The Influence of Alternative Visual Designs on Respondents' Performance with Branching Instructions in Self-Administered Questionnaires[•]

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12.1. INTRODUCTION

In Chapter 5, Beatty and Hermann examine the cognitive processes that may lead to peoples' decisions not to respond to survey items, independent of the survey's mode of administration. In this chapter, we examine the effects of a complexity that is specific to self-administered surveys, the fact that respondents are often expected to answer certain items, but not others. Research has found that item non-response, the failure to answer items that should be answered, is greater in questionnaires that include branching instructions than in questionnaires which do not include them (Turner et al., 1992; Featherston and Moy, 1990; Messmer and Seymour, 1982). However, very little explanation for this is offered, except to say that items with branching instructions cause greater confusion. Consequently, we attempt in this chapter to offer a theoretical framework as to why branching instructions may be confusing, followed by an empirical test of some of the concepts. We end by interpreting the empirical results in light of a proposed model of the question-answer process applied to self-administered questionnaires.

12.2. PAST RESEARCH

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A relatively small body of research has attempted to determine what causes item non-response from a social science perspective. As with the unit non-response literature, much of the research on item non-response has been directed at studying compartmentalized factors leading to item non-response. So, for instance, Donald (1960) examined motivational factors for item non-response and found that the higher a respondent's involvement in terms of active participation, knowledge and understanding of the study sponsor's organization, and loyalty to it, the lower the incidence of item non-response. Bauer and Meissner (1963) looked at the effect of questionnaire length on item non-response and found that item non-response varied as a result of length, with a two-page questionnaire demonstrating significantly higher item non-response than a one-page questionnaire. Ford (1968) examined questionnaire appearance and found that a printed, folded questionnaire did not affect item non-response in comparison to a questionnaire composed of copies stapled together. Featherston and Moy (1990) also looked at questionnaire design factors; they report that higher item non-response rates were a function of branching instructions, the number of columns, item placement within a column, and question type.

A consistent finding in the research on item non-response is that questionnaires, or questions, with branching instructions lead to greater item non-response than those without. For example, Messmer and Seymour (1982) found that branching instructions significantly increased the rate of item non-response immediately following the instruction. Featherston and Moy (1990) found that the use of branching had a strong negative effect on item response rates. Featherston and Moy (1990, p.5) suggest that branching instructions actually cause greater rather than less mental burden, to the point where respondents skip items rather than as they put it, "battle the logic of the item format. While this may be true, a competing explanation could be that respondents accidentally execute branching instructions when they should not.

In addition, other authors have examined alternative branching instruction designs. The conclusion of this research seems to be that the design of the instruction matters. For example, Turner et al. (1992) concluded that respondents had a greater tendency to see information to the right of an answer category if it was somehow made salient. Jenkins and Dillman (1995) suggested that respondents overlooked branching instructions when the instructions were to the right of an answer category

because the instructions were beyond the location where respondents' eyes naturally traveled.

Although some of the above research seems to suggest that using branching instructions leads to greater non-response, it is premature to conclude that the solution is to do away with the instructions altogether and to allow respondents to answer every question (by asking the respondent to mark 'not applicable' categories). It is possible that what is gained in lower item non-response rates in questionnaires with no branching instructions might be offset by greater unit non-response rates. That's because although respondents will not need to process branching instructions, they will need to process many more questions, and this may translate into an even larger amount of respondent burden. Or, they might get confused or frustrated. To our knowledge, no studies have been done which compare these trade-offs. Moreover, we may be able to improve upon the design of the skip instruction if only we understand the underlying processes better.

12.3. MENTAL PROCESSES THAT UNDERLIE BRANCHING INSTRUCTION ERRORS

Respondents can make two kinds of errors when responding to a question with a branching instruction. They can make an *error of commission,* which means they fail to branch when instructed to, or they can make an *error of omission*, which means they fail to advance to the next listed question on the page and answer it. We use the terms error of commission and errors of omission to convey a relationship between the printed instructions we have given respondents and their answers to questions. In comparison, Beatty and Hermann in Chapter 5 used the terms to describe a relationship between respondents' personal knowledge about themselves and their answers to questions. We propose that errors of commission and omission originate both as a result of the questionnaire and as a result of respondents themselves.

