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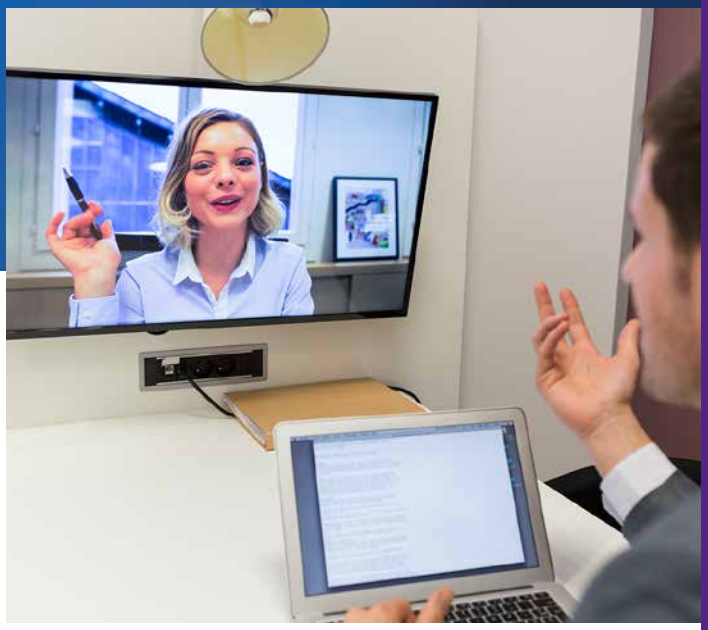

Technology Options for Engaging Respondents in Self-Administered Questionnaires and Remote Interviewing

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Abstract

Moving away from in-person interviewing and toward self-administered questionnaires (SAQs) reduces costs but also raises questions about data quality. Without an interviewer present, respondents may lose their engagement with the survey, leading to breakoffs and greater measurement error. One way to potentially reduce these errors is to leverage new technologies to enhance respondent engagement. Another is to use remote interviewers, which is more budget-friendly than in-person interviewers. In this paper, we describe new technology options to keep respondents engaged with SAQs and harness remote interviewing capabilities: mobile data collection, short message service and instant messaging, video interviewing, and virtual worlds. Drawing from literature and professional experience, we discuss the functioning and implications of these recent technologies for respondent engagement and additional indicators, such as respondent burden, accuracy, and retention. This paper serves as a starting point for researchers considering technological options for conducting SAQs or remote interviews to reduce costs while continuing to engage respondents without sacrificing quality.

Introduction

The early 21st century has seen an explosion in new communications and computing technologies. In January 2014, Pew Research Center (Smith, 2014) estimated that 42 percent of American adults owned a tablet and 90 percent owned a cell phone. Another Pew study (Fox & Rainie, 2014) released in February 2014 estimated that 87 percent of American adults used the Internet; 68 percent of adults could access the Internet from mobile devices. According to a report produced in April 2015, 64 percent of Americans owned a smartphone, and that percentage was rising (Smith & Page, 2015). These technologies have led to new modes of communication, including voice, video, and SMS text via personal mobile devices (e.g., smartphones and tablets), laptop or desktop computers, social media (i.e., social networking services and platforms like Facebook and Twitter), and even virtual worlds (that is, online simulations where people interact using avatars, such as Second Life [SL]; www.secondlife.com).

The rapid adoption of these technologies in many segments of the population affords survey researchers the opportunity to explore data collection modes along a continuum from completely interviewer-administered to completely self-administered. With these advancements, data collection could move away from in-person interviewing and toward virtual interviewing and self-administered questionnaires (SAQs) that reduce costs associated with having an interviewer physically present. However, without an interviewer present, respondents may lose their engagement with the survey, leading to breakoffs and greater measurement error. One way to potentially reduce these errors is to leverage various technology options to enhance respondent engagement in the SAQs. Another is to enable interviewers to conduct remote interviews, which is more budget-friendly than in-person interviews. Virtual interviewer presence is achieved on different levels, with video, graphic, audio, and text interactions between respondents and remote interviewers.

In this paper, we focus on four modes: mobile data collection, short message service/instant messaging (SMS/IM), video interviewing, and virtual world data collection. These modes represent a variety of interesting options with good viability for survey research in the future because of their growing usage and because they also allow for different levels of interviewer presence, from virtually present to not present. We describe the technology options related to these modes and how to keep respondents engaged with SAQs and remote interviewers. Although the choice of mode in a survey design may be motivated by inflexible factors, such as cost, mode choice has implications for data quality. Therefore, we also discuss data quality indicators of respondent burden, accuracy, and retention.

In addition, we recognize that segments of the population may be excluded from this research, such as those who cannot afford, do not have access to, or do not know how to use the technologies described. We refer to US population statistics because the vast majority of research we found studied an American population. Although more than three-quarters of the US adult population has access to the Internet in some form, these numbers do not take into account proficiency in the use of webcams, microphones, and applications necessary for successfully using all of the technologies described in this paper. In sum, this paper covers those who are able to access and use these technology options with the acknowledgement that coverage error is a critical factor in total survey error; researchers should take into account such error when they choose a survey mode.

