Factors that Influence Reading and Comprehension of Branching Instructions in Self-Administered Questionnaires[1]

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Abstract

In this paper we examine the tendency for branching instructions to be ignored, misread, or otherwise not appropriately followed so that item non-response occurs for follow-up questions. The potential influence on branching errors of seven features of question complexity are examined, including high number of question words, high number of answer categories, last categories branch, all categories branch, write-in responses, location at the bottom of a page, and high distance between the answer box and branching instruction. A logistic regression analysis revealed that question complexity had a tendency to increase certain errors, but not others.

Introduction

Item non-response, the failure to answer survey questions that should be answered, is greater in questionnaires that include branching instructions than in those that do not (Turner, Lessler, George, Hubbard and Witt, 1992; Featherston and Moy, 1990). The problem of item non-response in such questionnaires is of particular concern because when the branching

[1] A more detailed version of this paper with additional analysis and discussion is available at http://sesrc.wsu.edu/dillman/ . The opinions expressed here are those of the authors, not necessarily of the institutions where they presently work or the U.S. Census Bureau, which provided financial support for the

instruction is not seen nor followed correctly respondents may skip over series of questions that should have been answered, while answering many others that are not intended to apply to them. Thus, overall data quality in self-administered questionnaires may depend significantly on respondent reading, comprehension and adherence to branching instructions.

Two recent studies have shown that modifications of the visual layout of branching instructions can reduce significantly the number of branching errors made by respondents to student (Redline and Dillman, 2002) and general public surveys (Redline, Dillman, Dajani and Scaggs, 2003).

Our purpose in this paper is to investigate possible causes of differences in branching error rates that occurred among items. Specifically, we examine the effects of question complexity on whether questions and branching instructions are read and answered correctly.

Theoretical Development Of Test Elements

Despite the great emphasis in interviewer-administered surveys to provide all respondents with exactly the same stimulus (Fowler and Mangione 1990), sufficient examples now exist to demonstrate that this often fails when interviewers are confronted with poorly designed questionnaires (e.g., Sanchez 1992; Smith 1995). If interviewers make errors in the face of training and support systems meant to minimize such errors, how much more apt are respondents to make errors in self-administered situations where the task of maintaining control over the reading and processing of information depends entirely on them and the design of the questionnaire itself? Thus, understanding how a person *reads* information is paramount to our goal of designing questionnaires that are understood correctly by all.

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Redline and Dillman (2002) suggest that information on a questionnaire may be decomposed into one of four language types: (1) verbal language, (2) numeric, (3) symbolic, which refers to the check boxes, arrows, and other symbols on the questionnaire, and (4) the graphic paralanguage, which is the conduit by which all of the other languages are conveyed and which includes the brightness, color, shape, and location of the information. This taxonomy grew out of the work of Turner et al. (1992), which demonstrated that variations in the languages of branching instructions affected reading comprehension rates.

A probable explanation for the Turner et al. finding is that when a respondent is in the process of marking a check box, the branching instruction, which is located to the right of the answer category, is likely to be located outside of the respondent's foveal view. This explanation is based upon early eye-movement research conducted by Kahneman (1973), who demonstrated that people's vision is sharp only within 2 degrees (the foveal view), which is equivalent to about 9 characters of text. Moreover, when a conventional branching instruction is printed in the same font and point size as the rest of the text, it is unlikely to be detected as different from the remaining text and something important to attend to (Wallschlaegar and Busic-Snyder 1992).

Respondents' attention may also be diverted from the branching instruction and onto the next question because of the complex nature of perception. Both top-down processing (respondents' expectations of events) and bottom-up processing (the taking in of the actual stimulus) play a role (Jenkins and Dillman 1997). Respondents come to the form filling task with experiences that are likely to affect whether they see a branching instruction. Some evidence for this comes from Dillman et al. (1999), who found that respondents expect to read a question, read the answer categories, mark a box, and then look for the next question and Frohlich (1986), who observed that respondents' decisions to read instructions appeared to depend upon a perceived need for additional information. In addition, a series of questions that does not contain any branching instructions may also impart the erroneous expectation that respondents are supposed to answer the questions sequentially.

Further, respondents may focus their attention on what they see as either the primary reason for the questionnaire, or the most interesting--the questions and response categories. This may reduce their attention to what they view as the less important or less interesting aspects of the questionnaire, like branching instructions. According to Wright (1980), there can be a mismatch between what the writer wants to write and what the reader wants to read, as evidenced by the fact that the instructions, which explain how to answer questions on forms, are often ignored.