12.3.1. The Questionnaire's Role

To understand the role the questionnaire plays, however, one must first understand that a self-administered questionnaire is composed of more than just verbal language (i.e., words). In Jenkins and Dillman (1997), we argue that a self-administered questionnaire is composed of non-

verbal language in addition to the verbal, with the word language used here in the Newell and Simon (1972, p.65) sense of the word, that is, "anything consciously employed as a sign is, logically, language." In this chapter, we propose that there are two non-verbal languages we must be concerned with: the numeric and symbolic. Numeric refers to the use of numbers on a questionnaire and symbolic refers to the use of signs, such as arrows. Moreover, we propose that these individual languages combine to create meaning for respondents in ways that at present we understand very little. Recent research by Schwarz et al. (1998) lends support to the proposition that these languages may combine to create meaning, for they found that respondents interpreted the verbal label 'rarely' as indicating a lower frequency when paired with the numeric value 0 rather than 1.

In addition to language, a self-administered questionnaire also contains graphic paralanguage. Graphic paralanguage is a term we use to refer to the three fundamental elements of visual perception, that is, of brightness and color, shape, and location (Glass and Holyoak, 1986). Generally, paralanguage is used to refer to vocal features that accompany speech and contribute to communication, but are generally not considered to be part of the language system, e.g., loudness and tempo and facial expressions and gestures. Visual elements can be thought of similarly; that is, they accompany text and contribute to communication, but are not language per se, which is why we have chosen the term *graphic paralanguage*. However, we will sometimes refer to this as graphic language for convenience.

It is important to recognize that the languages of a self-administered questionnaire--the verbal, numeric and symbolic--never stand-alone. By definition they can only be transmitted through the visual channel via the graphic paralanguage. This means that the same verbal language, for instance the words "skip to," can take on an enormous amount of variation when put into print. We can change the size of the words, the font, the color, the background color, and the location.

An evaluation of the 1998 decennial census dress rehearsal questionnaires demonstrates the impact of graphic paralanguage. The relationship question on the short form presents two columns of answer categories, with answer categories referring to relatives on the left and those referring to non-relatives on the right. A long, white write-in box for other relatives is tucked into the lower right-hand corner of the question space. In comparison, the long form presents one long list of

categories, with the long white write-in box inserted into the middle of the list between the relative and non-relative answer categories. Davis (1999) compared the short form with the long form and found that significantly fewer people selected the non-relative answer categories on the long form than the short form. Although the verbal, numeric, and symbolic languages are almost identical, the graphic paralanguage is quite a bit different, resulting in respondents not attending to the non-relative answer categories on the long form because the long, white write-in box visually separates them from the relative answer categories.

This study lends credence to the proposition that manipulating the graphic paralanguage of the branching instructions may change respondents' perception, and therefore their understanding, of the purely verbal language. However, the most desirable way to best manipulate the graphic paralanguage at this point is still unclear.

Finally, a self-administered questionnaire is more than just language; it is a physical entity that requires physical manipulation from the respondent. In the case of a paper questionnaire, respondents must be able to orient the questionnaire properly in space and turn its pages. Recent cognitive research with questionnaires has suggested that these tasks burden less able readers more than able readers because they require additional work over and above the already taxing work of reading the questions and response options (Dillman et al., 1996). Therefore, it follows that the addition of even one more task—that of executing branching instructions in combination with reading the questions and response options and turning pages—may only serve to further overload the less able reader.

12.3.2. The Respondent's Role

Perception is a complicated process that relies not only on respondents' seeing an external stimulus (known as bottom-up processing), but it depends as well on their expectations (or knowledge) about that stimulus (Jenkins and Dillman,1997). This is termed top-down processing in the perception literature, but other literatures use different terms for what appears to be a similar concept--that essentially human beings call upon prior knowledge to process and act upon new information (e.g., Pressley and Afflerbach, 1995; Wickens, 1992; Matlin, 1998). Cognitive research has suggested that respondents often think they are supposed to answer every question on a questionnaire (Dillman et al., 1999). Even

when respondents begin to answer the questionnaire with the proper realization that they are not supposed to answer every question, if there are long series of questions in which respondents are not required to branch, they can easily fall into the habit of expecting to answer every question. These expectations are likely to affect what respondents perceive.

