Optimal Contact Strategy in a Mail and Web Mixed Mode Survey

Anders Holmberg¹, Boris Lorenc¹, Peter Werner¹
¹Statistics Sweden, e-mail: name.surname@scb.se

Abstract

Statistics producers are increasingly using the web as a mode of data collection. The motives to offer a web alternative lie in data quality and financial considerations. Nevertheless, a disappointingly low proportion of respondents in mixed mode mail and web surveys carried out by for instance Statistics Sweden uses the web as the mode of choice for providing data. Preliminary results (Holmberg and Lorenc 2008) indicated that participants are inclined to select the mode that is immediately at hand, which—in the standard contact strategy applied by Statistics Sweden—is the paper questionnaire. Previous research (Werner 2005) also indicated that simply not including the paper questionnaire in the initial mailout in such a contact strategy may achieve a considerably higher proportion of web responses.

With the aim of validating the preliminary results, we conducted a large-scale experiment embedded in a survey, where we varied timing and order of providing the sample with the two response modes (i.e. varied the contact strategies). In the standard approach, both the paper questionnaire and login data for the web survey were included in the initial mailout. In the alternative strategies, presentation of the paper or the web response option was delayed to one of the three later stages of the field work.

Web response rate of the standard approach, 15%, was exceeded substantially by all but one of the experimental conditions, reaching 65% in the most “web-intensive” alternative strategy, showing potential for considerable increase in proportion of web respondents. Suppression of the mail response mode did have just a minor disturbing effect on the over-all response rate, decreasing it by at the most about 4%.

Keywords: Embedded experiment, Web response rate.

1. Introduction

1.1 Promises of the digital data collection modes

It is generally held that computer-aided data collection methods (CATI, CAPI, Web, etc) offer data quality advantages over their non-digital counterparts. Higher level of standardization of the data collection process, capability of building in on-line data editing in conjunction with data entry, elimination of some of the processing steps (e.g. scanning), and capability to collect larger amounts of more detailed paradata are among the commonly mentioned advantages (Couper 1998, Heerwegh 2003, Couper...
and Lyberg 2005, and the review in de Leeuw 2008). Thus, it is generally seen as desirable to transfer the data collection processes to a digital alternative.

When the technical platform for a digital alternative is to be provided by the respondent, as for instance in web surveys—where it actually may happen that the respondent can not provide the required equipment—then mixed mode surveys are an option. At a cost of running a more complex survey operation, the advantages of the digital data collection process are applicable to the part of the sample that has access to the equipment and approves the data collection mode, while for the rest of the sample the alternative modes are used. Another situation where mixed mode is chosen is for tailoring the data collection to specific needs of different subsets of the sample, in striving to facilitate participation in the survey thereby reducing nonresponse, reducing response burden, and so on.

Many statistics producers have been adopting, over the past decade, digital data collection methods in single or mixed mode set-ups. At Statistics Sweden, for instance, it is more and more common in self-administered social surveys (i.e. surveys of individuals or households) to offer the web as an alternative to the ordinary mail questionnaire. Given the published values for home access to the Internet in Sweden in the range of about 75-80% for the general population (Findahl 2007; Holmberg and Weibull 2007; Statistics Sweden 2007), one would expect that the web alternative to the mail questionnaire is well accepted.

1.2 Dissatisfying results of the standard contact strategy

Nevertheless, in surveys where the web mode was offered as an alternative, its use has been disappointingly low: at Statistics Sweden, usually between 10 and 15 percent of the respondents are using it. Given the quality advantages, the economic investment put in providing this alternative, and the increased cost of running a more complex survey, it is reasonable to consider ways of raising this percentage so as to achieve some return on the investment.

To better understand the situation that faces a participant when choosing a data collection mode in the current study, we present now the standard mixed mode mail and web contact strategy (i.e. timing and order of providing the response modes) as conducted by Statistics Sweden.

The material for the mail mode part of this mixed mode strategy is first sent out in an envelope containing at least: (i) the questionnaire, (ii) an invitation letter tailored to the particular survey with the aim of motivating the recipient to participate, and (iii) the return envelope. In some surveys, also (iv) a separate leaflet or booklet containing instructions is enclosed. Usually no pre-notification letter is sent, but there is a reminder letter sent approximately 10 days after the initial mailout. Possibly there would be additional mailouts of either the complete package (i)-(iv) or just of a reminder.

