these sequential tests that despite these changes overall response rates could not be improved beyond those achieved in 2006, and appeared to decline slightly if only four contacts were used.

The good news from this ambitious set of studies is that response rates obtained by mail-only studies can, with additional effort, be maintained at 2006 levels. They also found that compared to the first years of testing, a greater proportion of the web+mail treatment responses can now be achieved over the internet. Simultaneously, overall responses to the web+mail method appear to have declined slightly. The mail and web+mail are apparently similar regarding whether they produce data from respondents with the same demographics reported in the American Community Survey results for Oregon. However, neither the telephone nor these two approaches as of yet produce results that are as close to ACS results as desired for some characteristics, especially respondent education and age.

At this time of enormous change in surveying alternatives, survey methodology needs more studies of the nature of the Lesser et al. investigations that follow a particular survey over time to identify promising possibilities for future data collection. Attempting to examine so many different implementation possibilities (nine), over so many data collection periods (five), in many different treatment groups (22) of limited sizes, presents an enormous challenge, but studies like this are essential for keeping up with the changing times we now face and the authors are to be commended for undertaking the investigations summarized in their article.

In-person Delivery and Retrieval of Self-administered Questionnaires

The articles by Jackson Smith et al. and Trentelman et al. have taken a quite different approach to modernizing survey data collection, describing successful uses of a drop-off pick-up method for surveying address-based samples of residences. This approach is particularly apropos for rural counties and communities, because the loss of the Decennial Census long form after 2000 and the inability of its replacement, the American Community Survey, to provide meaningful data for these smaller population areas.

The drop-off pick-up method is not new, as the authors point out. However, the combination of need for information on small population areas and the declining ability of telephone sampling to precisely target those areas and obtain acceptable response rates has heightened the need for reconsidering this method of data collection. Jackson Smith and colleagues document previous uses of this method. They also provide detail on various ways such a methodology can be implemented, reporting a 2014 case study undertaken in counties adjacent to the Wasatch Mountain range to describe public perceptions about household water use and policies that affected such use. A 60 percent response was obtained to a lengthy (16 page) questionnaire, with household responses on a county basis ranging from 54 percent in the highly urbanized area of Salt Lake City to 73 percent in the county where the sponsoring university is located. These response rates are much higher than could have been obtained by telephone with its coverage limitations, and compare favorably with the mail-only response rates of address-based samples that might have been obtained.

Trentelman et al. offer in their article an explanation for why drop-off pick-up data collection is effective. They attribute that success to personal interaction that facilitates applying social exchange theory, as is done in face-to-face interviewing that remains in use for important national surveys. They utilize this theory as a basis for proposing recommended practices for implementing drop-off-pick-up procedures. In addition, they provide specific recommendations and a script for training individuals to implement this methodology successfully.

The joint contribution of these articles is to provide in one place up-to-date insights into why the drop-off pick-up methodology should be considered as an alternative to other data collection methods. Both of them also point out how the advantages grow when surveys are more local in nature, resulting in greater densities of residences and less travel time between them, than is common for most national surveys. The authors point out that these methods may be less effective in highly urbanized regions of the country, especially where personal safety of data

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collectors is likely to be a concern. Yet, it can be very beneficial for surveying rural places and people, producing response rates much higher and at less cost than telephone.

It is ironic, that these articles seek to overcome the distrust associated with our Internet age with a return to in-person contact of households by interviewers that began its seemingly inexorable decline with the beginning of telephone interviewing in the 1970's. Yet, by adopting self-administration, rather than an in-person interview, and providing for a mail return among those unavailable for "pick-up" they have provided a potential replacement for the telephone approach that led to the original decline. It will be interesting to see if further economies can be achieved of this tailored design by incorporating an internet response alternative.

Public Intercept Interviews and Self-administered Surveys

Public intercept interviews have sometimes been used for surveys, but have not been viewed favorably for surveying the public because of the risk of bias regarding whoever frequents shopping malls or other places where they were typically conducted. Flint et al. encourage reconsideration of such a methodology for special purpose surveying and do so with a new century twist. They were primarily seeking responses to open-ended questions that tend not to perform well in self-administered surveys and can benefit greatly from personal interaction that allows probing as well as encouragement to provide answers.