Another reason respondents may overlook branching instructions is because the questions and response categories absorb their attention at the expense of the navigational aspects of the questionnaire, like branching instructions. This might occur with either the able or less able reader when they become interested in the content of the questions and response categories. However, it might also occur with the less able reader because they may have less ability to handle both the demands of difficult questions and the mechanical aspects of branching through the questionnaire. Moving sequentially from question to question requires less cognitive effort.

The solution to this problem and the previous one regarding respondent expectations may reside with breaking respondents' normal processes of sequentially answering each question. This may be accomplished by introducing variations into the design that will attract respondents' attention. However, it should also be noted that if not properly manipulated, these variations could have the deleterious effect of causing respondents to skip over questions when they should not, leading to increased item non-response, or of inducing respondents to answer questions that should be skipped. Thus isolating the appropriate balance between possible variations is a challenge of particular theoretical and practical interest.

12.4. MANIPULATING THE GRAPHICAL, SYMBOLIC AND VERBAL LANGUAGES

There are numerous ways in which information can be manipulated to possibly improve the design of a branching instruction. The goal behind each manipulation, and the theoretical arguments both for and against its use are stated here. It should become clear that the possible combinations quickly compound, making the job of choosing among the myriad possibilities a real challenge in need of further study.

12.4.1. Manipulating the Graphical Paralanguage of the Branching Instruction

Commonly, designers of self-administered questionnaires *locate* check boxes to the left of the response options and the verbal branching instruction to the right, as shown here:

1. Which of the following best describes you?
   - ☐ I tend to think before I act
   - ☐ I tend to act before I think - Skip to 3

Note that the branching instruction is the same *size, shape, color and brightness* as the rest of the text. In between the response category and the instruction is a dash, which too is of the same color and brightness as the rest of the information. Advancing to the next question (that is, NOT skipping) is signaled by the absence of any information to the right of the non-skip response category.

Cognitive interviews have suggested that respondents frequently fail to see the verbal branching instruction in this location (e.g., Gower and Dibbs, 1989; Jenkins and Ciochetto, 1993; Bogen et al., 1996). A person's vision is sharp only within two degrees, which is equivalent to about 8 - 10 characters of 12-point type on a questionnaire (Kahneman, 1973). This suggests that when a respondent is in the process of marking a check box, the branching instruction may be outside the respondent's view. This further suggests we will need to attract respondents' eyes to bring it within view.

Increase the Contrast Ratio

Visually, all of the above information, and this entire book for that matter, exist in a particular figure-ground format. The contrast ratio between a figure and its ground and between figures is critical to influencing the perception of information (Wallschlaeger and Busic-Snyder, 1992). Up to this point, the figure-ground we have been working in has been black print (i.e., black figures) on a white background. Black print against a white ground is highly visible because of the high level of contrast between the figure (black print) and ground (white paper). In comparison, black print on black paper (or white on white) would be invisible because of its lack of contrast.

Visual search tasks have demonstrated that a target item can be located more rapidly if it is made visually dissimilar from the non-target items (Foster, 1979). Therefore, one way to attract respondents' eyes to the branching instruction might be to make it look different from its surroundings by increasing the contrast ratio between it and the information surrounding it. However, there are numerous ways in which this may be accomplished, and at this point we don't know which is best.

One possibility is to increase the boldness of the branching instruction, as shown below:

2. Which of the following best describes you?
   - ☐ I tend to think before I act
   - ☐ I tend to act before I think - **Skip to 4**

A second possibility is to increase its size:

- ☐ I tend to act before I think - Skip to 4

Or, we could manipulate both the figure and ground rather than just the figures. A format developed for questionnaires in the early 1990's and employed by the U.S. Bureau of the Census uses a format that consists of black type on a lightly colored background (i.e., 20% of full color); all answer spaces are highlighted in white to attract respondents' attention.

- ☐ I tend to act before I think - **Skip to 4**

Black print on a white background contains a higher level of contrast than black print on a 20 percent colored background (shown here in gray), so we could change the background of the branching instruction to white too in hopes of attracting respondents' attention to it. However, the check boxes are also white, so the potential disadvantage of this design is that the more information is placed in white, the less it will look dissimilar from its surroundings, and therefore, the less effective it may become.

A second way to change the figure-ground of the branching instruction is to use reverse print, as shown below. The reverse printed branching

instruction is white type on a black background, or just as its name implies, the reverse of the main figure-ground composition.