What Mode Should Be Used? A Taxonomy of Emerging Technologies for Data Collection

To explore new modes along a continuum from completely interviewer-administered to completely self-administered, Figure 1 plots our interpretation of the type of survey interface and level of interviewer presence. As shown in Figure 1, mobile data collection and virtual world SAQs fall on the lower end of the interviewer presence scale. Conversely, video interviewing (e.g., Skype and FaceTime) and virtual world in-avatar interviewing are on the higher end of the presence scale. Although not done in person, video interviewing and virtual worlds provide either live video or avatar visual representation and

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Figure 1. Type of survey interface and level of interviewer presence

	Low Interviewer Presence			High Interviewer Presence
SAQ	• Mobile surveys • Virtual worlds[1]			
Virtual Interview		SMS/IM	Virtual worlds[2]	Video interviewing

SAQ = self-administered questionnaire; SMS/IM = short message service/instant message

[1] Virtual worlds as used for SAQs.

[2] Virtual worlds as used for in-avatar interviewing.

audio. Both of those components are missing from SMS/IM and mobile data collection.

Different levels of presence offer certain advantages and disadvantages. Higher interviewer presence can play a vital part in encouraging participation; engaging a respondent in the survey process; clarifying questions to maximize the accuracy of responses; and setting the stage for retention in the next round of data collection, if applicable. On the other hand, high interviewer presence can have secondary disadvantages if a question or questionnaire is sensitive or certain responses carry stigma such that respondents may opt for socially desirable rather than truthful responses (Dean, Murphy, & Cook, 2013). In that case, a mode somewhere in the middle of the spectrum of interviewer presence, such as SMS/IM, may be ideal.[1] Low interviewer presence as a result of self-administration also has advantages in that it gives respondents a sense of privacy and allows them to go at their own pace and complete the survey on their own time. Conversely, with low interviewer presence, respondents can find it easier to decline to complete the survey or not complete the entire survey.

Respondent Engagement, Respondent Burden, Accuracy, and Retention

For each of the technology options and modes explored in this paper (mobile data collection, SMS/IM, video interviewing, and virtual world data collection), we discuss how the mode engages respondents in SAQs and remote interviews. Respondent engagement is defined as the respondent being fully motivated in understanding the survey task and being interested in devoting significant attention to providing thoughtful responses. A lack of respondent engagement leads to disengagement. Some consequences of disengagement are dropping out of the questionnaire and "satisficing," the tendency for respondents to take shortcuts when answering survey questions (Krosnick, 1991). In the case of longitudinal surveys, lack of engagement can also lead to attrition.

If we are interested in moving toward SAQs and remote interviews to reduce cost, we need to weigh each technology's trade-offs with data quality. Therefore, we also consider data quality indicators of respondent burden, accuracy, and retention. Burden is the time and effort it takes to complete the survey. According to Bradburn (1977), there are four components of burden: length, respondent effort, respondent stress, and frequency of being interviewed. Accuracy is defined as respondents providing valid responses that reflect their own behaviors or attitudes in an honest way. Complete accuracy involves the absence of measurement errors. Retention refers to respondents completing the survey within the specified data collection period and setting the stage for respondents being willing to participate in the next wave of the study, if applicable. For some technology options and modes, the literature and professional experience on these indicators are still limited. We include a discussion when the information is available.

We chose these four dimensions for discussion because our professional experience suggests that they are vitally important to data collection and data quality. We also believe they are interrelated. Engagement and burden can have a reciprocal

[1] Ideal if not taking coverage bias into consideration.

relationship: individuals who are engaged may be less likely to perceive the survey task as burdensome, and people who perceive the survey to be burdensome may also be less likely to be engaged. Engagement and burden, in turn, affect accuracy and retention. We can reasonably assume that engaged respondents may be more likely to provide valid responses and be retained, whereas burdened respondents may provide less accurate responses or be less likely to complete the survey.

Technology Options and Dimensions for Data Quality

In this section, after presenting an overview of each survey mode spawned by new technology options, we discuss the implications these modes have for respondent engagement, respondent burden, accuracy, and retention.

Mobile Data Collection

Mobile surveying technology includes both smartphones and tablets. There are many ways to collect survey data on a mobile device, but we focus on two self-administered modes: with an app or with a mobile-optimized website. A survey app is a downloadable program designed to host a survey. Although some research organizations have created their own apps, there are off-the-shelf products as well. Off-the-shelf products are often cheaper and faster than creating a survey app in-house, but historically, they provide fewer customization abilities than apps developed in-house.

The other mode of mobile data collection is a mobile-optimized web page, which is one that has been intentionally adjusted to be more usable on the smaller screen of a mobile device. A normal web survey may be difficult to complete on a smartphone because of the size or layout of the screen, but a mobile-optimized version may have larger buttons or may only show one question at a time to compensate for the screen size. Figure 2 shows the difference between a mobile-optimized version and web survey of the same question.

