Chapter 15

Nonresponse in Web Surveys

Vasja Vehovar, Zenel Batagelj, Katja Lozar Manfreda, Metka Zaletel.
University of Ljubljana, Slovenia

This article was originally published in publication: **Groves, R.M., Dillman, D. A., Eltinge, J.L. and Little, R.J.A. (eds.) *Survey nonresponse*. New York: Wiley, 2002 (Wiley series in survey methodology. Wiley series in probability and statistics). ISBN 0-471-39627-3**.

Suggested citation:
Vehovar, V., Batagelj, Z., Lozar Manfreda, K. and Zaletel, M. (2002). Nonresponse in web surveys. In Groves, R.M., Dillman, D. A., Eltinge, J.L. and Little, R.J.A. (eds.), *Survey nonresponse* (229-242). New York: Wiley

15.1 INTRODUCTION

Web questionnaires have been placed on thousands of Web sites and Internet survey panels now include millions of Internet users. In addition, technology continues to improve all aspects of doing Web surveys: standardized software, user-friendly interface, attractive multimedia, merger of technologies (Web, TV, phone, VCR), high speed of transmission, and low access costs. During the next years, increased Internet penetration, massive Web usage, and technological improvements will further expand the application of Web surveys. However, nonresponse to such surveys is a serious problem. Our purpose in this chapter is to discuss the nonresponse process, factors that contribute to its occurrence, and its consequences.

The Web survey mode is based on computer-assisted self-administered questionnaires answered without the presence of the

interviewer. The questionnaires are based on HTML forms usually presented in standard Web browsers, while the responses are immediately transferred through electronic networks, usually the Internet. We further limit our discussion to the basic Web survey mode, where respondents record their answers manually (with a keyboard or a mouse), written questions are the core layout on the screen, there is no on-line interaction (help) with the interviewer, and multimedia is restricted only to illustrate the survey questions.

Our discussion of web surveys draws on an extensive on-line literature base we have compiled (http://surveys.over.net/method). In addition, data are reported from the national project RIS - Research on Internet in Slovenia (RIS, 1996-2000), conducted at the Faculty of Social Sciences, University of Ljubljana since 1996. In particular, we refer to RIS Web surveys in which participants were invited via e-mail solicitation (with two follow-ups) through addresses from the public directory. In 1998, one tenth (n=6,500) of the active Slovenian Internet users participated in the RIS Web survey. Due to a small population (2 million) and moderate Internet penetration (15%) a large post-Web telephone survey (n=10,000 households) enabled a study to be done of the units that were aware of the Web survey but did not participate.

15.2 NONRESPONSE PROCESS IN WEB SURVEYS

Nonresponse occurs across several stages of the Web survey process. In Figure 15.1 we outline the key steps of involvement and the corresponding groups of participants that also form the basis for calculations of nonresponse indicators.

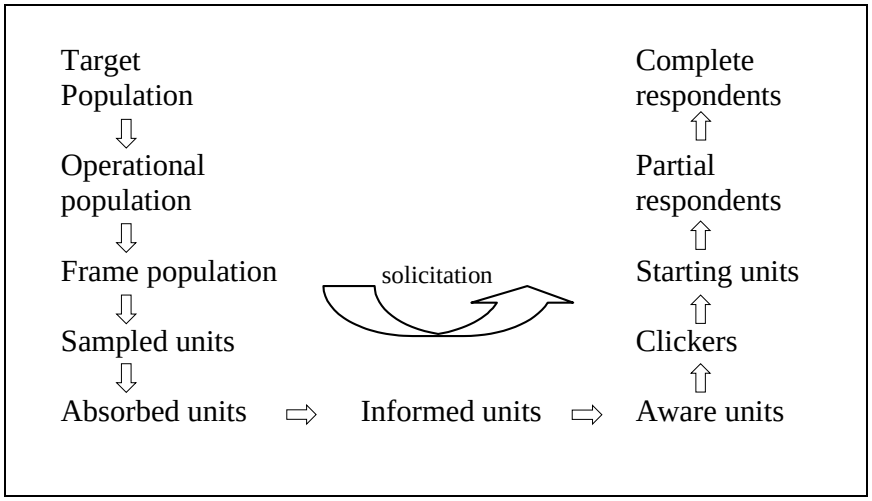

Figure 15.1: Involvement in a Web survey

In Web surveys the target population often differs dramatically from the operational population. In the general population those who actually access the Web usually represent only a minor part of the target population. Many of those who can connect to the web do not actually use it. In the U.S., for example out of around 100 million Internet users only 40% actually accessed the Web from home in the month of July 1999 (http://www.nielsen-netratings.com).

