

# The American Time Use Survey: cognitive pretesting

*Cognitive pretesting of the American Time Use Survey has resulted in several redesigns that disambiguated the wording of a number of questions in the instrument; further testing will ensure that the survey delivers high-quality data on an ongoing basis*

Lisa K. Schwartz

In the early 1990s, the Bureau of Labor Statistics (BLS, the Bureau) began exploring the feasibility of conducting a new survey to measure how Americans spend their time. The primary purposes of the survey were (and still are) to improve estimates of time spent in nonmarket activities (for example, child care) and in market-related work and to provide data on a variety of quality-of-life indices beyond income and earnings. In 1998, a BLS working group developed specifications for the American Time Use Survey and began pretesting the questionnaire through a series of cognitive studies that investigated how respondents understood and interpreted the survey's concepts and questions. Today, the Bureau continues developing and testing the survey, with full production scheduled for calendar year 2003.

## Historical background

The application of cognitive psychology to survey methods is motivated by the need to solve practical problems associated with questionnaires.<sup>1</sup> The Cognitive Aspects of Survey Methodology movement traces its beginnings to a 1980 U.S. conference that explored the implications of memory and recall on the quality of data in the National Crime Survey. Following that conference, several hypotheses were generated to test cognitive methods for improving recall of

victimization, and the results were incorporated into the redesign of the National Crime Survey. Shortly thereafter, in 1981, the Census Bureau opened the Center for Survey Methods Research, and in 1983, the first advanced seminar on the cognitive aspects of survey methodology (CASM I) was held in St. Michaels, Maryland.<sup>2</sup> The seminar brought together cognitive psychologists and survey practitioners in a deliberate effort to encourage interdisciplinary research into how the cognitive aspects of recall, comprehension, and judgment affect responses to a survey.<sup>3</sup> In 1985, the National Center for Health Statistics opened the Questionnaire Design Research Lab, which began routine testing of data collection instruments. From 1986 to 1993, the Census Bureau and the Bureau of Labor Statistics collaborated on cognitive research to support the Current Population Survey (CPS) redesign and conducted studies that helped inform the Office of Management and Budget's Directive 15, the Government standard for collecting information about race and ethnicity. In 1988, the Bureau of Labor Statistics opened the Collection Procedures Research Laboratory (now the Behavioral Science Research Center) to foster interdisciplinary research to improve the quality of data collected and published by the Bureau.<sup>4</sup>

This article describes the findings from a series of cognitive studies that were conducted as part of the American Time Use Survey's development.

Lisa K. Schwartz is a research psychologist and Associate Program Manager of the American Time Use Survey, Division of Labor Force Statistics, Bureau of Labor Statistics.

## Overview of the survey

*The questionnaire.* As mentioned earlier, the BLS American Time Use Survey is scheduled for full production in January 2003. National estimates are slated to be available in mid-2004. Eligible respondents<sup>5</sup> will be randomly selected from a subset of households that recently completed their final (eighth) CPS interview.<sup>6</sup> All interviews will be conducted by the Census Bureau, using computer-assisted telephone interviewing. The primary focus of the interview will be on the respondent's previous day's activities. The Bureau of Labor Statistics expects to conduct about 2,000 interviews per month—or 24,000 annually—and production will be continual throughout the year. The interview that will be conducted in 2003 will comprise several sections, described in exhibit 1.

*Summary questions.* The original specifications for the survey that were published in the National Research Council (NRC) report and *Monthly Labor Review* articles did not include descriptions of summary questions.<sup>7</sup> Shortly after the publication of those sources, the American Time Use Survey working group designed a set of summary questions that asked respondents about four specific activities: *child care*, *dependent care*, *paid work*, and *absences from home*. In the fall and winter of 2000, researchers completed Phase I pilot tests of the summary questions. Cognitive interviews revealed a number of problems resulting from respondents' differing interpretations of the wording of questions.<sup>8</sup> On the basis of these findings, the question on dependent care was dropped, and Phase II tests began on a revised set of the remaining summary questions in the winter of 2000.

