# Experimental Treatment Results of the Bilingual Census Form from the 2005 National Census Test

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## 1. INTRODUCTION

In preparation for the 2010 Census, the Census Bureau conducted the 2005 National Census Test (NCT), which explored variations of questionnaire content and questionnaire design alternatives, as well as other methodological issues, including the use of a bilingual census form. The test also included the Internet as an optional mode for completing the census short form. Census Day was September 15, 2005.

One of the experimental treatments in the 2005 NCT was a bilingual questionnaire with a "swim lane" design. The swim lane design provided two response columns, one in English and one in Spanish, each containing the same questions and response categories. The bilingual form instructed respondents to complete the form in the language that was most comfortable for them. This form was mailed to a randomly selected set of housing units that formed an experimental panel.

The Census Bureau proposed this research to answer the following research question: *What is the impact of a bilingual questionnaire on response behavior for a national sample of housing units?* Note that, to assess the impact of the bilingual questionnaire on response behavior, self-response rates and item nonresponse rates were examined. In addition, the Census Bureau was interested in any public reaction to the bilingual form, specifically any backlash in areas that were predominantly non-Hispanic.

The 2005 NCT was not the first time a bilingual form was tested in the context of a mid-cycle census test. The Spanish Forms Availability Test (SFAT) took place as a part of the 1993 NCT and consisted of three panels: a control panel with an English only questionnaire, a panel that distributed two distinct questionnaires (one in English and one in Spanish) in the same mailing package, and a panel offering a bilingual form with a back-to-back design (de la Puente *et al.*, 1994a). The SFAT also included a telephone debriefing with respondents who had received both the English and Spanish forms to gauge their reactions (de la Puente *et al.*, 1995).

Results from the SFAT suggested that offering a Spanish questionnaire significantly increased response to the census test by roughly four to five percentage points in areas where more than 30 percent of households were known to be linguistically isolated[2]; however, the results also showed that Hispanics were more likely to omit information on the Spanish form (bilingual or separate form) compared to Hispanics who responded to the English form (Corteville, 1994; de la Puente *et al.*, 1994a).

The bilingual experiment in the 2005 NCT extends this research by testing a new bilingual form with a swim lane design (i.e., two column design) instead of a back-to-back design.

## 2. METHODOLOGY

### 2.1 Panel Design

The 2005 NCT was comprised of 20 experimental panels. We used two of these panels to assess the effectiveness of the bilingual form. We used a bilingual form panel of 10,000 sampled housing units as the experimental panel, and an English form panel of 30,000 sampled housing units that was most similar in questionnaire content to the bilingual form as the control panel. The English panel used as a control in this analysis also contained experimental treatments for the Hispanic origin, race, tenure, and age items. The bilingual form contained the same experimental treatments for Hispanic origin and race as the control, but did not include the experimental treatments of the tenure or age questions.

### 2.2 Response Mode

Housing units in each 2005 NCT experimental panel, including the bilingual form panel, were invited to respond using the Internet. The Internet form did not, however, contain all of the experimental treatments and, most notably, did not provide the option of responding in Spanish[3]. In this sense, households that responded by the Internet were no longer considered part of their original experimental panel since they were not exposed to the experimental treatment(s) embedded in the paper questionnaire. Therefore, most of the analyses in this paper focus on responses returned via the paper questionnaires, and exclude any households that responded by the Internet.

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[2] A linguistically isolated household was a household where no household member 14 years of age or older spoke English or spoke English very well (de la Puente *et al.,* 1994b).

[3] In the English and Spanish columns of the bilingual form, the Internet invitation contained a disclaimer that the web site was "English only."

## 2.3    Mailing Strategy

The 2005 NCT used multiple mailings to contact sampled housing units. Every housing unit was sent an advance letter as a first contact. The advance letter informed households that they would soon receive a request to complete a questionnaire for the 2005 National Census Test.

The second mailing was an initial questionnaire package. Housing units received a paper questionnaire and a first-class postage-paid return envelope. Also included in the mailing package was a letter from the Census Bureau's Director that encouraged households to respond and provided the option of responding by Internet. Households selected for the bilingual panel received the bilingual questionnaire, and households selected for the English panel received the English form. The English questionnaire reminded respondents of the option to respond by the Internet before the first question, but the bilingual questionnaire did not.