Adding the web mode to the above contact strategy is at Statistics Sweden implemented by adding (v) an additional leaflet in the envelope, informing the recipient that participating in the survey may also be done on-line. An URL to the server and a unique user name and password are provided in this leaflet.
The material (i)-(v) obviously provides a ‘novice’ recipient with a substantial amount of information to read and understand.

1.3 Preparatory studies

1.3.1 Determinants of the response mode

Holmberg and Lorenc (2008) did a telephone follow-up in a mixed mode mail and web survey. After the field work of a survey concerning entrance of academics into the labour force ended, the sample was divided—given the observed response behaviour—into nonrespondents, paper respondents and web respondents. From each of the groups, a subsample of about 300 persons was selected and these were contacted for a telephone interview about their decision to participate and their mode choice.

The results obtained indicated that there was a lack of visibility of the web option in the described mixed mode contact strategy. It was found that the information about a web option in the survey was noticed by just about half of the recipients of the initial mailout. Another factor that was identified as leading to a larger use of the mail mode in this contact strategy was the ‘responding through the mode at hand’ principle: namely, when recipients of the initial mailout of the mixed mode material (i.e. the material (i)-(v) above) had understood the data request and had conceded (more or less explicitly) to the participation request, then they not seldom immediately started filling in the questionnaire at hand (that is, the paper questionnaire), possibly just for the sake of trying oneself out on the task in order to see the extent of the endeavour required.

The authors concluded that the ‘responding through the mode at hand’ principle, in conjunction with sending the paper questionnaire in the first mailout, worked against Statistics Sweden’s intention to raise the proportion of web respondents.

1.3.2 Influencing the response mode choice

These results of Holmberg and Lorenc (2008) are corroborated by evidence from an empirical study by Werner (2005), who—also in a mixed mode mail and web survey—achieved a considerably higher proportion of web participants by simply not including the paper questionnaire in the initial mailout.

In an experiment embedded in a survey of students’ housing conditions at Linköping University, Werner randomly divided a probability sample of size 2250 from the population into four contact strategy groups, distinguished by timing of response mode offers and content of two mailouts (Werner’s shorthand notation and group size in parentheses):

- Mixed-mode approach I (MI, 750). The first mailout included a paper questionnaire and a cover letter offering a Web response option. The reminder mailout only contained the Web response option.
**Mixed-mode approach IIa (MIIa, 375).** The first mailout only included a cover letter with the Web response option, but informed the recipients that a paper questionnaire was to be sent out in a week or so to those who would not be responding using the Web. The reminder mailout included a paper questionnaire as well as the Web response option.

**Mixed-mode approach IIb (MIIb, 375).** Identical to MIIa with one small but potentially important exception: the cover letter contained no information about the forthcoming paper questionnaire.

**Reference approach (R, 750).** A standard mail approach not offering a Web response option. Both of the mailouts included a paper questionnaire.

These four approaches (as well as an e-mail approach, not reported below) were compared with each other with respect to response rates and costs (the latter of which is also omitted here).

Werner’s (2005) response rates and web response rates for the four groups prior to the second mailout and prior to a telephone follow-up conducted to even more improve the response rate are given in Table 1.

<table>
<thead>
<tr>
<th></th>
<th>MI</th>
<th>MIIa</th>
<th>MIIb</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response rate before 2nd mailout</td>
<td>0.41</td>
<td>0.33</td>
<td>0.23</td>
<td>0.36</td>
</tr>
<tr>
<td>Response rate before tel. follow.</td>
<td>0.62</td>
<td>0.64</td>
<td>0.63</td>
<td>0.66</td>
</tr>
<tr>
<td>Web response rate before tel. fol.</td>
<td>0.35</td>
<td>0.67</td>
<td>0.58</td>
<td>0</td>
</tr>
</tbody>
</table>

Werner observed that, after the two phases of data collection, the response rates were quite similar between the groups. However, differences in proportion of web responses between MI and each of the two variants of MII were very large, in particular the difference between MI and MIIa.

**1.4 Rationale for the study**

The two preparatory studies provided useful insights. In part about possible motives for the low proportion of web responses: (a) poor visibility of the web mode option, (b) dominance of the mode ready at hand. And in part about a way to improve the proportion of web responses: by postponing the mail mode option. However, both studies were performed on somewhat special populations: the one by Holmberg and Lorenc (2008) on university graduates three years after graduation, and Werner’s (2005) on university students. Additionally, Werner’s (2005) study was done in the context of a relatively small statistics producer and with a relatively small sample size. As that one was the only of the two studies that was quantitative in nature with respect to inference about the effects of contact strategies on response rates and web response proportions, it was of interest to investigate whether the results would replicate in the context of a large statistics producer, with a target population more
resembling the general population, and with sample sizes enabling more secure inference.

