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Comments welcomed

An Experimental Evaluation of Left and Right Oriented Screens for Web questionnaires¹

By

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Introduction

Many different types of formats have been used in web surveys. In addition to the obvious substantive differences, web surveys vary primarily in their patterns of navigation and in their physical layout of questions and answers. With respect to the various navigational systems used in web surveys we have witnessed dynamic screen-by-screen and static horizontal/vertical-scrolling techniques, and physical layouts that involve right, left, and center alignment of answer categories. While the web offers tremendous potential in varying the navigation and layout of a questionnaire, there is currently no experimental research that provides any theoretical justification for using one approach over another, or, that suggests why one might be more efficient than the other.

However, the literature on human computer interaction (HCI) (see Broadbent, 1990; Giroux & Larochelle, 1988; Green, Payne, and van der Veer, 1983; D.A. Norman & Draper, 1986; and Schneiderman, 1997) and several emerging studies in survey methodology (see Dillman and Redline, 1997, and Dillman, 2000), suggest that alternative methods of information display are worth investigating. A common conclusion in this research is the implication that the deployment of any devices designed to decrease human effort in the person-computer interaction—and hence increase the rewards for participation, will result in higher levels of comprehension and may subsequently improve the quality of responses.

In this paper, we use the general conceptual frameworks outlined in these literatures to guide our investigation of the alternative web survey formats proposed here. Specifically, we report on an experiment that compares two types of web questionnaire screen layouts. One of these designs uses a traditional method of questionnaire construction that draws heavily from previous research on comprehension and navigation of paper questionnaires (see Jenkins and Dillman, 1997), while an alternative format has also been developed that utilizes similar principles as well as the user-interface principles developed by Schneiderman (1997). Each of the treatment questionnaires includes the same set of questions and contains all types of answer responses normally associated with web questionnaire construction (e.g. radio buttons, html boxes, drop down menus and open-ended text boxes).

Theoretical Background

In practice, traditional paper questionnaires favor the use of numbers and answer boxes placed on the left and have been applied to the vast majority of web surveys we have reviewed (Bowker, 1999). These surveys implicitly assume a cultural model of cognition in that they rely heavily on the expectation that readers will employ a conventional “paper logic” while filling out the web survey—a logic that dictates a top-bottom, left-right information processing based on cultural socialization. Numerous examples exist of such an approach, and any casual browsing of current or

past questionnaires will verify this point. To date, relatively few have challenged this approach, and arguably have had little reason to do so.

However, with the advent of web surveys and their tremendous flexibility, there is reason for re-examining this implicit assumption. First, there are several differences in the way one interacts with paper and web questionnaires that may suggest alternative formats would improve navigation and comprehension. Two of the more obvious differences for our discussion here are in the rules of navigation and the capacity of displaying information. For example, unlike a paper questionnaire where the respondent can “navigate” her way through the document with little effort by turning the pages back and forth, a web questionnaire requires its respondent to use either her keyboard and/or mouse to advance to the next question, and therefore assumes a certain level of basic proficiency above and beyond the use of a pencil—a skill most of us mastered in grade school. Moreover, whereas the centralization of eye, hand, and paper assist in the coordination and comprehension of the survey experience in paper questionnaires, in computer-assisted surveys, the eye-hand centralization is lost; we now have a separation of the two due to the addition of a keyboard and mouse. It seems logical then, to anticipate that in addition to the consequences as a result of the interruption in the navigational flow, the complexity of computer use in general will contribute negatively to the cognitive processes that afford effective participation—particularly for those who may have little or no experience with computers.

Paper and web questionnaires also differ in their capacity to display information. Computer displays have greater width than height to their general display, and vary according to the screen resolution in use by the respondent. Using a standard sheet of 8”x10” paper, one can fit approximately 64 characters (assuming 1 inch margins using a proportional font) per line of text. That same line of text in a web browser however, will only cover 75% of a computer screen if displayed in 800x600 pixels, the current industry standard. In other words, you gain approximately 25% more horizontal space in displaying information with web surveys—which can be further augmented if one is using a higher screen configuration such as 1024x760 pixels. Consequently, alignment of text is almost always somewhat variable across respondents browsers; text “wraps” and may cause additional unwanted space between answer categories unless specifically controlled in the HTML programming. Any alternative format that reduces the amount of variation across browsers should be considered an effective strategy.