The survey capabilities of mobile devices are expanding beyond interviewer-administered questionnaires. For example, respondents can use mobile devices to collect time diary data because most people who own a mobile device carry it with them, allowing them to record events in real time (Hamburger, 2014). In addition, the cost associated with mobile surveying varies on the basis of a number of factors. Using an existing survey software product to host an app takes considerably less time to program than building an app from scratch, just as using a survey hosting website (e.g., SurveyMonkey or SurveyGizmo) for a web survey takes less time to program. The same consideration can be made for mobile-optimized surveys. If a survey design already involves a hosting website, the host will likely be able to optimize the survey for mobile at a minimal cost compared to do-it-yourself.

Figure 2. Mobile-optimized version (left) vs. web survey (right) of the same question

Source: Generated by the authors under a contract to RTI International from the World Trade Center Health Registry, which is supported by National Institute for Occupational Safety and Health cooperative agreement #5U50/OH009739 and the New York City Department of Health and Mental Hygiene.

Engagement

Some researchers expect engagement to be greater when a survey is completed on a computer as opposed to a mobile device. There are many valid reasons a respondent may be distracted while completing a mobile survey. These reasons may include incoming phone, Skype, or FaceTime calls and environmental distractions, as the respondent could be virtually anywhere when trying to complete the survey. Jue (2012) found that respondents completing surveys on a mobile phone were more likely to drop out than computer users. This finding makes sense because computers are generally used in a sedentary environment, which encourages completing a task while remaining in one place, whereas the inherent transportability of mobile

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devices subjects respondents to more distractions. In another study (Tsvelik, 2013), researchers were concerned that mobile users would be considerably more distracted than desktop users while responding to the survey. The authors in this study measured engagement in both mobile and desktop modes by monitoring inconsistencies between two similar questions that appeared in different parts of the survey, and by asking a question at the beginning of the survey and having respondents recall the topic at the end of the survey. They found very few inconsistent answers and very high recall of the beginning question topic in both modes.

In a different study (Peterson et al., 2013), researchers measured engagement with straight-lining, speeding, satisficing (self-reported), and a trap question (i.e., a question telling participants to "Select option C for this question" or some other type of response direction meant to reveal when participants are not actually reading the questions). They found almost no difference in engagement between mobile and computer. The only difference was that some computer respondents were more likely to straight-line answers on one or more of their four grid-like response structures.

Some studies have shown what can be considered increased engagement in mobile versus web surveying. One example came from a panel of young mothers in the United Kingdom. The survey had two versions: a desktop version (not optimized for mobile) and a mobile-optimized version for use on tablets and smartphones. All desktop respondents received the first version, but only some mobile users received the mobile-optimized version. Because of the use of grids in the web survey, the authors created a "card shuffle" technique for mobile users. Through this technique, users who saw the mobile-optimized version saw only one row of the grid at a time. The researchers found that significantly more responses were checked by mobile users receiving the "card shuffle" method as opposed to desktop users or mobile users who received the nonoptimized web survey. The authors felt that this response could be a sign of increased engagement, but could also be an effect of viewing only one row at a time (Tsvelik, 2013).

Peterson and colleagues (2013) also compared respondents on a computer to those on a mobile device. Compared with respondents using a computer, respondents taking the survey on a mobile device provided more meaningful answers to open-ended questions, but the difference was small. This finding is consistent with previous research, which found that respondents did not have difficulties responding to open-ended questions on mobile devices (Wells, Bailey, & Link, 2013). There was, however, a possible increase in measurement error on multiple-choice questions, because it was relatively easy for a respondent to make an accidental selection depending on the size of the screen and the tool used for directing it (e.g., roller-ball, finger, or stylus) (Peterson et al., 2013). On the basis of this research, it is reasonable to conclude that engagement on mobile devices is not lower than computers, despite the perception to the contrary.

Burden

Research on the relative burden of mobile surveys compared with surveys on computers is the most common comparison found in the literature. However, a few studies have compared mobile surveys that are optimized for mobile administration to those that are not. In a study comparing users completing a questionnaire on a mobile device, mobile users who received the mobile-optimized version of the survey rated highest on all self-reported survey experience metrics. Those using a mobile device who received a nonmobile-optimized version self-reported significantly lower scores on "ease of use," "format/layout of questions," and "overall experience" (Tsvelik, 2013). One theory we have for these results is that when a survey is not mobile optimized, respondents who answer the survey on a mobile device will often have to pinch and scroll to see a layout that is usually visible on a single screen of a computer (Buskirk & Andres, 2013). Because this scrolling increases respondent burden, it can lead to more breakoffs compared with computer users (Callegaro, 2010). With mobile devices, respondents are less burdened by the ability to complete a survey whenever and wherever they want, but that decrease in burden may be negated if the layout is not user-friendly.

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Another consideration in respondent burden is the length of the survey on a mobile device. One study that asked for survey feedback from participants reported that mobile device users felt the survey lasted longer than those taking it on a computer. The timestamp data supported this evaluation, and the authors speculate that download speeds, connectivity, and task difficulty could be reasons for this difference (de Bruijne & Wijnant, 2013). Another study found the mean time of completion to be three times as long for mobile users compared with computer users (Mavletova, 2013).