## General testing methodology

Research contractors and psychologists in the BLS Office of Survey Methods Research conducted the cognitive pretests of the American Time Use Survey's summary questions. Phase I testing relied on face-to-face mock time-use interviews, followed by intensive cognitive interviews.<sup>9</sup> In full production, however, the survey will be conducted by telephone. The use of telephone interviewing methodology raises potential recall issues that needed to be addressed in testing. Thus, in all subsequent tests, the mock interviews were conducted by phone. Respondents were tested at the Bureau and at other research facilities. Researchers greeted respondents and then phoned them from a separate room to conduct the interview. Upon completion of the mock interview, respondents participated in a face-to-face intensive cognitive interview designed to highlight recall and interpretation difficulties that could jeopardize the quality of the data collected.

Respondents were recruited through databases of research participants, through advertisements in local newspapers, via e-mail, and by word of mouth. Each respondent was paid to

participate in a single session that lasted approximately 1 hour.

## Child care

*Background and research objectives.* To gain a more complete picture of who is caring for children and to identify the activities that adults combine with child care, time spent in secondary child care needs to be measured. Briefly, the concept of secondary child care recognizes a distinction between two types of parental or caregiver activities. There are times during which a parent or caregiver may be actively and directly engaged with a child. In a time-use interview, these *primary child-care* activities are reported in the diary. Examples of respondents' statements referencing activities that would be classified as primary child care are "I was feeding my child," "I was reading to my child," and "I was helping my child with her homework." There are other times during which a parent or caregiver is indirectly involved with a child, such as when the adult is engaged in some other activity, but is still mindful of, and responsible for, the child. This state of being mindful of, and responsible for, a child while engaged in some other, primary activity is termed *secondary child care*. The Bureau decided that it would be too burdensome to ask respondents, upon each report of a primary activity, if they were also caring for a child during that activity.<sup>10</sup> Instead, the Bureau opted to try to measure secondary child care with a summary question administered upon completion of the diary. Questions about secondary child care are restricted to care for children under the age of 13.<sup>11</sup>

Preliminary development of a survey methodology for collecting information on secondary child care began in 2000. Focus groups were conducted during which participants were shown examples of the kinds of activities that the Bureau was interested in capturing and were asked to provide their own descriptors for those activities.<sup>12</sup> Participants strongly suggested that the concept of secondary child care is not intuitively meaningful, because most parents would consider those activities "just part of being a parent." When asked, "What would you call these kinds of activities?" focus group participants suggested a number of phrases that could be used to capture secondary child care. Their preferred phrase was "taking care of," followed by "looking after." Participants also offered the alternative phrase "in your care." Upon reflection, "taking care of" seemed to include a more active component than was intended by the concept of secondary child care and thus was not considered for further testing. The phrases "looking after" and "in your care" were tested in Study 1. Respondents were asked about their care for children who lived in their household. Similar questions were then asked about the respondents' care for children who were not a part of their household during the previous day. If respondents reported unpaid care for nonhousehold children 12 years or younger, they were asked to identify whether they were related to the children for

**Exhibit 1. Structure of the American Time Use Survey**

Section number and title	Description
1. CPS updates	Information about the composition of the respondent’s household and the respondent’s labor force status will be updated.
2. Additional background information	Information on the employment status of the respondent’s spouse or unmarried partner will be collected. Respondents will also be asked to report the age and sex of each of their own children under 18 years who do not reside in the household.
3. Time-use component	A 24-hour time diary will be collected. The reference period will begin at 4:00 A.M. on the day before the interview and end at 4:00 A.M. on the day of the interview. <sup>1</sup> The interview will be semistructured, using “conversational interviewing” to probe for detailed information needed for coding. <sup>2</sup> Contextual information about where and with whom an activity occurred will be collected for each activity, except for personal care activities (sleeping and grooming) and those the respondent reports as “private.” Information about simultaneous activities will not be collected. <sup>3</sup>
4. Summary questions	Upon completion of the diary, respondents will be asked a series of summary questions which elicit details about the previous day’s activities that may not have been reported in the diary. Some summary questions also will be used to collect information about activities that occurred outside the “yesterday” reference period. (These questions are described more fully in the text.)
5. Additional CPS updates	Information about employed respondents’ usual earnings and current industry, occupation, and class of worker will be updated. Information on unemployed respondents’ jobseeking activities will be collected. Information on school enrollment status will be collected for all respondents aged 15 to 45 years.
6. Modules	After the first year of full production, the survey will include modules that will collect detailed information about specific activities of interest to data users.