An additional reason for re-examining the use of the traditional method of information display (e.g. left aligned text) is based on recent research that suggests that there may be benefits to placing text boxes on the right of answer categories to improve the quality of responses. For example, recent research on paper questionnaires by Redline, Dillman, Carley-Baxter and Jackson (1999) found that a strategy for reducing skip-pattern errors in surveys that place answer categories and skip instructions to the right was nearly as likely to reduce errors as was the traditional strategy of placing the

categories on the left. More importantly, during the cognitive interviews respondents were asked to answer portions of three questionnaires that used different skip-pattern formats, two of which were left justified (had response boxes to the left of each answer category) and one of which was right justified (response boxes to the right). After removing the questionnaires from the respondent's view she was asked whether she could recall which side of the answer choices the response boxes were on, and whether the location was different for any of the questionnaires. Only 2 of the 25 respondents were able to recall a difference, suggesting that the right vs. left justification was transparent to nearly all of the respondents. Their research, while not applied to web surveys, suggests that by placing the answer categories to the right, may improve the cognitive processing needed to provide valid responses and that perhaps the traditional cultural argument that favors a left aligned orientation for construction of self-administered questionnaires is overstated.

An alternative perspective that provides insight as to what criterion should be used to determine a suitable system of display and retrieval is found in the Human Computer Interaction literature, or HCI. Researchers in HCI, though not studying respondent participation in surveys, have been studying “end-user” interaction with computers. Due to society’s great dependence on computers and the increasing amount of time we spend interacting with them, researchers have been discovering ways to make the human-computer-interaction more “natural” and efficient. As a consequence, Cognitive Ergonomics has developed as an area of research with the aim of understanding the person/computer interface (see Giroux & Larochelle, 1988; Green, Payne, and van der Veer, 1983; D.A. Norman & Draper, 1986; Schneiderman, 1997). It focuses on the varying elements of HCI: the machine with which the user interacts, the user, and the way that the user thinks about the computer. Although they do not use the terms “costs” and “rewards,” these researchers are explicitly engaged in a process of reducing costs and increasing rewards so as to improve human computer interaction. That is, by reducing the amount of energy or effort expended in interacting with a computer it is possible to make the computer experience less onerous and in so doing improve usage and cognitive processing among end-users.

Based on these considerations an experiment was designed to test the proposition that respondents prefer right or left justification for web questionnaires. Whereas the left-justified format would seem to be a cultural preference, that view has been brought into question by the work of Redline et al. and Dillman et al. Thus, our expectation is that overall respondents will evaluate the forms similarly. The HCI work summarized above suggests that to the extent differences exist, people with greater computer skills and experience are more likely to prefer a right justified format.

In accordance with the HCI model perspective we might conclude that a more efficient and therefore perhaps appropriate format for static scrolling web surveys would involve the general alignment of the questionnaire, and specifically the categories, to the right of the screen in order to reduce the effort required for efficient navigation and completion of the survey. In left aligned web

surveys, respondents are forced into an answer routine of reading and answering questions on the far left of the screen, moving the mouse to the far right to advance to the next visible question using the scroll bar, and then having to repeat the process over and over to complete the questionnaire. In addition, respondents may have to constantly move their visual focus from the far left of the screen, over to the right and occasionally beyond to check on the location of the mouse. For these reasons alone, it would seem more efficient if a right oriented format were used to reduce the amount of hand-eye-keyboard-mouse coordination required in responding to the survey. This way, even though the respondent would begin reading questions starting towards the left of the screen, the cursor movement would be limited to a short distance between the right positioned scroll bar and the nearby answer categories.

In contrast, traditional usage that places questionnaire items and answer categories to the left suggests that the left aligned format would be the preferred choice of respondents because of its familiarity, and therefore may be more likely to improve comprehension and navigation.

Methods

Cognitive Interviews

Before conducting the proposed experiment, we completed thirty-seven cognitive interviews to assess the quality of our survey instrument and to gain further insight into the alternative design the spring of 2000. Graduate students enrolled in a survey practicum course taught by one of the authors were asked to participate in a web survey on environmental issues in the context of a “think aloud” format. They were not told in advance the purpose of the interview, only that it was a class requirement that would be explained later. At the time of the individual interview, students were randomly assigned to complete one of the two web questionnaires: a traditional left-aligned format vs. an alternative right-aligned format. After answering a core set of questions about the environment, students were then asked to view the alternative web questionnaire and answer a few questions using that format. Then they were instructed to evaluate the design and layout of each form before describing their preference for either format. The “alternative design” students were asked to evaluate was the format not initially assigned to the student. That is, if students were assigned to the *left* format, then he or she would be asked to examine the *right* format and state their preference, and vice versa. In an effort to learn more about student’s use and experience with web questionnaires, additional probing questions were asked based on the interviewee’s behaviors (both physical and verbal). Observational coding of a student’s body position, socio-emotional facial characteristics, assimilation of introduction and directions, navigational efficiency (e.g. general hand-mouse-keyboard coordination), and response category recognition, suggests that these students enjoyed participating in the survey interview and were mostly moderate to highly skilled computer users. Use of

navigational controls such as keyboard shortcuts and movement of the mouse to answer questions (and advance to new ones) were all observed with considerable end-user efficiency.