In addition, Peytchev and Hill (2010) conducted a small-scale panel on mobile devices and found that more respondents chose the provided "other" option when there was not a "specify" text box compared with when there was a "specify" text box. Though Wells et al. (2014) later found contradictory results that showed no respondent avoidance of half-open "other" categories, they did find that computer respondents provided significantly longer responses to open-ended questions than mobile respondents. This was also the case in a previous study done by Mavletova (2013). We believe this avoidance of text boxes and reduced answer content when they are encountered is because of the burden of typing out words on mobile devices.

Accuracy

One of the ways to determine accuracy in a mobile environment is by comparing mobile responses to other standard and well-researched behaviors found in other modes. One study (Wells et al., 2014) did just that and ran experiments between mobile and web users to compare the two modes as well as comparing mobile behaviors to that of other modes. One of their findings was that mobile respondents followed the same previously established patterns of other modes in that high-frequency scales resulted in higher frequencies reported and larger open-ended text boxes yielded longer responses. They also found no evidence of primacy effects in their comparison of check-all-that-apply responses. Though this is only one study, it is a promising glimpse at mobile respondent behaviors in terms of accuracy.

Other studies have compared mobile responses to computer responses of the same survey for quality and accuracy purposes. In a study that tested input types and survey duration, comparisons were made between computer (n = 119,692) and mobile respondents (four groups of ~2,000 each). The input type being tested was a five-point scale ranging from "highly satisfied" to "highly dissatisfied" and was manipulated as either vertically displayed response options or a drop-down box. Mobile respondents were assigned to one of these two display modes and further stratified by the number of survey questions asked (either the same as the computer mode or fewer). The researcher found that all of the mobile test groups were significantly different from the computer group, selecting highly satisfied more frequently. After controlling for demographic differences, the author still found significant differences in the dropdown groups compared with their computer equivalents (Stapleton, 2013).

Others, however, have found fewer significant differences in responses given between computer and mobile devices, which suggests that mobile responses may be as accurate as computer responses. One example is a study by de Bruijne and Wijnant (2013), who found that responses to only 4 of 26 questions had significant differences between mobile and web. Another study (Mavletova, 2013) found no significant effect of the survey mode (mobile or computer) on an index of socially undesirable responses. Though some data seems to suggest a difference in reporting between mobile users and computer users, we feel this mode is moderately accurate when compared with computer responses.

Retention

In recent years, researchers have studied the completion and breakoff rates of mobile survey users. Of course, factors such as length and survey difficulty could affect completion rates, but with mobile surveys, screen optimization may also be a factor. Callegaro (2010) has reported multiple studies where the breakoff rates were higher and completion rates lower for mobile than for computer users. However,

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it appears these studies did not have their surveys optimized for mobile. Stapleton (2013) experimented with both optimized and unoptimized mobile surveys and found that both had greater breakoff percentages compared to web (15.9 percent and 6.3–10.2 percent compared to 3.3 percent on computer). The lowest mobile breakoff rate of 6.3 percent was obtained on a survey with fewer questions than the computer survey. Mavletova (2013) consistently found lower completion rates among mobile users than among computer users. The author noted that filling out the questionnaire was more demanding and time-consuming on a mobile device than on a computer.

SMS/IM

Although not limited to mobile phones, SMS messaging, commonly known as "texting," is limited-character messaging between two phone numbers. In a group of surveys completed in November 2014, Pew researchers found that 97 percent of smartphone owners used SMS at least once during the week-long survey period. Ninety-two percent of owners used their smartphone to make a voice or video call during that same timeframe, showing greater SMS usage than traditional voice or video calling (Smith, 2015). Although these data are on smartphone users, almost all cell phones have the capability to send and receive SMS messages, and as of the beginning of 2014, 90 percent of American adults owned a cell phone (Pew Research Center, n.d.).

IM is a similar method, except there usually are no character limitations, and phone numbers are not required. IM functions are available in standalone software, such as Skype, or embedded on websites such as Facebook and Google. In both of these media, the only visual component is the text conversation, but back-and-forth interactions can happen in real time.

SMS and IM are being used more often as a method of communication with survey respondents. Many commercial websites have added a chat feature to assist customers, and there is a market for software providing chat features for websites. Government surveys have also started adopting this mode. For example, the Census Bureau will soon start testing new methods of SMS or e-mail contact with preregistered respondents (Cohn, 2014). The messages sent via these modes will ask participants to respond to the census online. In addition, a report developed by the American Association of Public Opinion Research on mobile technologies for research (Link et al., 2014) cited multiple studies using SMS texting for survey data collection, survey reminders, and contacting respondents in which voicemail was not an option (e.g., Brenner & DeLamater, 2012; Callegaro, 2002; Down & Drake, 2003; Kuntsche & Robert, 2009; Schober et al., 2013). Furthermore, when a study uses SMS/IM for interviewing, the transcript is automatically created because the responses are captured via text generated by the respondent. The researcher does not need to record responses, as in a phone interview. For studies where transcripts are required, the researcher also does not have to go back to an audio recording and determine which utterances or pieces of conversation should be transcribed, because that is already completed (Kazmer & Xie, 2008).