The third mailing was a reminder postcard. The postcard included a statement reminding households to respond to the census test if they had not already done so. It also provided instructions so that households could use the Internet to respond. Presenting the reminder postcard content in English and Spanish in the bilingual swim lane format required more space than was available on the postcard; therefore, the reminder postcard mailing was actually a reminder letter for the bilingual panel.

The fourth and final mailing was a targeted replacement questionnaire. A replacement questionnaire that looked identical to the initial questionnaire (i.e., contained the same experimental treatments) was sent to all housing units that had not responded prior to September 13, 2005. Accompanying the questionnaire was a letter from the Director urging response and providing instructions for using the Internet.

Note that there was no telephone or personal visit followup for nonresponding households in the 2005 NCT.

## 2.4    Sample Design and Standard Errors

The housing units selected for the bilingual form panel (10,000 housing units) and its corresponding control panel (30,000 housing units) were equally allocated to two strata that reflect differences in the racial and ethnic composition, and, hence, response propensity of the universe. The high non-White or Hispanic concentration stratum, which encompassed roughly 32 percent of housing units in the universe, contained a high proportion of the non-White and Hispanic populations. The remaining 68 percent of the housing units fell in the low non-White or Hispanic concentration stratum. All estimates in this report are weighted to account for the oversampling of the high non-White or Hispanic concentration stratum.

We computed standard errors for all estimates using a stratified jackknife replication procedure. This computation method accounted for the stratification in the sample, which we expect to lower the standard errors compared to a simple random sample. Clusters of housing units (or housing units selected at each hit) were assigned sequentially to one of 250 replicates. This assignment approach also accounted for the clustering of persons within a household in computing errors for person level estimates, since persons within households were contained in the same replicate.

## 2.5    Calculation of Self-response Rates

The self-response rate is a measure of respondent behavior with regard to responding to the census test. The denominator is the number of sample housing units minus those cases identified by the United States Postal Service as "undeliverable as addressed" (UAA). The numerator is the number of sample households for which we received a nonblank return. A census return was denoted as "blank" if fewer than two items were completed on the questionnaire. Also, we limited the numerator to primary returns. We selected a primary return when multiple responses (paper and/or Internet returns) were received for a given housing unit.

The formula for the self-response rate is presented below.

$$\text{Self-response Rate} = \frac{\#\text{of nonblank, primary returns}}{\text{panel sample size} - \text{UAA for the panel}} * 100\%$$

## 2.6    Calculation of Item Nonresponse Rates

Item nonresponse rates were computed as indicators of potential data quality issues. The analysis of item nonresponse rates was restricted to nonblank, primary paper returns for this analysis. The item nonresponse rates were calculated according to the following definition multiplied by 100%:

$$\text{Item Nonresponse Rate} = \frac{\#\text{ of records with missing data for a particular item}}{\text{total }\#\text{ of records}}$$

## 3.    LIMITATIONS

### 3.1    Population of Inference

The purpose of this experiment was to determine response to the bilingual form for a national sample of housing units. This experiment was <u>not</u> designed to study the efficacy of the bilingual form in targeted areas with a large portion of the Spanish-speaking population. However, the sample was equally allocated to two strata, one of which contained blocks with a high concentration of the non-White and Hispanic populations. Therefore, the estimates that we compute by strata may indicate the efficacy of the form in these areas but still give no indication of impact on Spanish-speaking populations.

## 3.2 Confounding Factors

There were certain inherent design issues for the bilingual form that triggered variation from the English (control) design. The following list denotes all known variations from the English control form to the bilingual form:

- The advance letter for the bilingual form panel had the dual language swim lane design.
- The cover letter, typically a separate document in the initial and replacement questionnaire mailings, had the swim lane design and formed the first page of the questionnaire booklet for the bilingual form.
- The bilingual form was not folded prior to mailing, so it was sent in a larger envelope than the English form, which was folded.
- The bilingual form required a reminder letter in lieu of a postcard (due to space constraints), and this letter had the swim lane design.
- The Internet invitation was included in the cover letter, which formed the first page of the questionnaire booklet for the bilingual panel. For the English panel, the invitation was included in a cover letter, which was separate from the questionnaire. An additional Internet invitation was included above the roster on the first page of the English form; the bilingual form had no such additional invitation. This difference could have impacted the selection of response mode between the English and bilingual panel respondents.
- Due to spacing issues, the relationship question response categories were different between the bilingual form and the control panel. Therefore, comparisons were not made across panels for the relationship item.
- Since experimental treatments for this test were combined in various panels for practical purposes, the panel that was used as the control for this evaluation had a different age/date of birth order than the bilingual form. Therefore, comparisons were not made across panels for these items.