<sup>1</sup> Original plans called for a midnight-to-midnight diary. Canada, New Zealand, and Eurostat all begin their diaries at 4:00 A.M., primarily because most people are asleep at that time. At midnight, respondents may still be doing activities that would be carried over from the previous day.

<sup>2</sup> Conversational interviewing is a flexible interviewing style that allows the interviewer to work with the respondent to ensure that the respondent interprets the questions consistently. As regards the diary, the conversational interviewing approach will allow respondents to use their own language to reconstruct their previous day’s activities and will permit interviewers to ask follow-up questions of a probing nature when they are needed to disambiguate verbatim reports.

<sup>3</sup> The survey asks respondents to report their main activity at any given time. The survey does not ask, “What else were you doing?” for each activity, because (1) doing so was perceived to be too burdensome in a telephone interview and (2) some respondents could not accurately report a duration for their secondary or tertiary activities. (See L. Stinson, “Report on Cognitive Testing Phase 1: The American Time Use Survey Summary Questions” (Bureau of Labor Statistics internal report, 2000).) Summary questions on child care will be used to estimate time spent caring for a child while doing other things. Further research will be conducted to examine whether and how accurate data on simultaneous activities might be collected; however, such data will not be collected during the first year of the survey (2003).

whom they provided care. The alternative versions of the question are shown in exhibit 2. The primary goal of this project was to determine whether there are important distinctions between the two expressions “looking after” and “in your care.”

*Findings.* In testing, the inclusion of a child-care summary question added dramatically to estimates of time spent provid-

ing secondary child care.<sup>13</sup> Across groups, respondents ( $n = 21$ )<sup>14</sup> reported an average of 3:44 hours (that is, 3 hours and 44 minutes;  $SE = 0:53$ ) engaged in secondary child-care activities. This figure contrasts with 2:20 hours ( $SE = 0:22$ ) engaged in primary child-care activities. Respondents preferred the phrase “in your care” to “looking after,” primarily because it suggested a more nurturing relationship between the parent or

## Exhibit 2. Alternative versions of question on child care

Statement or question	Description
Lead-in	Now I'd like to talk with you in a little more detail about child care. Child care certainly includes active things like feeding or playing with your children. But it also includes things that you could do even while doing something else, like <i>looking after</i> them.
First question	I'd like you to think back over your day yesterday. During any part of the day yesterday, were you <i>looking after</i> [fill with names from household roster of children less than 13 years]?
Second question	[If yes to first question] At which times or during which activities were you <i>looking after</i> [fill with names from household roster of children less than 13 years]?
Lead-in	Now I'd like to talk with you in a little more detail about child care. Child care certainly includes active things like feeding or playing with your children. But it also includes times when children are <i>in your care</i> , even while you are doing other things.
First question	I'd like you to think back over your day yesterday. During any part of the day yesterday, was/were [fill with names from household roster of children less than 13 years] <i>in your care</i> ?
Second question	[If yes to first question] At which times or during which activities was/were [fill with names from household roster of children less than 13 years] <i>in your care</i> ?

other caregiver and the child; further, those who did prefer “in your care” reported significantly more time spent engaged in secondary child care than did respondents who preferred “looking after.”<sup>15</sup> However, a confounding variable in the experimental design made it impossible to draw firm conclusions from this research: respondents with higher levels of education were disproportionately represented among those who made up the “in your care” group. Another problem that emerged was that respondents were inconsistent in their determination of when child care could occur. Some respondents reported care when they themselves were sleeping. Others reported care when their children were sleeping. These individual differences in interpretation resulted in large differences in the estimates of time spent providing secondary child care.

*Second child-care study.* A second study was conducted to address the methodological limitations of the first one. Specifically, Study 2 attempted to control for some inconsistencies in response patterns by implementing rules that bound the time during which secondary care could occur. Because respondents inconsistently reported secondary care when they themselves were asleep,<sup>16</sup> it was decided that child care would be defined to have occurred when, and only when, the respondent and at least one child were awake. The implementation of these rules required interviewers to collect information about the times the first child woke and the last child went to bed in order to bound the secondary-care period. This approach is similar to one that was implemented in a 1998 Canadian time-use survey.<sup>17</sup> Because respondents in Study 1 preferred the wording “in your care” to “looking after,” all respondents in Study 2 ( $n = 16$ )<sup>18</sup> were asked about times or

activities during which children who were 12 years or younger were in their care. Respondents with lower levels of education were recruited for this study.