When asked to evaluate and compare the design formats, the majority of students stated they preferred the left-aligned version (54%) while nearly thirty-eight percent preferred the right. Interestingly however, students who began the interview with the left format--when asked to compare the two forms--preferred the left format more often than those who began the interview on the right. Similarly, those who began the interview on the right were more likely to state they preferred the right format to the left (see Table 1). Further observational coding of socio-emotions suggests that those who did not like the right format, showed visible signs of distress such as re-adjustment of body, and negative facial contortions which did not accompany their speech. And, those who began with the right-aligned questionnaire were able to navigate the questionnaire more easily and with less absolute physical effort than those who filled out the left format. Interestingly, many students stated they did not realize the questionnaire was right aligned until they were asked to compare it with the left aligned version.

Taken together, these results suggest that the traditional alignment of questionnaire items and answer categories to the left may be prematurely applied in websurveys and thus an experiment examining its effects on survey errors such as item nonresponse and measurement is warranted.

Table 1: Questionnaire Format by Preference

		Questionnaire Format			Total
		Left-Justified	Right-Justified		
Which format do you prefer?	Left	Count	14	6	20
		%	73.7%	33.3%	54.1%
	Right	Count	3	11	14
		%	15.8%	61.1%	37.8%
	No Preference	Count	2	1	3
		%	10.5%	5.6%	8.1%
Total	Count	19	18	37	
	%	100.0%	100.0%	100.0%	

$(\chi^2=8.08, p=.018)$

Instrumentation³

Two versions of the questionnaires were constructed and placed on an access-controlled server. The questionnaires contained substantive measures about the environment and included all of the response options available in web surveys such as radio buttons, drop-down menus, check boxes, and open-ended text boxes. The principle difference in the two forms involved the general layout of text (left vs. right) and the location of answer categories (left vs. right). Figure 1 in Appendix A represents the traditional design that aligns all information to the left of the screen. In Figure 2, the questionnaire items are aligned to the right with the answer categories placed to the right as well. We chose environmental issues as our substantive topic as we wanted to engage the respondent in a dialog about something that he or she might have an opinion they felt like expressing. The Type of questions respondents were asked included opinions about the general state of the environment, governmental regulation of the environment, as well as awareness of past accidents such as oil spills and nuclear power plant failures. Based on the overall participation level and the nature of the responses, it appears we were able to accomplish our goal of keeping respondents focused on the content and not on the alignment of the questionnaire itself.

Following the seventeen questions related to environmental issues, we included measures of how easy or difficult it was to complete the survey, whether or not there were areas in the survey that caused confusion, and perceived satisfaction with the visual design. Personal characteristics such as age, sex, language use, and computer experience were also asked. Together, these measures will help evaluate the survey experience and assist in the determination of each form's level of efficacy.

The forms were programmed in HTML using the principle of the Least Compliant Browser (LCB) outlined by Bowker (2000). In short, the LCB approach seeks to reduce survey measurement and nonresponse error by "designing the web questionnaire for the lowest anticipated browser level" such that the likelihood of distributing an equal visual stimulus to all participants is maximized (measurement) and that access is not impeded by incompatible programming (nonresponse)." The task is accomplished by programming the web questionnaires using basic HTML code, and integrating--where appropriate--alternative code that anticipates cross-platform usage (PC and MAC), and between/within browser differences (e.g. making sure the HTML is compatible between browser vendors [Netscape and Internet Explorer] and within the base code itself [versions 1-5]. A final stage before entering the field involves the validation of code across several comparator programs to ensure the highest end-user compliance. The cumulative result of these procedures produces web questionnaires that maximize their probability of distributing equal survey stimuli and access to all its

³ There were two inadvertent differences between the two formats due to errors in the editing process. In one case, the question stem was different between both forms, and in the other, the answer categories were different. These questions were removed from all analyses.

participants and thereby minimizes potential sources of survey error such as item measurement and nonresponse.