The frame population refers to the units that can actually be reached. Typically, when e-mail is used, the frame is further restricted to e-mail users. In Slovenia, for example, as of January 2000, only 60% of monthly Internet users possessed a personal e-mail address. In addition, frames of e-mail addresses are rare and incomplete and a quarter of Internet users explicitly rejected being included in these frames (Batagelj and Vehovar, 1998). This percentage is similar to the customers of e–commerce Web sites who will not reveal their e-mail address (Enander and Sajti, 1999).

When e-mail is used, incorrect spellings – which usually survive postal delivery - are fatal. Together with changed, multiple, or fictitious, addresses (Comley, 1996), the percentage of messages that are immediately returned is usually high, particularly when the e-mail address list has not been edited. Even when users (respondents) type the e-mail address (i.e., e-commerce customers), at least 10% of the e-mails are returned (Flemming and Sonner, 1999, Enander and Sajti, 1999), but this figure can be as high as 35% (Comley, 1996) or even more when less accurate frames are applied.

However, not all wrong addresses are returned to the sender; some are absorbed by the network together with the correct ones. The informed units are those that actually receive the e-mail message. The exact proportion of absorbed but lost e-mails is extremely difficult to calculate. In a highly controlled e-mail solicited Web survey (Enander and Sajti, 1999) the post-Web telephone survey revealed that 7% of the sampled units claimed they had not received the invitation and an additional 28% were not sure about receiving it.

The informed units may remain unaware of the invitation for a variety of reasons and only the aware units can decide whether to participate in the survey or not. This group - although difficult to measure - is the base for the calculation of cooperation rates, the percentage of respondents among eligible and contacted sample units

(Groves and Couper, 1998). In the above-mentioned study of e-commerce customers this rate was between 51% and 76% (Enander and Sajti, 1999), while in the RIS 98 Web survey this percentage was estimated at 39%.

Among the aware units, only the clickers actually try to locate the Web survey page. In the RIS 98 Web survey this rate was 44% (among aware units) which is relatively high. The highest reported click-through rate among contacted units was 76% (Dillman, 2000: 374) in a study of customers where telephone was used for the initial contact, e-mail for reminders and a two dollar incentive was sent by mail.

However, not all clickers proceed to the survey questions. Only the starting units do; others may not be persuaded by the invitation, or may have gained access with no intention of responding. In addition, some potential respondents observe the survey questions without answering, or, they start answering but then stop. To distinguish partial respondents from nonrespondents, the completion of an initial block of questions is usually required. Of course, the complete respondents must, in addition to finishing the questionnaire, successfully perform the submission procedure.

Partial response refers to the percentage of respondents who complete only a portion of the questionnaire among all respondents (partial and complete). It is alternatively expressed as attrition rate (Kehoe and Pitkow, 1996), failure rate (Jeavons and Bayer, 1997) or drop-off rate (Kottler, 1997a, 1997b). Partial response depends on a variety of factors and can vary from 5% for a survey of users who previously (in a screening questionnaire) agreed to participate (Kottler, 1997a) to 37% (Batagelj et al., 1998) for a long and complex questionnaire.

We can conclude that the stages of the nonresponse process in Web surveys are relatively complex. The corresponding indicators are undeveloped and are lacking standardization. The same holds true for optimal design strategies; therefore, we do not really know whether the proper approach was undertaken. As a consequence, the available research exhibits low values and extreme variation in response rates, e.g., the percentage of completed questionnaires among all eligible units included in the sample.

The reported response rates in e-mail solicited Web surveys are below 50% in the vast majority of available studies. In addition, in telephone-recruited and e-mail-solicited Web surveys the overall response rate hardly reaches 30% (Comley, 1997, 1998; Flemming and Sonner, 1999; Hollis, 1999), regardless of the context. Even in the RIS 98 Web survey - with three e-mail invitations applied in a standard TDM pattern (but no incentives) - the response rate was 39%, which can be compared to a related RIS telephone survey response rate of 70%. Similar results were observed in a survey of e-commerce customers (Enander and Sajti, 1999).