□ I tend to act before I think - Skip to 4

There are arguments both for and against reverse printing the branching instructions. On the one hand, it is plausible that the high contrast of a reverse-printed branching instruction and the fact it has been made visually dissimilar from the other information on the questionnaire could attract respondents' attention. On the other hand, typographical studies warn against using reverse printing because it is difficult to read (Hartley, 1981; Wallschlaeger and Busic-Snyder, 1992). Also, it could be that if most of what respondents read is printed in black type, they may come to expect the information they are supposed to read to be in black type too, and therefore, not pay attention to the occasional reverse-printed instruction. At this point in time, there isn't enough evidence on which to base a decision.

Relocate the Branching Instruction

A different way to make branching instructions more visible may be to rearrange information so respondents are more likely to view it. One way to do this is to reverse the locations of the check boxes and response options, as shown here.

3. Which of the following best describes you?
   I tend to think before I act. □
   I tend to act before I think. □ Skip to 5

Relocate the Verbal Branching Instruction and Increase Its Contrast

The above manipulations can be combined in any number of ways. Since the white answer box is now close to the branching instruction, one logical combination would be to place the branching instruction in a white background too, as a way of emphasizing the connection between the verbal branching instruction and the check box. In the example below, the size and boldness of the verbal branching instruction were increased as well.

I tend to act before I think. □ **Skip to 5**

12.4.2. Manipulate both the Graphical and Symbolic Languages

The previous section discussed manipulating the graphic paralanguage of the verbal branching instruction to overcome its poor location. This section discusses ways of attracting respondents' attention to the branching instruction in its common location by manipulating the symbolic in addition to the graphic language.

Connect the Response Option and Branching Instruction
Symbols, as with verbal language, acquire meaning through use. For instance, an arrow '→' suggests direction. Therefore, replacing the dash in question 1 above with an arrow may convey to respondents that they should go from the response option to the branching instruction, as shown here:

4. Have you graduated from high school?
   - ☐ Yes
   - ☐ No → Skip to 6

The intention here is to group information together that the respondent may not otherwise associate as belonging together--in this particular case, the check box, response option and the branching instruction. In contrast, parentheses around the branching instruction will likely convey to readers that reading the branching instruction is optional rather than mandatory, and in this way act to segregate rather than integrate the information, as can be seen here:

5. Have you graduated from high school?
   - ☐ Yes
   - ☐ No (Skip to 7)

Connect the Non-Skip Response Option with the Next Question
As mentioned earlier, the non-skip situation is implied by the absence of any instructions. Perhaps one way of making respondents more aware of when not to skip is to draw an arrow coming off the left-hand side of the non-skip check box that points to the next question, as demonstrated in the example below:

7. Have you graduated from high school?

□ Yes

□ No → Skip to 9

8. Have you obtained additional schooling beyond the high school level?

12.4.3. Manipulating the Graphic, Symbolic, and Verbal Languages of the Branching Instruction

Norman (1990) suggests additional strategies for reducing errors, which require manipulating the verbal language in addition to the graphic and symbolic. The first strategy he discusses is the *prevention* of errors through the use of mental aids.

Prevention Technique

According to Norman, the notes we write to ourselves to remind us of tasks we need to accomplish are examples of mental aids. Mental aids, however, assume we have already learned the information to begin with, and simply need to be reminded. Another technique for preventing errors, which doesn't assume we have learned the information already, is to educate or train people in their prevention (Wickens, 1992). Training works by altering people's top-down processing about events.

Section 3 makes the point that respondents' top-down processing of the form-filling task is often erroneous. Thus, educating respondents about the branching phenomena before they need to execute one and continuing to remind them along the way might help to overcome this. The example below incorporates both the education and reminder prevention techniques:

9. From now on, if a "Skip to" instruction follows a box you mark, skip to the number given. Otherwise, continue with the next question.

   Have you graduated from high school?

   □ Yes

   □ No -- Skip to 14

10. Have you obtained additional schooling beyond the high school level?
    - ☐ Yes
    - ☐ No -- Skip to 15

11. Attention: Check for a skip instruction after you answer the question below.

    What is your sex?
    - ☐ Male
    - ☐ Female -- Skip to 16

Detection Technique

Another strategy Norman (1990) suggests for reducing errors is to allow the user *to detect and correct* errors once they have occurred through the use of feedback. According to Norman, an example of feedback that most of us use everyday is the sound of our own voices when we speak. In terms of branching instructions, placing an additional instruction before the subsequent question respondents are supposed to skip after the question requiring respondents to branch might provide effective feedback. The example below illustrates this strategy:

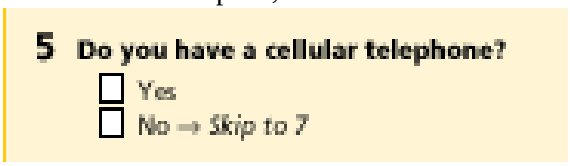
12. Have you graduated from high school?
    - ☐ Yes
    - ☐ No -- Skip to 17

13. (If Yes to 15) Have you obtained additional schooling beyond high school?

