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# Does Paying More Mean Getting a Better Product: Comparison of Modes of Survey Administration

# 21

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## 21.1 Review of Literature

The Total Design Method devised by Dillman (1978), created a framework for mail and telephone surveys with a primary focus on achieving high response rates. TDM emphasized the building of respondents trust and personalization, accompanied by the perception of increased rewards and reduced costs for respondent participation. The employment of these interconnected procedures resulted in high response rates, especially for mail surveys (Dillman 1978, 1991). This one-size-fits-all approach showed that general public populations could consistently produce high response rates, upwards of 70%. The reliance on one set of procedures Dillman (1999) claimed was also the biggest shortcoming of TDM. The proliferation of the Internet and the level of technology reached have made it impossible for most populations to be reached by a single mode survey.

The development of new technologies such as: increases of cell phone use and e-mail, decline in telephone response rates, and

coverage problems all contributed to the emergence of mixed mode surveys (Dillman et al. 2009; Singer 2006). By adding a second or even third mode, researchers believed that they could increase response rates in hopes of reducing the potential for non-response error. In congruence with this argument, prior research has suggested mixed mode surveys can achieve higher response rates than single mode surveys. De Leeuw (2005) reported that using a second or third mode may improve response rates as well as coverage. Furthermore, some research suggests that mixed mode approaches may increase respondents' motivation because participants may appreciate being able to choose their response mode (Dillman 2000; Schaefer and Dillman 1998).

Mixed mode surveys are not without limitations as well as potential problems that have been pointed out by previous research. According to Dillman (1999), there are four main reasons differences between various modes: social desirability, acquiescence, question order effects, and primary/recency effects. These differences constitute response bias issues, which indicate problems in *how* one responds to survey questions (which it is important to note is different from non-response bias which is concerned with *who* responds). One major potential problem between modes derives from measurement differences leading to unique respondent answers depending on survey mode (De Leeuw 1992; Dillman 1999). More specifically, several decades of mode experiments have appeared in the survey

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literature suggesting that significant differences frequently occur in the answers that people give to aural and visual surveys (Dillman et al. 2009). Evidence from separate studies have shown that aural respondents tend to give more positive extreme answers than do mail respondents when answering opinion questions (Dillman and Mason 1984; Tarnai and Dillman 1992; Krysan et al. 1994). In addition, studies comparing telephone and web respondents found differences in responses for various kinds of scale questions with telephone respondents giving more positive answers (Christian et al. 2008). Ramifications for these differences in mixed mode surveys may result in different analytical conclusions and recommendations (Cobanoglu et al. 2001).

The observable advantages and limitations of survey method techniques illustrate the need for a cost/benefit analysis taking into account the exhaustive research on unimodal and mixed mode surveys. For example, implementation approaches that may be beneficial for mail surveys may not directly translate into Web-based survey benefits (Couper 2000). Issues such as these create saliency concerns that may result in the misinterpretation of measures of equivalency such as: response rates, response time, and costs. In an effort to reliably choose a survey strategy that most appropriately corresponds with the research being conducted, researchers must understand and demonstrate this equivalency, or relative strengths of alternative modes (Dillman 2000).

In recent years, the popular press has reported that response rates for all types of surveys are declining (Bickart and Schmittlein 1999). Research has also found that the US population is being over-surveyed through an exponential growth in the amount of survey research which has resulted in an increase in the number of requests for survey response (Groves et al. 1992). Whatever the reason may be, low response rates are a concern for researchers and have the possibility of creating a biased estimate of the characteristics of the population (Bean and Roszkowski 1995). These concerns make choosing the most effective survey mode even more invaluable, by weighing the costs and

benefits of each and deciding on the most appropriate methodology.

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## 21.2 Mail Surveys

Mail surveys are used more than any other mode of survey administration. Mail surveys have been used for decades, and according to Dillman's Total Design Method (Dillman 1978) Total Design Method (Dillman 1978), mail surveys allowed for a cookie-cutter approach to sampling various populations of interest. And while mail surveys do offer several advantages over other survey designs, research has since revealed clear limitations of the survey mode as well (Dillman 1999; Cobanoglu et al. 2001). This section will examine the advantages and disadvantages of mail surveys, paying close attention to how changes in technology have affected this mode of administration over time.

### 21.2.1 Strengths

Traditionally, mail surveys have been employed more frequently than any other type of survey. And while response rates varied in their predictability prior to Dillman's Total Design Method (1978), according to Donald Dillman, survey designers could achieve, on average, a 74% response rate using mail surveys that followed his method. Such a percentage is very respectable, especially in light of the relatively low cost of administering such a survey (see below).

Another strength of mail surveys is that they were traditionally able to reach larger geographic populations than face-to-face (FTF) interviewers or telephone interviews (Cobanoglu et al. 2001). This is because staffing expenses were next to nothing, as were long-distance expenses. For the cost of a preaddressed stamped envelope (which is a fixed price nationwide), survey administrators were able to tap into a larger sampling frame, and thus, generalize results to a larger proportion of the U.S. population. Also, along with reduced staffing expenses, much less training and requirements are

needed for those who are employed to help conduct the survey.

Finally, mail surveys do not have to be concerned with the interviewer and response biases as much as their telephone and FTF counterparts (Groves 1989). This is because survey respondents have privacy and anonymity when filling out mail surveys, thus minimizing the likelihood of response bias and eliminating the opportunity for interview bias altogether.