A central theme in the above-cited reasons for making branching instruction errors is that respondents are not aware of the instruction at the moment that they make an error. Therefore, it becomes incumbent upon the questionnaire to bring the instruction to respondents' attention--in other words, to make it more visible. If errors are reduced as a result of making the instruction more visible, then this would provide evidence in support of the proposition that respondents were not aware of the instruction. If, however, errors are not reduced, then this may be an indication that respondents were aware of the instruction, but chose to disregard it.

Besides making the instruction more visible, however, two additional overarching strategies exist for reducing errors, depending on peoples' knowledge about a task (in this study how a questionnaire branching instruction is supposed to work). If people have no knowledge stored in memory about the correct workings of a situation, then errors may be *prevented* by providing people in advance with a working knowledge of that situation; essentially they need to be trained (Wickens 1992). If, however, they already have a working knowledge stored in memory, then they may need to be reminded in advance to summon this information to prevent errors (Norman

1992). The second strategy, then, for reducing errors, is to allow the user *to detect and correct* errors they have made through the use of feedback (Norman 1992). Both the prevention and detection methods described below attempted to make the instructions more visible.

The Prevention Method. This method, which is illustrated in the first column of Figure 1, includes an instruction before each question to remind respondents to pay attention to the branching instructions. The purpose of these reminders is to prevent mistakes before they are made. On the first page, the reminders read "Attention: Check for a skip instruction after you answer the question below", but as shown here, they are shortened on subsequent pages of the questionnaire to "Attention: Check for a skip after you answer…". In addition, the prevention method employs three techniques to make the instruction more visible. First, the position of the check boxes and response categories are reversed, which makes it possible to place the branching instruction immediately beside the check box and presumably within the foveal view of respondents. Second, the font is enlarged. Third, the background is changed from a mustard color to white to increase the contrast between the bold lettering and the background even further. It is hypothesized that, taken together, these visual and verbal manipulations will decrease branching instruction errors in self-administered questionnaires.

The Detection Method. In this method, which is illustrated in the second column of Figure 1, the check boxes and the verbal branching instructions remain in their traditional locations. Since, as discussed earlier, this is not an ideal location for the branching instruction, the verbal branching instruction is made even bolder and larger to attract respondents' attention to this location. Another difference between the detection version and the other versions is that the detection format is explicit about the non-branching situation. In both the conventional and the prevention formats, respondents are supposed to infer that in the absence of any explicit instructions to branch, they are to go to the next question. In the detection format, however, a bold arrow comes off the non-branching check boxes on the left-hand side and points to a parenthetical phrase at the beginning of the next question, which is meant to provide feedback to respondents for self-correcting their mistakes. It is hypothesized that, taken together, these visual and verbal manipulations will decrease branching instruction errors in self-administered questionnaires.

The Control Method. Shown in the third column of Figure 1, this treatment uses a conventional branching instruction design, with the check boxes on the left, and the response options on the right. This is the format commonly used by the Bureau of the Census, including the long form of the 2000 Decennial Census. An arrow and the verbal branching instruction are placed to the right of the response option with no change in size or font from the rest of the text, except for the instructions being set in italics.

Conceptualization and Measurement of Question Complexity

In addition to the design of the branching instruction, eight characteristics of a question were hypothesized to influence respondents' reading and comprehension of the branching instructions as described below, and were built into the test questionnaire.

Number of Words in Question. Lengthy or complex questions can exceed the respondent's capacity to process them (Just and Carpenter 1992). If questions with a higher number of words are more difficult to understand, then it may be that respondents need to concentrate on understanding the question, at the expense of the navigational features of the question. In this study the median number of words was used to categorize each question as high (12 or more words) or low (up to 11 words).

Number of Answer Categories. Questions with a high number of response categories may place more demands on the storing of information in short-term memory, making it more difficult to remember the branching instruction, even if it is read (Eysenck 2001). Alternatively, because there is more to process, respondents may accidentally associate the wrong instruction with their chosen response option. The median number of answer categories for this variable was used to categorize responses as high (4 or more) or low (up to 3)

Last Categories Branch. The fact that the branching instruction is the last piece of information, combined with its increased visibility in this position, might cause respondents to accidentally read and act upon it, even if it is not associated with the earlier answer category they selected.