Design and Procedures

The experimental design of this study is based on a simple random assignment to one of two treatments: Treatment 1, is the traditional left-aligned questionnaire, while Treatment 2 is the alternative right-aligned survey. Each form was placed on the web with entry restricted to those who had been assigned an access code and invited to take the survey. To solicit respondents, students in a graduate seminar were given a list of unique access codes and asked to recruit others, which might include friends, family members, or simply acquaintances, to visit the website and participate in a survey on environmental issues. Respondents were required to successfully enter their uniquely assigned code before they were able to begin the survey. Upon entry of the code, respondents were randomly assigned to one of the two questionnaire formats and then asked about environmental issues. Multiple participation entries were not permitted—once a respondent successfully logged in with their access code, they could no longer return to the survey to fill it out again, or pass their number on to someone else.

Sample Characteristics

The total number of respondents in this survey was 717. Thirty-three respondents terminated their participation for unknown reasons within the first twenty seconds of the survey thereby providing no usable information for our primary analysis. Therefore, the total number of cases used in this study is 684, with fifty-one percent ($n=350$) completing the right-aligned survey, and forty-nine percent ($n=334$) completing the left one. It is important to note that due to the nonrandom solicitation procedures, these data are not a representative sample from the population of potential web survey participants. Therefore we can only focus on issues of internal rather than external validity.

Nearly fifty-five percent of the sample members were female, while the average age for all respondents was 28 years old--the youngest respondent being 12 and the oldest 76. To address potential cultural effects due to language use, we asked respondents to report the language they first learned to speak. Fifteen-percent of the sample stated a first language other than English. Examination of IP addresses shows that 92% of these respondents completed the survey from abroad.

Results

How easy it is for respondents to complete the questionnaire, whether they had difficulties filling it out or not, and how much they liked or disliked the visual design and layout are all subjective indicators of the two form’s usefulness. However, objective indicators such as observed differences in survey item measurement, item nonresponse, and time to complete the survey are equally important factors in determining the value of each survey format. We now turn to a discussion on these issues, providing a descriptive summary with various tables and charts before making our conclusions.

Ease of Use

The first indicator of a format’s effectiveness is the respondent’s perception of how easy or difficult the questionnaire was to complete. When asked, “How easy was it for you to complete the survey,” ninety-one percent of the respondents stated they found the survey “very easy” or “somewhat easy” to complete. When compared across the two forms, the same exact pattern emerged: ninety-one percent stated the questionnaire was very easy or somewhat easy for both the left and right forms (see Table 2).

Table 2: Ease of Use by Format

		Survey Treatment		Total
		Left Aligned	Right Aligned	
Very easy	Count	207	203	410
	%	63.5%	58.7%	61.0%
Somewhat easy	Count	91	112	203
	%	27.9%	32.4%	30.2%
Somewhat difficult	Count	22	30	52
	%	6.7%	8.7%	7.7%
Very difficult	Count	6	1	7
	%	1.8%	.3%	1.0%
Total	Count	326	346	672
	%	100.0%	100.0%	100.0%

($\chi^2=6.42$, $p=.093$)

Confusion About What to Do

Next, respondents were asked, “Were there any places in the questionnaire that you were confused about what to do.” As shown in Table 3, nearly seventeen percent stated there was confusion while filling out the questionnaire. For the left format, only fifteen percent indicated they were confused, while eighteen percent stated they were confused while completing the right format.

Table 3: Confusion About What to Do by Format

		Survey Treatment		
		Left Aligned	Right Aligned	Total
No	Count	275	284	559
	%	84.9%	81.8%	83.3%
Yes	Count	49	63	112
	%	15.1%	18.2%	16.7%
Total	Count	324	347	671
	%	100.0%	100.0%	100.0%

($\chi^2=1.10$, $p=.293$)

Perception of Design and Layout

We also asked respondents for their general opinion regarding the visual layout and design of the questionnaire. Respondents were reminded that we were not concerned with the survey content, but rather how they felt the survey “looked.” Ninety-seven percent stated the questionnaire design and layout was “very good” or “somewhat good.” Again, an almost identical pattern occurs when comparing the two forms. In both cases ninety-seven percent felt the design and layout was very or somewhat good. No one stated the left format was “very bad,” however two respondents indicated the right format was very bad (see table 4).

