

A New Methodology for the Cognitive Testing of Translated Materials: Testing the Source Version as a Basis for Comparison

Patricia Goerman¹, Rachel Caspar²

¹Statistical Research Division, U.S. Census Bureau, 4600 Silver Hill Road, Washington, DC, 20233-9100

²Program for Research in Survey Methodology, RTI International, 3040 Cornwallis Road, Research Triangle Park, NC, 27009

Abstract

A great deal of research has demonstrated that parallel development of different language versions of a survey instrument is an ideal method to enhance the collection of equivalent data across language groups (Harkness, et.al., 2003, Potaka & Cochrane, 2004). This method involves the simultaneous development and pretesting of different language versions of a questionnaire in order to allow for two-way feedback and to ensure that each version is culturally and linguistically appropriate for its target population. Unfortunately, it is common practice for many large survey organizations to pretest and finalize source language versions of survey questions and other materials and then have them translated after the fact. Pretesting of translations does not always take place and when it does, the source language documents are often “frozen” and the results of the pretesting of the translations do not have a large impact on further revisions to the original documents.

This paper describes a new methodological approach for the cognitive testing of a translation that can be used when pure parallel development of different language versions of a survey instrument is not feasible. In short, we examine the advantages to cognitively testing both source language materials and translations concurrently, even when source materials are “frozen” and finalized in advance. Both methodological and cost implications are discussed.

KEY WORDS: Pretesting multilingual surveys, Cognitive interviewing and Spanish-speaking respondents, Data quality

1. Introduction

Survey research organizations both within the United States and throughout the world are finding an increasing need to translate survey instruments into multiple languages. These same organizations have been paying increasing attention to the need to pretest translated versions of survey instruments. Cognitive testing is a method that is particularly useful in pretesting translations in that large discrepancies in meaning and interpretation across source materials and translations can be spotted

relatively easily, even with small numbers of respondents (Willis, 2005).

While there has been increased interest in the pretesting of translated survey materials in recent years, there has been little methodological research to determine best practices for this pretesting. Using a U.S. Census Bureau project as an illustration, this paper compares the findings made possible when cognitively testing a Spanish translation in isolation as compared with testing the English source version and the Spanish translation concurrently. As a result of this research we recommend this as a new methodology for the pretesting of translations.

1.1 Background on Census Bureau Language Research: The Design of a Bilingual Census Form

In the 2000 Census, the Census Bureau provided respondents with a variety of non-English language materials including paper questionnaires in five languages and language guides in an additional 49 languages¹. The Census Bureau continues to expand its use of non-English language materials in preparation for the 2010 Census.

The Spanish-speaking population in the United States has increased exponentially over the last several decades; by 2000 Spanish was the most commonly spoken non-English language in the home (Shin & Bruno, 2003). Estimates from 2006 American Community Survey data showed that 19.7 percent of people reported speaking a language other than English at home. Spanish was by far the most commonly spoken language, with 12.2 percent of people reporting that they spoke Spanish. Of those who spoke Spanish at home, 47.3 percent said that they spoke English less than very well (U.S. Census Bureau, 2006). To address the needs of the Spanish-speaking population in the U.S., the Census Bureau has been working to design its first bilingual (Spanish, English) Census form over the last decade.

¹ Language guides are replicas of the Census Bureau questionnaire in non-English languages that are provided for respondents to use as a reference while they fill out the English language form.

A great deal of research has been conducted as a part of the design of the bilingual questionnaire. The process began with qualitative research to help choose the format of the questionnaire (Caspar, 2003). This research resulted in the choice of a “swimlane” format, in which there is an English column and a Spanish column on each page (See Figure 1).

Figure 1: Screen shot of the 2005 test version of the bilingual Census questionnaire.

The design of the bilingual questionnaire has continued with two large-scale field tests and more qualitative research including the cognitive testing of the content of the questionnaire (Bouffard & Tancreto, 2006; Caspar et al., 2006, Caspar et al., 2007). This paper focuses on the cognitive testing of the content of the bilingual questionnaire.