*Findings.* Participants in Study 2 were demographically similar to respondents who were in the “looking after” group in Study 1; however, they reported significantly more time in secondary child care than did the latter respondents. Respondents reported an average of 36.9 activities in their time diaries ( $SE = 3.2$ ), of which 6 were primary child care ( $SE = 1.0$ ). Time spent in primary child care was an average of 2:23 hours ( $SE = 0:26$ ). There were no statistically significant differences between respondents in Study 2 and either group of respondents in Study 1 with respect to the number of activities they reported in their time diaries, the number of primary child-care activities they reported, or the amount of time they spent providing primary child care. In response to the modified summary question administered in Study 2, respondents reported an average of 13.3 ( $SE = 1.2$ ) activities during which they were providing secondary child care. Time spent in secondary child care was an average of 5:32 hours ( $SE = 1:04$ ). Despite their educational similarity to respondents in the “looking after” group in Study 1, respondents in Study 2 reported significantly more time spent in secondary child-care activities.<sup>19</sup> Their reports were comparable to those obtained from respondents with significantly higher levels of education who constituted the “in your care” group in Study 1. Comparisons across groups are summarized in table 1.

It is important to note that the direct comparisons of estimates of time spent in secondary child care are complicated by the modifications to the summary question that were imple-

mented in Study 2. That study bounded the period of care by the time the first child under the age of 13 got up and the last child under the age of 13 went to bed. These restrictions were *not* imposed in Study 1.

These data, while not conclusive, shed some light on the findings coming out of Study 1. The findings from Study 2 suggest that the expression “in your care” may be more broadly interpreted than “looking after” and that this broader interpretation is shared across respondents with different levels of educational attainment.<sup>20</sup>

*Implications for the survey.* Although some respondents had difficulty remembering the times their children got up and went to bed, bounding the child-care period in this manner seems to be worthwhile. In the absence of a clearly defined child-care period in Study 1, respondents varied widely in their perceptions of when their parental responsibilities began and ended. The effectiveness of the summary question on secondary child care will continue to be evaluated in an additional cognitive test of the diary and summary questions, with results likely to be available in February 2002.

### Work-related summary questions

*Background and research objectives.* The American Time Use Survey will collect information about time spent working both in the diary and by means of a series of summary questions. In testing, the diary successfully captured time spent at work by individuals who “went to work.” For example, when reporting about workdays, most respondents reported some amount of time spent at home engaged in various activities prior to going to work. They reported traveling to work, and then they reported the time they started working and the time they stopped. In response to a question designed to identify non-work-related activities, respondents reported breaks of 15 minutes or longer that occurred during the workday, such as lunch breaks or time spent carrying out personal errands. In addition to recording those activities associated with being “at a workplace,” the diary captured time spent engaged in other work-related activities when respondents clearly specified that an activity constituted work. These activities may be identified in response to interviewers’ probing for selected activities. For example, interviewers were trained to probe reports of reading to determine whether the purpose of reading

was primarily work related or for personal interest. The use of probes in these instances allowed an interviewer to identify work-related activities accurately and ensured that such activities were coded appropriately. Work activities were also identified through additional information volunteered by the respondent. Some respondents volunteered additional information about activities that are not currently among those selected to be probed. For example, one respondent reported that a phone call made to a client was a “work” call. However, in the absence of predetermined probes for telephone calls, some work-related calls (and other activities) may not be recorded or coded accurately.

L. Stinson conducted a preliminary test of a question that asked respondents to identify all activities for which they were paid or for which they expected to be paid.<sup>21</sup> This question succeeded in identifying informal income-generating activities, such as making handicrafts that are sold on the side, but did not identify other work-related activities (that is, other than those reported in the diary), such as making business-related phone calls, engaging in business-related paperwork, mailing packages, or spending time working for one’s job on a computer. Thus, a number of issues related to the collection of paid work and work-related activities remained unresolved. The Bureau attempted to address these issues through the use of additional time diary probes and a series of summary questions. The purpose of Phase II testing was to evaluate the effectiveness of these methodologies in addressing a number of issues:

1. Can the American Time Use Survey measure the amount of time spent working by self-employed respondents, telecommuters, and other individuals who work in non-standard work environments or whose work hours are staggered throughout the day?

