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Message Board

Classifying Response Behaviors in Web-based Surveys

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Abstract

While traditional survey literature has addressed three possible response behaviors

(unit nonresponse, item nonresponse, and complete response), Web surveys can capture data about a respondent's answering process. Based on this data, at least seven response patterns are observable. This paper describes these seven response patterns in a typology of response behaviors.

Introduction

Surveys are generally characterized by the fact that data may be missing for some units of a sample, either partially, or for all variables. This problem of missing data is generally known as 'Nonresponse', whereby one usually differentiates between unit and item nonresponse (Groves & Couper, 1998). Unit nonresponse refers to the complete loss of a survey unit, while item nonresponse refers to missing responses to individual questions. Nonresponse is of particular importance to researchers because the unknown characteristics and attitudes of non-respondents may cause inaccuracies in the results of the study in question. Thus, past work has assumed the existence of three possible responses to requests for survey participation: unit nonresponse (due to inaccessibility, volitional refusal, or inability to respond), item nonresponse (when surveys are partially completed and returned), and complete response.

With the exception of Web-based surveys, this limited categorization has been necessary, since the process by which a sample member views and answers questions has been, for the most part, a black box. However, in Web surveys, the response process can be traced automatically. Such 'para' or 'meta-data' about the answering process can provide insight into the sequencing and completeness of responses. Such data support the existence of seven possible responses to requests for survey participation. We introduce this typology of response behaviors to explain more fully the potential variations in participation possible in Web-based surveys. We begin with a brief review of the literature on response behaviors, followed by a description of the response classification and an illustration.

Background

Response behaviors in classic survey modes

While the potential bias that may result as a consequence of nonresponse is a well-covered topic in 'classic' survey modes (e.g., mail surveys), there is little explanation of nonresponse itself. Literature tends to explore one of three areas: 1) how to increase response rates (e.g., Claycomb, Porter, & Martin, 2000; Dillman, 2000; Kanuk & Berenson, 1975; Yammarino, Skinner & Childers, 1991; Yu & Cooper, 1983); 2) how to estimate and/or correct for nonresponse bias (e.g., Armstrong & Overton, 1977; Baur, 1947; Bickart & Schmittlein, 1999; Donald, 1960; Ferber, 1948; McBroom,

1988; Pearl & Fairley, 1985; Stinchcombe, Jones & Sheatsley, 1981); and 3) correlates of nonresponse (e.g., Clausen & Ford, 1947; Baur, 1947; Mayer & Pratt, 1966). In the first two cases, the overall goal is the same. During survey design and implementation, increasing response rates decreases nonresponse and, therefore, minimizes nonresponse bias. Both timing and technique can affect response rates and some of the most well-documented methods include the use of a pre-contact and reminder letter as well as the use of incentives, personalization, and sponsorship (Kanuk & Berenson, 1975: Ratneshwar & Stewart, 1990). Following data collection, the presence of nonresponse bias should be estimated and, if necessary, corrected for, in order to increase the generalizability of results (see Armstrong & Overton 1977, Filion, 1975; Viswesvaran, Barrick, & Ones, 1993).

The third area of nonresponse research seeks to understand variations in response behaviors (e.g., Groves, Cialdini, & Couper, 1992; Couper & Rowe, 1996). By comparing characteristics of respondents and nonrespondents, researchers have found common differences. For instance, respondents may be better educated or of a higher socioeconomic status than nonrespondents (Vincent, 1964; Wallace, 1954; Clausen & Ford, 1947). Personality differences may exist (Lubin, Levitt, & Zukerman, 1962). Another common difference identified is the level of interest in the survey topic. Respondents are presumed to have more interest in the topic than nonrespondents (Baur, 1947; Suchman & McCandless, 1940; Mayer & Pratt, 1966; Armstrong & Overton 1977). Groves, Cialdini, and Couper (1992) identified several factors which influence survey participation including societal-level factors, attributes of the survey design, and respondent characteristics. They also noted that for surveys administered by an interviewer, interviewer attributes and the interaction between respondent and interviewer may affect survey participation. Finally, Bickart and Schmittlein (1999, p. 287) illustrate that some respondents display a survey response propensity (an enduring personal characteristic) while nonrespondents may either lack this survey response propensity or may be suffering from survey response fatigue. Yet, we still know relatively little about response behaviors.

