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Writing and Revising Questionnaire Design Guidelines

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Writing and Revising Questionnaire Design Guidelines

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Abstract

This paper will focus on establishment survey questionnaire design guidelines. More specifically, it will discuss the process involved in transitioning a set of guidelines written for a broad, survey methodological audience to a more narrow, agency-specific audience of survey managers and analysts. The process involved the work of a team comprised of individuals from across the Census Bureau's Economic Directorate, working in a cooperative and collaborative manner. The team decided what needed to be added, modified, and deleted from the broad starting point, and determined how much of the theory and experimental evidence found in the literature was necessary to include in the guidelines. In addition to discussing the process, the paper will also describe the end result: a set of questionnaire design guidelines for the Economic Directorate.

Key Words: Questionnaire design, Data collection, Data quality, Design guidelines, Questionnaire guidelines, Questionnaire revision.

1. Introduction

1.1 Census Bureau context

The United States Census Bureau collects information from both households and businesses, and analyzes that information to produce statistics about the nation's people and economy. The agency's Demographic or Decennial Directorates typically collect information about households and individuals, while the Economic Directorate typically collects establishment information. The Economic Directorate collects data through an array of annual, quarterly, and monthly surveys, as well as the quinquennial economic census.

The guidelines discussed in this paper were developed for the Bureau's economic surveys. As such, they may not be applicable to the agency's social and demographic surveys. The guidelines apply to both paper and electronic modes of data collection, but not interactive voice response (IVR) or touchtone data entry (TDE) modes, since they are not as widely used in the Economic Directorate.

1.2 The need for guidelines

The Economic Directorate recognized the need to develop guidelines because of two primary factors. First, there are several different mechanisms for creating questionnaires. Some economic surveys are developed uniquely for a particular survey and are constructed by forms designers located centrally within the agency. Some economic surveys are conducted on the web, using one of two design systems. Still other economic surveys are designed using a metadata repository and the Questionnaire User Interface and the Generalized Instrument Design System (QUI-GIDS). As a result of these various questionnaire construction methods, the "look and feel" of economic surveys tends to vary, thus lacking a Census Bureau corporate image for respondents. Second, the various survey programs within the Directorate requested questionnaire design guidance. Questionnaire design responsibilities generally lie with subject matter experts rather than survey methodologists, and subject matter experts are generally not trained in questionnaire design principles or familiar with the research literature.

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Ultimately, it is hoped that the questionnaire design guidelines will enable the Census Bureau's economic surveys to develop improved questionnaires with a more consistent look and feel across survey programs – regardless of type, timing, topic, or target population – to achieve the goals of improving data quality and reducing respondent burden.

1.3 Origins of the guidelines

In the summer of 2007, at the Third International Conference on Establishment Surveys, I authored and presented a paper that represented an initial effort towards questionnaire design guidelines for economic surveys (Morrison, 2007). Following that conference, I worked with Don Dillman (Washington State University) and Leah Christian (Pew Research Center, formerly of Washington State University) to expand and modify the ICES-3 paper. We submitted the manuscript for publication in the *Journal of Official Statistics* (*JOS*); that article is forthcoming.

The *JOS* article was written for a broad audience of survey methodologists. It needed to be modified for use by subject matter experts, project managers, and others within the Economic Directorate who would be using it. To make this transition effectively, I led a team from different survey program areas across the Directorate.

2. The Questionnaire Design Guidelines Review Team

The Questionnaire Design Guidelines Review Team consisted of eleven members. These eleven individuals were appointed by senior managers within the Economic Directorate, and represented multiple survey areas, covering a variety of industries, such as services, manufacturing, construction, and governments. Two members of the team represented processing concerns, rather than a specific industry or survey area. Each member of the team had experience with that area's paper and electronic surveys.

3. Process

The team's work started with the *JOS* manuscript. All in all, the process employed 6 steps, 9 months, and 14 drafts. A description of the basic process is below, but it should be noted that some of the steps overlapped with each other.

3.1 Step 1 – Quick sort

The *JOS* article contained eighteen guidelines. The team sorted each of the guidelines into one of three categories: keep as it was, modify it in some way, or delete it. These categories could refer to either the guideline itself or the supporting text. At the end of this step, the team decided to keep five guidelines as they were, and modify the remaining thirteen. None of the guidelines were deleted.