1.2 Cognitive Testing Methodology

In standard monolingual cognitive testing studies, researchers often look at issues such as the response process, question wording, form navigation and item non-response (DeMaio & Rothgeb, 1996; Willis, 2004). Due to cost, timing and personnel issues, cognitive testing of translations sometimes does not include all of these components (Harkness, 2004). While the Census Bureau has been increasingly pretesting non-English materials, the methods for doing so are being refined with each project.

2. The Pretesting of Survey Translations: Comparing Different Methodologies

The pretesting of the Spanish translation contained in the bilingual questionnaire included two phases which were done differently. This allows us the opportunity to examine advantages and disadvantages related to each method. As is often the case, the English language wording in the bilingual questionnaire had been cognitively tested, field tested and finalized prior to the creation of the Spanish translation and the project sponsor did not support conducting further research on the English language wording at the beginning of our study. In a first

round of cognitive testing, we therefore looked at only the Spanish contained in the questionnaire.

Due to some changes in the research goals mid-project, which we discuss further below, we were able to test the entire questionnaire in a second round of testing, including both the Spanish and English wording. Having used these two different methods in the same project allows us to examine the benefits and drawbacks of each method. In addition, the bilingual questionnaire allows the unique opportunity to study a source version and a translation side-by-side, all in one document.

2.1 The Bilingual Questionnaire Project: Pretesting of a Translation in Isolation

2.1.1 Cognitive testing Round One methodology

The first round of cognitive testing on the bilingual questionnaire focused only on the Spanish-language question wording, as the English-language wording had already been tested and finalized in the context of an English-only questionnaire prior to being translated.

We conducted 44 interviews with monolingual Spanish speakers and respondents who knew minimal amounts of English. The interviews were done in four research sites: Chicago, Miami, Los Angeles and Raleigh/Durham, and the respondents were from Mexico, Colombia, Cuba, El Salvador, Guatemala, Honduras, Nicaragua, Peru, Puerto Rico, Venezuela, and Argentina. They ranged from having less than a fifth grade education to having an advanced degree. We observed respondents filling out the questionnaire and then probed them on specific Spanish terms and phrases.

2.2 Findings from Testing a Translation in Isolation

Through our Round One testing, we found a number of the Spanish language terms in the questionnaire to be problematic. We ran into difficulties, however, when formulating our recommendations to improve the questionnaire. Because the Spanish version of the questionnaire is a translation, essentially a different version of the English survey instrument, we needed to keep the goal of collecting equivalent data across language groups in mind. Prior to making a recommendation, we needed to determine whether a given problem was due to a translation issue or a crosscutting issue that was apparent in both language versions of the questionnaire. In the case of a crosscutting issue, the poorly-performing Spanish wording might be considered to be essentially a “good” translation and in that case the sponsor would not want to “improve” only the Spanish version of a question while maintaining the problem in English.

2.2.1 Problematic translations

In some cases the problems with Spanish terms were clearly caused by problematic translations, which could easily be fixed by changing the Spanish language term and leaving the English term as is. For example, the term “seasonal residence” was originally translated as “residencia estacional.” The intended meaning in English was a residence where people stay during certain seasons of the year, as one might find with “snowbirds” or retired people who travel south in the winter to live in a warmer climate. We found that Spanish-speaking respondents were often interpreting “residencia estacional” as a permanent or “stationary” residence. This was clearly not the meaning intended by the questionnaire designers. In addition, some respondents interpreted the term “residencia” to refer to a mansion or a grand home. We recommended that different words be used to express both the concepts of “seasonal” and “residence” in Spanish. We suggested “vivienda de temporada,” essentially a different way to express the same concepts, which we believed would eliminate this confusion.