### 21.2.2 Limitations

While response rates for mail surveys were strong prior to the advent of the Internet, since then they have declined precipitously (Dillman 1999; Cobanoglu et al. 2001). Mail survey response rates have plunged from 71% in the late 1970s to 38% in 1992 (Parker 1992), all the way down to 26.27% in 2000 (Cobanoglu et al. 2001). In fact, Donald Dillman addressed the decrease in response rates between his 1978 Total Design Method in his revised work, “The Tailored Design Method” (1999), noting that with the advent of the fax machine and the world wide web, mixed modes of data collection are now superior to their unimodal design counterparts, yielding better response rates and more representative samples.

In addition to the decline of response rates over time, mail surveys have an additional limitation: since there is no interviewer, there is no opportunity for question flexibility, and/or interviewer assistance in explaining the questions ([www.cdc.gov](http://www.cdc.gov)). This lack of flexibility and opportunity for an interviewer to clarify questions regarding the survey makes answering the survey more difficult for respondents, particularly those who are cognitively challenged.

Finally, since response rates on mail surveys have dropped so sharply over the years, there is now reason to believe that individuals who choose to respond to mail surveys may be different from those who do not, suggesting self-selection bias may be a concern. Self-selection bias is a form of non-random error that occurs when “respondents having the same observable demographic characteristics, but different

unobservable characteristics, respond to a survey with a different likelihood” (Ethier et al. 1997).

For a full discussion on the advantages and limitations of mail surveys see [Chap.17](#) by Henninger and Sung.

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## 21.3 Telephone Surveys

Another commonly employed mode of survey administration is telephone surveying. Telephone surveying has been used for decades, as it has been estimated that 96% or more of all residences in the United States have a minimum of one telephone (American Statistical Association 1999). And in fact, following Dillman’s Total Design Method (1978), response rates reached upwards of 91% through the late 1970s and early 1980s. However, over time and particularly since the proliferation of cellular phones and e-mail, telephone response rates have declined precipitously (Curtin et al. 2005). This section addresses the strengths and weaknesses of telephone surveys, paying close attention to the changes in response rates over time.

### 21.3.1 Methods

In general, there are two ways to reach out to prospective respondents: through telephone directories and random dialing. Each method will be discussed below, along with its advantages and disadvantages.

#### 21.3.1.1 Telephone Directories

One way to reach potential survey respondents is to use telephone directories. While this would seem like a terrific resource, there are many limitations to using such a method (American Statistical Association 1999). First, not all residential lines are published in directories. Many residents choose not to appear in directories. This allows for sampling bias, a form of non-random measurement error. In fact, residences with unlisted phone numbers are likely to have lower incomes, more single-headed households, and be more concentrated in heavily populated

locations such as large cities and metropolitan areas.

Additionally, telephone directories exclude new phone numbers that are created since a given directory's publication (American Statistical Association 1999). In fact, between unlisted and unpublished phone numbers, it has been estimated that at least 30% of dwellings with telephones are not found in directories.

### 21.3.1.2 Random Digit Dialing

Random digit dialing (RDD) is another way to reach potential respondents. The theory underlying the method is that choosing a given area code and prefix (the first six numbers of any phone line), and choosing the last four numbers at random will prevent the sampling bias associated with telephone directory sampling. However, its strength also comes with quite an expense: it is very costly and time-consuming to call so many inactive phone numbers (American Statistical Association 1999). Additionally, when attempting to calculate total error estimates, response rate calculations may be inaccurate due to difficulty in determining whether certain phone numbers are valid (Massey et al. 1997; Sangster and Meekins 2003).

Variations in RDD techniques have been used to alleviate the concerns of RDD, including Mitofsky–Waksberg sampling and list-assisted telephone sampling; however, each method has its own set of limitations, and such methods are beyond the scope of this chapter.

### 21.3.2 Strengths

Historically, telephone surveying has been a popular survey mode of administration (Dillman 1978; American Statistical Association 1999). Given that estimates of households with at least one telephone have exceeded 96% (American Statistical Association 1999), sample representativeness has traditionally been viewed as one of the mode's advantages. Sample representativeness is an important consideration for surveyors, because omitting residences without phones from a sample may lead to nonrandom measurement error, thus biasing the results of the survey.

Another advantage of telephone surveys is that they are less expensive to conduct than FTF interviews (American Statistical Association 1999). Additionally, interviewer effects are reduced in phone surveying compared to FTF interviewing, reducing the potential for response bias. This is because phone surveys offer more anonymity than FTF interviews, which in turn triggers more honest responses from the respondents relative to their FTF counterparts.

While telephone surveys are more expensive to conduct than self-administered mail surveys, the data are collected quicker, and thus, available for analysis much sooner (American Statistical Association 1999; McNamara 2009). Thus, if a quick turnaround time is sought, telephone surveys have a distinct advantage over mail surveys. Additionally, telephone interviews offer the opportunity for additional qualitative data, as respondents have the opportunity to discuss issues with interviewers that could not otherwise be examined without such interpersonal interaction. Finally, quality control is improved with telephone surveys relative to mail surveys, as trained individuals are entering the data (McNamara 2009).

### 21.3.3 Limitations

What was once viewed as a major strength of telephone surveying has since become one of its greatest weaknesses: response rate. By the 1970s, less than 10% of U.S. households did not have telephones, making a large proportion of the population easily accessible (Massey et al. 1997). In fact, by the 1980s, response rates exceeded 70%. However, with the advent of the Internet and cellular phones, response rate has decreased significantly. Moreover, answering machines and caller IDs have also inhibited survey response. According to the American Statistical Association (1999), upwards of 55% of all households with landlines use answering machines to screen their calls. And to make matters worse for telephone surveying, the national Do Not Call registry has enabled households to block themselves from receiving unsolicited phone calls, further weakening

response rates and potentially affecting sample representativeness.