We are unable to determine what role, if any, these factors played in any significant differences between the bilingual form and the English form. That is, we evaluated the bilingual form with all of these changes as a package, and are unable to estimate the effects of any one factor.

## 3.3 Census Test Environment

Note that results from a census test may differ from results in an actual decennial census due to differences in media attention, advertising and scope. We cannot determine whether public reaction to the bilingual form would be different in a true decennial environment.

## 3.4 Natural Disasters

The 2005 NCT initial questionnaire mailings coincided with Hurricane Katrina. Mail service to some areas around Louisiana, Mississippi and Alabama was disrupted or suspended during the data collection period. As a result, selected sample cases (less than 1 percent) in the affected areas were treated as UAA and were excluded from this analysis.

## 4. RESULTS

### 4.1 Self-response Rate Comparisons

This section of the paper examines the effect of the bilingual form on response to the census test, as compared to the English form. Table 1 contains the self-response rates for the bilingual form panel and the English control panel at the national level. Additionally, the rates are further studied by response mode. Breaking out the self-response rates in this manner allows us to examine whether receipt of the bilingual form influenced the decision to respond by paper or Internet, keeping in mind the differences in how the response modes were offered.

**Table 1. Self-response Rates and Standard Errors (in percent) by Language and Response Mode**

| Treatment[†] | National | | |
|---|---|---|---|
| | Total | Paper | Internet |
| Bilingual Form | 62.0 | 55.5 | 6.5 |
| English Form | 60.8 | 53.3 | 7.5 |
| Difference | 1.1[*] (0.61) | 2.2[*] (0.60) | -1.0[*] (0.33) |

\* Indicates difference is statistically significant at the $\alpha$=.10 level.
† Standard errors for self-response rate estimates are $\leq$ 0.52 percent.

As previously mentioned, most results in this paper focus on paper response since there was no Spanish version of the Internet to complement the bilingual form. Looking at the paper self-response rates in Table 1, we see that the bilingual panel achieved significantly higher response (by 2.2 percentage points) compared to the English panel.

We also looked at paper response by strata[4], and this significant increase in response for the bilingual form was even more evident in the high non-White or Hispanic concentration stratum (3.2 percentage point increase; S.E. = 0.81 percent), suggesting that the bilingual form was particularly effective in areas with high proportions of the Hispanic and non-White populations. We found that the bilingual form also showed a significant increase (1.7 percentage point increase; S.E. = 0.79 percent) in paper response relative to the English form in areas with a low concentration of the non-White and Hispanic populations. We would have expected no effect in these areas or potentially even a negative effect if there were opposition to

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[4] For the high non-White or Hispanic concentration stratum, the paper response was 42.7 percent (S.E. = 0.73) for the bilingual form and 39.5 percent (S.E. = 0.39) for the English form. For the low non-White or Hispanic concentration stratum, the paper response was 61.3 percent (S.E. = 0.68) for the bilingual form and 59.6 percent (S.E. = 0.41) for the English form.

the use of a bilingual form. Therefore, this finding may suggest that there is no negative effect of offering a bilingual form in areas that have a heavy concentration of non-Hispanic Whites[5].

Please note that there are limitations associated with these paper response rate comparisons, as well as the Internet response rates. These limitations stem from differences in the administration of the Internet across the two panels, which may have influenced respondents in choosing a particular response mode. The first difference in Internet administration pertains to the invitation to use the Internet. While both panels (bilingual and English only) offered the option of responding by Internet, the invitation to use the Internet was located in different places between the English and bilingual panels. Both panels provided the Internet option in the cover letter[6], but the English panel also provided the option again on the first page of the questionnaire (above the first question), while the bilingual form did not[7]. Secondly, this test did not provide a Spanish version of the Internet, so the bilingual cover letter noted the disclaimer "English only" next to the invitation to respond by Internet.