Measuring the amount of time spent working by these individuals introduces two areas of concern. First, respondents who “go to work” may have an easy time following instructions to omit from their reports the individual activities that constitute their workday. They simply report the time they started working and the time they stopped. In comparison, individuals who do not “go to work” may have difficulty responding in this way; they may report individual activities that make up their workday. If this is the case, then these individuals face a more burdensome interview. Second, the diary may underestimate the amount of time these respond-

**Table 1.** Results of testing child-care summary question

Hours spent in child care	Study 1, “looking after” group			Study 1, “in your care” group			Study 2, “in your care” group		
	Mean	SD	SE	Mean	SD	SE	Mean	SD	SE
Primary child care (hours) .....	2:16	1:27	0:27	2:23	1:57	0:35	2:23	1:40	0:26
Secondary child care (hours) .....	1:42	1:01	0:21	5:23	4:39	1:24	5:32	4:01	1:04

ents spend working, because interviewers will be unable to use travel information (for example, “I went to work”) or location information (for example, “I was at work”) to help them identify work activities.

2. For respondents with multiple jobs, can probes during the collection of the time diary be used to identify for which job an activity was undertaken, without unduly burdening those respondents?

The Bureau is interested in coding work activities done for a main job separately from activities done for a second or other job. This classification scheme requires that multiple jobholders be able to report easily and accurately the job for which an activity was performed.

3. Can the American Time Use Survey identify work activities done outside of standard work environments or outside of “normal work hours”?

Anecdotal evidence and data collected in the May 1997 CPS suggest that some people bring work home with them and work beyond their scheduled work hours. According to the CPS data, more than 21 million persons did some work at home for their main job. Also, more than half of the people who worked at home were wage and salary workers who were not “expressly paid for their time worked at home.”<sup>22</sup> About 17 percent of the wage and salary workers who worked from home were paid for their time. Self-employed workers, most of whom had home-based businesses, made up the remainder of those respondents who reported working from home.

Two work-related summary questions designed to address the preceding issues were evaluated for effectiveness through the use of cognitive interviewing techniques:

Lead-in: Because so much of our time is spent working, I’d like to ask you a few questions to make sure that this survey doesn’t miss any of your work activities.

Question 1: (Other than the times you said you were at

work) Were any of the (other) activities you mentioned done for your job (or business)?

Question 1a [if yes to question 1]: Which ones?

Question 2: Were there any (other) activities that you were paid for or expect to be paid for? [Read if necessary. These would include things like crafts that you sell on the side.]

Question 2a [if yes to question 2]: Which ones?

*Findings.* Thirty of 51 respondents<sup>23</sup> reported in the time diary that they engaged in at least one work activity. Respondents reported an average of 1.3 times during the day that they were working, and they said they spent an average of 3:58 hours (SE = 0.32) engaged in activities during those work blocks.<sup>24</sup> In response to the first summary question, 32 of 51 respondents reported that they engaged in at least one activity which was done for their job or business. Respondents reported an average of 2.7 activities performed for their job or business, in which they spent an average of 2:39 hours (SE = 0.28). In the diary, multiple jobholders reported significantly more time working than did self-employed workers or freelancers ( $p < .04$ ). Self-employed respondents and freelancers reported significantly more time in activities done for their jobs or businesses (and not also reported as work in the diary) than did multiple jobholders ( $p < .02$ ). No other differences between any of the groups were statistically significant. The data are presented in table 2.