Another noteworthy limitation of telephone surveys is the lack of visual materials for a respondent (McNamara 1999). The lack of visuals means the respondents cannot read (and reread) the questions, inhibiting their understanding of the topic(s) being covered. In addition, respondent inattentiveness is a concern as well, as people often multi-task—or carry out other responsibilities—while on the phone. Also, telephone surveys using RDD are no longer representative of the United States' population, as home phones tend to be maintained by older respondents. Additionally, respondents are not usually willing to spend more than 15–20 min on a telephone survey. Finally, data have suggested that Internet surveys are preferred to their telephone counterparts, another potential factor that could harm response rates. For a more thorough discussion on phone and cell phone surveys, their advantages and disadvantages refer to [Chap. 16](#) by Vehovar, Slavec and Berzelak.

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## 21.4 Face-to-Face Surveys

Face-to-face surveys are surveys conducted by interviewers who are physically present and personally ask respondents the questions on a survey (De Leeuw and Van Der Zouwen 1988). This mode of survey administration is quite unique, and has distinct advantages and disadvantages over all other modes of survey administration. Each of these strengths and limitations are discussed below.

### 21.4.1 Strengths

One of the major strengths of FTF surveys is that they allow respondents to ask the interviewer questions or clarify items on the survey that they do not understand (Doyle, n.d.). This strength is particularly well suited when surveying respondents who are illiterate, have poor writing skills, or have physical or mental disabilities that

would prohibit them from completing a survey administered through the mail, telephone, or online. Additionally, FTF interviewers can bring visual aids that can provide additional assistance to respondents, should they need it.

Another major advantage of FTF surveys is that they allow for more data to be gathered than do other modes of survey administration. While telephone respondents typically would not answer surveys longer than 15–20 min, most respondents will spend up to an hour answering questions with a FTF interviewer (Doyle, n.d.). Of equal importance is that the additional response time allows for longer, more in-depth questions that can provide additional data that would be left unexamined in shorter surveys.

An additional strength of FTF surveys is that well-trained interviewers have control over the quality of the data being collected (Doyle, n.d.). By engaging in an interpersonal exchange FTF, respondents are more likely to focus exclusively on the task at hand, thus lessening the opportunity for extraneous factors to bias their responses.

The greatest strength of FTF surveys, however, is the response rates they produce. According to Doyle (n.d.), FTF surveys yield the highest response rate of any type of survey. Potential respondents are much less likely to turn away someone at their doorstep than they are to decline a telephone or mail survey. In fact, some FTF surveys have obtained response rates in excess of 90%!

Finally, FTF surveys tend to produce a sample more representative of the general population than do mail surveys (Doyle, n.d.). This is because individuals who respond to mail surveys tend to be better educated than those who choose not to fill out mail surveys, for example.

### 21.4.2 Limitations

While there are distinct advantages to FTF surveys, they also have unique disadvantages. First and foremost is the tremendous financial cost of conducting an FTF survey. Such a survey design requires large amounts of money

for several reasons. First, the travel data collection expenses are enormous compared to other modes of administration. Hourly employees need to be paid, as do their expenses to and from the data collection points. In addition, interviewers must be carefully selected and trained, which is a large expense as well. In fact, research has shown that FTF surveys can be double the cost of telephone surveys, and can take upwards of three times longer to collect the data than its telephone survey counterpart (Groves 1989).

Tied into high costs is that FTF surveys are limited to a relatively small geographic region (Groves 1989). Due to budgetary constraints, conducting FTF interviews across the country would be next to impossible. Moreover, some types of respondents are not easily reached because they are not home often (such as college students), or access to their residences is restricted. Additionally, surveying some neighborhoods may place interviewers at an elevated risk of victimization.

In regard to the quality and reliability of the data, there is evidence suggesting personal questions are not as likely to be answered as honestly when a respondent is completing a FTF interview (Groves 1989). This should make sense—some people are less likely to be forthright with their responses when they fear being judged.

Finally, tied into data quality is the greatest limitation of FTF surveys: the potential for interviewer bias. Interviewer bias is a bias that occurs when interviewers—through verbal and/or nonverbal queues—influence how respondents answer questions. This concern, while slight in telephone interviews, is enormous in FTF surveys, and great amounts of interviewer training are needed to mitigate the potential for such nonrandom measurement error.

The advantages and disadvantages of FTF surveys were discussed earlier in this section by Neuman in [Chap.14](#) and by Stoop and Harrison in [Chap.15](#).

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## 21.5 E-Mail Surveys

### 21.5.1 Strengths

The use of e-mail as a method of survey distribution has been around as early as 1986, when results from the first e-mail survey were published (Kiesler and Sproull 1986). Up until the late 1990s, e-mail survey distribution was the most popular form of Internet surveying (Solomon 2001). The research regarding e-mail survey techniques have suggested several advantages compared to postal surveys in terms of response speed and cost efficiency. Studies measuring delivery speed found that mail surveys took an average of 11.8 days to return while e-mail surveys were returned in 7.6 days (Sheehan and McMillan 1999). E-mail surveys are also more cost-efficient according to studies, showing e-mail costing only an estimated 5–20% of a paper survey (Sheehan and Hoy 1999; Weible and Wallace 1998). A majority of the cost savings originate from the reduction/elimination of paper and mailing costs.