Based on the qualitative results regarding determinants of the mode choice (Holmberg and Lorenc 2008) and the idea of influencing mode choice by varying the content of initial and follow-up mailouts (Werner 2005), we designed a large scale experiment to study, in a mixed mode mail and web survey, the effect of timing and order of providing the two response modes to the sample on (a) web response rates, (b) response rates.

2. Method

The study was designed as an experiment, embedded in a mixed mode survey whose data collection was carried out by Statistics Sweden.

2.1 Subject matter survey and its target population

The subject matter survey within which the experiment was embedded was the 2007 follow-up of the 2002 Stockholm County Council Public Health Survey. The follow-up was a part of an ongoing project carried out by Karolinska Institutet on behalf of the survey’s sponsor, Stockholm County Council (Magnusson 2008), still going on in 2008. It aims at establishing the Stockholm Public Health Cohort as a means of conducting prospective health studies.

Target population of the 2002 survey were persons living in Stockholm county aged 18 to 84 years. The sample size was 50,000, of which about 31,200 persons (62%) responded. Even if response rates per se are not the main subject of the present report, it is important to note that the cohort aspect of the surveys was introduced to the participants only in 2007, thus not affecting the 2002 response rates.

The 2007 follow-up (referred to in what follows as SCCPHS07, standing for 2007 Stockholm County Council Public Health Survey) was directed to respondents of the 2002 survey. With the goal of enhancing the response rate, the data collection was chosen to be a mixed mode mail and web strategy (whose content was presented in more detail in Section 1.2, above), in contrast to the 2002 survey which was a mail survey only. For subject matter reasons, partially different sets of questions were given to those up to the age of 64 years inclusive and those 65 years and above.

As majority of social surveys carried out by Statistics Sweden have target populations up to the age of 64 years inclusive, our experiment was embedded in the corresponding part of SCCPHS07. There were about 22,500 persons in that group.

2.2 Experimental conditions

The experiment consisted of comparing the standard mixed mode mail and web contact strategy (presented in more detail in Section 1.2, above) with a number of alternative strategies. Varying in the alternatives (denoted A1-A4) was timing of presentation of the two modes (mail and web) to the participants. The conditions can be viewed as representing an increase in “web intensity” and decrease in “mail intensity”. 
"intensity" of the contact strategies: from no web mode option given in the initial mailout in A1, to mail option given three weeks after the initial mailout in A4. The details are presented in Table 2.

Table 2: Experimental conditions in an increasing order of "web intensity". (The symbols used in the table are explained in the text below).

<table>
<thead>
<tr>
<th>Time</th>
<th>Action</th>
<th>A1</th>
<th>S</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>Mailout 1</td>
<td>P</td>
<td>P+W</td>
<td>W*</td>
<td>W*</td>
<td>W</td>
</tr>
<tr>
<td>Day 10</td>
<td>Mailout 2</td>
<td>p*</td>
<td>p+W</td>
<td>P+W</td>
<td>P+W</td>
<td>W*</td>
</tr>
<tr>
<td>Day 23</td>
<td>Mailout 3</td>
<td>P+W</td>
<td>P+W</td>
<td>P+W</td>
<td>p+W</td>
<td>P+W</td>
</tr>
<tr>
<td>Day 38</td>
<td>Mailout 4</td>
<td>p+W</td>
<td>p+W</td>
<td>p+W</td>
<td>P+W</td>
<td>P+W</td>
</tr>
</tbody>
</table>

In each of the conditions, there were four mailouts, on days 1 (Mailout 1), 10 (Mailout 2), 23 (Mailout 3) and 38 (Mailout 4) of the survey field operations. The mailouts consisted of one or more of the following items:

- **P** - The paper questionnaire with an accompanying introductory letter (in Mailout 1) or with a reminder (in Mailouts 2-4)
- **p** - A reminder without a paper questionnaire included
- **p*** - As “p”, but that mentions a forthcoming web mode option
- **W** - Information about the existence of a web mode option, with login data; it could accompany an introductory letter (in Mailout 1) or make a part of a reminder (in Mailouts 2-4)
- **W*** - As “W”, but mentions a forthcoming mail mode option

Do note that while the upper-case “P” denotes inclusion of a paper questionnaire into the mailout, the lower-case “p” denotes just a reminder, relying on the availability of the previously send paper questionnaire. Also, “*” denotes a promise of the alternative mode which has not been provided as yet.