Response behaviors in Web surveys

This is particularly true in the case of Web-based surveys. Research on response in Web-based surveys has thus far primarily focused on the task of establishing acceptable levels of response (Smith, 1997; Stanton, 1998; Dillman, et al., 1998) and equivalence of response, as compared to traditional data collection methods (Stanton, 1998; Rietz & Wahl, 1999; see Tuten, Urban, & Bosnjak (in press) for a review). Within the realm of variations on response behaviors, most empirical findings regarding Web surveys focus on design-specific causes of volitionally-controlled drop-out (e.g., Dillman, et al. 1998; Knapp & Heidingsfelder, 1999). A drop-out may be classified as unit nonresponse when it occurs prior to viewing and answering survey questions or as item nonresponse when it occurs after answering some questions.

Based on a summary of nine Web surveys, Knapp and Heidingsfelder (1999) showed that increased drop-out rates can be expected when using open-ended questions or

questions arranged in tables. Dillman et al. (1998) recommended avoiding graphically-complex or ´fancy´ design options. They compared fancy versus plain designs and found higher quit rates when fancy designs were used. This is likely due to the corresponding increase in download time for pages with complex designs.

Dillman (2000) warns of commonly-used techniques in Web surveys that may alienate respondents who are uncomfortable with the Web. The use of pull-down menus, unclear instructions on how to fill out the questionnaire, and the absence of navigational aids may encourage novice Web-users to break off the survey process.

Frick, Baechtinger and Reips (1999) conducted an experiment on the effect of incentives on response. They concluded that the chance to win prizes in a lottery resulted in lower drop-out rates than in those conditions where no prize drawing entry was offered as an incentive. Of particular interest in this context are the opposing findings of an experimental study by Tuten, Bosnjak and Bandilla (2000) which found that the share of unit nonresponders is significantly higher when the chance to win a prize is offered than in cases where altruistic motives for participation are addressed (contribution to scientific research).

Frick, Baechtinger and Reips (1999) also investigated the effect of the order of topics on the amount of dropping-out in a Web survey. In one condition, personal details were requested at the beginning of the investigation (socio-demographic data and e-mail address). In the other condition, these items were positioned at the end of the questionnaire. Surprisingly, drop-outs were significantly lower in the first condition (10.3% versus 17.5%). In other words, when personal data were requested at the beginning, fewer drop-outs occurred. While this is contrary to expectations, it is valuable information for survey design. While one may anticipate drop-out due to personal questions and thereby hold those questions until the end in order to gather as much data as possible prior to drop-out, we can now collect that information early on. This is perhaps due to the common practice of requiring website visitors to register at a website prior to accessing the full site. If web users are becoming accustomed to providing this information, they are less likely to be sensitive to it during a survey.