In addition, the data collection was entirely electronic, with interviewers recording answers on tablets, while also obtaining demographic information that the respondents could self-administer if desired. The case study reported here was a survey of visitors to parks in two Utah regions with the goal of identifying appropriate ways of framing water issues, the results of which could be useful in research like that reported in the Jackson-Smith et al. paper. The research team's goal was to identify appropriate ways of framing water issues. In addition, they utilized this opportunity to train students for thinking about water issues and interacting with ordinary people on that topic.

The work reported here is in many respects similar to the qualitative testing done in cognitive interviews now considered an essential procedure for learning how to develop better survey questions and learn better ways of explaining to people why a survey is useful and their participation is helpful. It also goes to locations where people are and maintains naturalness, instead of people being asked to come to a central testing site that limits participation and may seem artificial to those who do participate. It also retains the interview exchanges for types of

questions where it has been found most helpful. The detail provided on how to implement such a procedure will be especially helpful to those who consider using it.

Achieving Good Measurement

Data collection is of no use unless the questions to be answered achieve valid measurement. Willits et al. remind us of this fact while reviewing one of the greatest accomplishments of survey methodology in the 20th century. It was the scaling of answers to opinion questions, developed in the 1920's by Rensis Likert, which continues to be a fixture of good surveying. The authors' review of its development and uses is timely and they remind us of myths associated with its use, such as the unfortunate perception that good measurement must always require multiple items and cannot be analyzed using statistical tools such as t-tests. Few aspects of surveying have stood the test of time as well as the measurement approach developed by Likert, and the authors provide a most useful reminder of its contribution to scientific inquiry in many different disciplines.

In contrast, the second article on measurement by Kumar Chuadhary and Israel focuses upon a quite specific issue of measurement. They provide a combined test of two design considerations found important to improving the quality of answers in self-administered surveys. The authors show that conveying to respondents in words that answers to a particular question are very important and providing a larger answer box each reinforces the other, producing better item response and response quality in mail and web surveys.

This study builds upon early 21st century visual design research, discussed earlier in this commentary that has shown that graphical layout of self-administered questionnaires and contextual phrasing as part of questions are both essential tools for improving measurement in web and mail surveys. The new finding from this study is that focus on both simultaneously produces the best results.

CONCLUSION

The shift away from telephone and movement toward self-administration is providing motivation for identifying and developing new survey design possibilities. This movement is being guided by finding ways to shift surveys from single mode to mixed-mode designs and the development of tailored data collection methodologies that may be quite different for various populations, survey topics, and the amount and type of information being collected.

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The six papers included in this issue of the *Journal of Rural Social Sciences* provide important insights as well as advances to innovate cost-effect survey designs that provide high quality measurement. The studies reported here focus on survey needs of state, county, and local community surveys that may or may not require different solutions than national surveys.

Lesser et al. show how a survey can be transitioned from interview to self-administered methods (mail-only and web+mail) through a succession of experiments with each of them building upon results from the previous studies. Jackson Smith et al. and Trentelman et al. provide considerable guidance on how the benefits of personal interaction, in danger of being lost as we transition away from telephone interviews, can be used to set up cost effective drop-off pick-up self-administered questionnaires. These methods will provide a much needed tool for rural towns and counties that the American Community Survey has left behind with its emphasis only upon larger area estimation.

Flint et al. provide ideas and procedures for using public intercept interviews for obtaining answers to open-ended questions, which are somewhat more difficult to obtain with self-administered questionnaires. Willits et al. shift our attention from coverage, response rates and nonresponse error to the essentials of measurement, and the century of influence that has flowed from the developing of Likert scaling methods. Kumar Chaudhary and Israel close out this issue by picking up on the challenge of obtaining answers to open-ended questions by self-administration through enhanced visual layout and selective wording additions to those questionnaires.

Taken together these papers illustrate how just as the challenges facing survey methodology in the 21st century are diverse. The research needed for meeting those challenges must focus on multiple topics. They also remind us that while improving sample survey capabilities requires new ideas and approaches, it is also important to continue building upon the rich heritage from many decades of investigation that remains critical for achieving high quality survey results in our digital world.

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