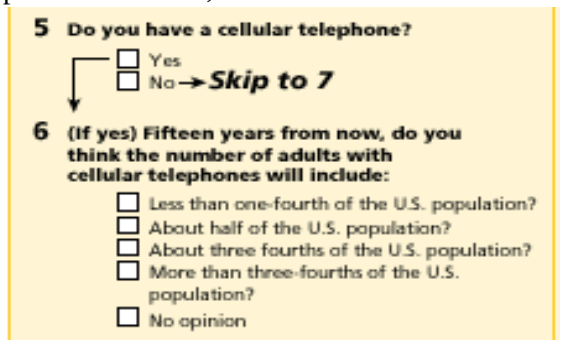
12.5. RESULTS FROM AN EXPERIMENTAL TEST

The preceding theoretical framework reveals a large number of individual manipulations (i.e., hypotheses) in need of further testing. Consequently, we reduced this to a manageable number by combining the individual manipulations in two ways that made sense from a theoretical perspective. These were named the detection and prevention branching instructions. We then tested these instructions against a control, which is the branching instruction that will be used in Census 2000.

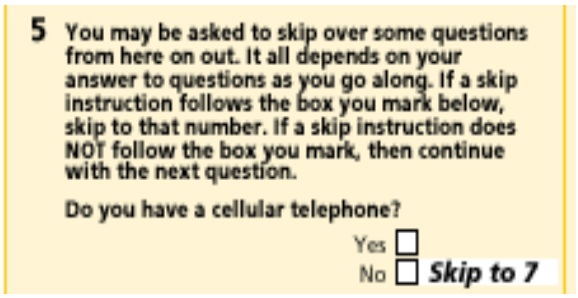
The Control Branching Instruction is very similar to the common instruction we discussed earlier, with two exceptions. The dash is replaced with an arrow and the verbal branching instruction is italicized rather than normal print, as shown below:



The Detection Branching Instruction is similar to the control with regard to the location of information, but the size and boldness of the verbal branching instruction is increased. Also, a left-hand arrow comes off the non-skip check box and points to a parenthetical instruction meant to provide feedback, as shown below:



The Prevention Branching Instruction is quite different from the others. First, the response categories and check boxes are reversed. Second, the verbal instruction was made bold and its background changed to white. Third, an education instruction was placed before question 5, which was the first question to contain a branching instruction on the questionnaire. And last, although this is not depicted in the figure below, instructions were placed before every subsequent question that contained a branching instruction to remind respondents to pay attention to the branching instructions.



We developed three versions of a test questionnaire, with each test questionnaire using one of the three branching instruction designs described above. Each questionnaire contained the same 50 items, with 24 of the items possessing branching instructions. An important characteristic of the test questionnaire was that respondents could get no clue from the questions themselves about whether they should be answering them.

As described in Redline et al. (In Press), a total of 1266 students in classes at Washington State University were randomly asked to complete one of the three forms. Approximately 420 students completed each form, following the general protocol for group administration of questionnaires outlined in Dillman (2000). And in addition, we conducted 48 cognitive interviews both at Washington State University and at the Bureau of the Census with a broad mix of people (Dillman et al., 1999; Redline and Crowley, 1999).

As shown in Table 1, both of the experimental forms significantly reduced the percent of commission errors by about half from 20.3 percent on the control form to 7.4 percent on the detection form, and 9.0 percent on the prevention form. However, neither of the experimental forms significantly reduced the proportion of omission errors. Whereas the control form resulted in 1.6 percent omission errors, the detection and prevention forms produced 3.7 and 3.3 percent errors, respectively, with statistically significant differences between the control and either of the experimental forms (Redline et al., In Press).

This result seems promising because if college students, who are relatively capable readers to begin with, can be affected in this way, then the chance of affecting the general population, which would contain a greater percentage of less able readers, should be even greater.