2.2.2 Crosscutting issues

Our pretesting also uncovered some problems that seemed to be crosscutting issues. For example, one of the questions asked about household tenure; whether respondents rented, owned or occupied their housing unit without payment of rent. One of the response options in that question asked whether a household was “rented for cash rent.” In Spanish, the response option read “alquilada por pago en efectivo.” Some Spanish-speaking respondents expressed confusion about the reference to “pago en efectivo” or cash payment. They said that they were uncertain about marking this option if they paid their rent by check. One respondent who rented his apartment mistakenly chose a different option on the form: “ocupada sin pago de alquiler en efectivo” meaning “occupied without payment of cash rent.” He explained that since he paid his rent by check, this seemed to be the most appropriate response option. This latter response option was in fact aimed at respondents who lived in a housing unit without paying any type of rent. We strongly suspected that this same problem was present in the English language version of the question. In formulating our recommendations, we had to use our best judgment in assessing whether the problem was crosscutting. This type of situation was problematic in that the English version of the question had already been finalized and recommendations to change the English were not being sought by the sponsor. In the end, we recommended that

the reference to cash be dropped in Spanish, but only if it could also be dropped in English.²

2.2.3 Problems of unclear origin

In the absence of concurrent, parallel testing of the original English contained in the form, we sometimes had difficulty determining whether a problematic term was a translation issue or a crosscutting issue. For example, one of the response options in a question about the relationship between different household residents read “roomer or boarder” in English and “inquilino o pupilo” in Spanish. We found that our Spanish-speaking respondents were interpreting “inquilino” to mean “renter,” and not a single respondent understood the term “pupilo” to mean boarder. The most common interpretation of this term was the idea of a pupil, as in student. Some people mentioned the pupil in one’s eye and some people reported that they had no idea what the term meant. We hypothesized that English-speaking respondents may not all be familiar with the phrase “roomer or boarder” since it is a somewhat antiquated concept, but we did not have information as to how this response option was being interpreted by English speakers. We recommended omitting “pupilo” from the Spanish side of the form and doing further research into alternative terminology for the concept of “roomer or boarder” in both languages.

2.2.4 Navigational issues

While navigational issues were not a focus of Round One of our study, we noticed that respondents sometimes skipped questions, flipped through the form and answered questions out of order. Some respondents also had trouble with response boxes or options, doing things such as writing small numbers in boxes where a checkmark was requested, or marking multiple boxes in a way that indicated confusion. Because the sponsor was not seeking information related to form navigation at this point in the study, we did not make recommendations regarding improvements based on these findings.

2.3 Remaining Questions

After conducting our first round of cognitive testing of the Spanish translation in isolation, we found that a number of questions remained. How could we evaluate equivalency of interpretation across languages when looking at only one language version of the questionnaire? How could we decide which things should be changed only in the Spanish version without the risk of

² This finding mirrored a finding from some separate research on the English-only questionnaire. The term “cash” was eventually dropped from both language versions of the question.

affecting equivalency between the two versions? Some of the above examples seemed to clearly represent either translation or crosscutting issues, but others were not so clear. In the absence of English-language testing that mirrored the focus of our Spanish-language testing, the only way to answer these questions was by expert review or opinion. In some cases, the English language terms had been tested in previous projects in the context of an English-only form. This sometimes helped us gain insight into the English version, but some of the terms that exhibited problems in Spanish had not been a focus of prior English-only testing. The format of the questionnaire in itself brought up additional questions: Did the context of the bilingual form affect respondent interpretation of the English questions? Would bilingual respondents look at both sides of the form? Finally, would the different context, layout and look of the form affect response or even interpretation of the various items in one or both of the languages?

3. A Change in Pretesting Methodology

3.1 The Results of a Field Test of the Bilingual Questionnaire

As we completed the first round of our Spanish-only cognitive testing, the Census Bureau released the results of a large field test involving the bilingual questionnaire (Bouffard & Tancreto, 2006). The bilingual questionnaire was one of the panels in the 2005 National Census Test; the form was sent to 10,000 randomly selected housing units across the United States. There were many positive findings and the questionnaire performed well on the whole. For example, there was a 2.2 percent higher paper response rate as compared with an English-only control form. At the same time, there was also a higher item non-response rate for a group of questions on the first page of the bilingual form, particularly among respondents who filled out the form in Spanish.

The Census Bureau was extremely concerned about these missing items, and although we had not focused on form navigation in our first round of cognitive testing, we suspected that this problem might be due to the format of the questionnaire booklet. The bilingual questionnaire had an introductory letter attached as a cover page to the booklet. This same letter was not attached to the front of the English-only control questionnaire. We had noticed that a couple of Spanish-speaking respondents in our cognitive testing had skipped the cover letter and then had proceeded to skip the first page of the questionnaire by accident.