Alternating Branches. Questions with alternating branches present respondents with more information than a question with a single branching instruction. As with 'high number of answer categories,' respondents may read and comprehend the instruction correctly, but fail to recall it when they actually need to act upon it, or they may simply see the wrong instruction.

Every Answer Branches. Since every response option has a branching instruction, the branching instructions may blend into the response options causing respondents not to see them at all. Visual search tasks have demonstrated that a target item can be located more rapidly if it is made visually dissimilar from the nontarget items, which is not the case here (Foster 1979). A competing hypothesis, however, is that respondents may see the branching instruction, but fail to recall it correctly when the time is right because of the limitations of short-term memory. An illustration of this question characteristic is shown in the second row of Figure 1.

Write-In Answers. In response to open-ended questions, respondents must do something different--they must generate their own answer and write it in a space provided. Respondents may be so focused on the more difficult task of generating their own answer and writing it down that they may forget to pay attention to the branching instructions. Rogers and Monsell (1995) have shown that there are costs associated with switching between tasks, even when the switches are predictable and regular. Furthermore, the write-in space must be large enough to reasonably accommodate an answer, which means that respondents may overlook the branching instruction because it is even further from their sight now (Kahneman 1973). The third row in Figure 1 displays a branching instruction associated with a write-in box for all three treatments.

Location at the Bottom of the Page. Previous research has demonstrated that questions at the bottom of the page exhibit more item non-response than elsewhere (Featherston and Moy 1990). It follows, therefore, that questions at the bottom of the page that also contain branching instructions are at even greater risk, for respondents now need to remember the instruction, while also needing to change directions and possibly turning the page.

Distance Between the Answer Box and Branching Instruction. As explained earlier, questions with more distance between the answer box and the branching instructions may lead to higher error rates because the branching instruction may be too far away to be in their direct visual field. If respondents cannot see the branching instruction, they cannot comply with it. The median distance between the answer spaces and branching instructions, as measured from the right-hand edge of a check box and the beginning of the word "skip" or the left-hand side of a write-in box and the beginning of the word "skip," was used to divide responses into high (0.97 inches or more) or low (less than 0.97) . Because distance was constant for items on the prevention form (See Figure 1), it was excluded from this analysis.

Data Collection and Analysis Procedures

In order to test the influence of design elements in conjunction with the effects of question complexity, a four-page questionnaire was developed in which twenty-four of the questions contained branching instructions. (Later a misprint was discovered in the branching instructions of one of the questions, so that question was dropped from any further analysis.) One criterion for developing the questions in this experiment was that the questions be perfectly independent from one another. This was to assure that any improvement in branching instruction performance was due to the design of the branching instructions and not due to differential cues provided by the 23 questions under analysis and their follow-up questions.

However, because the questionnaires used in this experiment did not have topically contingent follow-up questions, it seems plausible that any influences of visual design and or question complexity might be mitigated, i.e., respondents would make fewer errors if they happened to review their answers and see that they could actually answer all of the questions. This concern led to the development of a protocol that emphasized keeping respondents on task, and avoiding their reviewing and possibly changing answers once they had completed going through the questionnaire.

The questionnaire in the classroom experiment was administered to 34 classes of undergraduate students at Washington State University in October and November of 1998. The classes ranged in size from 9 to 192 students. Classes were selected from two campuses, Pullman, the main university campus located in Eastern Washington where students are primarily residential, and Vancouver, a commuter campus where students tend to be somewhat older and none live on campus. An attempt was made to vary the subject matter of the classes that were selected to increase heterogeneity among the students.

The questionnaires were systematically handed out in envelopes, with every third student receiving a different questionnaire. Students were told at the beginning of the experiment that they were being asked to help with a Census Bureau sponsored evaluation of questionnaire designs and that all they were being asked to do was to fill out a brief questionnaire, and then exchange it for a "blue" sheet with six short debriefing questions about their reactions to the questionnaire. We attempted to avoid a test mentality, whereby students who finished early might spend time correcting their answers by following procedures recommended in Dillman (2000). In total, 1,266 students filled out the test and debriefing questionnaires: 422 students filled out the control form, 421 students filled out the prevention form, and 423 students filled out the detection form.