The cost of using SMS/IM can depend on the method used to make contact. If respondents already have Internet access and are using IM from a free source (e.g., Skype, Facebook, or Google), then the costs, if any, should be minimal. When researchers use SMS to interact with participants, cost depends on the origin of the researcher's text message. If the researcher wants to text a respondent from a mobile phone, then a phone and a texting plan are required. However, researchers could also text for free using e-mail, as Wilt, Funkhouser, and Revelle (2011) did in their study; they sent a text to a Verizon Wireless phone by entering the mobile phone number followed by "@vtext.com" in the "To:" field of an e-mail. Texting may also cost the participants money if they do not already have a texting plan. Apple also has an iMessage system that works in a similar way, whereby users can set up an account on an Apple device either by the device phone number or by an e-mail address. An Apple device is required for both parties, however.

Something to keep in mind when planning to use SMS/IM for data collection is that there may be privacy, legal, and cost implications. For example, the European Society for Opinion and Market Research (ESOMAR) has issued mobile phone research

guidelines that address some of these topics. The ESOMAR guidelines point out concerns regarding privacy of any information stored on the respondent's phone should it be stolen, the possibility of data or text message charges if the respondent does not already have a plan that covers these features, and the possibility of reaching someone at a time that is inappropriate for them to respond, such as while driving a car. To mitigate problems related to these concerns, they recommend being up front with respondents about privacy concerns, covering the payment of any charges associated with participating, and warning respondents about doing anything that could put them at risk or break the law (2012). In the United States, researchers should confirm with their Institutional Review Board (and, if applicable, the Office of Management and Budget) whether prior consent is required before sending out unsolicited SMS/IM.

Engagement

The level of engagement in an SMS/IM study may depend on the surroundings of the respondent. If messages are exchanged via a mobile device, the respondent could be virtually anywhere an Internet connection or cell phone signal is present. The respondent can receive notifications upon receiving another SMS or IM, or from other apps or programs that are running on the respondent's device. If such outside stimuli exist while respondents are participating in an interview, they can become disengaged. Fortunately, this mode allows for synchronous interviewing, or interviewing where questions and responses are exchanged in real time (Kazmer & Xie, 2008), so the interviewer can assist in engaging respondents in the same manner used in computer-assisted telephone interviewing studies, only via text instead of speech.

Burden

One factor to consider when using SMS is that phones without full keyboards require respondents to use multiple button taps to enter letters (Wilt et al., 2011). Although such tapping may keep them more engaged in the activity, it could also increase their burden in terms of time spent. We are unable to draw a conclusion on this topic because of limited research that measures respondent burden related to using SMS/IM, regardless of the type of keyboard used. However, on the basis of research findings that open-ended text boxes receive shorter input on mobile devices compared to computers (Wells et al., 2014; Mavletova, 2013), it is possible that SMS responses may be shorter because of the increased burden of typing on either full or number-board keyboards compared with computer keyboards.

Accuracy

Because these media do not involve vocal tone, inflection, and body language, their use in interviewing may result in the misinterpretation of the meaning of the questions (Bianco & Carr-Chellman, 2002; Kazmer & Xie, 2008). These key components differentiate this mode from in-person, phone, and video interviewing. Although on screen this mode may feel like an SAQ, respondents know a person is available for them to ask questions. In a study comparing SMS and voice interviewing, researchers surmised that SMS interviews can lead to higher completion rates, greater satisfaction, and more-accurate data (based on satisficing and disclosure) despite taking longer to complete (Schober et al., 2013). We are not aware of other studies that support or negate this finding.

Retention

One study conducted at Northwestern University (Wilt et al., 2011) found favorable results with short-term retention within a diary study using SMS. For 2 weeks, six times a day, participants texted responses to how well certain adjectives described them. Researchers collected usable data from 42 of 50 participants. They excluded participants with no variation in their answers, low response rates, and consistently incomplete responses. However, at this time, there is insufficient evidence in the primary literature to examine retention during use of SMS/IM for traditional data collection that involves a large number of questions and response categories.

Video Interviewing

Video interviewing is similar to face-to-face interviewing except that the interviewer and respondent are not physically in the same location,

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but are communicating via video conferencing software, such as Skype or FaceTime. The interviewer and respondent can see and hear each other live on a computer, tablet, or mobile phone screen. Jeannis, Terry, Heman-Ackah, and Price (2013) cited a case study that showed very little evidence of problematic respondent behavior during face-to-face interviews and concluded that the results supported the use of video interviewing because of their comparable visual aspect.

Figure 3 shows one type of video-interviewing technology, in which the interviewer and the respondent can view each other on a split screen. A chat window to the right of the screen is available for observers to take notes or exchange IMs.

