

HAVE CHANGES MADE TO THE CENSUS FORMS SINCE 1990 AFFECTED DATA QUALITY?

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The Census 2000 Dress Rehearsal was designed to conduct operational testing of methodologies planned for Census 2000. It was conducted in Columbia, South Carolina and eleven surrounding counties; Menominee County, Wisconsin; and Sacramento, California. Each dress rehearsal site was selected because of its demographic and geographic characteristics to provide experience with some of the expected Census 2000 environments.

Since the 1990 census, there were significant changes to the design of both the mail and enumerator forms. For Census 2000 Dress Rehearsal, changes to several of the questions (e.g., relationship, Hispanic origin and race) included the addition of response options, question rewording, and a modified questionnaire format. This paper analyzes what effect these changes had on data quality in the Census 2000 Dress Rehearsal. Specifically we looked at the structure of the short mail form, the new topic-based format of the enumerator form, additional response options added to the relationship question, and the reversal of the order of the Hispanic origin and race questions. Results from both qualitative and quantitative studies of the Dress Rehearsal census forms are presented. In addition, we present results from two 1996 studies to supplement our evaluation of changes made to the race and Hispanic origin questions.

Does the new structure of the short mail form negatively affect respondents ability to navigate through the form correctly?

Specifically, we wanted to know whether people are beginning in the first person space, and whether they were using the form like a booklet rather than completely unfolding it. We did this by examining dress rehearsal data from all three sites. We assessed this by examining the person spaces completed by the respondents. To assess whether respondents have difficulty determining where to start the forms, we looked at the percentage of households for which the first completed space was the first person space. To assess whether respondents are using the form like a booklet and missing person spaces four and five, we looked to see if person spaces four or

five are complete in households with four or more people. In addition we explored results from a 1998 cognitive study designed to evaluate changes in the mail short form.

Based on a preliminary review of a non-representative set of mail returns as well as results from laboratory pretesting, we thought mail respondents might have some difficulty figuring out where to start and how to navigate through the short form. This was not the case. Less than one percent of all respondents started completing the person spaces some place other than person one. Similarly, only between three and five percent of households with four or more people missed one of the person spaces on the form and had to continue listing people on the continuation roster.

Thus our concerns about whether people would be able to use the short form and all of its folds were unfounded. Regardless, a decision has already been made to collect data for six people rather than five in Census 2000. The move to a six person form meant changing the structure of the form, so the Dress Rehearsal design is no longer an issue.

Cognitive research was conducted by Development Associates, Inc. for Census Bureau Population Division during the summer of 1998 to evaluate changes in the Census 2000 Dress Rehearsal mail short form (Development Associates, 1998). The study primarily focused on how respondents worked with the race and Hispanic origin questions, but also gathered detail on complications with the roll-fold design of the form. Face-to-face cognitive interviews were conducted with 122 respondents using a retrospective think-aloud approach with scripted and unscripted probes. Respondents were chosen to represent the kinds of people who are expected to have the most difficulties with the form: those with a high school education or less, people who were born and/or educated abroad and recent immigrants. Respondents were between the ages of 18 and 65 and had to be able to read English. There was a mix of gender and racial identities.

Results obtained through this study were quite different. The study reported that respondents did not always turn the pages of the form correctly, especially when going from Person 3 to Person 4. A number of respondents (1 in 5) who had four or more household members did not record the Person 4 information on that

page, but on the Person 6-12 page. It was unclear why they failed to open the form to find the pages for Person 4 and Person 5, as there appeared to be no consistent pattern with regard to failing to operate the roll-fold correctly.

How did the new topic-based format of the enumerator form influence data quality?

To address this question we obtained results from observation reports completed by headquarters employees while observing enumeration in the field. Observers were asked to pay specific attention to the format that enumerators used to administer the questionnaire. In addition, results are presented from debriefing questionnaires and debriefing focus groups held with Nonresponse Followup (NRFU) enumerators after the operation.

On the debriefing questionnaire, enumerators reported no difficulty with using the topic-based format, as about 93% of enumerators said it was somewhat or very easy to administer the questions in that format. During focus groups, enumerators also indicated that the topic-based format was easy to use. Yet, results from observation reports suggest that many enumerators do not use this format.