A more recent experiment conducted on a general public sample as part of Census 2000 provides evidence that the results of the classroom experiment provide inferential value. First, the overall pattern of error rates across treatments is similar in the two experiments (Redline et al. 2003), suggesting that the treatments behave similarly under both conditions. Second, the absolute error rates within comparable treatments are either the same or higher in the census than in the classroom experiment (Redline et al. 2003). This counters any notion that the error rates in the classroom experiment may have been artificially inflated as a result of the experimental design.

The alternate visual and verbal designs were evaluated by comparing the commission and omission error rates across designs. An opportunity to make an error of commission occurred when a respondent selected a response with a branching instruction associated with it. An error of commission occurred if the respondent answered a question other than one they were instructed to answer. An opportunity to make an error of omission occurred when a respondent selected a response that did not have a branching instruction associated with it. An error of omission occurred if the following question was left blank. It is also possible that the lack of response to a follow-up question may be due to a refusal by the respondent to answer the question. For this study, the possibility was unlikely, so all such missing responses were assumed to be unintentional and due to an error of omission.

For each question with a branching instruction, the error rates were calculated as follows: (1) Any respondent who provided no answer to the question (or provided more than one answer to the question) was removed from the sample. (2) For those remaining in the sample, the answer to the branching question was used to classify each respondent as *supposed to branch* or as *not supposed to branch*. (3) For those who were supposed to branch, respondents were only counted as executing the branching instruction correctly if they answered the question specified in the instruction and no intervening questions. If a respondent branched to the wrong question, that was categorized as an error. The number of those who made a commission error was used as the numerator in the commission error percent calculation and the number of those who were supposed to branch was used as the denominator. (4) For omission error candidates, response to the question following instructions for the branching question was used to determine whether or not an omission error had been made. The number of those who made an omission error was used in the numerator of the omission error rated, and the number of those who were not supposed to skip was used in the denominator.

The total number of commission errors and the total number of omission errors was computed for each respondent. Overall estimated commission and omission error rates were computed as weighted averages of the individual commission and omission error rates, with weights being the number of commission and omission error opportunities. Standard errors for the commission and omission error rates were computed using the VPLX variance estimation program using simple jackknife replication (U.S. Census Bureau 1999). Z tests were computed using these variances for overall error rate differences between the control, prevention, and detection forms. This procedure takes into account the clustering or correlation of answers within respondents when computing the variances.

Logistic regression analysis was used because the dependent variables are binary (1= error made, 0= error not made) and because more than one aspect of complexity (the independent variables) were hypothesized to influence the making of errors. The variable alternating skips was dropped from the analytic models after determining that it was strongly correlated with a high number of answer categories. In addition, write-in and distance on the prevention form are perfectly correlated, and thus distance was excluded from the initial analysis conducted with all three forms of the questionnaire.

Two sets of four logistic regression analyses were conducted: one with the errors of commission as the dependent variable and another with the errors of omission as the dependent variable. Each set included an analysis of all forms together and a separate analysis of the control, prevention, and detection forms. PROC GENMOD in SAS was used to take into account the dichotomous nature of the dependent variables and the REPEATED statement was used to account for the clustering or correlation of answers within subjects (Allison 1999).

Results

Table 1 shows that on average the errors of commission were reduced by more than half, from a high of 20.7% for the control form to 9.0% for the prevention form and 7.6% for the detection form. The difference between the control form and either experimental form was significant at the .001 level of the Z test. However, the difference between the two experimental forms was not significant. According to Table 1, the errors of omission, however, more than doubled, from a low of 1.6% for the control to 3.3% for the prevention and 3.7% for the detection forms.

Again, the difference between the control form and both of the experimental forms was significant at the .001 level of the Z test; however, the difference between the prevention and detection forms was not significant.

Substantial variation existed in the errors among questions, with the errors of commission ranging from 0 to 51.7% and the errors of omission ranging from 0 to 33.9% by question. As a result, it was hypothesized that questions possessing complex question characteristics would have higher commission and omission error rates than questions that did not possess them. Table 2 shows that all of the question characteristics have a significant effect on the errors of commission when the forms are analyzed together. Four of the six characteristics are in the predicted direction: high number of categories, all categories branch, write-in response, and bottom of the page. For instance, the odds of making an error of commission with questions containing a write-in response is nearly four and three-quarters times the odds of making an error with multiple choice questions across all forms. The odds of making an error of commission with questions that contain a high number of answer categories is over one and a half times the odds of making an error with questions that have a low number of answer categories across all forms.