We cannot conclusively determine the impact of these differences on paper response. We would expect that having one less Internet invitation and no Spanish Internet would lower Internet response[8]; however, it is unclear as to the impact on paper response. We could imagine lower paper response if those who would have used the Internet chose not to respond at all. Conversely, we could see an increase in paper response if those who would have used Internet substituted the paper form in its place.

Therefore, to the extent that these differences in Internet administration influenced response mode selection, the results from the paper response rate comparisons, as well as Internet rate comparisons, may not be valid. That is, the paper response rates (and related results) may be overstated, while the Internet rates may be underestimated, especially under the substitution theory. Assuming people who would have responded by Internet substituted paper, we can study total response rates (paper and Internet) to gauge the effect of the bilingual form. Similar to the paper response rate, the difference in total self-response rates was also significantly

higher for the bilingual panel compared to the English only panel, both nationally (see Table 1) and for the high non-White or Hispanic concentration stratum[9] (2.8 percentage points; S.E. = 0.87 percent). Paper response for the low non-White or Hispanic concentration stratum was significantly higher for the bilingual panel than English panel, but this difference did not remain when combining both the paper and Internet returns. Again, the total response rate estimates may not be meaningful due to survey administration differences that could have affected both paper and Internet response rates.

### 4.2 Bilingual Form Usage and Response Patterns

Next, we studied response patterns for those who responded via the bilingual form. We set out to get a better understanding of how people were using the form. First, we studied the percentage of respondents that used each column. We found that 2.7 percent of bilingual returns predominantly used the Spanish language column to complete the form, while the remaining 97.3 percent used the English column.

We also considered whether households used both language columns in responding (i.e., lane jumping[10]). For those that used both columns, we studied how they incorporated both language columns in responding (e.g., reported the same person twice, once in each language column, etc.). There were 45 forms (less than 1 percent of bilingual paper returns) where respondents provided data in both language columns. Of the 45 forms, just under half of the respondents (n = 19) appeared initially confused, as they completed only the first few items (i.e., household count, name, sex) in both columns but then provided all remaining answers in one column. Also, a little less than half of the respondents (n = 19) seemed to randomly switch language columns for various questions. That is, there was no particular pattern of column use for these forms. The balance (n = 7) used different language columns for different persons within a household. For these cases, it appears that there was more than one respondent, and each respondent exhibited a personal preference with respect to choosing a language column.

The fact that less than 1 percent of the bilingual form respondents used more than one column in responding seems to suggest that respondents are using the form in the way it was intended to be used. That is, most households chose to respond in one language. The seven cases where different languages were used for each person is also one of the anticipated uses of the form. This form allows

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[5] This finding is based on the distribution of bilingual forms to 10,000 housing units across the United States. It is possible that public attention would impact this finding if bilingual forms were distributed on a larger scale.

[6] Recall that the cover letter for the bilingual panel formed the first page of the bilingual questionnaire, whereas the cover letter for the English panel was contained in the mailing package as a separate document.

[7] Although the bilingual form did not have a second Internet invitation on the first page of the questionnaire, this difference may not have had a substantial impact on self-response for that panel. Item nonresponse analysis shows higher household item nonresponse for the bilingual form, which may indicate that those respondents missed the first page of the questionnaire.

[8] These differences did not result in a significantly lower Internet response rate for the bilingual panel in the high Non-white or Hispanic stratum, where we might expect the absence of a Spanish Internet form to have the most effect.

[9] For the high non-White or Hispanic stratum, the total self-response was 47.0 percent (S.E. = 0.78) for the bilingual form and 44.2 percent (S.E. = 0.40) for the English form. For the low non-White or Hispanic stratum, the total self-response was 68.8 percent (S.E. = 0.67) for the bilingual form and 68.4 percent (S.E. = 0.39) for the English form.

[10] For subsequent analysis, we assigned persons or households to a primary language based on the language column that was used most heavily. If both columns were completed equally, we randomly assigned the person or household to one of the columns.

household members to provide information for themselves in the language that is most comfortable for them.