Because of these new issues, the project sponsor asked us to address navigational issues and to include English-speaking respondents in our second round of testing—

enabling us to do more complete and traditional cognitive testing of the form as a whole. This did not mean that the English version was now open to being revised, but the sponsor wanted to gain a clearer picture of how the form was performing as a whole. We therefore had the opportunity to test the same questionnaire with different methodology.

4. Cognitive Testing of a Translation and Source Questionnaire Together

4.1 Cognitive Testing Round Two Methodology

In the second round of cognitive testing of our project, we tested the English source version of the questionnaire in conjunction with the Spanish translation. In order to examine the issue of item non-response as seen in the results of the 2005 field test, we tested two versions of the questionnaire: one with an introductory letter attached as the cover page and the other with a separate introductory letter. We interviewed 66 respondents in the same four research sites as in Round One: Chicago, Miami, Los Angeles and Raleigh/Durham, and again interviewed both men and women of different ages and educational levels. Approximately one-third of the respondents were monolingual English speakers, one third were monolingual Spanish speakers, and the final third were bilingual respondents who were “Spanish dominant,” meaning that they were more comfortable speaking and writing in Spanish than they were in English. We again interviewed Spanish speakers of a variety of national origins and the English-speaking respondents were both of Hispanic and non-Hispanic origin. We looked at form navigation and the content of the form in both languages. We found that this new methodology allowed for very different types of findings.

4.2 Findings: Equivalency across Language Versions of a Questionnaire

As previously noted, an issue of ultimate importance, which is sometimes overlooked in the testing of survey translations, is whether or not a survey instrument will allow one to collect equivalent data across language versions of the survey. Testing the Spanish and English versions of the bilingual form together allowed us to examine whether or not respondents were being asked and were answering the same questions across languages.

We could now quite easily separate our findings into items that were purely translation issues, questions that had crosscutting issues and even items that had other types of issues such as problems with only the English original, “combination” problems, which we explain further below, contextual issues, and issues related to form navigation.

4.2.1. Translation issues

Part of our Round Two research involved testing new Spanish terms that had been changed based on our Round One recommendations. In the Round Two version of the questionnaire, the Spanish term for “seasonal residence” had been changed to “vivienda de temporada,” or seasonal dwelling. We confirmed that this wording worked better than the previous wording of “residencia estacional.” More importantly, we were also able to confirm that Spanish and English speakers were interpreting the two phrases in a similar way.

We also examined a number of new translation issues in Round Two, and this time we had the benefit of testing the English wording along with the Spanish wording. One example of a term that had been problematic in Spanish but had not been altered for Round Two testing was the concept of “Foster child,” translated as “hijo de crianza.” We found that English speakers for the most part interpreted this term as intended, as a child placed with a family by the government-run foster care program. Most Spanish speakers, on the other hand, interpreted “hijo de crianza” as it literally reads in Spanish, as a “child by upbringing or care” as opposed to a child by birth. This is a common term and a common type of situation in many Latin American countries, whereby a person takes in the child of a family member or close friend for a period of time to help them during hard times. This is almost always an informal arrangement with no government involvement. It was clear through our cognitive testing that English and Spanish speakers were interpreting this term differently, although a few Spanish speakers, most often bilingual respondents, had heard of the government foster care program and did interpret “hijo de crianza” to be referring to the official program. Our findings enabled us to make the recommendation that the term be left unchanged in English but changed to “Hijo de crianza del programa Foster del gobierno” in Spanish, meaning “child by upbringing through the government Foster program” to ensure equivalency of interpretation.

4.2.2 Crosscutting findings

Our Round Two testing also allowed us to identify some findings that cut across language versions of the form, essentially “good” translations of poorly-worded English-language terms. For example, the introductory letter contained the term “enumerator” in English and “enumerador” in Spanish; terms used to refer to a Census Bureau field interviewer. The sentence in English read: “Every Census Bureau employee -; including the Director as well as every enumerator -; has taken an oath and is subject to a jail term, a fine, or both if he or she discloses ANY information that could identify you...” We found

that this term was not well understood by people in either language group. Some respondents, particularly Spanish speakers, correctly inferred that the term referred to “someone who counts something” but virtually no respondent understood the term as referring to an interviewer. We therefore recommended that this term be changed or eliminated in Spanish but only if it could also be removed from the English version of the form. This is a case where we would not have wanted to recommend making a change to only the Spanish translation while leaving the English as is.