However, the odds of making an error of commission when the question contains a high number of words or the last category branches is significantly less than the odds of making an error with questions that do not possess these characteristics. This is the opposite of what was hypothesized.

Table 2 shows that when the results across all forms are parsed by treatment, two of the six question characteristics clearly exhibit differences in the predicted direction across all treatments: high number of answer categories and write-in responses. The odds of making an error of commission with questions that contain a high number of answer categories is 1.43 times the odds of questions containing a low number of answer categories in the control, 1.69 times the odds in the prevention method and 2.30 times the odds for the detection method. The odds of making an error of commission with questions containing write-in responses in the control method are a little over 3 times the odds of making an error with the multiple choice questions on that form. However, the odds jump to over seven times the odds for the prevention and detection methods, respectively. Also, the odds of making an error of commission when all of the answer categories instruct respondents to branch is over two and a half times the odds of making an error with all of the other questions in the detection method only. Finally, the odds of making an error of commission when the questions fall at the bottom of the page is significantly greater than for the questions throughout the rest of the questionnaire on the control and detection forms only.

When the data are parsed, it becomes evident that the odds of making an error of commission when the question contains a high number of words are significantly less on the detection form, but not the other forms. The odds of making an error of commission when the last category branches are also less on the control and prevention form only.

When distance between answer box and instruction is added to the model for the only two versions to which it applies, i.e. the control and detection forms, it too is significant overall, and in the predicted direction (results not presented to save space). However, the estimate is only significant for the control form, and not for the detection form.

Table 3 shows that four of the five question characteristics have a significant effect on the errors of omission when all forms are considered together: high number of question words, high number of answer categories, write-in response, and bottom of the page[2]. Two of the four characteristics (write-in response, bottom of the page) are in the predicted direction, the other two (high number of question words and high number of categories) are in the opposite direction. When the data in this table are examined by treatment, one variable remains significant across all treatments: bottom of the page. The odds of making an error of omission is approximately four and a half times the odds of making such an error elsewhere on the control method, and it was a little over two times the odds on the prevention and detection methods, respectively.

Also, one can see that the non-significant effects of last category branches is due to the fact that the individual effects are moving in the opposite direction on the control and detection forms and canceling one another out. For instance, the odds of making an error of omission when the last category branches on the control form was 0.32 times the odds of doing so with the other questions on the form. However, the odds were nearly three times more on the detection form.

Addition of distance between answer box and instruction to the models for the control and detection forms reveals that it is significant, but not in the predicted direction as was the case for commission errors. It is significant for both the control and detection form as well as overall.

Discussion and Conclusion

The results of this experiment extend previous research by showing that question complexity influences the extent to which respondents correctly follow branching instructions in self-administered questionnaires, in addition to the influence registered by the specific visual and verbal design of the branching instruction. As predicted, question complexity had a greater tendency to increase errors of commission than to increase errors of omission. Five of the seven

[2] Since the “All Answers Branch” variable yields no omission opportunities, it is not included in the omission error models, and thus five variables are under analysis here compared to six for the commission error rate analysis.

characteristics had this effect (high answer categories, all categories branch, write-in responses, bottom of the page, and high distance).. But contrary to prediction, only two of the six characteristics had this effect (write-in response and bottom of the page).

Since we conducted this classroom experiment, Redline and Lankford (2001) tracked the eye movements of 25 respondents filling out these same questionnaires, and found that the reason for making errors of commission in the presence of a large number of answer categories appeared to be related to errors of memory, the fact that the branching instruction was not the last thing respondents read. This same reason could very well explain why respondents' performance improved when the branching instruction was the last item they read, that is, when the last category branched.

These findings demonstrate the difficulty questionnaire designers face, for placing the branching instruction with the answer category with which it is associated could reasonably be interpreted as placing it 'where it is to be used,' that is, adhering to good questionnaire design practice as recommended by Jenkins and Dillman (1997), until it is understood that respondents may delay acting upon the branching instruction at the moment they read it in favor of reading through the remaining answer categories. Of course, moving the entire answer category and its associated branching instruction to the last position or positions in the list might solve this dilemma, but cause another—errors due to the illogical ordering of answer categories or to primacy effects.