15.3 PARTICIPATION IN WEB SURVEYS

In general, the basic features determining survey cooperation (characteristics of respondents, social/technical environment, and survey design) play a role in Web surveys as well. However, some differences exist (Figure 15.2) compared to conventional (face-to-face, telephone, mail) household and establishment surveys.

15.3.1 Social and Technological Environment

The social environment affects participation in Web surveys indirectly, through general economic development, telecommunication policy, educational system, technological tradition, etc. In some countries (e.g., Slovenia and the UK) school children are provided free e-mail addresses, which may impact their participation. Similarly, advanced Internet adoption, as in the US or Scandinavia, increases the potential for cooperation in Web surveys. A general survey climate (Groves and Couper, 1989), perception of direct marketing, legitimacy of surveys and their sponsors, data protection scandals, and opinion leaders, also influence participation. In addition, an Internet-specific social exchange climate may exist. For example, in the early years of Internet adoption, a sense of comradery existed among Internet users, which could help participation in Web surveys.

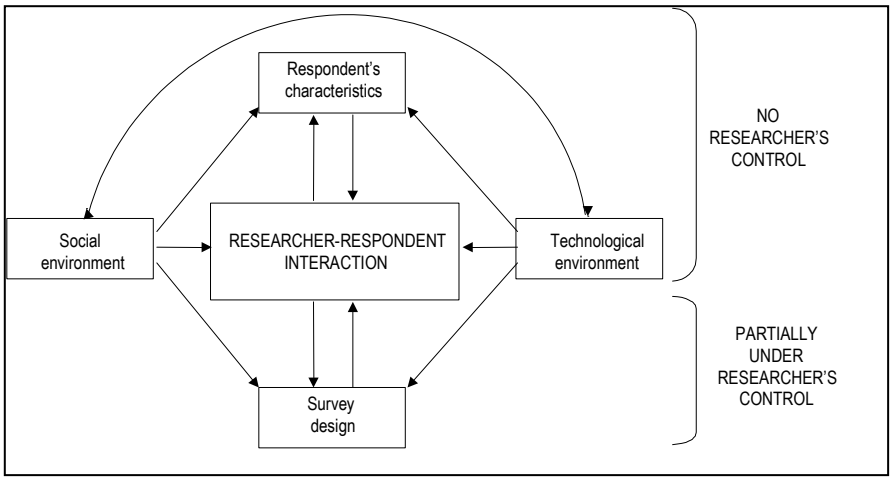

Figure 15.2: Participation in Web surveys

Legal regulations are also of extreme importance. In some countries strict laws exist regarding incentives (Eichman, 1999), or, privacy regulations require encryption technologies (Clayton and Werking, 1998). Internet users are also increasingly reluctant to reveal personal information if conditions of its use are not clearly specified (Pitkow and Kehoe, 1997). However, evidence exists that respondents to computer-assisted modes of surveying are less critical about privacy compared to paper-and-pen interviews (Beckenbach, 1995; de Leeuw and Nicholls, 1996; Weisband and Kiesler, 1996). With Web surveys these attitudes may change, because of the lack of Internet privacy laws (Clayton and Werking, 1998).

The attitude towards spamming, e.g., unsolicited commercial e-mail messages, is also extremely important in e-mail-solicited Web surveys. Though an invitation to participate in a Web survey is not considered spamming, it is unclear how respondents may perceive it. Currently, spam regulations in the European Union (Banks, 1998) and in the US Congress (Everett-Church, 1999a, 1999b) have no direct restrictions on e-mail survey solicitation, other than the explicit right to opt-out of the list. Professional standards (ESOMAR, 1997, 1998; ARF, 1999) also allow for unsolicited e-mail invitations, but encourages that they be minimized. Nevertheless, anti-spam activities on the Web

(Everett-Church, 1999a, 1999b; Rickard, 1999) are extremely inconvenient. The same is true also for the ISP's restrictions on the number of e-mails delivered from a single address (Banks, 1998; Sheehan and Hoy, 1999). Due to these difficulties even market researchers recognize that for a Web survey you need a panel of Internet users who previously agreed to participate (Nadilo, 1999).

Of course, attitudes about unsolicited e-mail vary considerably from country to country. In the early stages of Internet penetration with limited commercial activities on the Web, as in Slovenia in 1998, only a minority of Web users regularly received spammed messages. Similarly, in the RIS 1998 Web survey, out of 19,000 units from the public e-mail directory that received an invitation, only 1% clicked the option to be removed from the list. However, the RIS telephone survey in 1999 showed that only a half of the Internet users regarded an e-mail invitation as an appropriate tool in Web surveys.