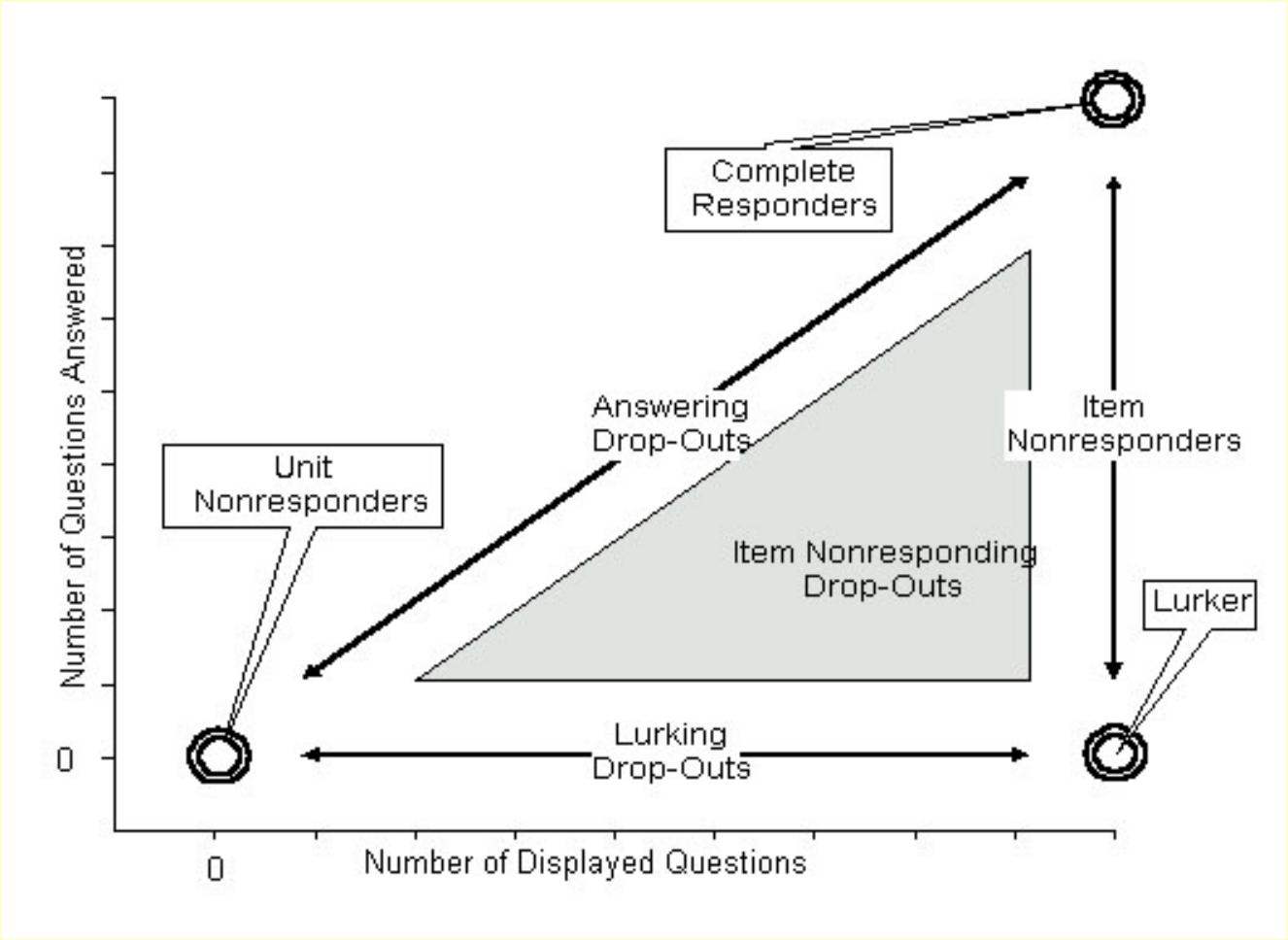
While such studies are useful as we learn how design affects response in Web-based surveys, they leave many questions unanswered. Certainly web survey methodology is still in its infancy. However, the additional information provided when using the Web to collect data (e.g., automatically-generated log files, visitor tracking programs etc.) can provide a valuable insight into understanding nonresponse and response behaviors. It is no longer necessary to view responses to survey requests within the confines of three generic behaviors. The classification of response behaviors proposed herein serves as a descriptive model for operationalizing specific behaviors. It provides a starting point for research seeking to understand various response behaviors and minimize nonresponse.