3.2 Step 2 - Add

The next step was to add new guidelines that the *JOS* article did not address. The team determined that five guidelines needed to be added. The new guidelines addressed topics including units of measurement, previously reported data, the use of "Mark 'X' if None" boxes, questions that continue across pages or screens, and questionnaire due dates.

3.3 Step 3 - Structure

Step 3 in the revision process was to determine the structure of the final document that would contain the guidelines. To do this, the team used a detailed outline. The outline started as a six-page, single-spaced document. By the end of this step, the outline had grown to nine pages.

At this time, the team also wrestled with how many of the citations found in the *JOS* article should be kept. Because the *JOS* guidelines were grounded in and supported by the published literature, this discussion was an important one to have. Keeping all the citations could make for an unwieldy and cumbersome document, but helped establish that the guidelines were supported by the literature rather than gut feelings and general practice. In the end, the team decided to keep all of them, thinking it was better to err on the side of giving readers additional resources they could reference and evaluate for themselves within the context of their own survey programs.

3.4 Step 4 – Revise

At this stage, the document started looking more like the final version. Sections were rearranged to fit the new structure and transitions were reworked, to account for sections that had been relocated. New sections were written, and then reviewed by team members. New figures and examples were added to the text to illustrate the points being discussed.

3.5 Step 5 – Review and approval

After the revision step was complete, the final document was reviewed in its entirety by team members, then by successively higher levels of management within the Economic Directorate, concluding with review and approval by the most senior managers. Each group of reviewers generated comments that needed to be addressed in the next draft. Some comments were minor and editorial in nature. Other comments were more significant, and required feedback from the team members. Finally, after all of the comments had been incorporated, senior managers within the Directorate approved the guidelines on October 8, 2008. Subsequently, the document was posted to the Directorate's Policies and Standards intranet page.

3.6 Process challenges and benefits

The process described above had several challenges as well as benefits. The challenges included the timeline, and the group size. The first four steps took place within two and a half months. At times, this felt rushed, and it would have been useful to have more time for revising old sections and writing new ones. The variation of the group members' subject matter and processing expertise provided a unique challenge because each area within the Economic Directorate tends to develop their own questionnaires independently of each other. At times, it was difficult to write the guidelines so that these various survey areas were satisfied with the result.

The *JOS* article was both a challenge and a benefit. The *JOS* article, which served as the starting point for the Economic Directorate guidelines, was lengthy and its scholarly tone was a bit daunting. An outline probably could have accomplished a similar purpose. However, the article provided a solid starting point for the group and was one reason why the team was able to complete the first four steps so quickly. Starting to write guidelines from scratch would have been difficult and overwhelming, given the time constraint. Having something to react to was good, as it got people focused and thinking critically about the types of things that should be included and excluded.

4. Guidelines

4.1 Overview

There are 23 questionnaire design guidelines for economic surveys conducted by the Economic Directorate. They are organized under six major themes. The themes begin with the smallest elements of the questionnaire: individual questions as well as answer spaces and response options. Then the guidelines address the questionnaire as a whole, by discussing visual clutter, navigation, instructions, and matrix-style questions. The complete list of guidelines is below:

Guidelines on Wording

- Phrase data requests as questions or imperative statements, not sentence fragments or keywords.
- Break down complex questions into a series of simple questions.

Guidelines on the Display of Answer Spaces and Response Options

- Use white spaces against a colored background to highlight answer spaces.
- Use similar answer spaces when requesting the same type of information.
- Clearly indicate the unit of measurement for each data item.

- Decide whether or not to provide previously reported data to respondents after weighing the potential data quality benefits and risks and the potential disclosure risks.
- Provide “Mark ‘X’ if None” checkboxes if it is necessary to differentiate between item non-response and reported values of zero.

Guidelines on Eliminating Visual Clutter

- Use font variations consistently and for a single purpose within a questionnaire.
- Group data items and their answer spaces / response options.
- Evaluate the necessity of any graphics, images, and diagrams to ensure that they are useful for respondents.

Guidelines on Establishing a Clear Navigational Path

- Format the instrument consistently, taking advantage of familiar reading patterns.
- Clearly identify the start of each question and section.
- Group similar data items together.
- Use blank space to separate questions and make it easier to navigate within questionnaires.
- Align questions and answer spaces / response options.
- Use strong visual features to emphasize skip instructions.
- Inform respondents of the navigational path when a question continues on another page.

Guidelines on Instructions

- Incorporate question-specific instructions into the survey instrument where they are needed. Avoid placing instructions in a separate sheet, booklet, or webpage.
- Consider reformulating important instructions as questions.
- Convert narrative paragraphs to bulleted lists.
- When possible, use an actual date, rather than a vague timeframe, to reference due dates.