The social environment interacts intensively with the technological environment. General telecommunication and information infrastructure is especially critical for successful implementation of Web surveys. Across countries considerable differences can be observed with respect to Internet penetration, which has, by the year 2000, surpassed 50% of the active population only in a few developed countries such as the US, Canada and Scandinavian countries. In general, the developed world had reached 20-30% penetration rate by the year 2000, but in some of the largest countries (China, Russia, India, etc.) as well as in the remaining developing countries penetration was well below 10% (http://www.nua.ie).

Low quality Internet networks may be an important limitation. For example, a joint Slovenian-Russian research (RINE, 1998) had to adapt a Web questionnaire to an e-mail version due to the limitations of the Web usage in Russia. High costs of Internet access in countries without a flat Internet or telephone access fee can interfere with participation. The local telephone charges per hour (typically, between one and two US dollars) that are in addition to the ISP monthly fee are not negligible.

15.3.2 Respondent's Characteristics

Response rates to surveys usually vary across social-demographic categories, survey experience, interest in the survey topic, and other

attitudes. In addition, with Web surveys, computer literacy and one's orientation towards computer use also become extremely important.

Social-demographic characteristics

The intensity of computer and Internet usage is the most important predictor of cooperation in a Web survey, even when observed within the social-demographic categories defined by age, gender, education and income (Kehoe and Pitkow, 1996; Batagelj and Vehovar, 1998, 1999; Vehovar et al., 1999). Of course, when computer orientation is not controlled, it appears that the usual characteristics of Internet usage also determine the participation in Web surveys: respondents are younger, educated, richer and male (Batagelj and Vehovar, 1998; Flemming and Sonner, 1999; GVU, 1994-1999).

	General population	Internet users (general)	Non-respondents	Partial respondents	Complete respondents
Data source	Statistical office	RIS phone survey	RIS phone survey	RIS Web survey	RIS Web survey
% women	53	40	40	27	18
Average age	42	32	32	30	30
% with some university education	11	38	39	47	49
% speaking English well or fluently	56	63	57	85	90
% of weekly users	/	69	70	94	98
Average number of years of Internet use	/	1.6	1.6	2.1	2.7
% of users reading computer magazines	/	25	23	40	48
% cooperated in previous RIS Web surveys	/	/	12	18	26

Table 15.1. Characteristics of participants in the RIS 98 Web survey

As a typical illustration we can observe the RIS 98 Web survey where characteristics of e-mail-solicited nonrespondents were analyzed in the post-Web telephone survey. The features determining computer and Internet usage were almost linearly related to the involvement in the

survey (Table 15.1). The Pew Research (Flemming and Sonner, 1999) confirms these findings. Of course, with increased Internet penetration the above difference are becoming less radical.

Attitudes and other psychological predispositions

A positive attitude towards survey participation in general (measured by participation in previous surveys) increases the chances for completing a Web survey (Gonier, 1999; PR Newswire, 1998). In addition, persons not willing to participate in traditional surveys may still participate in Web surveys (PR Newswire, 1998). In particular, younger males, a traditionally difficult group from which to obtain response, have positive attitudes towards the participation in these surveys (Balden, 1999).

In general, respondents like computer-assisted self-interviewing (Beckenbach, 1995; Witt and Bernstein, 1992; Zandan and Frost, 1989) and Web survey designers have enormous potential for increasing the fun and satisfaction of some respondents. Research has already shown that specific design features significantly impact the satisfaction (Batagelj et al., 1998). However, a novelty effect (de Leeuw and Nicholls, 1996; Pilon and Craig, 1988) may also be present that will diminish with time. Some researchers (Onyshekvych and McIndoe, 1999; Venter and Prinsloo, 1999) are already warning that the willingness to participate in Web surveys is declining because of respondents being over-surveyed.

In general, survey participation depends strongly on the survey topic, its salience and the respondent's involvement (Clausen and Ford, 1947; Franzen and Lazarsfeld, 1945; Groves and Couper, 1998; Jansen, 1985; Kojetin et al., 1993; Martin, 1994; Pearl and Fairley, 1985; Roeher, 1963). For Web surveys in particular, intensive users with strong attitudes toward Internet issues are more likely to participate in Internet use surveys (Findlater and Kottler, 1998). Similarly, satisfied customers are more likely to participate in customer satisfaction Web surveys (Enander and Sajti, 1999) and more involved e-commerce users are more likely to participate in Web surveys on e-commerce (Elder, 1999). On the other hand, a strong aversion to certain topics (e.g., pharmacy, politics) unrelated to the Internet has been observed (Batagelj and Vehovar, 1999).