In addition to being cost-efficient and possessing quicker rates of response, some e-mail surveys offer software that allows for the precise tracking of surveys. Having this knowledge can help researchers know the number of undeliverable e-mails as well as when the e-mail survey was opened, replied to, and deleted; all of which can improve sampling procedures. E-mail surveys can also elicit heightened response quality; as research has suggested respondents tend to provide longer open-ended responses than to other types of surveys (Paolo et al 2000). These open-ended responses allow for more self-disclosing comments, possibly due to the speed of typing over handwriting (Bachmann and Elfrink 1996), although no research has carefully investigated this difference.

E-mail surveys also serve a geographical advantage over many other types of survey techniques. Worldwide e-mail surveys have the

potential to reach nearly every part of the world, where mail, telephone, fax, or even other web-based surveys may not. One example, Swoboda et al. (1997) performed a worldwide e-mail survey and achieved only a 20% response rate, but received responses from all parts of the world (90% of them within 4 days). E-mail users in developing nations can access e-mail surveys at the same speed as those in developed nations. This suggests that if the target population has e-mail and many live in remote places, e-mail provides the most effective communication method for quick data collection (Yun and Trumbo 2000).

### 21.5.2 Weaknesses

While e-mail survey techniques offer advantages compared to more traditional survey modes, there are also limitations that must be noted. When e-mail addresses are changed there is usually no way to forward e-mails that were sent to an old address (Cobanoglu et al. 2001). Finding participants e-mail addresses may also create potential problems as contacting e-mail addresses for people without a prior established relationship with the survey sponsor is considered an unacceptable survey practice (Dillman et al. 2009). Unsolicited e-mail invades an individual's private space, and sending too many of these messages or surveys will bother some people. The abuse of the e-mail survey may actually damage the e-mail survey environment (Yun and Trumbo 2000). Research in the 1990s suggested this was the case by predicting that the increase in junk e-mail would result in a reduction of response rates, similar to mail and telephone rates as well (Dillman 2000; Parker 1992; Schaefer and Dillman 1998; Tse 1998).

Limitations also arise with e-mail surveys with trying to obtain a representative sample (Dillman 2000). Internet users changing their Internet Service Provider and their e-mail address create a 'churn effect', changing the accessibility and representativeness of samples. Also, the possession of multiple e-mail addresses by one individual can increase under-representation (Bradley 1999). These issues, according to

Dillman (2000), strengthen the argument for using Web-based surveys as an alternative to e-mail, since anyone with Internet access can respond to the survey. Mesch, Chap.18, discussed e-mail surveys in more detail.

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## 21.6 Web-Based Surveys

The exponential growth of the Internet has influenced practically every feature of society. Survey methodology and research certainly are no exception. The use of the Web as a medium for survey administration offers significant advantages over previous modes of survey distribution (i.e. mail, telephone, and fax); however, methodological limitations still apply. One of the biggest challenges stems from the lack of knowledge on the most effective ways to conduct surveys over the Internet and their relatability to other survey modes (Solomon 2001). While much research is yet to be done on the most effective uses of web-based survey techniques, a large amount has already been published on the strengths and limitations of this method.

### 21.6.1 Strengths

According to Wyatt (2000), web-based surveys possess a number of strengths over more conventional-type surveys (mail, paper, or FTF). One such strength is the overall net financial cost of using web-based surveys. After initial setup fees, Web-based surveys are cheap to carry out, allowing for the recruitment of large numbers of participants or to collect data repeatedly, on multiple occasions. This allows for significant increases in sample sizes with minimal additional costs compared to other survey modes. While many mail and fax surveys require the use of purchasing pre-stamped envelopes or a toll-free fax number, Web-based surveys require no variable cost to the respondent. Web-based surveys also eliminate the need for printing and mailing of survey instruments as well as allowing researchers to acquire survey data that is already in electronic format (Cobanoglu

et al. 2001). Not only does this advance help to eliminate costs of data acquisition, but it also significantly reduces the labor required, especially when compared to mail surveys.

In addition to cost savings, Web-based surveys provide improved convenience and interactive feedback for respondents. More recent online questionnaires are often designed to provide feedback in the form of summary statistics about an individual's responses, which may act as an incentive to participate (Dillman 2000; Schmidt 1997). Online feedback also assists researchers as Web-based technology now allows for data capture with rapid checking of responses and immediate validity checking of individual data items. This feedback allows Web-based surveys to rapidly update questionnaire content and question ordering according to user responses, helping to control for recency, and other question order effects (Wyatt 2000). Web-based surveys can also be convenient for participants, since completion is based on the respondent's leisure, which may increase the likelihood of participation (Sax et al. 2003).

Research has also suggested that Web-based surveys yield higher response rates for college populations. According to Carini et al. (2001) and Handwerk et al. (2000), variables that positively predict response to Web-based surveys in comparison to paper surveys include: being a traditional-aged college student, living on campus, majoring in math/science, declaring multiple majors, attending a selective institution, and attending an institution that provides substantial academic support for students.