These findings appear to be opposing faces of the same coin in that complexity (or competition for the respondent's attention) deleteriously diverts respondents' attention from reading, or as our research suggests, remembering branching instructions intended for them. By the same token, however, complexity either has no effect or advantageously keeps respondents from mistakenly reading or remembering to act upon branching instructions not intended for them, except perhaps in those cases where they are presented with an additional out-of-the-ordinary task, as occurs with write-ins and being at the bottom of the page. These findings are not surprising in that they demonstrate the complex and often opposing forces at work in questionnaires, and the difficulties questionnaire designers face when searching for an optimal balance between them.

Two question characteristics led to increased errors of commission, regardless of form type and one led to increased errors of omission. These can be thought of as strong determinants of error, and included requiring a write-in response, having a high number of answer categories, and being at the bottom of the page, respectively.

This last finding has immediate practical implications. It suggests that questions with branching instructions should be avoided at the bottom of a page, and more thought should be put into how to design write-in spaces with branching instructions. Also, to lower error rates further, long lists of answer categories might be rearranged so that those associated with branching instructions are placed last.

On the surface it may seem that it is far more important to reduce omission errors, i.e. non-responses to questions that <u>should</u> have an answer, than commission errors, i.e. responses to questions that <u>should not</u> have been answered. However, there are two reasons to question this strategy. For one, the branching patterns in questions often constitute a series of path choices and are otherwise nested in ways so that once a person makes a commission error and answers one question unnecessarily, they may get off course-- answering questions, which should not be answered, while missing altogether later ones that should have been answered. And a second reason is that it presupposes that cleaning the data will correct errors of commission, which we know from personal experience to be a false supposition. We have witnessed edit programs, which adopt errors of commission as truth by erroneously changing respondents answers to the first question in the series to be in line with respondents mistaken answers to the follow up questions, thereby making responses to the entire sequence of questions incorrect rather than ‘clean’ as expected. Thus, it is important that simultaneous efforts be made to reduce both types of error, rather than allowing one to increase at the expense of the other type.

Although designers of self-administered questionnaires sometimes try to avoid branching questions altogether, by requiring all items to be answered. That too presents a problem because being asked to answer questions that seem not to apply often leads to item nonresponse, or even discontinuation of the answering process(Dillman, 2000). And even if it does not, it clearly leads to increased respondent burden.

Overall, the results of this research have shown that the verbal language of a questionnaire cannot be divorced from or thought of in isolation from the other languages of the questionnaire, nor can the physical structure of the questionnaire be ignored when questionnaires are designed, as all of these factors clearly combine to affect what respondents read and the order in which they read it. Research needs to continue to identify the factors that influence what respondents read and the order in which they read it, for the results of this paper have shown that comprehension, the retrieval of information, and ultimately respondent performance are affected.

In addition, the results of this research also suggest numerous other areas for research. We do not yet know the extent to which respondent characteristics, such as education, language skills, and other personal attributes affect respondents’ performance with branching instructions. As noted earlier, question content/context effects were controlled for in the classroom experiment. Although this feature allowed us to attribute improvements in respondents’ performance to the experimental designs, it did not represent the usual branching situation in which additional clues are available from the questions themselves. Finally, quite a few individual manipulations were made to each of the experimental designs and evidence regarding their efficacy was gleaned from the logistic regression analyses, but future research in which these manipulations are experimentally controlled needs to be conducted to clearly isolate and determine their relative effects with precision.

Despite the enormous use of self-administered questionnaires by survey institutions, our knowledge of what people read and comprehend and why remains in its infancy. Studying branching instructions has allowed us to make some inroads into understanding these phenomena better. However, it is important that ways be developed to objectively measure whether respondents see, comprehend and act upon other information in questionnaires, where there is not such an obvious indicator of comprehension as there was with branching instructions. Our understanding of the quality of respondent answers to self-administered questionnaires depends upon it.

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Figure 1. Examples of selected question characteristics by branching instruction treatment.