4.2.3 English-only findings

Testing the English and Spanish versions of the questionnaire together allowed us to identify places where the Spanish wording was working better than the English wording. For example, we tested a number of terms in the Census Bureau’s “Relationship question.” This question asks respondents to explain how one household resident is related to another. The questionnaire contained the term “Parent-in-law” in English, and this was translated as “Suegro(a)” in Spanish. We gave respondents the following vignette scenario: “Juan and Maria live with Maria’s mother. What is the mother’s relationship to Juan?” We found that English-speaking respondents spent a great deal of time looking for the term “Mother-in-law” on the form and they often had a hard time spotting “Parent-in-law,” although most people eventually located and chose this term to describe the relationship. We did not observe a similar difficulty with Spanish-speaking respondents, since “Suegro” or “Suegra” are terms commonly used to express this relationship and respondents located them quite easily on the form. We therefore recommended that, when possible, only the English wording on this item be changed to read “Father-in-law or mother-in-law” to reduce respondent burden.

4.2.4 “Combination” findings

A final type of finding made possible by our new methodology is what we call a “combination finding.” This is a situation in which neither the original English nor the translated Spanish terms work well, but each exhibit different problems. The aforementioned relationship category of “Roomer or boarder” turned out to be this type of term. We found that most English-speaking respondents did not interpret this category as intended, as a person who pays for room and board, meaning lodging and meals. Many English speakers said that they had no idea what this category referred to and some talked about group homes for people with disabilities. As in Round One, we again found that Spanish speakers were interpreting “Inquilino o pupilo” to mean “Renter or student,” or to say that they had no idea what the term pupilo meant. In formulating our

recommendations, we wondered whether the Spanish speakers' interpretations of *inquilino* as a renter was really the same as English speakers' interpretation of a "roomer." We concluded that more research is needed to clarify what this response option is measuring in English and whether there is a way to better express the concept in both languages. In the meantime, we again recommended removing the clearly misunderstood "pupilo" from the Spanish-language version of the question.

4.2.5 Contextual and navigational issues

One final area that we were able to examine through the testing of the English and Spanish versions of the form together was form navigation. The bilingual questionnaire is somewhat unique in that both the English original and the Spanish translation are contained side-by-side in the same questionnaire, and together they make up the overall context of the form. We did not identify a lot of navigational problems for our English-speaking respondents; however, some people expressed the idea that they had been intimidated by the lengthy appearance of the form when they first saw it. They later reported that they had been pleasantly surprised when it did not take them a great deal of time to complete it.

As hypothesized, we noticed that a small number of Spanish speakers skipped the questions on the first page of the questionnaire when the introductory letter was attached as a cover page. These were particularly lower educational level respondents who may have been intimidated by the verbose appearance of the cover letter. The first page with actual questions looked similar to this cover letter, and we found that some of these respondents had accidentally skipped that page when they had skipped reading the letter.

Bilingual respondents were a unique group in that they were theoretically able to read both the English and Spanish versions of the questions contained in the form. We did not observe many respondents actually looking at both versions of the questions, but a small number of people reported that if they were unfamiliar with a word in one language they might look at the other language column to see what word was used there. It should be noted that for this study we recruited only bilingual respondents who were Spanish dominant, since the Spanish question wording had previously received less research attention and we wanted to maximize our Spanish language findings. Our findings in this regard may have been different had we also recruited English-dominant bilinguals.

Most monolingual respondents did not report looking at both language versions of the form; however, we did observe some monolingual Spanish speakers looking first

at the English language column on each page of the form and exhibiting a bit of confusion before they located the Spanish column on the right hand side. This may be due to both the expectation of starting to read a form on the left hand side and the lower literacy levels of many of our Spanish-speaking respondents. As a result, we recommended that the sponsor consider testing a version of the form with the Spanish column on the left and the English column on the right.