### 21.6.2 Weaknesses

While Internet access in the U.S. has been increasing, as of 2007, only about 67% of American adults (18 and older) currently possess access from their homes (Horrihan and Smith 2007). Although Internet access has steadily increased in the last 20 years, coverage is still not sufficient for general public surveys (Dillman et al. 2009). This coverage bias creates significant validity concerns since results are only generalizable to those who are keyboard

and Internet literate; which in 2000, constituted only a third of the US population (Wyatt 2000). Technical difficulties may also increase this coverage bias. When browsers do not have the same capacity to view websites, it can cause surveys to have a different appearance from one respondent to the next (Dillman 2000). This may decrease response rate or even prevent an individual from accessing the survey (Smith 1997).

In addition to a coverage bias and reduced generalizability, the prevalence of non-deliverable surveys is greater for Web-based surveys as people are more likely to change their e-mail addresses and Internet Service Providers than postal addresses (Zatz 2000). This creates a problem since the increase occurrence of e-mail change potentially limits the ability to carry out repeated assessments of the same individual for epidemiologic purposes (Wyatt 2000). Furthermore, some of the more "technologically advanced" populations such as college students have been responding at lower rates than previous decades which may have biasing effects on the data (Bradburn 1992; De Leeuw and Heer 2002; Dey 1997; Fraenkel and Wallen 1993; Schuman 2002; Smith 1995; Steeh 1981). These effects create a non-response bias worth noting that may limit the generalizability of Web-based survey data.

Research has shown that incentives such as cash and non-cash enticements can significantly increase response rates. (Shank et al. 1990; Hare et al. 1998; Dillman 1999; also see Toepoel Chap.13). However, limitations arise with Web-based surveys since tangible incentives cannot be included in Web-based media like they are for mail and FTF surveys. One potential solution to this limitation, according to Cobanoglu et al. (2001), is the inclusion of coupon attachments. Another significant difference between mail and Web-based surveys stems from concerns of potential survey participants of Internet security and the receipt of electronic "spam" or "junk mail" (Smith 1997; Sills and Song 2002).

Research has suggested both advantages and limitations in regard to respondent concerns with Internet security. A study by Bachmann et al. (2000) found that responses to e-mail surveys

tend to be more candid than mail or phone responses, potentially leading to increases in response quality. While Web-based surveys may still be more candid than other survey modes, concerns of guaranteed anonymity by respondents of Web-based surveys may prevent respondents from submitting personal information and/or sensitive issues over the Internet (Wyatt 2000). These security and data integrity differences reaffirm that some implementation approaches that benefit response rates in other modes may not translate directly to benefits in Web-based surveys. Potentially, as a result of these concerns unique to Web-based methodology, research has shown that response rates tend to be lower for Internet surveys than for other modes (Cook et al. 2000; Couper 2000).

### 21.6.3 Summary

Web-based surveys hold clear advantages when compared to other survey modes in that they have the potential to save researchers time and money, as well as stimulating respondents and gather other important respondent data. Yet, for all of these benefits, there are still significant limitations with coverage, anonymity, and confidentiality, as well as technical problems that arise with the use of Web-based surveys. The constant evolution and progress of Internet and computer technologies create an opportunity for more research on Web-based survey techniques since most findings are inconsistent (Sax et al. 2003). Until then, Web-based models can be most effective in surveys designed by overemphasizing the benefits and limiting the significance of the weaknesses.

Manzo and Burke earlier in this handbook, Chap.19, further discuss the multifaceted issues revolving around Web-based/Internet surveys.

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## 21.7 Mixed Mode Surveys

According to Dillman et al. (2009), mixed mode survey techniques became popular based on developing research indicating preferences by respondents to certain modes over others. The

advent and proliferation of new technologies such as the Internet and cell phones have supported the popularity of this trend. These new networks, combined with a decrease in coverage for RDD surveys and declining home telephone response rates, have forced researchers to move in the direction of additional survey administration techniques. A mixed mode approach was developed with the goal of optimizing data collection while reducing total survey error (TSE), owing to time and budgetary constraints (De Leeuw 2005).

Mixing modes creates an opportunity for survey designers to balance the weaknesses of each individual mode at an affordable cost (De Leeuw 2005). For example, written modes (like mail surveys) may contain low question flexibility coupled with low requirements of survey staff. Other modes like telephone surveys offer high question flexibility, but very high requirements of survey staff. By combining these modes, the researcher has the best of both worlds: more flexibility in question design and less demand on survey staff. If the more expensive mode is used second, researchers would only need to survey non-respondents from the first wave that used the first mode of mail surveys. This technique combines less costs and less error than in a unimodal approach, which optimizes benefits while achieving a higher response rate (De Leeuw 2005; Dillman et al. 2009).

The first advantage of mixed mode techniques is the reduction of non-response error. In official statistics as well as in academic research, response rates have been on the decline over the years (De Leeuw and Heer 2002; Balden 2004). To reduce non-response while maintaining low cost, Fowler et al. (2002) conducted telephone follow-ups to initial mail surveys. Results indicated that these follow-ups actually raised overall response rates and may even reduce non-response bias in mail surveys. Mixed mode survey techniques have also been shown to reduce selective nonresponse. A study by Beebe et al. (2005) included statements on the cover of their mail survey that were in several languages. The statement urged respondents interested in

**Table 21.1** Strengths and limitations of the modes of survey administration

Issue	Mail	Telephone	Face-to-face	Web based
Cost	Medium	High	Very high	Low/medium
Data collection time	Medium	High	Very high	Low/medium
Demands on/requirements of staff	Low/medium	High	High	Low
Question flexibility	Low	High	High	High

Information from this chart was provided by [www.cdc.gov](http://www.cdc.gov)

completing a telephone survey to call the center where bilingual interviewers were available. These techniques were shown to raise the overall response rates compared to unimodal counterparts (De Leeuw 2005).