In the debriefing questionnaire, 65% of enumerators said they always used topic-based format for the 100% questions. However, enumerators may be slightly over-reporting this behavior since observation reports indicated that only 53% of observed enumerators administered the Simplified Enumerator Questionnaire (SEQ) in a topic-based format. About a third used a person-based administration, and a few used a combination of the two formats. There is no indication on the form itself that it is to be administered in a topic-based format, and many of the enumerators said that topic versus person based questioning was not mentioned in their training.

The use of person-based format may be consequential when enumerating large households. We suspect that enumerators may collect all of the data on the first five household members before taking the names of any other persons in the household. Once respondents know that there are a number of questions to answer for each person listed on the roster, they may be reluctant to provide the names of additional household members. Although the format of the questionnaire has changed, the question wording continues to promote a person-based approach. For example, question 3 reads "**What is (your/...'s) date of birth?**" It was recommended that the questions on the SEQ be reworded to better accommodate a topic-based format, and this has been

done for the Census 2000 SEQ. The new wording is "**What is each person's date of birth?**" It is also recommended that more emphasis be placed on using a topic-based format during enumerator training.

Did the categories added to the relationship question (two in-law categories, split of daughter/son into natural born daughter/son and adopted daughter/son) affect the overall distribution for the item, across both mail and enumerator forms?

To assess whether the additional response categories for the relationship item affect data quality, item missing data rates were calculated and compared to 1990 allocation rates for these areas. In addition, the overall response distribution for both the enumerator and mail returns will be compared to Current Population Survey (CPS) data which only included the "son/daughter" category. This will allow us to examine what effect the introduction of the new in-law and foster child categories and the split of son/daughter into adopted and natural born categories might have. Generally, we would expect a decrease in the "other relative" category to account for the new "in-law" and "adopted son/daughter" category. However, we will not be able to assess whether the magnitude of change is appropriate.

We found that for both the short and long forms, across mail and enumerator forms, the item missing data rates for the relationship item are lower than the 1990 Census allocation rates for all three sites. On the SEQ, this may be attributed to the ease of administering the form in a topic-based format.

To assess the appropriateness of the response distribution for the relationship item, the response distribution on the Census Unedited File (CUF) was compared to the March 1998 CPS. (Clark & Fields, 1998)

The distributions of persons in each of the relationship categories for each of the three Dress Rehearsal sites were consistent with the March 1998 CPS (Clark and Fields, 1998). Only about one percent selected the other relative category which is lower than the CPS, most likely due to the inclusion of the "in-laws," "step," and "adopted" categories in the Dress Rehearsal. In addition, there are slightly higher counts of Person 1 categories on the Dress Rehearsal forms. This is probably due to the inclusion of SEQ continuation forms where Person 6 in the household on a continuation form was counted as Person 1. However, this problem will be corrected in further Dress Rehearsal processing.

There was no noticeable effect of these changes on the missing data, and the effect on the response

distribution was what was expected, a slight decrease in the percent of 'other relative' reported as compared to other survey data. Thus no changes are recommended.

Does placing the Hispanic origin question before the race question reduce item nonresponse rates for the Hispanic origin question? Did this sequence reduce the reporting in the "Some other race" category among Hispanics? What impact does this sequence have on nonresponse rates for the race question?

To address these questions we reviewed and summarized questionnaire experiments conducted by the Census Bureau on how the sequencing of the race question and the Hispanic origin question affects the data quality of these two key items on the census form. We relate these findings to race and Hispanic origin reporting in the Dress Rehearsal.

To assess how the changes to race and Hispanic origin affect data quality, we calculated item nonresponse rates by form and compared them to allocation rates for these areas in 1990.

The race question has changed substantially from the 1990 version. One of the most notable changes is that respondents are allowed to select more than one category to describe a person's race. The second notable change affects both the race and Hispanic origin items. This change is the placement of the Hispanic origin question directly before the race question.

Bates et al. (1995) analyzed and summarized the results of a series of questionnaire experiments undertaken by the Census Bureau from 1987 through 1992 and found that placing the Hispanic origin question before the race question restricted the frame of reference for race reporting. Thus, respondents "subtract" their answers to the narrower question (Hispanic origin) from their response to the broader question (race). Bates et al. note that while this context effect has been documented with attitude questions and termed the "part-whole" effect, this context effect had not been documented with factual questions such as questions that ask for respondents' race and Hispanic origin. The authors showed that placing the Hispanic origin question before the race question resulted in a statistically significant reduction in nonresponse to the Hispanic origin question and declines in "Other" race reporting by Hispanics in the race question. Additionally, Bates et al. (1995) found that, in some questionnaire design experiments, adding instructions asking respondents to answer both the Hispanic origin question and the race question also significantly reduced nonresponse to the Hispanic origin question.