12.6. THE INFLUENCE OF QUESTION CHARACTERISTICS ON ERRORS OF COMMISSION AND OMISSION

A substantial amount of variation was observed in the individual error rates across the 24 items. For commission errors, the rates ranged from 0 to 51.7 percent and for omission errors, they ranged from 0 to 33.9 percent (Table 1). Items with higher error rates on one form tended to have higher error rates on the others. Therefore, it seemed likely that question characteristics, as well as the experimental formats, influenced the error rates. Eight ways were identified that described how questions varied from one another in ways that were theorized to affect the ability of respondents to correctly follow the branching instructions. In general, each of these question attributes, which are listed below, are ones that seem likely to place higher cognitive demands on respondents' ability to follow branching instructions, as explained in Dillman et al. (1999).

1. being the last question on a page;
2. all answer options were directed to branch;
3. write-in answers were requested;
4. answer categories alternated between being directed to branch and continue;
5. high number of answer categories;
6. high number of words in the question;
7. the last answer category contained a branching instruction;
8. high distance between check box and branching instruction.

The influence of these variables on both errors of commission and omission has been examined in more detail elsewhere. A series of regression analyses was conducted that examined the influence of these eight variables, form type, and potential interactions among them on mean error rates (the dependent variable) for each of the test items (Dillman et al., In Press). These analyses showed first, at the bivariate level (Table 2) that most of the question attributes were significantly correlated with the number of commission errors (alternative branching instructions was a noteworthy exception), but were not significantly correlated with the making of omission errors.

Initial regression analyses revealed that commission errors and omission errors were significantly influenced by different variables.

Commission error rates were primarily influenced by being a write-in question (Table 3). In addition, more detailed analyses of commission errors (not shown here) revealed that deleting the powerful effects of the write-in question format did not result in other variables being significant. In contrast, the making of omission error rates was primarily influenced by being at the bottom of the page (Table 4). However, further partitioning of the data (also not shown here) revealed that being at the bottom of the page led to significant increases in the errors of omission on the detection form only. Also the data revealed that the omission errors were significantly decreased on the detection form when the skip instruction was either associated with the last category or there was a high distance between the skip instruction and the check box. Thus, we concluded that question characteristics, in addition to the visual design of the branching instruction, led to the making of response errors.

12.7 DEVELOPMENT OF A MODEL APPLICABLE TO THE QUESTION-ANSWER PROCESS IN SELF-ADMINISTERED QUESTIONNAIRES

It is useful to interpret the above findings in light of the question-answer process. Tourangeau (1984) describes the question-answer process for interviewer-administered surveys as consisting in its simplest form of these four steps: (1) comprehending the question, (2) recalling relevant information, (3) making a judgement, and (4) selecting a response. While these steps are still at the core of the self-administered situation, we propose that the following changes need to be made:

1. Addition of an initial step that takes into account the fact that respondents must perceive and attend to the question stimulus. This is depicted by the addition of Box A in Figure 1.
2. Denoting that respondents must perceive and understand the graphic paralanguage, symbolic, and numeric languages in addition to the verbal**.** This is depicted in Figure 1 by inserting the phrase "all languages" in both Boxes A and B.
3. The addition of an entire sequence of activities from F to I to represent the branching instruction phenomena.

Thus, Figure 1 reveals that the question-answer process in self-administered questionnaires is complicated by the fact that respondents

need to go through the same process for branching instructions that they need to go through for the questions and answers. That is, they need to first perceive the branching instruction in F, then comprehend it in G, etc. Also, this process is made even more complicated by the fact that sometimes respondents are supposed to branch, sometimes not, so we need two paths to represent this, paths marked '1' and '2' in Figure 1.

12.7.1 Application of the Model to Errors of Commission

Theoretically, when respondents are instructed to branch they are supposed to travel on the shaded path marked 1, but when they make an error of commission, they accidentally take the unshaded path marked 2. It is clear from the results of the classroom experiment that when respondents come across a question that requires them to write in an answer, they are more likely to erroneously travel Path 2.