While the mixing of different survey techniques has shown to increase response rates, different strategies such as pre-notice contact and phasing can also impact response rates. Research studying mixed mode techniques has demonstrated that surveys using increased number of contacts and pre-notice contacts appear to have the strongest impact on response rates (Dillman 2000; Dillman et al. 1995). In a mixed mode survey of college students, Kaplowitz et al. (2004), combined a pre-notice postcard with an e-mail survey in comparison with four other mixed methods (mail; postcard, e-mail survey, postcard; e-mail, postcard; and e-mail only). The mail survey mode yielded a 31.5% response rate at a cost of \$10.97 per response, while the pre-notice followed up by an e-mail survey yielded a 29.7% response rate at a cost of only \$1.31 per response. The other survey modes yielded lower response rates and higher costs than the pre-notice postcard with e-mail survey design.

These results support previous research, suggesting that pre-notice increases response rates while also finding increased cost-effectiveness when compared to other modes. It is also important to note the substantial cost difference between the mail survey and the advanced notice e-mail survey. This evidence suggests that in populations with full Internet access, Web-based survey designs can achieve comparable response rates to mail surveys if the Web-based design is preceded by advanced notice (Kaplowitz et al. 2004; also see Mesch,

Chap.18, Manzo and Burke, Chap.19). More broadly, these findings illustrate the potential for more cost-effective mixed mode survey designs based on the recognition of the populations intended for research.

Pre-notice contact is not the only technique that can be used in mixed mode surveys to achieve an increased response rate. Combining various survey modes by administering “phases” can have a positive effect on response rates as well. Phasing involves the administration of one type of survey technique, then switching to a second type of mode once the first phase has been completed. The second phase only targets non-respondents from the first phase. For instance, Dillman et al. (2009) achieved response rates of 80–83% overall by combining mail and telephone surveys, regardless of order. These response rates were higher than single mode designs, which yielded a 44% response rate for telephone and 75% for mail. These findings are similar to other studies looking at phasing with other modes such as mail-based and Web-based combinations (Börkan 2006).

Table 21.1 presents a comparative summary of the main survey modes—mail, phone, FTF, and Web-based—on their characteristics. Readers are advised to use this table for consideration of mixing their data collection. Specifically, and as can be seen from Table 21.1, whenever it is possible to begin data collection using mail or e-mail surveys, researchers should attempt to use this mode, as it is cheaper and may be highly effective in academic surveys where scales are used. Similarly, FTF option, being the most expensive data collection mode, should be reserved for such cases where more flexibility is needed, and where there is an added value

to having a trained interviewer to convert non-response. It is quite obvious from Table 21.1 that those modes that lean on interviewer interaction are the most expensive ones. However, they are also the ones that enable more question flexibility and conversion of non-response. Accordingly, it is recommended that these methods will not be the preliminary default for all survey topics (also refer to Table 11.2 in Chap.11 by Albaum and Smith for a more comprehensive evaluation of the alternative survey methods of data collection and their overall cost and benefit).

## 21.8 Conclusion

Mixed mode survey techniques have clear advantages compared to unimodal designs with regard to increasing response rates while also being relatively affordable. As previously discussed in the literature review, while mixed modes offer many benefits, it is important to acknowledge the possibility of mode effects. These mode effects should dictate how and when a survey designer uses a mixed mode approach to creating an effective survey. Many of the benefits of combining survey techniques may be lost if mode effects are not taken into account by researchers (Dillman et al. 2009). For example, a survey designer who uses a seven-point “agree–disagree” scale for a telephone mode may also offer the scale in a mail or Internet version. The question wording effects could add to significant measurement error (De Leeuw 2005; also see Gideon, Chap.7). According to Dillman and Christian (2003), questions should be constructed to provide an equivalent stimulus for respondents across various modes.