Video interviewing is inexpensive for those with Internet access because most video software is free and easy to download. Currently, video interviewing is rarely used in survey research, but researchers could consider offering a video-interviewing option to respondents in follow-up waves if the respondents are already familiar with the technology and have access to the appropriate equipment and software. For instance, frequent users of Skype or FaceTime may be quite comfortable with the technology and may prefer scheduling an interview this way rather than arranging a time for an interviewer to visit the home. However, researchers should avoid using significant resources to "train" respondents to download, install, or become proficient with the software and hardware if respondents are not already using this technology. This could add burden and unfamiliarity and could lead to breakoffs or other data quality issues.

Figure 3. Example of video-interviewing interface

Source: Generated by the authors.

The only cost associated with video interviewing is the cost of meeting hardware and connectivity requirements. To participate in video interviewing, both interviewer and respondent must have either a computer with a webcam or a tablet or smartphone with video capabilities, along with a means of accessing the Internet. Skype is free and relatively easy to use, and researchers have noted the benefit of using Skype video calling as an interview method regardless of location (Dean, Head, & Swicegood, 2013; Wildeman, 2010).

Engagement

Video interviewing has the potential to be engaging because it closely replicates face-to-face interviewing. Little research has investigated this aspect of video interviewing; however, there is a strong theoretical basis for expecting engagement. In the video-interviewing mode, interviewers and respondents can establish eye contact, interviewers can assess the respondent's body language and modify their approach as needed, and interviewers can maintain the respondent's attention more easily by following visual cues. A study conducting cognitive interviews in multiple modes—the virtual world SL, Skype video, and in person—found only slight variation between Skype video interview and SL interview disengagement. In SL, they found an average of 0.8 observations of disengagement per interview out of 17 completed interviews, and in Skype video, they found about 1.1 observations of disengagement per interview out of 16 completed. There were no observations of disengagement in the in-person interviews, but only two in-person interviews were completed (Dean, Head, & Swicegood, 2013). Although there are likely more instances of disengagement in virtual interviewing compared with in-person interviewing, the level of disengagement still appears to be minimal.

Burden

Although the authors are not aware of much prior research, practical experience suggests that respondent burden is both increased and decreased using video interviewing. On one hand, respondents must have access to the Internet, the proper hardware, and the proper software to participate. Although

the interviewer can direct the respondent through the download and installation process, some may find it frustrating, which may increase respondent burden. On the other hand, allowing respondents to be interviewed virtually from their home or other convenient location may reduce the additional burden of meeting an interviewer in person. Often, respondents may meet interviewers for in-person interviews in public places for safety reasons.

Accuracy

Video interviewing is the closest medium to a face-to-face interview without an interviewer being physically present. Though studies have shown that self-administered modes tend to produce higher-quality data (see, for example, Bowling, 2005), an interviewer's presence may be desirable in certain situations, such as with complicated or complex surveys that are not on highly sensitive topics. In these cases, an interviewer's guidance may be more helpful than harmful. Using video interviewing as opposed to telephone interviewing can simulate the rapport that is generally present with in-person interviews. Video interviewing also allows for third-party or supervisory observations in real time, often without the visual obstruction of another person in the room or a two-way mirror. Such live observations can, in some situations, enhance accuracy and overall data quality by employing monitoring of the interviewer and offering real-time feedback.

However, decreased accuracy may possibly occur with video interviewing if the respondent's comfort level with the technology is low. That is, a respondent may have access to the proper hardware, software, and Internet connection, but may not have experience using the tools. If respondents do not know where to look or speak during the interview, the researcher may not get a clear view of the respondents or be able to understand what they are saying. Such ambiguity could result in a loss of data, thus affecting the accuracy of the results.

Retention

With video interviewing, the quality of the equipment the respondent is using may be outdated or not in proper working order, resulting in audio or video distortion. The researcher generally has no control over the quality of the webcam or microphone the respondent is using, which may be unreliable (Wildeman, 2010). There is also the possibility of a loss of audio or video connectivity (or both). Although connectivity issues are not unique to the video interviewing mode, such technical difficulties could result in respondents requesting to drop out of the study or to use a different mode of data collection as opposed to troubleshooting the technical problem.

Virtual Worlds

Virtual-world interviews take place online in a space created for virtual interaction with other users or players. One of the most popular virtual worlds is SL. Although there are other virtual worlds in existence, SL is by far the largest, with 40 million registered accounts as of December 2014 (Voyager, n.d.). All content in SL is created by its users, and it maintains virtual currency with an actual exchange rate. In this type of interview, both the respondent and interviewer choose avatars to represent themselves. An avatar is a "digital persona that you can create and customize" (Second Life, 2014). Interactions can take place either by text using a chat feature or by real voice audio. The virtual environment and avatars of the interviewer and respondent serve as the visual cues. Although this method of interviewing is in its infancy, researchers have begun citing best practices while these domains evolve (Hill, Dean, & Murphy, 2014).

