CAN INFORMATION FROM AND ABOUT INTERVIEWERS PREDICT THEIR CAPI BEHAVIOR?

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BACKGROUND

The interviewer's ability to conduct an interview correctly has long been an important focus of research on survey measurement error (Hansen, Hurwitz and Madow, 1953; Groves, 1989; Flower and Mangione, 1990). When computer-assisted personal interviewing (CAPI) is used, how well interviews are conducted can depend on how well interviewers understand and use special CAPI navigation features (e.g., backing-up to correct a data entry). If interviewers find it difficult to use these features, they may use them incorrectly or avoid using them altogether, thereby increasing the potential for measurement error (Couper, Hansen and Sadosky, 1995). Thinking that survey managers could limit this source of potential error if they knew which interviewers needed additional training and support, we developed a short questionnaire that asked interviewers how they felt about some of the special CAPI features to see whether their responses were associated with how well they used the features during production interviews.

DATA AND STATISTICAL METHODS

The data used for this investigation are from the 1996 Medical Expenditures Panel Survey (MEPS) Nursing Home Component (NHC) (Potter, forthcoming). The MEPS NHC is sponsored by the Agency for Health Care Policy and Research (AHCPR) and the National Center for Health Statistics. It is a national probability sample of nursing homes and nursing home residents. It is longitudinal in nature, includes three rounds of interviewing in nursing homes (NH's), and the survey reference data is calendar year 1996. Data from Round 1 only are used for analysis. The data were collected by Westat, Inc., using a CAPI application designed by AHCPR and Westat staff and programmed in Cheshire. For each nursing home, the interview averaged four hours of CAPI administration time and 1,300 items.

Of the 951 NH's that cooperated during Round 1 (85 percent facility response rate), 24 were eliminated from the analyses because data in these NH's were collected by supervisory staff and by interviewers who left the study after only a few weeks of data collection (for health reasons). These data were believed to be atypical of the general interviewing experience.

Source data used includes a SAS file created as a subset of the raw keystroke file of all entries made to complete the Round 1 interviews. To generate a file that was reasonable in size, met the schedule for our analyses, and included at least two points of measurement on the interviewers' learning curve, we selected the first and fifth cases completed by the 46 non-supervisory interviewers. Each interviewer's fifth case was conducted after the interviewer had acquired about 16 hours of production interviewing experience -- enough, in our judgment, to enable us to examine learning curve issues. The SAS file of keystrokes contains entries made during approximately 400 hours of interviewing and includes more than 800,000 elements, some of which provide context for the interviewers' keystrokes.

This analysis also used items from the CAPI-collected survey data, in particular those items that characterized the interviewing environment, for example, the size of the nursing home, whether the nursing home was certified to receive Federal and State reimbursements, and the number of contacts that the interviewer made to complete the interview. We also used data from questionnaires that the interviewers completed about themselves after several days of Round 1 interviewer training.

Due to the methodological nature of this research, these analyses were not weighted with the MEPS NHC sampling weight. This was done to allow each unit of analysis an equal weight.

The major focus of this research, with respect to hypothesis testing, is to the universe of potential responses exhibited by the MEPS NHC interviewer population. However, the interviewers used in this analysis are not a random sample of interviewers, but rather non-supervisory interviewers hired to collect data about a sample of nursing homes. Thus, the ability to generalize from these findings should be considered when interpreting the results, although the MEPS NHC field staff is likely to be characteristic of interviewing staffs hired for similar U.S. government-sponsored CAPI surveys.

CAPI FEATURES STUDIED: BACKWARD MOVEMENT

The CAPI features that we chose to study for this paper are those associated with moving backward

through questions already asked and then returning to the original location in the CAPI questionnaire. These features are used by interviewers to review earlier questions and responses, and to correct previous entries (if necessary). There are two types of non-destructive backward movement that we studied. The first is called back-up, and it moves backward through the questionnaire one screen at a time. When the interviewer presses the appropriate key sequence for back-up (the Control Key and the letter B Key, simultaneously), the previous completed screen appears. The other type of backward movement that we examined is called jump-back, and it is used to jump over a set of previous screens to get to a chosen question. The jump-back key sequence (the Control Key and the letter J, simultaneously) opens a window that displays the questions previously asked. The interviewer then moves a highlight bar through the list of questions, locates the target screen with the highlight, presses the enter key, and the selected question appears on the screen.

To investigate interviewer use of backward movement features, we needed first to define episodes of backward movement. For this study, an episode began when an interviewer first pressed one of the key sequences used to invoke backward movement. The episode ended when the interview returned to the point at which it began. An episode could include "nested" uses of backward movement in which the interviewer moved backward and came forward several times before coming all the way forward to the initiation point of the episode. All interviewer actions from the initiation point until the CAPI program returned to or beyond the initiation point were included in one episode.