Since its introduction in 1970, the Hispanic origin question has experienced a variety of response problems

including misreporting by non-Hispanics, response inconsistency, and relatively high nonresponse. Our focus here is on nonresponse.

Results from the the 1996 National Content Survey (NCS) and the 1996 Race and Ethnic Targeted Test (RAETT) confirm the findings of the experiments examined by Bates et al. (1995) regarding response to the Hispanic origin question. Nonresponse to the Hispanic origin question in Panel 1 of the 1996 NCS where the race question preceded the Hispanic origin question was 8.6 percent whereas in Panel 3, where the order of these questions are reversed, the nonresponse rate to the Hispanic origin question was 5.5 percent, a significantly lower rate (Harrison, et al., 1996). It is important to note that Panel 3 (sequencing Hispanic origin before race) also contained instructions to respondents to provide a response to both the Hispanic origin question and the race question.

Results from the RAETT also indicate that significant reductions in nonresponse to the Hispanic origin question can be achieved by placing the Hispanic origin question before the race question and by instructing respondents to answer both questions. In both the White ethnic targeted sample and in the Hispanic targeted sample in the RAETT, nonresponse to the Hispanic origin question was significantly reduced by placing the Hispanic origin question before the race question, along with instructions for respondents. In the White ethnic targeted sample nonresponse to the Hispanic origin question went from 10.6 percent in Panel D where the race question came first, to 4.3 percent in Panel B, where the Hispanic origin question was placed first. Similarly, in the Hispanic targeted sample the comparable figures are 9.9 percent in Panel D and 7.5 percent in Panel B, a significant difference of 2.4 percent (U.S. Census Bureau, 1997).

Because of the overwhelming evidence that placing the Hispanic origin question before the race question significantly reduces nonresponse to the Hispanic origin question, and to a lesser extent, produces a significant reduction in "Other" race reporting, the order of these two question in the Dress Rehearsal was the Hispanic item followed by the race item.

What effect did the Hispanic origin first and race second sequence have on item nonresponse to the Hispanic origin question in the Dress Rehearsal?

On the short form, for both mail and enumerator return forms in all three dress rehearsal sites, item nonresponse for the Hispanic origin item is substantially lower in the Dress Rehearsal (where the Hispanic origin question preceded the race question) than in the 1990 census (where the race question preceded the Hispanic origin question).

However, the Dress Rehearsal results regarding nonresponse for the Hispanic origin item with respect to the long form are mixed. On the mail return form for both Sacramento and South Carolina, item nonresponse for the Hispanic item is close to identical in the Dress Rehearsal and in the 1990 census. Whereas, enumerator return forms item nonresponse for the Hispanic origin item is lower in the Dress Rehearsal than in the 1990 census.

In general, nonresponse for the Hispanic origin item in the Dress Rehearsal is in line with the nonresponse level for this item in the NCS (a significant reduction from 8.6 percent when race is placed before Hispanic to 5.5 percent when Hispanic comes first) and the RAETT (a significant reduction from 10.6 percent when race is placed before Hispanic to 4.3 percent when Hispanic comes first). Therefore, it seems that the context effect identified by Bates et al. (1995) is operating in the Dress Rehearsal environment and that the Hispanic origin first and race second sequence has improved data quality for the Hispanic item in the Dress Rehearsal.

As we mentioned above, Bates et al. (1995) found that a significant reduction in "Other" race reporting among Hispanics can be achieved by placing the Hispanic origin question first. Results from both the NCS and the RAETT indicate that such reductions are achievable. Focusing on the NCS, the race distribution of Hispanics for Panel 1 (race is placed first) and Panel 3 (Hispanic origin is placed first) reveals that a significant decline in "Other" race reporting occurs when the Hispanic origin item is placed before the race item (42.9 percent compared to 24.9 percent). The same pattern was also identified in the RAETT. In the Hispanic targeted sample in the RAETT, 24.9 percent of the residents in that targeted area reported as "Other" race in Panel D (race first) compared to 15.7 percent in Panel B (Hispanic origin first), resulting in a significant difference of 9.2 percentage points.