The cost of virtual-world interviews depends on the actions the study designers want to attempt to carry out. Researchers may want to build their own facility within the selected virtual world ("in-world") or find different outfits for their avatars. Doing so not only costs money (e.g., all virtual property in SL must be purchased using Linden Dollars, the virtual currency of SL) but also involves programmer time and expertise. Another cost consideration is the mode in which the interviewers will engage respondents. If in-avatar interviewing (similar to in-person except it takes place in a virtual world using avatars; Dean, Cook, Keating, & Murphy, 2009) is used, the only expense may be the interviewer's time—however, if respondents are to participate in SAQs, costs will increase because of the need for more programming.

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In virtual worlds such as SL, participants can obtain a "heads-up display" (HUD) and use it to complete surveys. HUDs are any kind of dashboard or display that is superimposed on a portion of the screen to provide information without users having to move completely away from their current screen. HUDs are private, and others in the virtual world cannot see when someone is using one. They can be picked up at a kiosk placed anywhere in SL (Bell, Castronova, & Wagner, 2011). The creation of a HUD and the kiosk require extra programming time and skill. Figures 4 and 5 depict in-avatar interviewing and a survey kiosk in SL.

Figure 4. In-avatar interview in Second Life

Source: Generated by the authors in Second Life.

Figure 5. Kiosk in Second Life

Source: Generated by the authors in Second Life.

Engagement

Dean, Murphy, and Cook (2013) compared two similar questionnaires delivered in SL. One was a self-administered HUD posted at a kiosk in SL. The other was administered by an avatar interviewer controlled by a researcher. Looking at straight-lining and satisficing, and comparing the number of "Don't Know" and "Refuse" responses, these researchers concluded that respondents were more engaged when they were interviewed by an avatar. They attributed this to an increase in social presence the avatar interviewer provided compared with the SAQ.

Another study comparing Skype and SL interviews (Dean, Head, & Swicegood, 2013) measured disengagement by coding times when respondents either did not respond, went off camera, paused the interview for a reason outside of the interview, or held a conversation with someone off camera. The authors found an average of only 0.8 interruptions per interview in SL, compared to 1.1 interruptions per interview on Skype. Although more research is needed, these findings suggest that SL respondents are no less engaged than video-interviewing respondents, despite the use of avatars as opposed to live video.

Burden

With HUD, the burden to participants is minimal. HUDs conveniently allow participants to respond to surveys without having to open a new window or "teleport" (a common method of travel in SL) to an alternate location. Providing an incentive is also easy for researchers and participants in SL who are using Linden Dollars. Incentives can be paid directly to an avatar's account using Linden Dollars upon completion of the survey or interview. This process reduces burden to both the researcher and the respondent. The literature has yet to address burden as it relates to data collection in a virtual world, but theoretically, the burden would be minimal. Because of the complexity of virtual-world concepts, including avatar design, surveying in virtual worlds so far has been conducted using convenience samples of volunteers who already have a presence in a virtual world. Because such participants are already familiar with virtual worlds, they are not burdened with the learning curve that accompanies one's first experiences in-world.

Accuracy

Using a HUD for SAQs is very similar to having a respondent complete a Web survey. Some HUDs not only allow for text surveys but also have audio and graphic capabilities (Bell et al., 2011). One of the advantages of surveying while a respondent is using an avatar is that anonymity is high, which may help accuracy when asking sensitive questions (Bell et al., 2011). Having a made-up name and a computer-generated physical representation allows for anonymity, but it also carries the risk of the respondent having and responding as an alter ego. Researchers can help mitigate that concern, however, by writing questions in reference to the respondent's real life (RL). For example, the question "What is your gender?" can be rewritten to ask "What is your gender IRL?" ("IRL" is an acceptable abbreviation for "in real life.") Though it may be a concern of some researchers, there is currently no evidence to suggest that survey respondents in virtual worlds respond to surveys as anyone (or anything) other than themselves. Again, research on the accuracy of data collection in virtual worlds has yet to be explored, but theoretically, the accuracy would be similar to that of a web survey (for HUD interviewing) or a video interview (for in-avatar interviewing).

Retention

One of the benefits of using HUDs in a virtual world is that participants can pause surveys and come back to them later (their HUD and data are attached to their unique avatar, allowing this feature). Although allowing participants to leave without losing their data can increase retention, respondents could also leave without returning to the survey, thus increasing breakoffs. As long as the user gives permission, an avatar name can be stored for easy contact should follow-up be necessary. Another benefit of using HUDs for data collection in SL is that surveys can be completed at any time of day, regardless of time zone or geographic location (Bell et al., 2011). This flexibility in administration will assist in respondent retention.

One advantage of in-avatar interviewing is the variety of ways to communicate within the system, which may help increase retention. For example, in a study comparing Skype video interviews and SL avatar interviews, researchers found that audio and video quality could sometimes become an issue. Even so, in instances where extreme audio problems occurred, interviewers and respondents were still able to complete the interview using the chat function in SL or Skype accordingly (Dean, Head, & Swicegood, 2013). Other modes, such as traditional telephone interviewing, have no alternate way of connecting and thus retaining the participant to complete the survey.