Respondent's technical equipment

The respondent's technical equipment affects Web survey participation. For certain Web surveys only the technologically advanced users with the latest version of browser, higher speed of Internet access, better PC platform and monitor can participate. Similarly, for e-mail-solicited surveys it has been reported that the users with e-mail software enabling "click-able" URL addresses are more likely to participate (Chisholm, 1998). Inadequate equipment also makes the Web survey longer, unpleasant, difficult or even impossible (Batagelj and Vehovar, 1999; Batagelj et al., 1998; Dillman, 1998, 2000; Dillman et al., 1998; Kehoe and Pitkow, 1996; Nichols and Sedivi, 1998; Sheehan and Hoy, 1999; Smith, 1997). On the other hand, advanced e-mail software or firewall protections may prevent receiving messages from unknown sources.

15.3.3 Design of a Web Survey

Invitation to a Web survey

An e-mail invitation to participate in a survey clearly has cost and time advantages over the telephone, mail, fax, or personal invitations. In addition, it provides easy access to Web questionnaires. On the other hand, an e-mail invitation is less noticeable than other types and it is also extremely sensitive to typing errors and changes in addresses. In addition, it is often perceived as commercial spam, particularly when the information in the head of the message (lines 'From', 'To', 'Subject') is unclear. The e-mail headline is therefore extremely important in order to catch the attention and encourage participation (Coomber, 1997; Tuten, 1997). A prenotice e-mail has been suggested (Comley, 1996; Sheehan, and Hoy, 1999; Venter and Prinsloo, 1999), but may generate high pre-survey refusal rates (Sheehan and Hoy, 1999). Some other features of e-mail invitations that have been shown to have a positive impact on participation are the sponsoring organization (Woodall, 1998) and personalization (Nadler and Henning, 1998).

RDD telephone surveys are sometimes used to solicit e-mail addresses for web surveys (Farmer, 1998; Flemming and Sonner, 1999; Hollis, 1999). However, in RIS telephone surveys only 65% of the respondents with e-mail address were willing to reveal it. In the US, the corresponding percentages in the Pew research telephone recruiting survey (Flemming and Sonner, 1999) was much lower (36%). The same

was found to be true for commercial surveys in the US where incentives were applied (Hollis, 1999).

Follow-ups

Follow-ups improve response to web surveys, just as they also do for personal, telephone, and mail surveys (Dillman, 1978, 1991; Dillman et al., 1974; Goyder, 1985, 1987; Heberlein and Baumgartner, 1978; Kanuk and Berenson, 1975; Scott, 1961), as well as e-mail surveys (Mavis and Brocato, 1998; Mehta and Sivadas, 1995; Schaefer and Dillman, 1998; Sheehan and Hoy, 1999). Evidence exists that e-mail reminders contribute up to one third of the final sample size (Batagelj and Vehovar, 1998; Enander and Sajti, 1999; Flemming and Sonner, 1999). In addition, follow-ups contribute to a more representative sample since late respondents often differ from early respondents (Batagelj and Vehovar, 1998; Willke et al., 1999).

Usually, the majority of responses in Web surveys are received within the first few days of the data collection period (Balden, 1999; Batagelj and Vehovar, 1998; Comley, 1996, 1998; Enander and Sajti, 1999; Flemming and Sonner, 1999; Kottler, 1998; Venter and Prinsloo, 1999; Willke et al., 1999). This suggests that, in comparison to traditional mail surveys, shortening the time intervals between follow-ups (Dillman, 1978) may contribute to more effective follow-up strategies (Schaefer and Dillman, 1998).

Incentives

Incentives have proved to be an efficient way of increasing response rates in mail, telephone and personal surveys (Dillman, 1991; Lankford et al., 1995; Shettle and Mooney, 1999, see also Chapter 11). For Web surveys the research findings vary from low impact of incentives (Enander and Sajti, 1999) to a prevailing positive effect on the response rate (Venter and Prinsloo, 1999; Woodall, 1998).