## 4.3 Item Nonresponse Rate Analysis

### 4.3.1 Item Nonresponse Rates by Panel

Next we considered whether the language of the paper form influenced the presence of a response to the questions. Item nonresponse is important to study, as it is one indicator of the extent to which a particular item may be subject to nonresponse bias. For this analysis, we calculated the item nonresponse rates for five person level data items (sex, Hispanic origin, race, ancestry, and overcount) and four housing unit level data items (household count, tenure[11], undercount, and telephone number). Note that we cannot compare rates for age/year of birth and relationship between the bilingual and English forms due to differences in item wording. When computing rates for the bilingual form, total item nonresponse took into account both language columns; that is, we deemed an item missing if it was not completed in either the English or Spanish columns. Table 2 contains national item nonresponse rates for the English form and bilingual form.

**Table 2. Item Nonresponse Rates and Standard Errors (in percent) by Language Treatment**

| Item[†] | Eng Form | Bil Form | Diff (S.E.) (Bil – Eng) |
|---|---|---|---|
| **Household Items** | | | |
| Household count | 1.1 | 2.7 | **1.6**[*] (0.27) |
| Tenure | 1.5 | 3.5 | **2.0**[*] (0.29) |
| Undercount | 7.3 | 10.4 | **3.1**[*] (0.51) |
| Phone number | 8.1 | 10.0 | **1.9**[*] (0.53) |
| **Person Items** | | | |
| Sex | 0.6 | 0.6 | 0.0 (0.09) |
| Hispanic origin | 2.6 | 4.5 | **1.9**[*] (0.26) |
| Race | 3.6 | 3.9 | 0.3 (0.31) |
| Ancestry | 13.2 | 12.5 | -0.7 (0.65) |
| Overcount[††] | 1.1 | 1.0 | 0.0 (0.14) |

* Indicates difference is statistically significant at the α=.10 level.
† Standard errors for item nonresponse rates are ≤ 0.62 percent.
†† Difference inconsistency is due to rounding.

Table 2 shows item nonresponse rates for the bilingual panel were significantly higher than the English only panel for household count, tenure, undercount, telephone number and Hispanic origin. Note that while undercount and telephone number had higher item nonresponse rates for the bilingual panel, these items are generally used for operational purposes and are not publicly reported. Item nonresponse rates for sex, race, ancestry and overcount were not significantly different across treatments.

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[11] Note that there is a slight wording difference for the tenure response options across forms, however, we do not expect this difference to impact item nonresponse rates.

The difference in item nonresponse rates for all household items was somewhat surprising so we looked further at the percent of households with all household data missing. The bilingual panel had a significantly higher percent of forms with all household level items missing (2.1 percent; S.E. = 0.21) compared to the English panel (0.4 percent; S.E. = 0.05). This may suggest that the increase in item nonresponse for the household items on the bilingual form is more of a bilingual form design issue rather than an item nonresponse issue (i.e., the bilingual form design allowed respondents to miss the first page where all household level data is collected).

The first page of the bilingual form that deals with household level data has less "white space" and more writing due to the residency rules being included twice (once in English and once in Spanish) on the page. Respondents may have quickly looked at this page and dismissed it as simply more instructions. Also, preliminary results from cognitive testing of the bilingual form showed that some Spanish-speaking respondents tended to look to the left side of the form (the English column) on each page before locating the Spanish column (Casper *et al.*, 2006). Thus, it is possible that some respondents may not have noticed the Spanish column until getting further into the questionnaire.

In addition to the potential forms design issue, there are several other factors that may have contributed to the higher prevalence of missing household data on the bilingual form. For instance, this increase in household item nonresponse may be a product of the primary population responding to the bilingual form. As we show in section 4.4 of this paper, the bilingual form increases the percent of Hispanics responding to the census test compared to the English only form. Moreover, the increase in household item nonresponse for the bilingual form may also be related to question translation since there was limited pre-testing conducted on this form. Finally, as suggested above, early cognitive research suggests that the Spanish column may be initially overlooked (Casper *et al.*, 2006). Thus, there are quite a few factors that may be driving the item nonresponse differences between the bilingual and English forms.