Table 4: Perception of Design and Layout by Format

		Survey Treatment		
		Left Aligned	Right Aligned	Total
Very good	Count	220	213	433
		67.7%	61.4%	64.4%
Somewhat good	Count	98	123	221
		30.2%	35.4%	32.9%
Somewhat bad	Count	7	9	16
		2.2%	2.6%	2.4%
Very bad	Count		2	2
			.6%	.3%
Total	Count	325	347	672
		100.0%	100.0%	100.0%

($\chi^2=4.48$, $p=.214$)

Immediately following the question about the visual design and layout, we asked respondents to tell us specifically what it was they liked or disliked about the questionnaire’s design. Overwhelmingly, respondents remarked positively about the form’s layout and design. The total number of open-ended responses for each form varied slightly. For the left format, there were 218 responses provided, while the right format recorded 240 responses. In addition, the left format contained fewer “negative” comments than the right format, 52 versus 89 respectively. Table 5 shows the results after coding both the positive and negative responses for each of the survey formats across five substantive dimensions: colors and/or graphics, font size and/or spacing, text alignment, questionnaire navigation, and general content. In addition to the observation that the right format has more negative responses than the left, the left format has more comments regarding the navigation of the survey. In particular, negative comments regarding the use of the scroll bar was the most common response. Overall, it is clear respondents remarked positively in their open-ended response, corroborating their initial position of the design and layout.

Other interesting comments included the preference and appreciation for a simple and plain design. Also, despite the fact that both forms looked the same, and used the same colors and graphics, the right format was perceived more negatively than the left. Many of these comments involved comments regarding the “drab” or “bland” appearance of the questionnaire, usually adding a comment about the amount of “empty” space on the left caused by the right alignment.

Table 5: Open-ended Responses on Visual Design and Layout

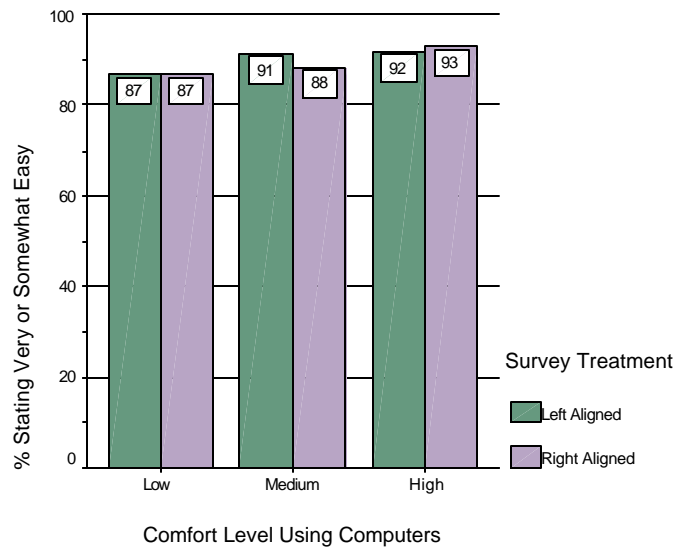
Comment Type	Questionnaire Format			
	Left-Aligned		Right-Aligned	
	-	+	-	+
Colors and/or Graphics	16	31	31	31
Font Size and Spacing	10	8	9	34
Text Orientation/Alignment	8	1	17	1
Navigation	7	30	3	73
General Content	11	159	29	164
Totals:	52	229	89	303

**Responses can be coded multiple times. For example, if a respondent stated the colors were bothersome and that they did not like the scrolling, their negative responses are reflected in both the navigation and the colors/graphics cell.*

Respondent's Comfort Level and Experience with Computers

One might ask, does a respondent's level of comfort and/or experience with computers affect the way he or she experiences the survey? We might expect that those who are least comfortable with computers would find the "unfamiliar" right aligned format more difficult to complete, which might arguably confound the initial relationships outlined above. Figure 3 shows the percent stating "very easy" or "somewhat easy" for each form by level of comfort in using computers.

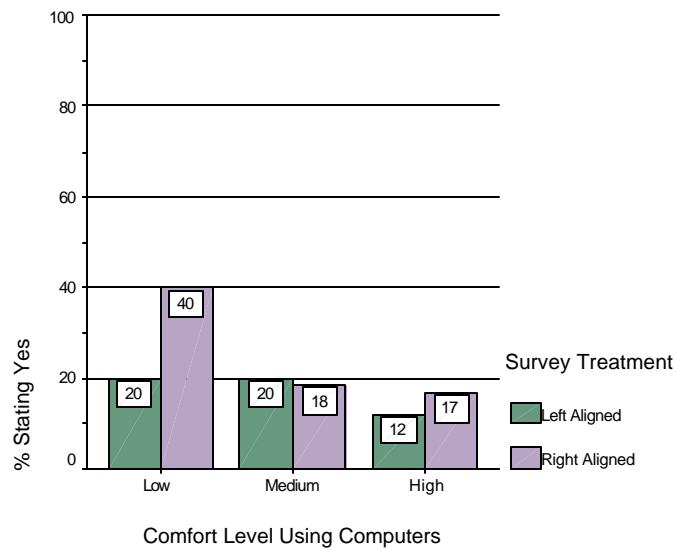
Figure 3: Ease of Use by Comfort Level and Survey Treatment