Dress Rehearsal data reveal that a relatively high proportion of Hispanics report in the "Some other race" category even though the Hispanic origin question precedes the race question. In Sacramento only 2.2 percent of non-Hispanics reported as "Some other race" while 31.6 percent of Hispanics reported in this category. The proportion of Hispanics who reported in the "some other race" category in the Dress Rehearsal is not in line with earlier studies conducted by the Census Bureau. In these early experiments "Other" race reporting among Hispanics were in the 15 percent to 25 percent range once the Hispanic origin item was placed before the race item. The differences between findings from the dress rehearsal and Census Bureau experiments may be due to differences in samples as well as considerable differences in questionnaire formatting.

As Census Bureau experiments have shown, significant reductions in "Other" Race reporting occur

when the Hispanic origin item comes before the race item; however, there remains a sizeable proportion of Hispanics who report in the "Other" race category regardless of question order. Although multivariate analyses were not conducted with data from the NCS or the RAETT, Bates et al. (1995) did develop log-linear models to identify factors that influence the reporting in "Other" race among Hispanics. These analyses showed, among other patterns, that among Hispanic subgroups, Cubans were more likely to select "White" regardless of question order. This finding reflects what we found in the Dress Rehearsal. Among Hispanics, Cubans are less likely than most subgroups to report in "Other" race (28.2 percent compared to 32.5 percent for Mexicans) and more likely than any of the other subgroups to report as White (33.2 percent compared to 25.9 percent for Mexicans, 23.6 percent for Puerto Ricans, and 27.9 percent for other Hispanics).

We now turn to the race question. The race question was first introduced in the 1850 census. Since that time the race question has dropped and added racial categories. The 1900 census contained the least number of categories with a total of five and the 1990 race question had the most racial categories ever totaling 16 racial groups.

The results reported by Bates et al. (1995) indicate that context effect reduced nonresponse to the Hispanic origin question but the nonresponse to the race question remained basically unaffected. In fact, the NCS and RAETT show that race nonresponse among Hispanics slightly increases when the Hispanic origin question comes before the race question but only in one instance was this decline statistically significant.

The NCS and RAETT show that nonresponse rates to the race question among Hispanics is consistently higher than that of non-Hispanics. In the NCS nonresponse on the race item was only 1.1 percent for non-Hispanics compared to 27.1 percent for Hispanics. These levels remained very similar after the reversal of the race and Hispanic origin item. For Hispanics it remained high at 31.0 percent and for non-Hispanics there was basically no change. The change was statistically significant for Hispanics but not for non-Hispanics.

Turning to the dress rehearsal, the differences in race nonresponse between non-Hispanics and Hispanics is striking. In Sacramento 44.7 percent of Hispanics left the race question blank in the short mail form compared to only 1.2 percent for non-Hispanics in the short mail form. The comparable figures for the long form are: 37.9 percent for Hispanics and 1.0 percent for non-Hispanics. The race nonresponse rate among Hispanics in the other two Dress Rehearsal sites were not as high as the rates in Sacramento, however, in all sites other than Sacramento

there were differences in race nonresponse among Hispanics and non-Hispanics.

Regarding mail return short and long forms in the Sacramento and South Carolina Dress Rehearsal sites, race nonresponse among Hispanics is over 10 times higher than for non-Hispanics. The race item nonresponse rates among Hispanics on the enumerator return short and long forms in Sacramento and South Carolina is relatively lower than in the mail return forms. This mode effect may be because perhaps enumerators are persistent and probe persons of Hispanic origin for a race or perhaps race for Hispanics was collected based on observation. It is not possible to identify a conclusive reason for this disparity but other researchers have identified differences in race reporting between race reported on mail return forms and race reported to enumerators.

Conclusion

Changes to the design of the mail and enumerator forms appear to have had some effect on data quality. Overall, the 1998 Dress Rehearsal forms performed better than their respective 1990 versions. Many of the changes made to the Dress Rehearsal forms since 1990 will be kept for the Census 2000 forms. These include topic-based format, additional relationship categories, and the placement of the Hispanic origin question before the race question. Some additional changes have been implemented on the Census 2000 forms in the form of question wording and form structure to develop the best possible instrument. For example, a decision was made to collect data for six people on the Census 2000 mail forms. Hence, the structure of the short form has been redesigned, and the roll-fold is no longer an issue.