Guidelines on Matrices

- Limit the use of matrices. Consider the potential respondent’s level of familiarity with tables and matrices when deciding whether or not to use them.
- If a matrix is necessary, help respondents process information by reducing the number of data items collected and by establishing a clear navigational path.

Rather than discuss how each guideline was developed, five guidelines have been selected to demonstrate how the process described in Section 3 was applied.

4.2 Process for the guideline on previously reported data

Previously reported data are data that respondents provided in response to an earlier data collection effort and are fed back to the respondent on the current data collection effort. This technique is analogous to a “bounded interview” in interviewer-administered surveys. In self-administered surveys, previously reported data are visually provided to respondents on the page or screen. Previously reported data are also called historical data or prior period data.

This topic was not originally addressed in the *JOS* article, but team members thought it was important to discuss in the Economic Directorate’s guidelines since there was some internal debate about its usefulness and effectiveness. The issue the team wrestled with was whether the guidelines should state that previously reported data should be provided to respondents or not.

The argument in favor of providing previously reported data is that data quality could be improved because respondents are less likely to double-count figures from one time period to the next (Holberg, 2002; Hoogendoorn, 2004; Pafford, 1986). However, there are risks to providing previously reported data to respondents. Response bias may occur, partly due to respondents using historical data to anchor and adjust for the current reference period without consulting records (Philips, et al., 1995; Stanley and Safer, 1997; Pafford, 1988). Also, respondents might not adjust for changes in organizational structure, such mergers and/or acquisitions. Finally, there is a risk for unintentional disclosure, especially if mail is delivered to the wrong address (Morrison, et al., 2008).

After deciding that this issue should be addressed in the guidelines, the team took the following steps to develop the guideline. First, a couple of team members reviewed the appropriate literature and provided a summary to the other team members. Second, team members met with several different survey programs within the Economic Directorate to determine if they provided historical data to respondents, and how they came to that decision. Managers who oversee research and methodology functions within the Directorate met to provide feedback on the guideline and its statistical implications. Finally, a guideline with supporting text was drafted, reviewed by the team, and incorporated into the guidelines document. The guideline was to "provide previously reported data to respondents when there are problems with high response variability and measurement errors."

During the review of all of the guidelines by higher levels of management, the supporting text garnered relatively few comments. At their request, we added additional information about past experiences with historical data in the services industries. The text of the guideline itself, however, was thought to be worded too positively, given the literature cited in the supporting text. As a result, the guideline was reworded to be more neutral: "Decide whether or not to provide previously reported data to respondents after weighing the potential data quality benefits and risks and the potential disclosure and security risks."