As shown, those who report a low level of comfort in using computers were only slightly less likely to state that the questionnaire was easy or very easy to complete. For both the high and low levels of comfort, there was virtually no difference between the two forms, however those reporting a medium level of computer comfortability appeared to be slightly more likely to find the left format easier to complete, though this difference is not significant.

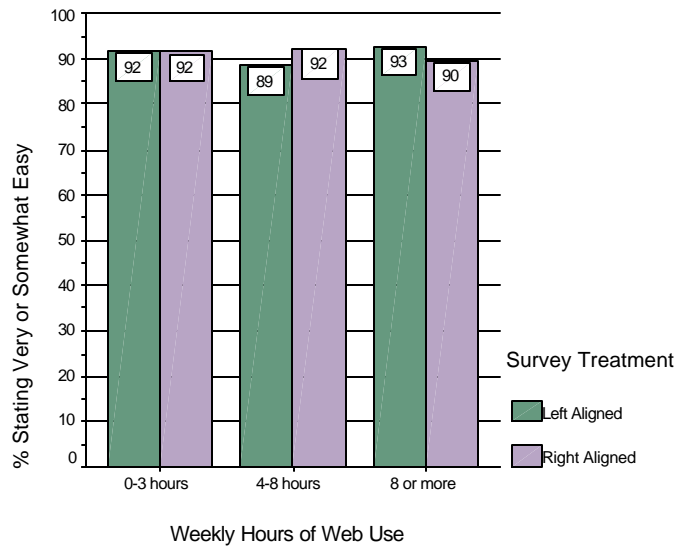
Figure 4 shows the percent of respondents stating there was confusion while completing the survey by the level of comfort in using computers for each form. While the biggest difference is found in those who stated they were least comfortable using computers (20 vs. 40 percent) the number of cases for the left format is only 3, while the right is 6, thereby making it difficult to determine the strength of the relationship.

Figure 4: Survey Confusion by Comfort Level and Survey Treatment



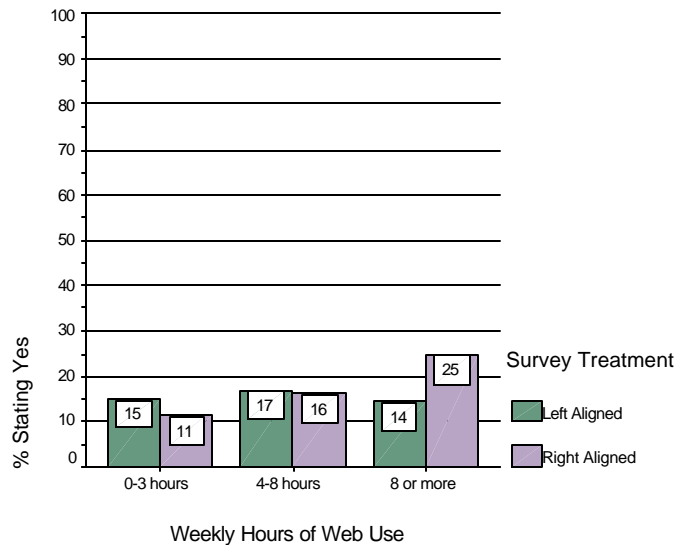
What about experience using computers? Do respondents who use the web more frequently and/or who have had experience with websurveys in the past more or less likely to favor one format over the other? HCI research would suggest that more experienced users would find the right format easier to use, and likely even more appealing. In contrast, traditional methods would predict that the unfamiliarity of the right aligned format would be bothersome for experienced users, especially since their expectations (i.e. for a left aligned format) of web use are more prevalent. Figure 5 shows the distribution of respondents by their level of web use and how easy they felt the survey was to complete. Across all levels of use, there are no significant differences between the two forms. However, those who use the web four to eight hours a week appeared to have more difficulty while completing the left form while those who use the web eight or more hours found the right format more difficult to complete. Though these differences are quite small, and are not statistically significant, they suggest equivocal support for both perspectives.