Finally, we also looked at the percent of sampled housing units (excluding UAA cases) with all household level items missing for the bilingual panel. We wanted to get a better understanding of the tradeoff between the increase in missing household level data and the increase in paper self-response rates. Thus, we compared the percent of sampled housing units with all household level data missing (1.1 percent) against the percentage point increase in paper response to the panel (2.2 percentage points). When examining these results, we see that there is still a 1.1 percentage point net gain in overall paper response when taking into account the rate of missing household data.

As for panel comparisons by strata (table not shown), the results were similar to the national results with all household items and Hispanic origin being significantly higher for the

bilingual panel compared to the English only panel, for both strata. Additionally, within the high stratum, the race item nonresponse rate was significantly higher for the bilingual panel as compared to the English only panel. This difference in item nonresponse for the race item was not surprising since more Hispanics responded to the bilingual form (see section 4.4 for demographic characteristics) and Hispanics tend to omit race more than non-Hispanics (Martin *et al.*, 2004; del Pinal, 2003).

Next, we compared item nonresponse rates across the forms for Hispanic and non-Hispanic respondents (table not shown). We used the characteristics of Person 1 to describe the respondent.

For Hispanic and non-Hispanic respondents alike, item nonresponse for household count, tenure and undercount are significantly higher for the bilingual panel as compared to the English only panel. Again, this could be a function of the form design in completing the household level data on the bilingual form, as previously mentioned. No other differences in item nonresponse were found by Hispanic origin of Person 1. These results provide limited support for the SFAT evaluation finding that Hispanics are more likely to omit data on a bilingual form than Hispanics who use an English form (de la Puente *et al.*, 1994a).

### 4.3.2    *Item Nonresponse Rates – Bilingual Form Only*

We then examined item nonresponse rates between the two language columns on the bilingual form (see Table 3 below). For this analysis, we calculated the item nonresponse rates for seven person level data items (age/year of birth, sex, relationship, Hispanic origin, race, ancestry, and overcount) and four housing unit level data items (household count, tenure, undercount, and telephone number). We assigned persons or households to each language column to compute rates based on the language column that was used most heavily. For example, if Person 2 provided all data in Spanish with the exception of sex, which was provided in the English column, he or she was counted in the Spanish column and was included as item nonresponse for the sex question.

**Table 3. Item Nonresponse Rates and Standard Errors (in percent) by Language Column on the Bilingual Form**

| Item | Eng[†] Col | Span[††] Col | Diff (S.E.) (Span – Eng) |
|---|---|---|---|
| **Household Items** | | | |
| Household count | 2.6 | 7.8 | **5.3**[*] (1.97) |
| Tenure | 3.3 | 9.3 | **6.0**[*] (2.09) |
| Undercount | 10.0 | 24.8 | **14.8**[*] (3.46) |
| Phone number | 10.0 | 9.9 | -0.1 (2.27) |
| **Person Items** | | | |
| Age/Year of birth | 0.8 | 1.4 | 0.6 (0.59) |
| Sex | 0.6 | 1.3 | 0.7 (0.96) |
| Relationship | 0.8 | 2.1 | 1.3 (0.90) |
| Hispanic origin | 4.5 | 4.7 | 0.2 (1.13) |

| Item | Eng[†] Col | Span[††] Col | Diff (S.E.) (Span – Eng) |
|---|---|---|---|
| Race | 2.9 | 31.4 | **28.5**[*] (3.94) |
| Ancestry | 12.6 | 12.0 | -0.6 (2.84) |
| Overcount | 0.9 | 5.3 | **4.5**[*] (1.59) |

\* Indicates difference is statistically significant at the $\alpha$=.10 level.
† Standard errors for English column estimates are $\leq$ 0.63 percent.
†† Standard errors for Spanish column estimates are $\leq$ 3.93 percent.

Table 3 shows item nonresponse rates for household count, tenure, undercount, race and overcount were significantly higher for the Spanish column as compared to the English column. Again the household level item results were somewhat unexpected, so we looked at the percent of bilingual forms with all household items missing by language. The respondents that used the Spanish column had a significantly higher proportion of all household items missing (5.9 percent; S.E. = 1.73) than the respondents who used the English column (2.0 percent; S.E. = 0.22). As noted earlier, there are many potential reasons for this difference, including question translation and form design.