4.3 Process for the guideline on consistent font variations

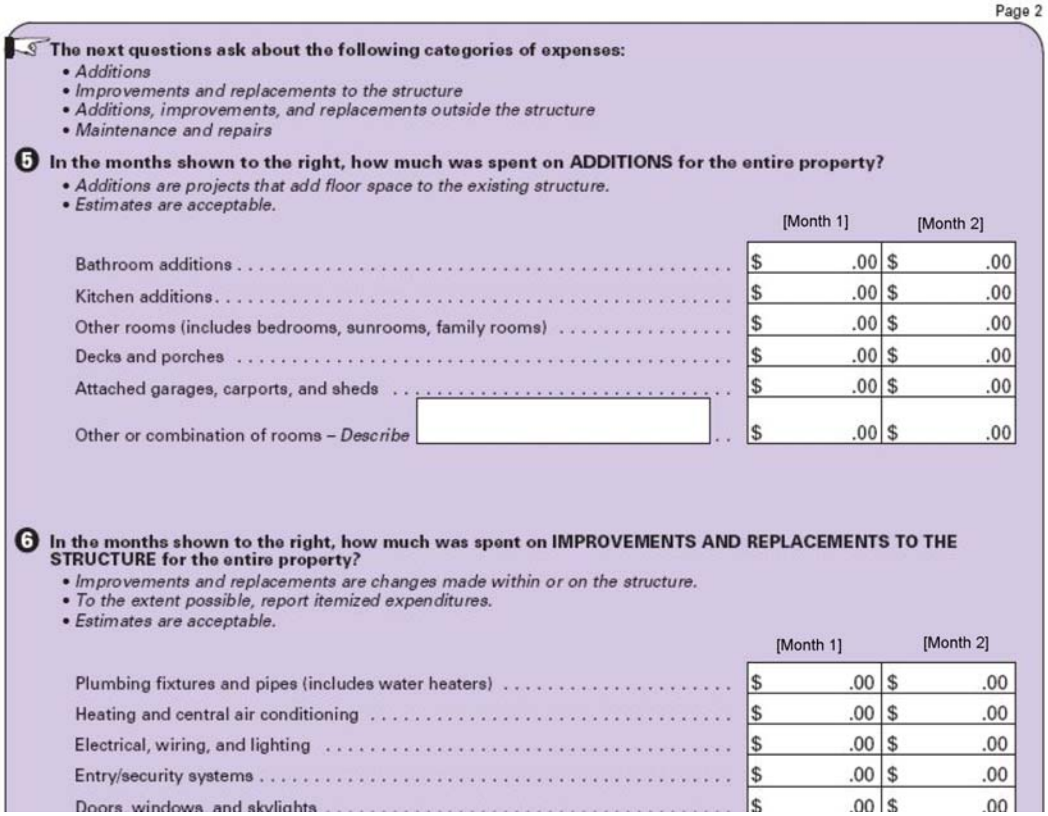
The text of this guideline remained the same from the *JOS* article to the Economic Directorate's guidelines. However, the team thought it was important to add more supporting text. We developed recommended font variations for use in both paper and electronic survey instruments, and added more examples to illustrate the main points. These recommended font variations were based largely on what various survey programs in the Economic Directorate do, as well as anecdotal evidence about what has worked for economic surveys at the Census Bureau. In addition, the guideline and its supporting text was moved. In the *JOS* article, this guideline stood on its own, toward the end of the document. In the Economic Directorate guidelines, it was moved so that it fell under the larger theme of eliminating visual clutter.

The recommended font variations for paper instruments discuss printing question numbers in reverse-print bubbles; using sans serif fonts; printing questions in bold, instructions in italics, and response options in plain text; using at least an 8-point font, and possibly printing questions in a larger point size compared to the instructions and response options; de-emphasizing keycodes for respondents; and, where to locate and how to display "Census Use Only" spaces so they do not distract respondents.

In addition to the recommended font variations (described above) this guideline advised survey designers to use the same style in a consistent manner for similar items. For example, if survey designers choose to print questions in italics rather than bold, then all questions should be printed in italics and italics should not be used to emphasize any other survey elements. An example of the consistent use of font variations in a paper survey comes from the Survey of Residential Alterations and Repairs, as seen in Figure 4.3-1.

The recommended font variations for electronic instruments are similar to the ones for paper instruments, with regard to question numbers, the use of sans serif fonts, questions in bold text, and response options in plain text. For obvious reasons, keycodes and "Census Use Only" spaces are not addressed for electronic instruments. The main difference between the recommended font variations for paper and electronic instruments is that italics should be avoided in electronic instruments. Instead, it is recommended that instructions be provided in plain text.

Figure 4.3-1
A consistent use of font variations in a paper survey, from the Survey of Residential Alterations and Repairs


Page 2

The next questions ask about the following categories of expenses:
- *Additions*
- *Improvements and replacements to the structure*
- *Additions, improvements, and replacements outside the structure*
- *Maintenance and repairs*

5 In the months shown to the right, how much was spent on ADDITIONS for the entire property?
- *Additions are projects that add floor space to the existing structure.*
- *Estimates are acceptable.*

	[Month 1]	[Month 2]
Bathroom additions	$ .00	$ .00
Kitchen additions	$ .00	$ .00
Other rooms (includes bedrooms, sunrooms, family rooms)	$ .00	$ .00
Decks and porches	$ .00	$ .00
Attached garages, carports, and sheds	$ .00	$ .00
Other or combination of rooms – *Describe*	$ .00	$ .00

6 In the months shown to the right, how much was spent on IMPROVEMENTS AND REPLACEMENTS TO THE STRUCTURE for the entire property?
- *Improvements and replacements are changes made within or on the structure.*
- *To the extent possible, report itemized expenditures.*
- *Estimates are acceptable.*

	[Month 1]	[Month 2]
Plumbing fixtures and pipes (includes water heaters)	$ .00	$ .00
Heating and central air conditioning	$ .00	$ .00
Electrical, wiring, and lighting	$ .00	$ .00
Entry/security systems	$ .00	$ .00
Doors, windows, and skylights	$ .00	$ .00

4.4 Process for the guideline on graphics, images, and diagrams

In the *JOS* article, this guideline read, “Avoid including images or other graphics that are not necessary.” Team members thought this wording employed a negative tone, and agreed that a more positive tone would be a better approach. As a result, the guideline was changed to “Evaluate the necessity of any graphics, images, and diagrams to ensure that they are useful for respondents.” In addition to modifying the tone of the guideline, the new guideline text also emphasizes the need to gather feedback from respondents in determining the usefulness of images and graphics.