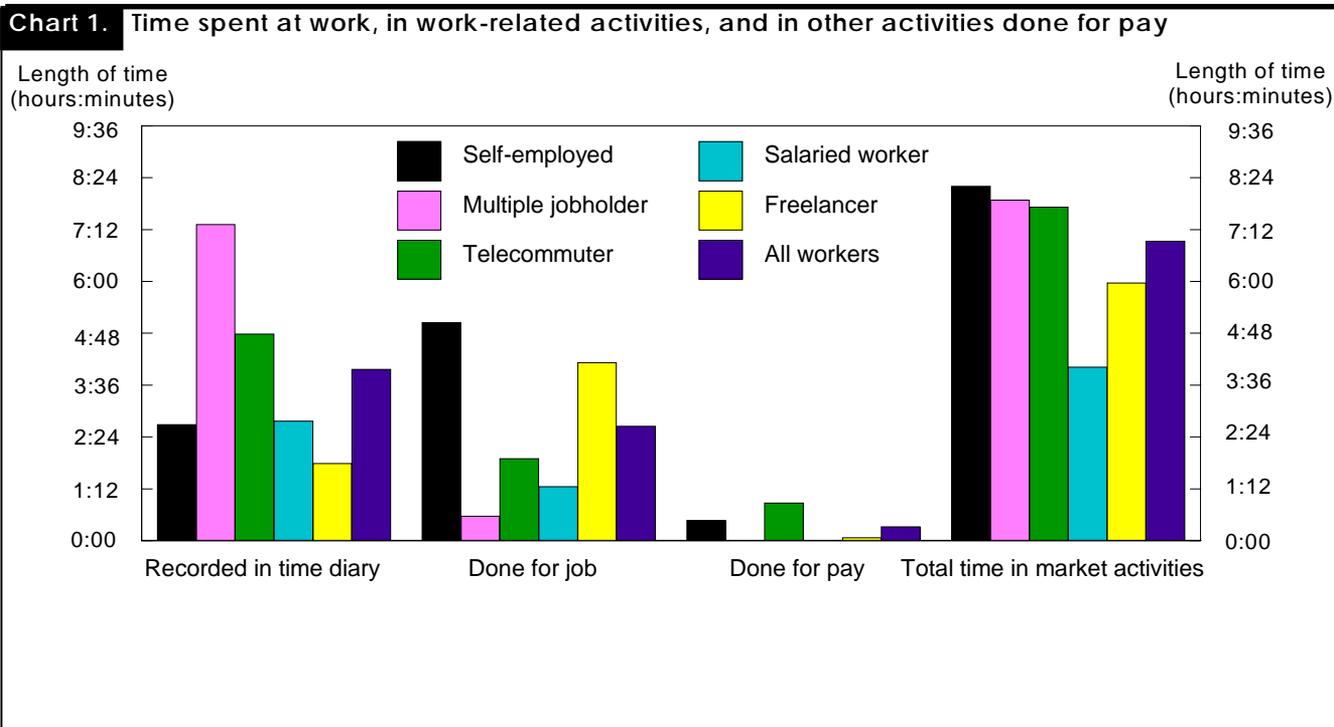
Eight of 51 respondents reported at least one activity that they performed for pay.<sup>25</sup> Respondents who reported any activities for pay reported an average of 0.5 activity and spent an average of 19 minutes engaged in such “income-generating” activities. There were no statistical differences between groups with respect to their reports of activities they engaged in for pay. The relevant data are depicted in chart 1.

The cognitive interview revealed that respondents defined activities that they engaged in for their job or business more broadly than had been intended. They included work prepara-

**Table 2.** Hours spent in work and work-related activities

Category of employment	Time spent working, reported in time diary		Time spent in work-related activities, response to summary question	
	Mean	SD	Mean	SD
All workers .....	3:58	0:32	2:39	0:28
Self-employed .....	2:41	0:58	5:03	1:14
Multiple jobholders .....	7:19	0:56	0:34	0:17
Telecommuters .....	4:57	1:07	1:54	0:51
Salaried workers .....	2:46	1:21	1:15	0:31
Freelancers .....	1:47	0:59	4:07	1:11

<sup>1</sup> Salaried workers were interviewed on Monday about Sunday; they reported about work they brought home with them, not about a full workday.



tion activities, such as ironing clothes, and networking or other relationship-building activities in their reports. Similarly, respondents interpreted activities for which one is paid or expects to be paid more broadly than had been intended. Some respondents even included income-generating activities, such as investment activities and playing the lottery.