## References

- Bachmann, D., & Elfrink, J. (1996). Tracking the progress of e-mail versus snail-mail. *Marketing Research*, 8(2), 31–35.
- Bachmann, D. P., Elfrink, J., & Vazzana, G. (2000). Email and snail mail face off in rematch. *Marketing Research*, 11(4), 10–15.
- Balden, W. (2004). *Highlights from the session on Web-based data collection*. Federal Committee on Statistical Methodology: Statistical policy seminar session on web based data collection, December, Washington, D.C.
- Bean, A. G., & Roszkowski, M. J. (1995). The long and short of it. *Marketing Research*, 7(1), 20–26.
- Beebe, T. J., Davern, M. E., McAlpine, D. D., Call, K. T., & Rockwood, T. H. (2005). Increasing response rates in a survey of medicaid enrollees: The effect of a prepaid monetary incentive and mixed-modes (mail and telephone). *Medical Care*, 43, 411–414.
- Bickart, B., & Schmittlein, D. (1999). The distribution of survey contact and participation in the United States: Constructing a survey-based estimate. *Journal of Marketing Research*, 36, 286–294.
- Börkan, B. (2006). Effectiveness of mixed-mode survey designs for teachers using mail and web-based surveys (Doctoral dissertation). Retrieved from <http://etd.ohiolink.edu/view.cgi/Borkan%20Bengu.pdf?osu1158597296>.
- Bradburn, N. M. (1992). Presidential address: A response to the non-response problem. *Public Opinion Quarterly*, 56, 391–398.
- Bradley, N. (1999). Sampling for Internet surveys: An examination of respondent selection for Internet research. *Journal of the Market Research Society*, 41(4), 387–395.
- Carini, R. M., Hayek, J. C., Kuh, G. D., Kennedy, J. M., & Ouimet, J. A. (2001). *College student responses to web and paper surveys: Does mode matter?* Paper presented at the 41st Annual Forum of the Association for Institutional Research, Long Beach, CA, June 4, 2001.
- Christian, L. M., Dillman, D. A., & Smyth, J. D. (2008). The effects of mode and format on answers to scalar questions in telephone and web surveys. In J. Lepkowski, C. Tucker, M. Brick, E. De Leeuw, L. Japiec, P. Lavrakas, M. Link, & R. Sangster (Eds.), *Advances in telephone survey methodology* (pp. 250–275). New York: Wiley. (Chapter 12).
- Cobanoglu, C., Warde, B., & Moreo, P. J. (2001). A comparison of mail, fax and web-based survey methods. *International Journal of Market Research*, 43, 441–452.
- Cook, C., Heath, F., & Thompson, R. L. (2000). A meta-analysis of response rates in web- or Internet-based surveys. *Educational and Psychological Measurement*, 60, 821–826.
- Couper, M. P. (2000). Web surveys: A review of issues and approaches. *Public Opinion Quarterly*, 64, 464–494.
- Curtin, R., Presser, S., & Singer, E. (2005). Changes in telephone survey nonresponse over the past quarter century. *Public Opinion Quarterly*, 69(1), 87–98.

- De Leeuw, E. D. (1992). *Data quality in mail, telephone, and face-to-face surveys*. Amsterdam: TT Publications.
- De Leeuw, E. D. (2005). To mix or not to mix data collection modes in surveys. *Journal of Official Statistics*, 21(2), 233–255.
- De Leeuw, E. D., & Heer, W. (2002). Trends in household survey nonresponse: A longitudinal and international comparison. In R. M. Groves, D. A. Dillman, J. L. Eltinge, & R. J. A. Little (Eds.), *Survey nonresponse* (pp. 41–54). New York: Wiley.
- De Leeuw, E.D., & Van Der Zouwen, J. (1988). Data quality in telephone and face-to-face surveys: A comparative analysis. In R.M. Groves, P. Biemer, L. Lyberg, J. Massey, W. Nichols III, & J. Waksberg (Eds.), *Telephone survey methodology*. New York: Wiley.
- Dey, E. L. (1997). Working with low survey response rates: The efficacy of weighting adjustments. *Research in Higher Education*, 38, 215–227.
- Dillman, D. A. (1978). *Mail and telephone surveys: The total design method*. New York: Wiley.
- Dillman, D. A. (1991). The design and administration of mail surveys. *Annual Review of Sociology*, 17, 225–249.
- Dillman, D. A. (1999). *Mail and Internet surveys: The tailored design method* (2nd ed.). New York: Wiley.
- Dillman, D. (2000). *Mail and Internet surveys: The tailored design method* (2nd ed.). New York: Wiley.
- Dillman, D. A., & Christian, L. M. (2003). Survey mode as a source of instability in responses across surveys. *Field Methods*, 15(2), 1–22.
- Dillman, D. A., Clark, J. A., & Sinclair, M. A. (1995). How prenotice letters, stamped return envelopes, and reminder postcards affect mailback response rates for census questionnaires? *Survey Methodology*, 21, 1–7.
- Dillman, D. A., & Mason, R. G. (1984). *The influence of survey method on question response*. Paper presented at the Annual Meeting of the American Association for Public Opinion Research. Delavan, WI.
- Dillman, D. A., Phelps, G., Tortora, R. D., Swift, K., Kohrell, J., & Berck, J. (2009). Response rate and measurement differences in mixed mode surveys using mail, telephone, interactive voice response, and the Internet. *Social Science Research*, 38, 1–18.
- Doyle, J. (n.d.). 9 February, 2012, [http://www.wpi.edu/Images/CMS/SSPS/Doyle\\_-\\_Face-to-Face\\_Surveys.pdf](http://www.wpi.edu/Images/CMS/SSPS/Doyle_-_Face-to-Face_Surveys.pdf).
- Ethier, R. G., Poe, G.L., Schulze, W.D., & Clark, J. (2000). A comparison of hypothetical phone and mail contingent valuation responses for green-pricing electricity programs. *Land Economics* 76(1), 54–67.
- Fraenkel, J. R., & Wallen, N. E. (1993). *How to design and evaluate research in education* (2nd ed.). New York: McGraw Hill.
- Fowler, F. J, Jr, Gallagher, P. M., Stringfellow, V. L., Zalavsky, A. M., Thompson, J. W., & Cleary, P. D. (2002). Using telephone interviews to reduce nonresponse bias to mail surveys of health plan members. *Medical Care*, 40, 190–200.
- Groves, R. (1989). *Survey errors and survey costs* (1st ed.). New York: Wiley-Interscience.
- Groves, R. M., Cialdini, R. B., & Courier, M. P. (1992). Understanding the decision to participate in a survey. *Public Opinion Quarterly*, 56, 475–495.
- Handwerk, P. G., Carson, C., & Blackwell, K. M. (2000). Online vs. paper-and-pencil surveying of students: A case study. Paper presented at the 40th Annual Forum of the Association for Institutional Research, Cincinnati, OH, May 21–24, 2000.
- Hare, S., Price, J. H., Flynn, M. G., & King, K. A. (1998). Increasing return rates of a mail survey to exercise professional using a modest monetary incentive. *Perceptual and Motor Skills*, 86(1), 217–218.
- Horrigan, J. B., & Smith, A. (2007). Home broadband adoption, 2007. Pew Internet & American Life Project. Accessed July 10, 2011. Available from: [http://www.pewinternet.org/pdfs/PIP\\_Broadband%202007.pdf](http://www.pewinternet.org/pdfs/PIP_Broadband%202007.pdf).
- Kaplowitz, M. D., Hadlock, T. D., & Levine, R. (2004). A comparison of Web and mail survey response rates. *Public Opinion Quarterly*, 68, 94–101.
- Keisler, S., & Sproull, L. S. (1986). Response effects in the electronic survey. *Public Opinion Quarterly*, 50(3), 402–413.
- Krysan, M., Schuman, H., Scott, L. J., & Beatty, P. (1994). Response rates and response content in mail versus face-to-face surveys. *Public Opinion Quarterly*, 58, 381–399.
- Massey, J. T., O'Connor, D., & Krotki, K. (1997). Response rates in random digit dialing RDD telephone surveys. In: *1997 Proceedings of the section on survey research methods*. American Statistical Association. (pp. 707–712). Alexandria, VA.
- McNamara, C. (2009). General guidelines for conducting interviews. Retrieved June 8, 2011, from <http://managementhelp.org/evaluatn/intrview.htm>.
- Paolo, A. M., Bonaminio, G. A., Gibson, C., Patridge, T., & Kallail, K. (2000). Response rate comparisons of e-mail and mail distributed student evaluations. *Teaching and Learning in Medicine*, 12(2), 81–84.
- Parker, L. (1992). Collecting data in the e-mail way. *Training and Development*, 46, 52–54.
- Sangster, R. L., & Meekins, B. J. (2003). Data concerns for hard to reach and reluctant respondents in telephone panel surveys, *Presented for the 14th International Workshop on Household Survey Non-response*, Leuven, Belgium.
- Sax, L. J., Gilmartin, S. K., & Bryant, A. N. (2003). Assessing response rates and nonresponse bias in web and paper surveys. *Research in Higher Education*, 44, 409–432.
- Schaefer, D. R., & Dillman, D. A. (1998). Development of a standard e-mail methodology. *Public Opinion Quarterly*, 62, 378–397.
- Schmidt, W. C. (1997). World-Wide Web survey research: Benefits, potential problems, and solutions. *Behavior Research Methods, Instruments and Computers*, 29, 274–279.
- Schuman, H. (2002). Sense and nonsense about surveys. *Contexts*, 1, 40–47.
- Shank, M. D., Darr, B. D., & Werner, T. C. (1990). Increasing mail survey response rates: Investigating