Classifying Response and Nonresponse Patterns in Web Surveys

In traditional mail surveys, the response process basically remains a mystery. We do not know whether a potential respondent received the questionnaire at all, read it, and began answering it. Such information can hardly be reconstructed afterwards without the aid of a follow-up study. Given this lack of information about the participation process, a survey researcher loses valuable information. If an individual does not return the questionnaire, was it a genuine refusal (i.e., volitionally-controlled) or was some artifact to blame? In both cases, the questionnaire is simply categorized as one with unit nonresponse. If a questionnaire is returned incomplete, we do not know whether the participant chose not to answer the remaining questions purposefully, or if he or she merely dropped out of the process. In either case, the questionnaire is categorized as one with item nonresponse.

One of the substantial advantages of Web surveys, in comparison to mail surveys, is that they can supply para-data, or meta-data, in addition to responses to the substantive questions. There are several methods possible to trace the response process including the use of cgi scripts, java applets, and log files. Regardless of the specific approach used, the data allow the reconstruction of the response process (Batinic & Bosnjak, 1997). In order to log these individual response patterns completely, the following three conditions must be fulfilled: (1) each question must be displayed separately (screen-by-screen design), (2) the participants are not forced to provide an answer before being allowed to move on (non-restricted design), and (3) each page of the questionnaire must be downloaded separately from the server, and should not be allowed to reside in the Web browser's cache (cache passing pages)[1]. If these conditions are fulfilled, the data set containing information on the user´s activities can be used to analyze the completeness and the sequence in which the respondents have processed the questions. Figure 1 illustrates the typical response patterns that can be differentiated.

Figure 1: Types of Response in Web Surveys



In Figure 1, the number of separately displayed questions (abscissa in Figure 1) is set in relation to the number of questions actually answered (ordinate in Figure 1). This graphical representation of observable response patterns allows for a differentiation between the following seven processing types: 1) Complete responders, 2) Unit nonresponders, 3) Answering drop-outs, 4) Lurkers, 5) Lurking drop-outs, 6) Item nonresponders, and 7) Item non-responding drop-outs. Each pattern is described below.

Complete Responders (Segment 1) are those respondents who view all questions and answer all questions. *Unit nonresponders* (Segment 2) are those individuals who do not participate in the survey. There are two possible variations to the unit nonresponder. Such an individual could be technically-hindered from participation, or he or she may purposefully withdraw after the welcome screen is displayed, but prior to viewing any questions. *Answering Drop-Outs* (Segment 3) consist of individuals who provide answers to those questions displayed, but quit prior to completing the survey. *Lurkers* (Segment 4) view all of the questions in the survey, but do not answer any of the questions. *Lurking Drop-Outs* (Segment 5) represent a combination of segments 3 and 4. Such a participant views some of the questions without answering, but also quits the survey prior to reaching the end. *Item nonresponders* (Segment 6) view the entire questionnaire, but only answer some of the questions. *Item non-responding drop-outs* (Segment 7) represent a mixture of segments 3 and 6. Individuals displaying this response behavior view some of the questions, answer

some but not all of the questions viewed, and also quit prior to the end of the survey. In our opinion, this typology of response patterns is a more accurate depiction of actual events in Web surveys than the relatively basic categorization of complete participation, unit nonresponse, or item nonresponse.

Using the traditional categorization of possible response behaviors, some behaviors would be mistakenly categorized. Specifically, Lurkers (segment 4) and Lurking drop-outs (segment 5) would be classified as Unit nonresponders (segment 2). Answering drop-outs (segment 3) and Item non-responding drop-outs (segment 7) would be classified the same as Item nonresponders (segment 6). Only segment 1, Complete responders, remains unaffected by the classification system used. The variations among the segments represent significant differences, particularly when one seeks to understand and possibly change response behaviors.