The supporting text for this guideline remained much the same, though more examples were added.

4.5 Process for the guideline on converting instructions into questions

The original guideline recommended that the survey designer “consider reformulating important instructions as questions,” because cognitive interview research at the Census Bureau indicated that respondents might skip over instructions, but they tend to pay attention to questions that are numbered. The team thought the guideline was fine, but needed more information. As a result, an example of how to turn an instruction into a question was added. In the Annual Retail Trade Survey for department stores, respondents are instructed to include “retail leased departments and concessions operated by this firm in establishments of others (e.g., shoe departments in department stores or prescription counters in food stores) which report payroll under this firm’s current EIN shown in Item 1A.” To convert this instruction into a question, the words were moved around, and a question mark and response options were added, as seen in Figure 4.5-1.

The team members thought that Economic Directorate readers would be concerned about increases in response burden associated with converting instructions into questions. The team decided to be forthright about this topic in the guidelines, so a few paragraphs were drafted and incorporated into the document. Later, in response to comments from reviewers, the paragraphs were strengthened. In essence, these paragraphs state that, when designing a questionnaire, it may be necessary to balance the (perceived) burden of additional questions with improved data quality. We also emphasized that, according to the U.S. Office of Management and Budget, the number of questions respondents answer is not the sole determinant of response burden; other factors include the time spent reading instructions and gathering data. As such, it is not necessarily true that additional questions will increase respondent burden.

Figure 4.5-1
An untested example of an instruction that has been converted to a question, from the Annual Retail Trade Survey.

Does your firm operate any retail leased departments or concessions in establishments of others which report payroll under your firm's EIN, reported in [insert question number] (for example, shoe departments in department stores or prescription counters in food stores)?

☐ Yes – Include the data for these facilities in this report
☐ No

4.6 Process for the guideline on processing information in matrix-style questions

A matrix presents queries to respondents within the context of a table, and is "a way to save space by reducing the number of times a question is asked or to avoid repetitive questioning about similar items" (Hunter, et al., 2005). Though efficient in terms of the amount of space needed on a page, matrices are burdensome in terms of the cognitive processing they require of respondents. Mainly, this is because respondents must keep multiple pieces of information – based on the row and column headers, as well as any accompanying information and instructions – in their heads at one time to provide their response (Morrison, et al., 2008). In essence, each cell within a matrix represents an individual question. This means that a matrix with 6 columns and 7 rows is equivalent to 42 questions.

The guideline as it appeared in the *JOS* manuscript advised questionnaire designers to "[u]se lines and spacing to help respondents process information vertically and horizontally as needed to complete the matrix." The team members thought the guideline was fine as it was written, but that the supporting text needed more explanation and examples. Those changes were made. When the guidelines went through a review by senior managers, however, the team received comments that the guideline text was too limiting considering the content of the supporting text, which talked about more than just the use of lines and spacing. As a result, the team revised the guideline as follows: "If a matrix is necessary, help respondents process information by reducing the number of data items collected and by establishing a clear navigational path." The revised language addressed the comment raised by senior managers, but also referenced earlier topics in the document (i.e., a clear navigational path).

5. Next steps

Now that the guidelines have been completed, they have been posted to an Economic Directorate intranet site, where all employees can access them. The next step is implementation. This step is expected to be challenging, since the guidelines are just that: guidelines. They are not standards, and are not intended to be applied unilaterally across surveys. There is room for interpretation, and how they are applied to one survey may not work as well for another.

As such, it is necessary to train Census Bureau employees on questionnaire design. A new in-house course on questionnaire design is currently being developed. The course will focus on the questionnaire design tools that are available. Theoretically, this should facilitate implementation of the guidelines by bringing them to the attention of employees who have questionnaire design responsibilities.

These guidelines are intended to be a "living document." As more information about questionnaire design becomes available, the guidelines will be reviewed, revised, and updated. Ultimately, though, the guidelines should encourage survey programs to think more critically about their questionnaires when they design or revise them.

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