- the perceived value of cash versus non-cash incentives. *Applied Marketing Research*, 30(3), 28–32.
- Sheehan, K. B., & Hoy, M. G. (1999). Using e-mail to survey Internet users in the United States: Methodology and assessment. *Journal of Computer Mediated Communication*, 4(3). [Online]. Available: <http://www.ascusc.org/jcmc/vol4/issue3/sheehan.html>.
- Sheehan, B. K., & McMillan, J. S. (1999). Response variation in e-mail surveys: An exploration. *Journal of Advertising*, 39(4), 45–54.
- Sills, S. J., & Song, C. (2002). Innovations in survey research: An application of web surveys. *Social Science Computer Review*, 20, 22–30.
- Singer, E. (2006). Introduction: Nonresponse bias in household surveys. *Public Opinion Quarterly*, 70(5), 637–645.
- Smith, T. (1995). Trends in nonresponse rates. *International Journal of Public Opinion Research*, 7, 157–171.
- Smith, C. B. (1997). Casting the net: Surveying an Internet population. *Journal of Communication Mediated by Computers*, 4(3). <http://www.ascusc.org/jcmc/vol3/issue1/smith.html>.
- Solomon, D. J. (2001). Conducting Web-based surveys. *Practical Assessment, Research, and Evaluation*, 7(19), 1–5.
- Steeh, C. (1981). Trends in nonresponse rates. *Public Opinion Quarterly*, 45, 40–57.
- Swoboda, S. J., Muehlberger, N., Weitkunat, R., & Schneeweiss, S. (1997). Internet surveys by direct mailing: An innovative way of collecting data. *Social Science Computer Review*, 15(3), 242–255.
- Tarnai, J., & Dillman, D. A. (1992). Questionnaire context as a source of response differences in mail versus telephone surveys. In N. Schwarz & S. Sudman (Eds.), *Context effects in social and psychological research*. New York: Springer.
- Tse, A. (1998). Comparing the response rate, response speed and response quality of two methods of sending questionnaires: E-mail vs. mail. *Journal of the Market Research Society*, 40(4), 353–361.
- Weible, R., & Wallace, J. (1998). The impact of the Internet on data collection. *Marketing Research*, 10(3), 19–23.
- Wyatt, J. C. (2000). When to use web-based surveys. *Journal of the American Medical Informatics Association*, 7(4), 426–429.
- Yun, G. W., & Trumbo C. W., (2000). Comparative response to a survey executed by post, e-mail, and web form. Available at <http://jcmc.indiana.edu/vol6/issue1/yun.html>.
- Zatz, D. (2000). Create effective e-mail surveys. *HR Magazine*, 45(1), 97–103.