A1, the most “web conservative” strategy, began as a usual mail survey in Mailout 1, then made a promise of a forthcoming web mode option in Mailout 2, and fulfilled this promise by including web login data in Mailout 3 in parallel with sending out a new copy of the paper questionnaire. Mailout 4 was a reminder which also reiterated the possibility of a web response (by reprinting web login data).

S, the standard contact strategy, consisted of offering a choice of modes by including both the paper questionnaire and web login data in Mailout 1, a reminder about both modes in Mailout 2, then again a choice of modes by including the paper question-
naire in Mailout 3, and then again the reminder of both modes in Mailout 4. The web mode option was kept viable throughout by providing web login data in each mailout.

A2 and A3 both began by providing in Mailout 1 a web mode option only, but also announcing a mail option to those who do not respond within a week. The mail option was then given in Mailout 2, still keeping the web mode option viable by again including web login data. The remaining two mailouts consisted in A2 of sending the paper questionnaire and web login data again (Mailout 3) followed by a reminder with web login data (Mailout 4), while in A3 the order of these two steps was the opposite (thus expected to consume somewhat less of the paper questionnaires).

A4, the most “web intensive” strategy, began by inviting responses only through the web (Mailout 1), without mentioning a mail mode alternative. Only in Mailout 2, a reminder, was the other option promised, and this promise fulfilled in Mailout 3 by including the paper questionnaire, which was then repeated in Mailout 4. The web mode option was kept viable throughout by providing web login data in each mailout.

2.2.1 Experimental groups

The sample for SCCPHS07, consisting of 22,509 persons, was stratified on three variables of potential influence on response rates and web response rates. These variables were: sex, age (the classes 18-29 years, 30-44 years and 45-64 years), and whether being sampled to participate in a large related health survey conducted in Stockholm County in 2006 or not. (About 1,100 were in fact sampled even for that survey. The concern was that a recent request to participate in a similar survey would potentially be perceived as burdensome and might lead to an increased nonresponse.)

Within each stratum, the SCCPHS07 sample was randomly assigned to one of the five experimental groups (S and A1-A4) keeping the stratifying variables’ marginal distributions within the groups, with the following sample size considerations in mind: for the experimental groups A1-A4, even with expected unit nonresponse, the sample sizes of 2000 were deemed sufficient to provide power to the results; the remainder of the sample, its majority consisting of 14,509 persons, was assigned to group S (which would otherwise have been used as the only contact strategy).

2.2.2 Calculating differences in rates

Suppose that each person exposed to strategy \( g \) responds with probability \( \theta_{gw} \) using the web mode and with probability \( \theta_{gp} \) using the mail mode, so that \( \theta_g = \theta_{gw} + \theta_{gp} \) is the probability that the persons responds (using whichever of the two modes). Suppose further that each person decides whether to respond independently of any other person. Under these assumptions, confidence intervals for (1) differences between response rates \( (\theta_g - \theta_g') \) and (2) differences between conditional web response rates \( (\theta_{gw}/\theta_g - \theta_{gw}/\theta_g') \) were constructed. An interval that did not contain the value 0 was considered to indicate a statistically significant difference. The confidence levels were adjusted by the Bonferroni method for each of the 20 comparisons.
3. Results

Data collection with respect to the current experiment ended after 58 days of field work. (The SCCPHS07 data collection continued with a fifth mailout, which included a simplified data collection form.) The results are presented in Tables 3 and 4.

**Table 3: Response rates in the experimental conditions**

<table>
<thead>
<tr>
<th>Condition</th>
<th>A1</th>
<th>S</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
</tr>
</thead>
<tbody>
<tr>
<td># responses</td>
<td>1 490</td>
<td>10 964</td>
<td>1 426</td>
<td>1 436</td>
<td>1 466</td>
</tr>
<tr>
<td>Sample size</td>
<td>1 993</td>
<td>14 479</td>
<td>1 997</td>
<td>1 995</td>
<td>1 999</td>
</tr>
<tr>
<td>Response rate</td>
<td>0.748</td>
<td>0.757</td>
<td>0.714</td>
<td>0.720</td>
<td>0.733</td>
</tr>
</tbody>
</table>

With respect to the possibility of a deteriorating effect of the alternative contact strategies on the response rate (Table 3), the standard approach had a 75.7% response rate while the four alternative approaches had 74.8%, 71.4%, 72.0% and 73.3% respectively in A1-A4. Two of the differences are statistically significant: those between S and A2 and S and A3, but the largest of them is 4.3%. Thus, the alternative approaches seem to have had at the most a minor disturbing effect on the overall response rate.