5. Conclusions

5.1 The Benefits of Testing a Translation in Conjunction with the Source Version of a Questionnaire

On the whole, when the ideal method of pure parallel development of different language versions of a survey instrument is not possible, our results point to the importance of conducting parallel testing of both the original and translated materials. We recommend this approach regardless of one's ability to make changes to the source language version of a questionnaire.

It is often the case that cognitive testing of the source version will have taken place prior to translation. While it is possible to make use of research reports on the prior testing of the original, it is unlikely that previous research will have covered every term, question and concept that is of interest in the testing of the translation. This is because many terms that seem completely unproblematic and straightforward in the original document will exhibit difficulty in translation.

It is also often the case that a focus on issues of interest in the translation will cause one to take a deeper look at things in the source version that had appeared to be unproblematic at face value. The testing of a translation often brings to light a more detailed understanding of respondent interpretation of the original language version.

The depth and complexity of our findings in Round Two of the bilingual questionnaire project allowed us to make much more sound recommendations for changes, especially when keeping in mind the goals of equivalency and collection of parallel data across versions of the questionnaire. Having this type of information is important whether working with two totally separate questionnaires or a bilingual questionnaire with both languages contained in the same form, as in our case.

Through testing the original and the translation together, we gained insight into a variety of things; equivalence of meaning and interpretation across versions of the survey, problems with translation, crosscutting problems, English

language problems that had been “corrected” through translation and contextual and navigational issues.

Even with the original version (English in this case) past the point of being changed, due to this testing, the survey sponsor now had a record of where questions were being asked or interpreted differently across languages. This information can be used at a future time when revisions to the original English are possible, and to give insight into interpreting strange patterns that might appear in the data collected with this instrument.

5.2 Costs of Testing the Source Version along with the Translation

Despite the benefits gained from testing the original and the translation together, there were some additional costs to this method. Because we tested the form with three different groups of respondents, a larger number of interviews was necessary. We also needed staff that was able to conduct cognitive interviews in both languages. In our case the interviewers that we had used in Round One to test only the Spanish version of the form were bilingual, so we used the same interviewers for Round Two testing. We also needed to create all interview documentation in two languages, including interview protocols, consent forms, and payment receipts. Again, in our case this did not increase the costs between Rounds One and Two of testing because even in Round One we had had the need to create English language materials to enable project sponsors and other non-Spanish speakers to review and participate in the development of our materials.

In the grand scheme of things and given the high start-up costs of cognitive testing projects in general, the cost of including the English source version in the testing may not be very much greater than testing only the translation. If the original version has been tested in previous research, it may not be necessary to do an equal number of interviews in both languages. We strongly recommend doing some new English interviews as part of the testing of a translation in order to be sure that the same terms are tested across languages as a basis for comparison.

As far as timing of the research, in an ideal situation the original version of the survey should not be finalized before it can be tested in conjunction with any translations. Problems that arise in a translation often illuminate previously unnoticed problems in the original. This method is the next best option in the event that parallel development is not feasible due to cost, timing and/or staffing issues. Even when the original version has been finalized prior to translation, parallel testing allows for more educated decisions as to revisions that should be made only to the translated version, and it provides a

record of problems in the original that might be addressed at a later date. In making decisions about cognitive testing methodology in relation to survey translations, individual research organizations will need to take all of these factors into account.

6. Future Research

The Census Bureau continues to expand its cognitive testing of translated materials, and with each new project we are able to test and refine our methodology further. In 2006 we completed a cognitive testing study of translations of American Community Survey letters and brochures in four non-English languages. That study included testing of the original English materials, which had not been completely finalized prior to the testing of the translations. All language versions were revised based upon the research (Pan, et al., 2006). We are currently embarking upon a study of the Spanish CAPI/CATI version of the American Community Survey and translations of various Decennial Census forms and American Community Survey materials in non-English languages. Parallel English language interviews are being conducted as a part of the new projects, so we will be able to gather further evidence as to the advantages of this method.