Of course, the respondents attracted by incentives may differ in their characteristics (Enander and Sajti, 1999). Incentives can cause people to ponder the respondent burden with the final consequence being nonresponse (Groves and Couper, 1998). They can also stimulate respondents to answer more than once when access is not controlled

(Batagelj and Vehovar, 1998) or produce biased responses (Chisholm, 1998).

Research organization

Name of the sponsoring organization is becoming extremely important to participation. This trend is additionally reinforced with the increased concern for privacy. In the RIS Web surveys, loyalty measured by participation in previous RIS surveys is one of the most important determinants of participation (Batagelj and Vehovar, 1999).

Length of data collection period

A prolonged data collection period has only a limited impact on the number of responses, even in unsolicited Web surveys. For example, in the self-recruited (unsolicited) part of the RIS 97 survey only 13% of responses were received in the last 10 (of the 40) days of the data collection period (Batagelj and Vehovar, 1998). However, more women, older users and new users responded in this period, suggesting that an extended data collection period brings respondent characteristics closer to those of the target population.

Questionnaire design

The design of a Web questionnaire has a limited impact on the initial decision to participate in a Web survey but is strongly related to partial nonresponse, item nonresponse and data quality. In general, computer based surveys have a positive effect on item nonresponse and data quality (Saris, 1998). On the other hand, the role of advanced technological features, such as intensive use of graphics, images, animations, cookies, and links to other web pages, is much more ambiguous. In addition, even some crucial features of Web questionnaire design are still waiting for a comprehensive evaluation of their role.

One page vs. multiple pages design. Both alternatives, the whole questionnaire on one scrolling HTML page or a questionnaire divided to several HTML pages have certain advantages and disadvantages (Clayton and Werking, 1998; Dillman, 2000; Farmer, 1998; Kottler, 1997b; Spain, 1998; Vehovar and Batagelj, 1996). Item nonresponse may be greater when one page is used, unless advanced Java-applets and Java Scripts are applied. However, increased download times and lack of

browser support may prevent their application. On the other hand, the responding time and the danger of abandoning the questionnaire are potentially higher with multiple page designs. There is also evidence of no difference in the partial nonresponse rates for the two designs in a relatively short questionnaire (7 minutes), although the completion time is 30% longer for multiple page design (Vehovar and Batagelj, 1996). On the other hand, use of an extreme one-question-per-page design in the RIS 98 Web survey resulted in strong complaints (Batagelj et al., 1998). Different results were reported by Zukerberg et al. (1999); no differences were observed in either the questionnaire completion time or the respondents' satisfaction. That may have been due in part to the laboratory conditions of this experiment.

Advanced graphics. Advanced graphics may improve the respondents' motivation, and generate a precious feeling of having "fun" while answering a Web questionnaire. However, the potential for negative effects from technological limitations, distraction of respondents and biased answers must be taken into account. An experimental study of two questionnaire designs--fancy and plain one--(Dillman, 2000) provides an important warning about the extensive use of graphics. Respondents to the plain version, which required only one-third the computer memory of the fancy version, completed more pages, more write-in boxes, were less likely to drop out, spent less time, and were less likely to have to return to the questionnaire in order to complete it. Similarly, the graphical aids (logotypes) used in measuring Web pages visitation in the RIS 98 Web survey increased the percentage of respondents abandoning the survey in that block of questions from 0.5% when no logotypes were used to 4% when logotypes were used (Lozar Manfreda et al., 1999). The graphical version was especially a problem for respondents with older versions of browsers and those answering from dial-up access.

Progress indicator. Graphical symbols, for example a "progress bar" that shows the proportion of questionnaire so far completed, conveys an important sense of orientation in the questionnaire completion process. When missing this was one of the most frequent complaints (Batagelj et al., 1998). In addition, its application may slightly increase the response rate (Couper et al., 1999) without any other consequence on the data quality and item nonresponse. On the other hand, in lengthy surveys, the progress indicator may remind people

of the length and cause them to abandon the survey prematurely. In certain circumstances it may also increase the download times of each page (Couper et al., 1999).

Quality-check reminders. The extent of edit control is one of the crucial design issues for which a definitive research answer has not yet been obtained. In principle, forcing respondents to answer questions properly can prevent any item nonresponse or inconsistent response. However, besides known (but disappearing) technical difficulties with Java Script applications, the respondent's frustration associated with these requirements is likely to lead to premature terminations (Dillman, 2000; Dillman et al., 1998; Zukerberg et al., 1999). Soft reminders that allow the respondent to proceed, even when the error is not corrected, seem a reasonable alternative to hard (forced) corrections (Zukerberg et al., 1999).