Discussion and Conclusion

Before the proliferation of the Internet and mobile devices, interviewer-administered survey options were limited to in person (interviewer completing paper form or computer-assisted personal interview [CAPI]) and telephone. SAQs were limited to paper-and-pencil interviewing in person or by mail, interactive voice response by telephone, and audio computer-assisted self-interview in household settings. The advent of Internet and mobile devices came at a time when survey response rates, especially for telephone surveys, had been declining. In the United States, the past few decades have witnessed this decline because of multiple factors, including over-surveying (both market and government) and a decrease in landline telephone coverage (Pew Research Center for the People and the Press, 2014). Obtaining enough respondents to meet the stipulations of a sampling design requires more resources devoted to nonresponse conversion; however, many funding agencies face significant budget constraints.

Because data collection by interviewers makes up most of the major costs in surveys, moving toward using more SAQs or remote interviewers can reduce cost. The Internet and mobile devices, in particular, have made possible SAQs and remote data collection through web surveys, text messages, mobile apps, and virtual worlds. The plethora of technology options comes at an opportune time—these new interfaces have created possibilities for new survey modes that can achieve cost reduction.

An important consideration when using these technologies is to continue engaging respondents

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without sacrificing quality. Another important consideration is ensuring that most, if not all, of the target population for a study has access to the technology required for participation. When considering these different modes, researchers must consider trade-offs with respect to coverage, engagement, accuracy, burden, and retention. For example:

- **Mobile data collection.** The literature suggests that engagement on mobile devices is not as low compared with computers as may be perceived. However, Peterson and colleagues (2013) found that there might be a possible increase in measurement error on multiple-choice questions (because it was relatively easy for a respondent to make an accidental selection depending on the size of the screen and the tool used for directing it). It must be noted that mobile devices are not used by all individuals, or at the same rate or ways by those who do use them. However, the rate of growth in mobile use has increased rapidly overall in recent years, and it appears it will continue to grow as coverage for more-traditional communication modes (e.g., landline telephones) continues to decline. We agree with the recommendation of Wells et al. (2014) that smartphones can be a comparable device for short and optimized surveys.
- **SMS/IM.** In a study comparing SMS and voice interviewing, researchers surmised that SMS interviews can lead to higher completion rates, greater satisfaction, and more-accurate data despite taking longer to complete (Schober et al., 2013). However, phones without full keyboards require respondents to use multiple button taps to enter letters (Wilt et al., 2011), which could increase their burden and lower retention. SMS may also have limited character length on some phones, in which case, respondents may have to either abbreviate their responses, lowering accuracy, or send multiple messages, increasing burden. Similar concerns and observations regarding coverage mentioned for mobile devices also apply to both SMS and IM.
- **Video interviewing** has the potential to be engaging and accurate because it closely replicates face-to-face interviewing. Using this technology, however, assumes that both the interviewer and respondent are proficient and have equal access. Though burden is low, because interviews may take place without going to a specific location, technical difficulties may be burdensome and result in breakoffs, either accidentally or because of respondent fatigue. The quality of the audio or video components on both the respondent's and interviewer's devices may also affect accuracy.
- **Virtual world.** Theoretically, the accuracy would be similar to that of a web survey (for HUD) or a video interview (for in-avatar interviewing). Surveys can also be completed any time of day, regardless of time zone or geographic location (Bell et al., 2011), decreasing burden. However, virtual world interviews take place online in a space created for virtual interaction with other users or players, and it is possible that distractions from the computer or the respondent's environment (similar to the mobile data collection distractions) can reduce engagement and even retention. Among the modes discussed, virtual worlds likely represent the largest challenge when it comes to coverage. Rates of use for virtual worlds are relatively low, overall, but may potentially increase in the future just as mobile has in recent years.

As demonstrated in the summarized examples above, some modes may be more engaging but possibly less accurate or have lower retention. Other modes may have a high level of accuracy but may be more burdensome. Yet other modes may be engaging and accurate, but may lower the likelihood of retention. The combined impact of engagement, accuracy, burden, and retention may differ depending on the population being studied, but should be taken into consideration as a group of factors and not individually.

In addition, we acknowledge that coverage error is a critical factor in total survey error, and researchers should take into account such error when they choose a survey mode. For example, researchers will need to consider the feasibility of different modes: respondents without access to the Internet cannot participate in the Web-connected modes, which automatically changes a characteristic of the respondent pool. Other respondents may have Internet access, but may not be proficient at

navigating through a web survey or engaging in video interviewing. In addition, some of these modes—such as SMS/IM—have limited utility for lengthy surveys. The level of engagement for these modes cannot be directly compared to other modes that can be used for both brief and lengthy data collection. Nevertheless, this paper serves as a starting point for researchers considering technological options for conducting SAQs or remote interviews to reduce costs while continuing to engage respondents and not sacrificing quality. With advances in technologies and their adoption, survey researchers can now blend the advantages of interviewer- and self-administered modes while mitigating the drawbacks.

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