Figure 5: Ease of Use by Web Use and Survey Treatment

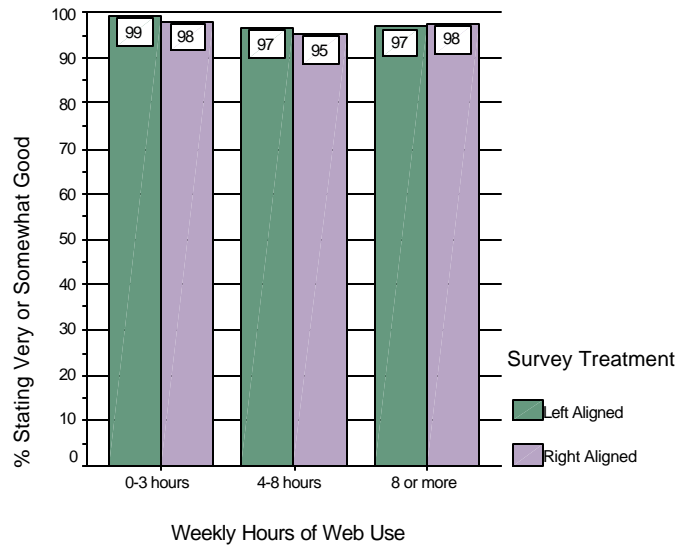


With respect to the amount of confusion between the two formats, we might expect a simple extension from the analysis conducted above. Figure 6 shows the percent of respondents for both forms who indicated there were places in the questionnaire that was confusing and their weekly hours of web use. Interestingly, those who use the web least had the most difficulty with the left aligned format, while those who use the web 8 or more hours a week were more likely to find the right aligned format with more confusion.

Figure 6: Ease of Use by Web Use and Survey Treatment



Finally, we examine how weekly web use is related to perceptions of visual design and layout. Figure 7 summarizes respondent opinions for both forms. Again, there is little variation across all levels of weekly web use and the two formats.



Measurement Differences

One of the questions this study attempts to answer involves the differences in item distributions between the two formats. Does one format result in different distributions for the survey items? And, if so, are these due to the substantive content of the survey items or the variation in alignment of the questionnaires? A simple comparison of the survey items by each form shows no differences in any of the questions. We conducted extended analyses controlling for variables such as computer use and previous experience with completing web surveys, and none showed any statistical or even substantive differences for any of the items in either form.

Item-nonresponse

In addition to being an indicator of Rates of item non-response are also appropriate indicators of a web survey's navigability and design. Specifically, item nonresponse is affected by such factors as inadequate information organization, poor navigational flow, and improperly worded questions. It is possible that the questionnaire's alignment could lead to increases in nonresponse error if some people are so uncomfortable with the survey's layout and design that they stop and fail to complete the web survey. Moreover, right or left justification could increase the number of hand movements associated with completing the questionnaire, as well as add to the survey's complexity. This might

result in respondents inadvertently clicking on the wrong responses—thus leading to measurement error.

We examined rates of item nonresponse for both forms and found that overall, eighty-four percent of the respondents did not skip any questionnaire items. Of those that did however, the average number of skipped items was 1.12. When compared across both forms, we find that the left format was more likely to contain a higher rate of item-nonresponse than the right format (see Table 8). A Chi-square test indicates these differences are significant ($X^2=6.64$, $p=.016$). A possible reason for these differences, small as they are, is that the greater “back and forth” eye movement required for answering the left aligned questionnaire may have contributed to a greater number of items being missed by some respondents.

Table 7: Number of Missing Questionnaire Items by Format

		Survey Treatment			
		Left Justified	Right Justified	Total	
Total # of Missing Items	1-3 Items Missing	Count	42	53	95
		%	77.8%	94.6%	86.4%
	4 or More Items Missing	Count	12	3	15
		%	22.2%	5.4%	13.6%
Total		Count	54	56	110
		%	100.0%	100.0%	100.0%

($X^2=6.64$, $p=.016$)

Furthermore, recall that our sample initially included 717, but 33 were dropped because they only answered the first few questions before terminating. Of these 33 respondents, 16 had been assigned to the left aligned format, while 17 were assigned to the right aligned treatment. Thus, it appears there is no difference in the terminations that is contributable to the format itself.

Finally, while there were only 15 people in the sample who had four or more missing items, we wondered if perhaps there was a pattern of termination that would suggest a particular questionnaire item(s) that confused respondents. An examination of these cases however shows no identifiable pattern that would suggest a decision to terminate was based on a specific questionnaire item.