With regards to the bilingual questionnaire, the Census Bureau is undertaking a large-scale field test in 2007 to examine the performance of a revised version of the form. The field test involves three panels, one with an English-only control version of the census questionnaire, one with a version of the bilingual questionnaire with an attached introductory letter, and one with a bilingual form with a separate introductory letter. Each of the three versions is being sent to 10,000 housing units in areas targeted to have a high number of Hispanic respondents. This field test will allow us to see whether there are any apparent problems with form navigation with relation to the attached introductory letter. We will also be able to examine whether there is evidence that any of the questions are not working with particular groups of respondents.

Acknowledgements

This research is based on a project done with Census Bureau and RTI International staff and we'd like to thank our project sponsors at the U.S. Census Bureau and the RTI research team: Mandy Sha, Georgina McAvinchey and Rosanna Quiroz for their collaboration on the project. We would also like to thank Manuel de la Puente for participating in discussions that gave rise to many of the ideas that we developed in this paper.

References

- Bouffard, J.A. and Tancreto, J.T. (2006). "2005 National Census Test: Bilingual Form Analysis." DSSD 2010 CENSUS TEST MEMORANDA SERIES Chapter: 2005 National Census Test No. 22, August 29, 2006.
- Caspar, R.A. (2003). "2010 Census Language Program: Bilingual Questionnaire Research: Final Report" Contract report submitted to the U.S. Census Bureau, July 25, 2003.
- Caspar, R., Goerman, P., McAvinchey, G., Quiroz, R., and Sha, M. (2006). "Census Bilingual Questionnaire Research Final Round 1 Report" Contract report co-authored with Census Bureau and submitted July 7, 2006.
- Caspar, R., Goerman, P., Sha, M., McAvinchey, G., and Quiroz, R. (2007). "Census Bilingual Questionnaire Research Final Round 2 Report." Contract report co authored with Census Bureau and submitted July 30, 2007.
- DeMaio, T.J. and Rothgeb, J.M. (1996). Cognitive Interviewing Techniques: In the Lab and in the Field. In N. Schwarz and S. Sudman (eds) Answering Questions: Methodology for Determining Cognitive and Communicative Processes in Survey Research. San Francisco: Jossey-Bass.
- Harkness, J.A., Van de Vijver, F.J.R., Mohler, P. Ph. (eds.) (2003). Cross-Cultural Survey Methods. John Wiley & Sons: Hoboken, New Jersey.
- Harkness, J.A. (2004). "Problems in Establishing Conceptually Equivalent Health Definitions across Multiple Cultural Groups." In Cohen, S.B. and Lepkowski, J.M. (eds.), Proceedings of the Eighth Conference on Health Survey Research Methods. Hyattsville, MD: National Center for Health Statistics.
- Potaka, L. and Cochrane, S. (2004). "Developing Bilingual Questionnaires: Experiences from New Zealand in the Development of the 2001 Maori Language Survey." *Journal of Official Statistics*, Vol. 20, No. 2, pp. 289-300.
- Pan, Y., Hinsdale, M., Schoua-Glusberg, A., and Park, H. (2006). "Cognitive Testing of Translations of ACS CAPI Materials in Multiple Languages." U.S. Census Bureau Statistical Research Division Research Report Series (Survey Methodology - #2006-9). Retrieved from: <http://www.census.gov/srd/papers/pdf/rsm2006-09.pdf>
- Shin, H.B. and Bruno, R. (October 2003). Language use and English-speaking ability: 2000. Census 2000 Brief. U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau. Retrieved from <http://www.census.gov/prod/2003pubs/c2kbr-29.pdf> on 2/15/05.
- U.S. Census Bureau (2006). Table S1601. Language Spoken at Home. American Community Survey data from American Fact Finder. Retrieved from: http://factfinder.census.gov/servlet/STTable?_b m=y&-r_name=ACS_2006_EST_G00_S1601&-geo_id=01000US&-ds_name=ACS_2006_EST_G00_&-_lang=en&-format=&CONTEXT=st
- Willis, G. (2005). Cognitive Interviewing: A Tool for Improving Questionnaire Design. Sage Publications, Inc.: Thousand Oaks, CA.