In spite of numerous experiments and cognitive research since the 1990 census, the race and Hispanic origin questions do not perform as desired among persons of Hispanic origin. While sequencing has significantly reduced item nonresponse to the Hispanic origin question among non-Hispanics, the relatively high reporting in the "Some other race" category among Hispanics and the sizeable level of item nonresponse to the race question among Hispanics continue to be a source of concern. Measures to address these concerns will be explored after results from the Census Bureau's Census 2000 Research and Experimentation Program become available and analyses are conducted on Census 2000 race and Hispanic origin data.

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NOTE: This paper reports the general results of research undertaken by Census Bureau Staff. The views expressed are attributable to the authors and do not necessarily reflect those of the Census Bureau.

Table 1: Item nonresponse rates for the relationship question on the Dress Rehearsal forms as compared to allocation rates from the 1990 census.

	California		South Carolina		Menominee	
	num.	percent	num.	percent	num.	percent
SHORT FORM						
Mail						
Dress Rehearsal	220,115	1.27%	377,155	1.25%	2,095	1.29%
1990 Census	215,164	2.82%	422,309	2.78%	500	3.80%
Enumerator						
Dress Rehearsal	95,188	1.4%	185,004	1.1%	1757	0.1%
1990 Census	94,327	5.9%	174,109	6.6%	1184	9.5%
LONG FORM						
Mail						
Dress Rehearsal	29,772	1.78%	54,853	1.52%	257	1.56%
1990 Census	31,778	2.26%	74,432	2.27%	--	--
Enumerator						
Dress Rehearsal	17,741	2.3%	38,096	1.6%	273	0.0%
1990 Census	19,100	5.8%	37,462	6.1%	2151	5.4%

Table 2: Item nonresponse rates for the Hispanic Origin question on the Dress Rehearsal as compared to allocation rates from the 1990 census.

	California		South Carolina		Menominee	
	num.	percent	num.	percent	num.	percent
SHORT						
Mail						
Dress Rehearsal	197,328	5.1%	343,732	6.5%	2,084	7.6%
1990 Census	215,164	10.15%	422,309	19.78%	500	21.20%
Enumerator						
Dress Rehearsal	81,916	2.1%	158,858	1.7%	1582	0.1%
1990 Census	94,327	6.0%	174,109	8.7%	1184	10.0%
LONG						
Mail						
Dress Rehearsal	28,616	3.6%	53,571	5.3%	258	6.2%
1990 Census	31,778	3.83%	74,432	5.82%	--	--
Enumerator						
Dress Rehearsal	15,150	3.3%	33,198	2.5%	235	0.4%
1990 Census	19,100	5.1%	37,462	7.1%	2151	1.4%

Table 3: Item nonresponse: Race question by Hispanic origin on the Dress Rehearsal forms compared to item nonresponse to race from the 1990 Census.

	California		South Carolina		Menominee	
	num.	percent	num.	percent	num.	percent
SHORT FORM						
Mail						
Dress Rehearsal	197,328	8.9%	343,732	1.4%	2,084	1.1%
Hispanics	31,780	44.7%	4,463	19.8%	31	16.1%
Non-Hispanics	153,948	1.2%	315,781	0.8%	1,888	0.9%
1990 Census	215,164	3.06%	422,309	1.63%	500	2.20%
Enumerator						
Dress Rehearsal	81,916	4.5%	158,858	1.2%	1582	0.8%
Hispanics	21,174	11.8%	3,481	16.3%	59	8.5%
Non-Hispanics	58,682	1.0%	152,388	0.2%	1,521	0.3%
1990 Census	94,327	3.8%	174,109	4.8%	1184	1.9%
LONG FORM						
Mail						
Dress Rehearsal	28,616	7.0%	53,571	0.9%	258	1.6%
Hispanics	4,154	37.9%	859	12.3%	5	0.8%
Non-Hispanics	23,225	1.0%	49,678	0.3%	236	0.8%
1990 Census	31,778	1.47%	74,432	1.12%	--	--
Enumerator						
Dress Rehearsal	15,150	5.9%	33,198	2.0%	235	1.7%
Hispanics	3,821	12.3%	759	21.3%	1	0.0%
Non-Hispanics	10,750	1.3%	31,510	0.3%	233	1.7%
1990 Census	19,100	3.2%	37,462	4.5%	2151	1.4%