Looking at the person items, we see that the race item nonresponse rate was significantly higher for the Spanish column than the English column. Note that the vast majority of respondents who completed the Spanish column were Hispanic, and Hispanics are less likely to answer race, as previously mentioned. Additionally, cognitive testing of the bilingual form with Spanish-speaking respondents revealed that the note under the race question ("for this census, Hispanic origins are not races") might have inadvertently served as a skip instruction for some Hispanic respondents (Caspar *et al.*, 2006).

We also noticed an increase in item nonresponse for the coverage overcount question. The intent of the coverage overcount question was to detect whether each person listed on the form should be counted at another place. The noticeable increase in item nonresponse for the overcount question may indicate that this question is sensitive to Spanish-speaking respondents, potentially in light of current public debate about immigration policies.

Finally, we studied item nonresponse between the two language columns on the bilingual form for Hispanics (table not shown). Item nonresponse rates for household count, undercount, race and overcount were significantly higher for the Spanish column than for the English column for Hispanic respondents. These results provide some support the SFAT result that showed that item nonresponse rates were higher for Spanish language than English language for Hispanic respondents specifically for household items and race (de la Puente *et al.*, 1994a). Note that caution should be used in interpreting these results due to small cell sizes in both columns.

### 4.4    **Comparisons of Demographic Characteristics**

The 2005 NCT sample was selected such that each panel contained a random sample of housing units. Therefore, we

would expect that the respondents in both panels would be demographically similar, unless the offer of a bilingual form somehow influenced the self-selection of those that chose to respond.

We hypothesized that the bilingual form would be more appealing than the English form to certain respondents, especially those who are primarily Spanish-speaking. This analysis helped determine whether the population responding to the bilingual form differed from the population responding to the English form. Again, the data for this comparison came solely from the paper returns for both panels and the analysis was restricted to Person 1 data (i.e., assumed to be the respondent). Admittedly, past research suggests that Person 1 is not the respondent roughly 30 percent of the time[12] (DeMaio *et al.*, 1990).

**Table 4. Demographic Characteristics and Standard Errors (in percents) by Language Treatment**

| Item[†] | Eng Form | Bil Form | Diff (S.E.) (Span – Eng) |
|---|---|---|---|
| Average hh size | 2.4 | 2.5 | **0.1**[*] (0.04) |
| Male | 60.8 | 59.8 | -1.0 (0.85) |
| Hispanic | 7.6 | 8.3 | **0.7**[*] (0.40) |
| Race | | | |
| White | 83.7 | 83.2 | -0.6 (0.56) |
| Black | 8.5 | 8.7 | 0.2 (0.38) |
| American Indian /Alaska Native | 0.4 | 0.4 | 0.0 (0.11) |
| Asian | 3.3 | 3.5 | 0.2 (0.30) |
| Native Hawaiian /Pacific Islander | 0.2 | 0.2 | 0.0 (0.07) |
| Some Other Race | 2.7 | 3.1 | 0.4 (0.27) |
| Two or more races | 1.1 | 0.8 | **-0.3**[*] (0.15) |

* Indicates difference is statistically significant at the $\alpha$=.10 level.
† Standard errors for demographic estimates are $\leq$ 0.75 percent.

Table 4 shows the distribution of household and Person 1 characteristics (i.e., respondents) for each panel. In general, there are few demographic differences between respondents of the English form and respondents of the bilingual form, with three exceptions. Household size and the proportion of Hispanic respondents were both significantly higher for the bilingual form and respondents with two or more races was significantly higher for respondents of the English form.

The increase in the percent of Hispanics listed on the bilingual form is noteworthy, since Hispanics have been notably undercounted in previous censuses (U.S. Census Bureau, 2004). This finding also justifies the observed increase in household size. With more Hispanics responding to the bilingual form, the larger household size is consistent with findings from Ramirez *et al.* (2002), which

shows that Hispanics live in larger households than non-Hispanics.

Table 5 shows the distribution of household and Person 1 characteristics (i.e., respondents) for each language column for the bilingual questionnaire. Note that race categories for Black, American Indian/Alaska Native, Asian, Native Hawaiian/Pacific Islander and Two or more races were removed from the table due to small cell counts.