EPISODES OF BACKWARD MOVEMENT

The file of keystrokes from each non-supervisory interviewer's first and fifth cases included 2,199 episodes of backward movement that meet the definition above. The mean number of episodes per interview was 23.9, yielding one episode for each approximately 18 minutes of interviewing.

Of these episodes, 95.5 percent used only the back-up feature (screen-by-screen backward movement) with 74.7 percent including only one or two uses of the back-up key sequence and another 13.6 percent using the back-up key sequence three to five times (moving the application backwards 3 to 5 screens, depending upon the number of times the interviewer invoked the back-up key sequence). Only 7.2 percent of all episodes included six or more uses of the back-up key.

Among all episodes, the jump-back key sequence was used only 4.5 percent of the time. Approximately 45 percent of these episodes involved the use of a single jump-back key sequence; 32 percent were initiated with the jump-back key and included one or more uses of the back-up key, and 23 percent were initiated with the back-up key sequence and included one or more uses of jump-back key.

There was an average of 2.9 CAPI screens per episode across all episodes of backward movement. The longest episodes were those that involved both jump-back and back-up key uses with a mean of 27 screens per episode. Among jumpback episodes that were initiated with the back-up key (and included jump-back) the mean was 40 screens per episode.

Among the interviewers examined, all had at least one episode of backward movement that involved one or two uses of the back-up key sequence, and 97.8 percent of interviewers had episode(s) that used the back-up key three to five times within a single episode of backward movement. Episodes including six to ten back-up key uses were found in the work of 84.8 percent of interviewers, and 56.5 percent of the interviewers had episodes that involved 11 or more uses of back-up. Episodes that involved both the jump-back and back-up key sequences were used by 65.2 percent of interviewers, and 54.3 percent had episodes that involved using only the jump-back key. The mean number of episodes per interviewer was 47.8.

The interview for every nursing home in this analysis included at least one episode that involved one or two uses of back-up. Eighty-eight percent of nursing homes had episodes with three to five uses of back-up, 62 percent had episodes with six to ten back-ups, and 39 percent of nursing home interviews included episodes with 11 or more uses of back-up. Episodes that involved using both the jump-back and back-up key sequences were found in the interviews for 40.2 percent of the nursing homes, and 31.5 percent of nursing homes had episodes that involved only jump-back. (For additional information on the use of the back-up and jump-back key sequences, see Sperry, et al., forthcoming.)

INTERVIEWER ASSESSMENTS OF CAPI

To investigate the hypothesis that an interviewer's assessment of CAPI features could be used to foresee their future CAPI behavior, it was necessary to measure each interviewer's "CAPI comfort level." During Round 1 training, interviewers completed a self-administered questionnaire that included items about interviewer char-characteristics, such as age and interviewing experience, as well as attitude items designed to measure each interviewer's level of comfort with the special CAPI features used in the NHC application. The latter were adapted from questions used by others to evaluate software

Table 1. Items used to measure interviewers' assessment
of CAPI features

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1. I find backward movement features hard to use. (yes)
2. I feel knowledgeable about backward movement. (no)
3. I have trouble remembering how to use the backward features. (yes)
4. I think that the backward movement features will be useful. (no)
5. When I use the comments feature, I am confident I will use it correctly. (no)

Source: MEPS Nursing Home Component, Round 1, 1996

usability (Shneiderman, 1992). Several items were considered, and discarded, because of large Person Correlations (e.g., Rho=.85). Five items were eventually used; four assessed interviewers' comfort with backward movement and a fifth item assessed their comfort with the CAPI comments feature (see Table 1).

MULTIVARIATE ANALYSES

To investigate our hypothesis in more detail, the episodes of backward movement were examined in a multivariate context with logistic regression (SAS Institute, 1988). Excluded from this analysis were all episodes (44) completed by a single interviewer who had missing data on all the CAPI comfort items. This resulted in an analysis of 2,155 episodes of backward movement.

To screen potential correlates for model inclusion, we conducted Chi-square analysis. Variables considered for model inclusion, in addition to the five CAPI comfort items, included interviewer characteristics and items that measured the interviewing environment. Interviewer variables included: interviewer's age, education, interviewing experience, keyboarding experience, CAPI experience and the interviewer's frequency of backward movement, the latter measured in quartiles. Items on the interviewing environment were: the size of the NH, NH ownership, Metro/non-Metro, whether the NH was certified to receive Federal or State reimbursements, Census Region, when the case was completed during the field period (first or fifth case), whether the NH required Institutional Review Board consent procedures, and number of interviewer contacts required to complete the interview. The latter two items were proxies measures for a hostile interviewing environment.

The initial models were run with a step-wise procedure. Those variables found to be significant (p < 0.05) with the step-wise were included in the final models as were variables found to improved the overall model fit.