*Implications for the survey.* The work-related summary questions are undergoing revision and further testing. On the basis of the findings from cognitive testing, the first question has been reworded as follows to clarify the kinds of activities that should be excluded from respondents' reports: "(You told me about your work activities yesterday.) Were any of the (other) activities you mentioned done for your job (or business)? Please do not include getting ready for work or commuting." The first two parenthetical interpolations are used for respondents who report work activities in their time diaries. The third is used for self-employed respondents. The second summary question about income-generating activities also has been reworded and is being tested. The new version, which attempts to further narrow the scope of activities respondents report, reads, "Of all the activities you mentioned, which were done *as part of* your job? Please do not include getting ready for work or commuting." To ensure that respondents report income-generating activities beyond crafts that are sold on the side, the original clarification to a respondent that "These could include things like crafts that you sell on the side" was omitted. A stipulation to exclude reports of paid time off was added.<sup>26</sup> The revised question

asks, "Were there any activities that you were paid for or *will be* paid for? Please do not include any paid time off." The results from the next round of testing may be available by February 2002.

### Absences from home

*Background and research objectives.* American Time Use Survey respondents will be contacted at home by telephone on a designated interviewing day and will be asked to provide detailed information about their activities the previous day (the reference day). Bounding the reference period this way reduces the chance that memory deficits will interfere with accurate reports.<sup>27</sup> However, missed interviews are a potential problem with this collection methodology, because the inability to reach a respondent on a specific day may be related to the respondent's activities on the reference day.

To illustrate, suppose that a respondent's designated interview day is Tuesday, March 6 (to collect information about activities that occurred on Monday, March 5), but she misses her interview because she is vacationing out of town.<sup>28</sup> Suppose further that the respondent is contacted on her 2nd designated day, Tuesday, March 13th, and reports about activities from her 2nd reference day, Monday, March 12th. The report from this completed interview might have differed substantially from the (missed) report on her 1st reference day (that is, while she was vacationing), had it been possible to contact her on March 6th.

Because interviewers cannot reach people by phone when

### Exhibit 3. Questions dealing with trips away from home

Statement or question	Description
Lead-in	Thanks for telling me about what you did yesterday. Because this survey focuses on what people did yesterday, the picture that we get of how people spend their time is incomplete. In particular, we get very little information about what people do when they travel, even though we know that activities often change when people travel. To help us get a more accurate picture of how you spend your time, I'd like to ask you a few very general questions about times when you may have been away from home.
Q 1	In the month of [preceding month], how many times were you away from home for 2 or more consecutive nights?
Q 2	(Let's start with the most recent of those trips.) What was the main purpose of that (most recent) trip? <sup>1</sup>
Q 3	Any other purpose?
Q 4	How many days were you away to/for [insert main purpose]?
Q 5	How many days were you away to/for [insert other purpose]?

<sup>1</sup> Text in parentheses is used with respondents who went on more than one trip the preceding month.

they are traveling, the survey may underestimate activities that respondents engage in when they are away from home and overestimate the time they spend on activities at home. Therefore, it is important to have a measure of this potential bias. To that end, the survey needs to collect normative data on the number of extended absences from home. The survey will not be able to collect information about the kinds of activities respondents engage in when they are on an extended absence from home. However, obtaining some information about the *purpose* of trips away from home may guide future research on how to minimize the bias. For example, if the majority of absences from home in a given month are for business travel, workdays could be weighted upwards to account for missed days.

The Bureau developed a series of summary questions to collect information about survey respondents' extended absences from home. The effectiveness of these questions as regards collecting information about activities outside of the 1-day reference period was tested by means of cognitive interview techniques. The primary objectives of this study were (1) to evaluate the accuracy with which respondents could recall the month they were absent from home and the duration of the trips they took, (2) to examine the impact of length of recall on respondents' reports, and (3) to identify meaningful categories into which the purposes of a trip could be classified. Exhibit 3 shows the questions related to trips away from home that were tested in the study.

The BLS Office of Field Operations provided respondents for this test ( $n = 22$ ). To help evaluate the accuracy of the

responses, the Office verified the month and duration of respondents' work-related trips.