Petty and Cacioppo (1984, 1986) and Chaiken (1980, 1987) established the importance of motivation, opportunity, and ability in processing messages fully. Specifically, to the degree that an individual is motivated, able, and given the opportunity to process information, he or she will process that message more fully. However, if an individual is unable or if he or she lacks motivation, he or she will process information in a perfunctory manner. Groves, Cialdini, and Couper (1992) explained the value of using this approach for understanding response behaviors. This distinction is equally important in understanding response to web-based surveys.

An individual's motivation to respond (possibly due to an interest in the topic or the desire to comply with a request) explains the difference between someone who views and proceeds through the survey and someone who chooses not to address the survey. However, motivated respondents could still behave in any category except unit nonresponder. It is the three variables of motivation, opportunity, and ability that differentiate between the remaining six categories. That is, respondents may be motivated (and have the opportunity and ability) and so behave as complete responders. They may be motivated to view the survey but not to actually answer (lurkers). They may be lurkers experiencing difficulties (lurking drop-out). Such difficulties could be technical in nature (such as server lag, etc or it may be a lack of ability including a change in one's time constraints). They may be motivated but experience difficulties (answering drop-out). They may be motivated but feel protective of sensitive information and so leave those questions blank (item non-responder). They may be motivated and protective and experience difficulties and so behave as an item nonresponding dropout.

Unit nonresponders are commonly thought of as people who refused to answer (lack of motivation) or are hindered from answering due to a lack of opportunity or ability (they may not have actually received the survey, may not have the time, or may not be able to process the information). Lurkers and Lurking drop-outs, however, are able to respond and are interested enough in the topic to peruse the questions. Yet, they refuse to answer. Lurkers show enough interest to view all questions. Lurking drop-outs either experience technical difficulties in continuing to view the survey or lose

interest during the survey, and so do not view all of the questions.

Item nonresponders are commonly thought of as people who were not comfortable answering certain questions but otherwise completed the survey. They may have felt a question was too personal. In other words, we do not tend to assume that Item nonresponders lack motivation to respond, but rather that the question(s) influenced their response, or lack thereof. Answering drop-outs, however, begin the survey process much like a Complete responder but they drop out prior to completion. These participants may drop-out due to technical difficulties or because they purposefully decide to drop-out. Item non-responding drop-outs begin the survey process like Item nonresponders but also quit prior to the end of the survey. This responder type may be more similar to a Unit nonresponder than to an Item nonresponder.

In Segments 2, 3, 5, and 7 (nonresponse and drop-outs), there is always the possibility of both volitional and non-volitional behaviors. With volitionally-controlled, or intentional nonresponse types, the (potential) respondent decides to what extent he or she will or will not participate in a survey. Technical artifacts, or other external obstacles cause non-volitional nonresponse. In principle, these two classes of causes must be taken into consideration as an explanation in all drop-out types, as well as for unit nonresponse. In Segments 1, 4, and 6, one can assume that all actions are volitionally-controlled due to the evidence that the participants view all questions in the survey.

An Illustration

A Web-based survey was conducted on the topic of “the roles of men and women in family and work life.” The survey questions were arranged according to the design guidelines described above for the identification of different response patterns: (1) each question was displayed separately, (2) participants were not forced to provide answers before allowed to move on, and (3) each page of the Web questionnaire was protected from being cached. Because our goal was to investigate response patterns, no incentive for participation was offered.

Participants were ‚invited‘ to the survey through advertising placed on search engines and Web catalogs (e.g., Yahoo, Altavista, etc.). In total, 1469 people participated in the study. Of those answering demographic questions, 35.4 % were male and 64.6 % female. The mean age in this group was 27.6 years (SD= 8.4 years) and most of the participants were employed (46.5%) or students (34.8%). It is important to note, though, that not all participants are represented in the demographic descriptions. For instance, Lurkers viewed the questions, but did not answer them.

Participants were classified into the appropriate segments by analyzing data from both the automatically-generated log file and data set. Specifically, we tracked the questions viewed and answered for each participant. As anticipated, seven specific

response types were identifiable.