Two models were developed. The first to predict the probability that an episode achieved backward movement with the use of the jump-back key (jump-

back behavior consistent with the design of the jump-back key, i.e., successful jump behavior). Episodes with jump key use and no movement (e.g., opening a jump menu window, browsing the list of items and choosing not to jump) were not considered episodes of successful backward movement with jump-back key use (although they maybe perfectly legitimate uses). Of the 2,155 episodes examined, 75 contained one (or more) uses of the jump-back key.

The final Model 1 displayed a good fit (Chi-square =31.8, with 9 DF, p=.0002). Found to be significant predictors associated with deceasing the use of jump-back behavior were: interviewer's age in the oldest age group and interviewer's age in the youngest age group (each in comparison to interviewers in the middle age bracket); interviewers with proficient keyboarding experience (in comparison to those in the middle keyboarding group); when the interview was conducted (those conducted late -- the fifth case -- decreasing the likelihood of jump-back in comparison to the first case); and that interviewers who failed to feel knowledgeable about CAPI backward movement features were less likely to use the jump-back feature (Item 2 from Table 1). Found to be significantly associated with increasing the probability of jump-back being used was: the experience level of the interviewer (the low and high experience groups more likely to use jump-back, in comparison the middle experience group) and the interviewers' comfort level with the CAPI comments feature (Item 5 from Table 1).

Model 2 was developed to predict the probability that an episode contained questionable jump behavior. Questionable jump behavior was defined to include, at least one of the following behaviors:

- A backward movement episode in which the back-up key was used 11 or more times, within the episode.
- An episode with 15 or more screens.
- An episode containing jump-back key use but no backward movement.

In all, 97 episodes contained questionable jump-behavior. Of these, 50 contained one or more uses of the jump-back key sequence, while 47 involved excessive use of the back-up key sequence.

Found to significantly increase the likelihood of questionable jump behavior was: interviewers' level of educational (those with a college degree more likely to have questionable behavior when compared to those with only a high school education); high levels of interviewing experience (in contrast to the middle group; 1 to 4 years experience); a lack of CAPI experience (less than 1 year in comparison to 1 to 4 years); and interviews

conducted in non-certified NH's rather than certified homes. Found to significantly decrease the likelihood of questionable jump behavior was when the interview occurred during the field period -- late interviews less likely to have questionable jump behavior. The final Model 2 (Chi-square=26.1,11 DF, p=.0062) also included Census region of the NH, although this was not significant.

CONCLUSIONS

These analyses explored the hypothesis that an interviewers' comfort level with special CAPI features could be used to foresee their future CAPI behavior during production interviewing. Using data from 46 non-supervisory interviewers' first and fifth cases (about 400 hours of interviewing), it was possible to quantify interviewers' use of special CAPI backward movement features within a complex CAPI application. While the number of interviewers upon which these data are based is small, the data provide some insight into interviewers assessment of CAPI backward movement features, the interviewers' use of those features in the field, and suggest some interviewer training strategies for the future.

As these data illustrate, the interviewers use of the CAPI jump-back key sequence is a rare event. Among the 2,199 episodes of backward movement examined, only 4.5 percent involved the use of the jump-back key sequence. Seventy-five percent involved moving backwards across just one or two screens and were initiated with the back-up key (screen by screen movement) rather than the jump-back key. These findings are generally consistent with those reported by Lepkowski (1998) in his assessment of CAPI in the National Health Interviewer Survey.

What is not possible to know from these data is whether the rare use of the jump-back key is the result of interviewers failing to use the jump key sequence properly, the result of their being no reason to use the jump key, or something else. The comments data from the MEPS NHC Round 1 provides some evidence that the comments feature is used, at times, in place of the jump-back key, potentially increasing data collection costs. Whatever the reason, others have also reported the rare use of jump-back features (Couper, 1997; Lepkowski, 1998).

The finding that inexperienced interviewers and experienced interviewers were more likely to use jump-back for backward movement -- in contrast to those in the middle experience group -- appears counter-intuitive. We hypothesis this is the result of two distinct mechanisms, one for experienced interviewers and another for the novice interviewers. Given that

experienced interviewers are thought to be more efficient users of CAPI, than those in the lower experience groups (Couper, et al., 1995) it stands to reason that this group would use the efficient jump-back feature. Novice interviewers, on the other hand, are more likely to use CAPI features, use more keystrokes, enter more CAPI comments, enter longer CAPI comments, and do more editing than the other experience groups (Couper, et al., 1995), so it is no surprise that the novice group is more likely to use the jump-back key than the comparison middle group. However, Lepkowski (1998) reports that novice interviewers have a more difficult time preforming various CAPI tasks, and this difficulty was not measured well in our models.

In conclusion, these data provide some evidence that the interviewers' assessment (during training) of special CAPI features can be used to target interviewers who might need additional CAPI training. Interviewers who self-reported a lack of knowledge about the CAPI backward movement features were significantly less likely to use the jump-back feature for backward movement. Similarly, interviewers who self-reported being confident about using the CAPI comments feature were more likely to use jump-back.

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