**Table 4: Web response rates in the experimental conditions**

<table>
<thead>
<tr>
<th>Condition</th>
<th>A1</th>
<th>S</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
</tr>
</thead>
<tbody>
<tr>
<td># web responses</td>
<td>38</td>
<td>1 595</td>
<td>641</td>
<td>640</td>
<td>948</td>
</tr>
<tr>
<td># responses</td>
<td>1 490</td>
<td>10 964</td>
<td>1 426</td>
<td>1 436</td>
<td>1 466</td>
</tr>
<tr>
<td>Web response rate</td>
<td>0.026</td>
<td>0.145</td>
<td>0.450</td>
<td>0.446</td>
<td>0.647</td>
</tr>
</tbody>
</table>

The results show further that the standard approach had a proportion of web respondents of 14.5% (Table 4). The proportion of web respondents in the alternative approaches varied from 2.6% in A1, over 45.0% and 44.6% in A2 and A3 respectively, and up to 64.7% in A4, thus showing potential for considerable increase in proportion of web respondents by employing some of the alternative strategies.

Calculations in an internal Statistics Sweden report (Holmberg, Lorenc and Werner 2007) show that the alternatives A2-A4 could lead to a cost reduction of between 12% and 20% compared to the cost of the standard strategy.
4. Conclusion

The purpose of the present study was to experimentally verify a way of increasing web response rates in mixed mode mail and web surveys by making the web mode more prominent. This was achieved here by a delay in introducing the paper questionnaire to the sample. But, in spite of a broad access to Internet from homes in an increasing number of countries, attention needs to be given to concerns about the effects of delaying the paper questionnaire on the overall response rate.

The results of the experiment showed however that there was little effect of the alternative contact strategies on response rates but a considerable increase in web response rates in all of the “web-intensive” strategies, A2-A4.

There is, in the literature, a distinction between sequential mixed mode designs and concurrent mixed mode designs (Cobben, Schouten and Bethlehem 2006). Further, there is evidence that sequential mixed mode designs might give a higher response rates than concurrent mixed mode designs (Dillman et al., 2001). In our experiment, the alternatives A1 and A4 were single mode surveys in Mailout 1 and just gave a promise of another mode in Mailout 2—thus not becoming concurrent mixed mode surveys until Mailout 3. The alternatives A2 and A3, on the other hand, were concurrent mixed mode surveys from Mailout 2. These latter conditions were at the same time those that were less robust to the response rate drop compared to the other two alternatives, A1 and A4, corroborating the previous findings. But, this does not give a whole account, as S—the condition with the highest response rate—also was the one with a concurrent mixed mode design throughout, from Mailout 1 to 4.

Finally, significance of these results needs to be interpreted in the light of the population on which the experiment was conducted. While being similar to the general (Swedish) population, the study’s population was not completely that in three respects: it consisted of respondents on a previous health survey, from the most urban county in Sweden, and in the age group 18-64 years. These properties might have influenced the overall response rate in the experiment somewhat: for instance, earlier participation might have raised it, being from an urban area might have lowered it. In any case, this population does not allow extrapolation of the results to those that are 65 years of age and over. But, given control over the variables sex, age and participation in a recent health survey, it is plausible that the main outcomes of the experiment—increase in web response rates and little effect on response rates in the web intensive contact strategies—would still carry over to the general population.

Further replications of this or similar experimental designs might put these conclusions on a firmer ground. It would also be of interest to tackle theoretically and practically the issue of the small (insignificant in some of the alternatives) but still occurring response rate drop in comparison to the standard strategy: for instance, would a better presentation of the web alternative to the sample counteract the drop.

Acknowledgements

We express our thanks to Johan Hallqvist and Cecilia Magnusson of the Stockholm Public Health Cohort project for the possibility to implement the experiment in the
project’s 2007 data collection field work. We also express our thanks to colleagues at Statistics Sweden Tania Hayden, Lars Lindam-Olsson, Dennis Österberg and Michael Nilsson for making it practically possible to carry out the experiment.

References