An example of a question from the questionnaire in which …	Prevention	Detection	Control
1. the last category directs respondents to branch.	**24** **Attention: Check for a skip after you answer . . .** **Have you ever purchased the sound track of a movie?** Yes ☐ No ☐ **Skip to 26**	**24** **Have you ever purchased the sound track of a movie?** ☐ Yes ☐ No ➔ **Skip to 26**	**24** **Have you ever purchased the sound track of a movie?** ☐ Yes ☐ No → *Skip to 26*
2. all answer categories direct respondents to branch	**35** **Attention: Check for a skip after you answer . . .** **About how often do you attend religious services?** Once a week or more ☐ 2–3 times a month ☐ **Skip to 36**; Once a month ☐ 4–9 times a year ☐ **Skip to 37**; Once a year or less ☐ Not at all ☐ **Skip to 38**	**35** **(If one of last two categories) About how often do you attend religious services?** ☐ Once a week or more ☐ 2–3 times a month **Skip to 39**; ☐ Once a month ☐ 4–9 times a year **Skip to 37**; ☐ Once a year or less ☐ Not at all **Skip to 38**	**35** **About how often do you attend religious services?** ☐ Once a week or more ☐ 2–3 times a month *Skip to 39*; ☐ Once a month ☐ 4–9 times a year *Skip to 37*; ☐ Once a year or less ☐ Not at all *Skip to 38*
3. a write-in response is requested.	**13** **Attention: Check for a skip after you answer . . .** **Who is your favorite sports star?** **Skip to 17** Mark this box if you don't have one. ☐	**13** **(If basketball, wrestling, or sent here from an earlier question) Who is your favorite sports star?** ➔ **Skip to 17** ☐ Mark this box if you don't have one.	**13** **Who is your favorite sports star?** → *Skip to 17* ☐ Mark this box if you don't have one.

Table 1. Overall mean percent of commission and omission errors by treatment, having taken into account the within subject effect.

	Commission			Omission		
	Control	Prevention	Detection	Control	Prevention	Detection
Error Percent	20.7%	9.0%***	7.6%***	1.6%	3.3%***	3.7%***
Std. Error	1.02	0.72	0.61	0.24	0.37	0.43
Number of Errors	875	368	318	52	98	109
Number of Opportunities	4237	4102	4171	3217	3026	2954
Number of Respondents	422	421	423	422	421	423

*p<.05, **p<.01, ***p<.001 Significant differences are in comparison to control group.

Table 2. Logistic regression analysis of commission errors over all forms and by treatment, having taken into account the within-in subject effect.

	All Forms		Control		Prevention		Detection	
Independent Variable	Std Error	Odds Ratio	Std Error	Odds Ratio	Std Error	Odds Ratio	Std Error	Odds Ratio
High number of question words#	0.05	0.88*	0.08	0.88	0.11	1.05	0.12	0.73**
High number of answer categories#	0.06	1.66***	0.07	1.43***	0.12	1.69***	0.12	2.30***
Last category branches+	0.07	0.75***	0.10	0.68***	0.15	0.82	0.18	0.76
All categories branch+	0.06	1.48***	0.09	1.22*	0.14	1.28	0.13	2.68***
Write-in response+	0.10	4.74***	0.15	3.27***	0.17	7.33***	0.21	7.47***
Bottom of the page+	0.06	1.35***	0.08	1.35***	0.12	1.10	0.13	1.81***
Intercept	0.15	1.00	0.21	1.05	0.28	1.02	0.29	0.60
Number of observations (opportunities)	12,510		4237		4102		4171	

*p<.05, **p<.01, ***p<.001

Coding of Variable: 1 = Above median, 0 = below median
+ Coding of Variable: 1 = Yes, 0 = No

Table 3. Logistic regression analysis of omission errors over all forms and by treatment, having taken into account the within-in subject effect.

	All Forms		Control		Prevention		Detection	
Independent Variable	Std Error	Odds Ratio	Std Error	Odds Ratio	Std Error	Odds Ratio	Std Error	Odds Ratio
High number of question words#	0.13	0.60***	0.30	0.42**	0.20	0.71	0.21	0.59*
High number of answer categories#	0.16	0.44***	0.44	0.28**	0.28	0.32***	0.25	1.51.
Last category branches+	0.14	1.29	0.41	0.32**	0.25	0.98	0.20	2.96***
Write-in response+	0.22	3.14***	0.43	4.09**	0.32	5.88***	0.46	3.62
Bottom of the page+	0.15	2.58***	0.38	4.46***	0.28	2.19**	0.21	2.25***
Intercept	0.25	12.7***	0.76	66.71***	0.40	10.06***	0.47	14.76***
Number of observations (opportunities)	9197		3217		3026		2954	

*p<.05, **p<.01, ***p<.001
Coding of Variable: 1 = Above median, 0 = below median
+ Coding of Variable: 1 = Yes, 0 = No