Questionnaire length. In general, shorter questionnaires achieve higher response (Dillman et al., 1994; Groves and Couper, 1998) and we can expect similar results for Web surveys. In the RIS Web surveys respondents had no problems in answering a twelve-minute questionnaire, but a 20-minute questionnaire was a problem (Batagelj and Vehovar, 1999). The research organization InfoTek found that questionnaires which take more than 15 minutes to complete have a very high probability of some questions not being answered or the questionnaire being abandoned prematurely (Farmer, 1998). On the other hand, questionnaire lasting more than 40-minutes have been reported as effective (Wydra, 1999).

Mixed-mode environment

The solicitation procedures in Web surveys often introduce certain aspects of a mixed-mode approach. More and more often sample units are being offered the option of answering questions by a different mode The Web survey option helps target segments that are difficult to reach with other modes and increases response rates through offering an alternative survey option.

The mixing of modes used for solicitation and response makes the mixed-mode environment extremely complex. This is particularly true for the context, in which the respondent selects the preferred survey option. In some circumstances they prefer the Web to the paper questionnaire (Chisholm, 1998), and in others the opposite is true

(Vehovar et al., 2000). Nevertheless, evidence exists that a Web option increases the response rate in mail/Web surveys of the general population (Comley, 1996), in establishment surveys (Vehovar et al., 2000), and also in Web/telephone surveys (Onyshekvych, 1999).

15.4 VALIDATION PROBLEM

Web surveys have been used extensively only since the mid-1990s (GVU, 1994). However, conducting them has already became a profitable industry, with a code of ethics (ESOMAR, 1997, 1998; ARF, 1999), tens of software packages and hundreds of research papers (RIS, 1999-2000). Despite this, an impression exists that Web surveys are still a questionable survey mode. This is often stated as a "validation problem" (Bruzzone, 1999; Hollis, 1999; Kottler, 1998; Nadilo, 1999) and is based on the discrepancies arising from comparisons of the results of Web surveys with parallel (control) surveys performed by traditional modes.

However, in probability Web surveys, or in controlled experiments, the available research shows no significant differences between Web surveys and e-mail (Chisholm, 1998), telephone (Gonier, 1999; Terhanian and Black, 1999), mail (Gonier, 1999), or mall intercept surveys (Gonier, 1999; Nadilo, 1999; Willke et al., 1999). On occasions minor differences are observed, such as the inclination of Web respondents towards more extreme responses (Findlater and Kottler, 1998; Gonier, 1999; Wydra, 1999), more "don't know" answers and a higher recognition of ads (Hollis, 1999). The Web survey mode itself is therefore a valid survey mode, which has already been demonstrated for other types of self-administered computer surveys (Saris, 1998). The threat to validity thus arises only from nonresponse and noncoverage problems, particularly in nonprobability Web surveys, which are, unfortunately, quite common. As a consequence, Web surveys are often automatically associated with the validation issues in nonprobability Web surveys, although this is nothing but the usual problem of statistical inference without scientific/probability sampling (Hollis, 1999). What makes the issue of nonprobability samples so fresh and unique with Web surveys is only the temptation to ignore inferential

limitations, because fast, reliable (at the respondents' level) and cheap data can be collected so easily.

In this context, Web surveys are often mentioned as a "replacement technology" (Black, 1998; Hollis, 1999) in the sense that Web surveys replace telephone ones similarly as telephone surveys replaced face-to-face surveys in the 1970s. However, such replacement should be restricted only to the probability Web surveys replacing other probability surveys, or nonprobability Web surveys replacing other nonprobability surveys. Nevertheless, an implicit claim exists that the nonprobability (panel) Web surveys could replace also the probability telephone surveys of the general population (Black, 1998; Comley 1996; Kottler, 1997a, 1997b; Nadilo, 1999; Spaeth, 1999). In principle, this is extremely questionable as the actual Web coverage rates are much lower than telephone coverage rates at the time of replacing the face-to-face surveys 20 years ago. In addition, the reported nonresponse rates are usually twice as high in Web surveys compared to telephone surveys, not to mention that Web surveys have no sampling frame comparable to the RDD frame used for the telephone surveys.