Time to complete the survey

Though the right-aligned format took slightly longer to complete, there was not a single comment that suggested a respondent was dissatisfied with the length of the survey or the amount of time it took to load. Several respondents completing the left format however stated the survey was too long and that too much scrolling was involved. The average amount of time taken to complete the

left aligned survey was six minutes and seven seconds, while the right aligned format took six minutes and thirty-three seconds. Although the right format took slightly longer to load (due to additional HTML code required for right alignment), nearly two-thirds of all respondents completed the survey using a high-speed connection from on-campus computer labs. Therefore, there is no reason why the left format would take longer, except that it takes longer to respond to questions due to the disjuncture of the answer categories and the scroll bar—the mechanism used to advance to the next question.

Discussion & Conclusions

It is important to note some of the limitations of this study. First, it should be reiterated that these data were not selected at random and do not represent any given population of interest other than the population of users solicited to take the survey and thus these results cannot be generalized beyond our sample. Moreover, the sample members studied here were above average with respect to education and experience with computers. It is possible that these results may not be the same in an uneducated sample, or one with one that has less computer experience. Any future studies in this area should definitely address this with more diverse and representative samples. Third, this study focused exclusively on static scrolling navigation and since its thesis is based on a principle of scrolling as the primary form of navigation, any device (hardware or software) that bypasses this, makes the results of this study somewhat extinct. For example, computer mice are increasingly being manufactured with devices that act like a wheel allowing its user to scroll through pages with great ease and without moving the body of the mouse itself⁴. Another limitation of this study is that we did not construct a middle ground to compare left and right alignments with. Perhaps a third treatment for a text aligned in the middle is appropriate. If the right format is truly more efficient than the left, then we would expect the middle to be at least minimally better than the left if for no other reason than the fact that the navigational effort is reduced for respondents. Finally, our findings regarding the confusion or difficulty encountered in the survey are tempered by the inequality between the two forms with respect to two substantive questions and their categories.

Limitations notwithstanding, there are several conclusions that are worthy of making note. One of the most obvious and consistent findings in this study is the general lack of difference—across several dimensions—afforded by the two formats, particularly in the distributions of the questionnaire items. While some respondents had difficulty filling out the questionnaire, were confused about what to do at times, and even rated the layout and design unfavorably, the vast majority had no problems completing the survey, knew precisely what to do (and when), and remarked positively about the

⁴ In response to this weakness however, it is our belief that the diffusion of technology such as the Intellimouse will undoubtedly take several years, and therefore we need—at the very least—an interim solution for dealing with static scrolling methods. A similar argument can be made to rebut claims that advancements in HTML and web browsers will negate the need for static scrolling surveys.

questionnaire. This suggests that either format produces desirable outcomes with respect to item response rates and the quality of measurement.

Though not large, the differences between experienced and less experienced users and how comfortable they felt using computers, clearly warrant further investigation. For users who have little experience with the web, the right aligned format may not be appropriate. However, because it does reduce the response effort, tailoring the form for experienced users might be appropriate. Conceivably one could screen participants by having experienced users directed to an alternative format. That we discovered no substantive differences between the responses in each form suggests that such a procedure would not have any negative effects on the outcome of the study.

As a result of the alignment, the blank space to the left or right of the main body of the questionnaire, particularly for those completing the right aligned form, was distracting for some respondents. This suggests that regardless of which format used, something should be done to minimize the presence of this white space. In this study we attempted to emulate paper surveys as closely as possible by restricting the total number of characters that were displayed in any one line in the questionnaire. As a consequence, we may have distracted respondents by leaving the area blank. A potential solution would be to change the figure ground color scheme such that the “background” is of slightly darker color. Alternatively, several respondents suggested placing pictures or additional instructions in the open space.

With respect to the higher rates of item nonresponse that we discovered in the left format, it is possible that the extra effort required to move back and forth between the response categories and the scroll bar may have caused respondents to “skip” over or inadvertently miss some items. However, more research that uses a random sample from a general population is needed to confirm this point.

Finally, it appears that the simplicity of the format and ease of navigating through the document are of paramount importance to respondents. Thus the principles for navigational guides and information organization that Jenkins and Dillman (1997) advanced for paper surveys may well be applicable to web surveys. Furthermore, the findings of simplicity in web questionnaires supports earlier research by Dillman et al (1998) that found higher completion rates for plain vs. fancy web survey designs.

Figures 1 and 2

(Images of Figures that illustrate the left and right oriented web page formats are omitted from this version of the paper because of file size, but are available from the authors.)