**Table 5. Demographic Characteristics and Standard Errors (in percents) by Language Column on the Bilingual Form**

| Item | Eng[†] Col Est. | Span[††] Col Est. | Diff (S.E.) (Span – Eng) Est. |
|---|---|---|---|
| Average hh size | 2.5 | 3.8 | **1.3**[*] (0.17) |
| Renters | 22.9 | 39.3 | **16.3**[*] (4.39) |
| Average age | 54.4 | 45.5 | **-8.9**[*] (1.20) |
| Male | 59.5 | 71.6 | **12.0**[*] (3.55) |
| Hispanic | 5.9 | 94.3 | **88.4**[*] (2.19) |
| Race | | | |
| White | 83.6 | 61.7 | **-21.9**[*] (4.70) |
| Some Other Race | 2.5 | 36.9 | **34.4**[*] (4.62) |

* Indicates difference is statistically significant at the $\alpha$=.10 level.
† Standard errors for English column estimates are $\leq$ 0.76 percent.
†† Standard errors for Spanish column estimates are $\leq$ 4.65 percent.

The data suggest several differences between respondents who used the English column compared to those who used the Spanish column. A significantly higher proportion of respondents who used the Spanish column were renters, male, Hispanic and of "Some Other Race"[13]. These respondents were also from larger households and younger than those who used the English column.

Table 5 shows that 94.3 percent of the bilingual form respondents using the Spanish column were Hispanic. This result was not surprising, nor were the other demographic results shown in Table 5, as they have been shown to be correlated with being Hispanic. That is, past research (Ramirez, 2004) supports the notion that Hispanics tend to be renters and younger than non-Hispanics. The past research also shows that males outnumber females in the Hispanic population (Ramirez, 2004). Furthermore, household size results are consistent with findings from Ramirez *et al.* (2002), which show that Hispanics live in larger households than non-Hispanics. And finally, the race results are also consistent with past research, in that, Hispanics are more likely to report their race as either "White" or "Some Other Race" (when the question is asked with this particular wording) compared to non-Hispanics (Grieco *et al.*, 2001).

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[12] Note, we are uncertain if this assumption holds true for the Hispanic population or for non-English forms. There is some evidence from cognitive testing that Spanish-speaking respondents may tend to list a male or the eldest as "head of household" (Casper *et al.*, 2006).

[13] Note that "Some Other Race" was a response category on the form for the race question.

**4.5 Public Reaction to the Bilingual Form**

There was no formal evaluation to scientifically measure the reaction of respondents to the bilingual form in the 2005 NCT. Therefore, we cannot infer from this experiment what public reaction would be if the bilingual form were included in a decennial census. As an attempt to get some indication, the Census Bureau coordinated an effort to collect anecdotal information on the public's reaction to receiving a bilingual census form. Regional offices and other Census Bureau divisions were asked to document any inquiries related to the 2005 NCT bilingual questionnaire. Additionally, staff members combed through bilingual form returns that included written correspondence (i.e., comments written on the questionnaire) to provide insight on reactions to the use of dual languages.

This investigation resulted in less than ten instances of communication regarding the bilingual questionnaire. In these inquiries, almost all respondents wondered why they received an English and Spanish questionnaire. There was no negative public feedback encountered concerning the 2005 NCT bilingual questionnaire.

While we did not scientifically measure public reaction to the form, we can say that the data for this 10,000 housing unit sample showed no sign of backlash since we did not see any drop in self-response rates, even in areas that were heavily concentrated with non-Hispanic whites. However, it is important to note that this experiment was limited to 10,000 housing units across the country, and we have no way of knowing what the reaction would be if the form were distributed on a much larger scale.

**5. CONCLUSIONS**

The data from the 2005 National Census Test show that a bilingual form significantly increases self-response nationally, and more specifically increases response in areas where there is a high concentration of non-White and Hispanic populations. Item nonresponse rates for the bilingual form were higher for most household level items, which may suggest a possible forms design issue or may be a product of the population responding (i.e. more Hispanic respondents). In addition, there were a minimal number of bilingual form lane jumpers, which may suggest there was little confusion with the dual language design of the bilingual form. Finally, the bilingual form had larger households, more Hispanic respondents and fewer respondents with 2 or more races compared to the English form respondents.

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