The prevention form and the detection forms appear to act upon the commission error process differently. Basically, the prevention form works to induce respondents to stay on Path 1, and given the results of the classroom tests, overall, it was successful at this. However, the data show that it was just as unsuccessful as the other forms when it came to correcting errors of commission associated with write-in responses. In comparison, not only does the detection form attempt to induce respondents to stay on Path 1, but it also provides a mechanism for getting respondents back on this path if they accidentally get off it. If a respondent erroneously takes Path 2, then from I they will go to A. Now at A they should perceive and comprehend the parenthetical instruction, in which case, they will be sent on Path 3 back into Path 1 and on to F, where they will be given a second opportunity to perceive the branching instruction.

12.7.2 Application of the Model to Errors of Omission

Errors of omission appear to occur for different reasons than errors of commission. It seems that, overall, manipulating the information on the experimental forms not only increased the likelihood that respondents would attend to and perceive the branching instruction when we wanted them to, but when we didn't want them to as well. In this case, respondents are supposed to take Path 2, but instead they take Path 1, where they perceive and attend to a branching instruction they are not

supposed to. The data show that having to turn the page or go to the top of the next column makes it even more likely on the detection form that respondents will make this mistake.

12.8 CONCLUSION

In this chapter, we attempt to answer the question, "Why do respondents make mistakes when they navigate through a self-administered questionnaire with branching instructions?" We suggest that the answer begins with understanding that respondents must process much more than just the verbal language of a self-administered questionnaire. They must process the graphic paralanguage, numeric, and symbolic languages as well as its physical structure. Furthermore, they must interleave the processing of the languages applicable to the questions and responses, with those applicable to navigation. Because so much information must be processed, it is not surprising that errors occur. However, an initial experiment, results from which are reported here, has led us to conclude that manipulating the languages as we did reduced errors of commission, but not errors of omission. Consequently, we need to continue to manipulate the languages of the questionnaire and study their effects until we are able to effectively guide respondents through self-administered questionnaires without fail.

Table 1. Overall Mean and Range of Error Percents by Form Type (Redline et al., In Press; Dillman et al., In Press).

	Control	Detection	Prevention
Commission Errors			
Mean	20.7%	7.6%	9.0%
(Std. Error)	(1.02)	(0.61)	(0.72)
Range	0 - 51.6	0 – 36.9	0 - 51.7
Omission Errors			
Mean	1.6	3.7	3.3
(Std. Error)	(0.24)	(0.43)	(0.37)
Range	0 – 22.8	0 – 14.3	0 – 33.9

Table 2. Effect of possessing the specified question characteristic on error rates (Dillman et al., In Press).

Question Characteristics	Commission Error			Omission Error		
	With	W/out	Prob.	With	W/out	Prob.
Bottom of page	15.1%	11.0%	.02	5.2%	2.3%	.21
All choices branch	16.2	11.3	.01	NA	NA	NA
Write-in answer	34.1	11.7	.00	5.0	2.7	.50
Alternating branches	14.0	12.3	.49	1.2	3.3	.60
Last choice branches	5.4	13.5	.04	5.8	2.4	.16
High distance	15.3	9.9	.00	1.7	3.8	.39
High no. words	8.7	14.1	.01	2.3	3.2	.68

Table 3. Effect of regression analysis on *commission error rates* (Dillman et al., In Press)

Independent Variable	Unstandardized Regression Coefficient	Standard Error	Standardized Regression Coefficient
Bottom of page	3.69	3.1.3	0.14
All choices branch	5.90	4.31	0.16
Write-in answer	25.16***	4.82	0.56
Alternating branches	1.25	4.19	0.04
High number of choices	0.08	0.60	0.02
Last choice branches	0.78	2.92	0.03
High number of words	-0.13	0.12	-0.12
Intercept	11.81		
R-squared	.35***		
Model df	7		
Total df	70		
*p<.05, **p<.01, ***p<.001			

Table 4. Effect of regression analysis on *omission error rates* (Dillman et al., In Press)

Independent Variable	Unstandardized Regression Coefficient	Standard Error	Standardized Regression Coefficient
Bottom of page	5.66**	1.73	0.42
Write-in answer	4.29	2.44	0.22
Alternating branches	0.11	2.14	0.01
High number of choices	-0.60	0.31	-0.28
Last choice branches	-2.23	1.49	-0.19
High number of words	0.05	0.06	0.11
Intercept	4.07		
R-squared	.25**		
Model df	6		
Total df	61		
*p<.05, **p<.01, ***p<.001			

Figure 1. Revision of Tourangeau (1984) model for self-administered questionnaires