In this study, 25.3% of the participants were Complete responders, 10.2% were Unit nonresponders, and 4.3% were Answering drop-outs. 6.9% of the respondents were Lurkers while 13.3% were Lurking drop-outs. 36% of the participants were Item nonresponders and 4% were Item nonresponding drop-outs.

Discussion

Analysis of the log file and data set confirmed the existence of the seven response types proposed in the model. The existence of these specific types is of particular importance to those seeking to increase response and to minimize nonresponse bias.

Using the traditional categories of complete response, unit nonresponse, and item nonresponse, the study described above would have reported nonresponse at 30.4% with a response rate somewhere between 25.3% and 44.3% (depending upon the degree of unanswered questions in each case). As discussed previously, if using only three response types, Lurkers and Lurking drop-outs are grouped with Unit non-responders. While Unit non-responders and Lurking drop-outs may have experienced technical difficulties, which prevented further participation, it is likely that the three groups differ significantly from each other. If one seeks to minimize nonresponse by encouraging those individuals who are likely to refuse to respond, these differences must be better understood. For instance, given that Lurkers do not experience technical problems and willingly choose to view the entire survey, perhaps it is not lack of interest or motivation that prevents response but some other attitude.

Similarly, using only item nonresponse, unit nonresponse, and complete response as categories, item nonresponse would have been estimated at 44.3% of returned surveys. Using the response typology, we see that 8.3% of the participants answered some questions but dropped out prior to completing the survey. This is an important distinction. The 36% who finished the survey but left missing answers to some questions maintained enough involvement in the survey to complete the activity and did not experience problems completing the survey. However, the Answering drop-outs and Item nonresponding drop-outs either chose to quit or possibly experienced some problem that interrupted the session. If the drop-out was volitionally controlled, we must learn what variables may have affected that decision. This is especially important for Answering drop-outs, as this segment represents individuals who answered all questions up until the decision to quit. Answering drop-outs may be easily converted into Complete responders if we develop an understanding of the reasons behind the choice to end participation.

There are limitations to the classification. First, researchers must meet the three conditions required in the survey design (display each question separately, use a non-restricted design, and download each question separately from the server) in order to

differentiate the segments in the resulting log file and data set. If the design guidelines are not followed, some of the segments will be visible, but not all. Second, and most importantly, the classification system is not able to address differences between someone who chooses to end the survey process and one who drops-out due to non-volitional, technical difficulties. The ability to identify those who purposefully dropped-out versus those who would have continued the survey process is desirable as we seek not only to understand response behaviors but also to increase response rates and to minimize nonresponse bias. At this time, unfortunately, there is little researchers can do to differentiate between volitional and technical drop-outs.

Despite these limitations, the classification provides three key directions for future research: 1) differences in the effectiveness of techniques designed to increase response rates among the segments, 2) the effect of nonresponse bias and techniques for estimating and correcting for nonresponse bias given the variations in types of nonresponse, and 3) understanding the underlying psychology of response - why do people respond to requests for survey participation in these varying ways. Differences in the effectiveness of techniques for improving response may be particularly interesting as past results in mail survey literature have often conflicted. Perhaps such variations in response behaviors can explain contradictions in past research. From a practical standpoint, the classification may be used to provide indications of questionnaire quality during the pre-test stage. Changes can then be made, as appropriate, based on the distribution of response types reflected in the pre-test.

In conclusion, this paper identifies seven distinct response patterns in Web surveys. The patterns are based upon the questions viewed and answered in a Web survey. In our opinion, the typology suggested here is both of practical and theoretical relevance, as it provides a detailed insight into the individual response patterns in Web surveys, and illuminates the previous ‘black box’ model of response patterns.

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Footnotes

1 Various technical implementation methods are available, such as script- based downloading of pages, or integrating specific META tags. The precise technical procedures will not be elaborated upon in the context of this article

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