On the other hand, there is an evidence that nonprobability (panel) Web surveys perform relatively well even in the case of election predictions for the general population (Comley, 1997; Terhanian and Black, 1999). This success can be partially explained with the robustness of the variables and with the advanced selection and modeling/adjustment techniques. Nevertheless, this poses the question of why pay for expensive probability samples when high response rates, adequate sampling frames and probability samples may not be needed. There is no doubt that further success of nonprobability (panel) Web surveys would seriously alter professional standards as well as the role of probability samples and nonresponse issues in survey research.

Of course, there is also much evidence which points to the fact that, even after adjustment (i.e. weighting), considerable discrepancies among estimates from Web and telephone surveys remain (Batagelj and Vehovar, 1999; Elder, 1999; Flemming and Sonner, 1999; Gates and Helton, 1998; Vehovar et al., 1999). Kish's (1998) comment that nonprobability samples "can be correct for the majority of variables, but sometimes they are painfully wrong", provides another context for understanding the relative success of certain nonprobability Web survey panels.

To summarize, the so-called validation problem of Web surveys relates only to the eternal quest for replacing inconvenient probability surveys with convenient nonprobability ones. Nonprobability Web surveys bring nothing new to this problem except the massive usage arising from convenience, speed and costs. On the other hand, however, it seems that with sophisticated Web survey panels the above quest might come a small step closer to its aim.

15.5 CONCLUSIONS

The nonresponse process in Web surveys is much more complex than for other survey modes. First, technology emerges as an additional factor that interacts with other features at the respondent, at the society and at the survey organization level. Second, the technological changes are occurring extremely fast, which permanently complicates a whole array of issues. Third, the very nature of the Web survey mode often introduces components of mixed-mode surveys at the solicitation as well as at the responding stage.

We can conclude that at the end of the millennium the available evidence shows relatively low response rates in Web surveys. This may be due to limited Internet penetration, to the technology supporting only the basic Web survey mode or, more likely, to relatively undeveloped Web survey solicitation techniques. In addition, the probability Web surveys are currently limited only to special populations and to certain mixed-mode studies.

With respect to nonprobability Web surveys and Web surveys with extremely low response rates we can observe some promising results arising from advanced selection and adjustment/modeling techniques. An alternative approach that gives legitimacy to these surveys is the context of qualitative research, which is a legitimate instrument not conditioned with statistical inference issues and nonresponse problems. Web surveys can be thus applied as a preliminary qualitative method in a quantitative study or a follow-up qualitative method in quantitative research (Morgan, 1998).

The future expansion of the Web surveys can be observed in the light of transforming all computer-assisted survey modes to the Web (Comley, 1998; Onyshekvych and McIndoe, 1999). The self-administered Web option now presents the third stage -- after computer

assisted telephone and personal interviews -- in the evolution to the computerized survey industry (Baker, 1998). In addition, data input and survey management of other survey modes also converge to automated computer processes performed on the Web. This perhaps presents the final integration step in the computer-assisted collection of survey information. However, interactive and multimedia help from the interviewer may also appear in the near future and radically change the prevailing self-administered trends.

In the future of nonresponse research in Web surveys, the following areas need special attention:

- Solicitation strategies. The existing comparisons of response rates with other survey modes may be unfair to the Web surveys, as we do not know the proper strategy to attract cooperation. The mode of the contacts, their combination, the frequency and intervals of follow-ups thus needs to be studied.
- Incentives. Research on incentives (type, elasticity, combinations) is extremely important, as they seem to play a crucial role in providing sufficient cooperation in Web surveys.
- Questionnaire design. Some key features still wait for an answer: one scrolling page vs. multiple page design, forced reminders and checking controls, the role of the graphic, and the design/implementation of instructions. All these aspect have to be observed in a broader context of data quality.
- Respondents' satisfaction. The factors that increase the satisfaction are extremely important because of the growing role of the research organization's brand for conducting Web surveys.
- Confidentiality issues. The identification procedures (password, cookies, and automatic identifiers) are critical for cooperation, particularly in the context of anonymity and confidentiality.
- Survey participation. Understanding the participation in different stages of the Web survey process may lead to efficient post-survey adjustment.
- Costs and errors in the mixed-mode environment. The low costs and high nonobservation errors of the Web surveys force us to introduce mixed-mode surveys, so explicit models for the costs and errors are needed for these complex settings.