*Findings.* The ease and accuracy with which respondents could recall information about their trips varied with the length of the recall period and the frequency with which the respondent traveled. Sixty-four percent of trips that were verified were accurate in terms of the month they occurred. Nine trips appeared on respondents' records, but were omitted from their reports, and seven trips were reported for which no record existed. Errors increased as the recall period increased. Thirty-one percent of trips that were verified were accurate in terms of their duration. However, when the duration of a trip was reported inaccurately, the report was usually off by only 1 day. Respondents did not have any difficulty labeling trip scenarios by purpose and suggested that categories to capture the purpose of business trips, vacation or leisure travel, community service or volunteer trips, career development trips, emergency travel, and multipurpose trips be included as response options. Respondents could easily identify the main purpose of their trips, but they found questions about "other" purposes intrusive and difficult to answer.

*Implications for the survey.* On the basis of the findings from the study, modifications were made to the summary questions about absences from home. To assuage concerns that respondents would need to report about trips away from home in as much detail as is required in the time diary, midway through testing the introduction to the survey was revised to specify

that only *general* information is needed about business, vacations, and other types of trips. Further, only information on the main purpose of trips will be collected, and the response categories will include a multipurpose option. To facilitate recall, respondents will not be asked about trips that occurred more than 2 months ago.

## Current projects and future directions

A cognitive test of the time diary and all three summary questions is currently underway. The primary objective of this test is to evaluate the overall flow of the interview, with particular attention paid to the order in which the summary questions are asked. The study will also assess the cognitive difficulty associated with completing the time-use interview and respondents' perceptions of the survey topic's intrusiveness. Forty-five individuals will participate in the study. The sample will include young adults between the ages of 15 and 24 years and adults aged 65 years and older, in order to ensure that the survey content is meaningful to both age groups and that their activities can be coded accurately with the use of the survey's coding lexicon. Results from this test likely will be available in February 2002.

A separate test related to how travel is best coded is scheduled to begin in January 2002 ( $n = 20$ ). The traditional way of measuring travel-related behavior is through the use of diaries in which respondents record their trips,<sup>29</sup> together with some contextual information. The 1954 travel diary of the U.S. Bureau of Public Roads, predecessor to the Federal Highway Administration, captured the origin and destination of a trip, the mode of travel, the duration of each travel episode, the purpose of the trip, the number of occupants in the vehicle, and details about parking. According to K. W. Axhausen, this type of diary takes a stage-based approach to recording travel activities.<sup>30</sup> The stage-based approach essentially asks respondents, "Where did you stop next?" and "Why did you stop there?" Axhausen notes that a stage-based travel diary has been extremely influential in the United States and has served as the reference standard for all federally funded travel projects. In comparison, time-use diaries capture trips as they occur within the context of all other daily activities. Much of the same contextual information is offered by respondents when describing travel in the time-use diary (for example, they cite the duration of the trip and its origin and destination) or is derived from other information collected in that kind of diary (for example, respondents will be asked, "Who accompanied you?" for activities that take place outside of the respondents' or someone else's home).<sup>31</sup> This probe will provide information about the number of occupants in a vehicle. Similarly, in the American Time Use Survey, travel will be coded according to the purpose of each trip, thereby providing an additional piece of information traditionally collected in travel surveys. The time-use diary may better match the way respondents think

of their daily activities, which, if true, means that they will be less likely to forget relatively unimportant short trips that tend to be underreported in traditional travel diaries.<sup>32</sup> Thus, time-use surveys may be an excellent source of travel data and may do a better job of capturing trips of short duration than do traditional travel surveys. In a recent review of several time-use studies, A. S. Harvey found that travel accounts for about 19 percent of all activities reported and that individuals report an average of 4.3 trips per day.<sup>33</sup>

Because the American Time Use Survey is likely to provide important data about travel and the context in which travel occurs, and because a high percentage of activities reported are likely to be travel activities, it is crucial that the Survey successfully measure and accurately code travel. In a series of tests designed to evaluate the survey's coding lexicon, it became apparent that coding travel was problematic.<sup>34</sup> In January 2001, the Bureau tested the effectiveness of collecting additional information about travel episodes to enhance the reliability of coding. Results from this test are scheduled to be available in February 2002.

A number of survey methodologists and economists have raised concerns that the Bureau does not plan to include a diary with the advance materials for the survey.<sup>35</sup> In response to their concerns, a split-panel test of the effects of advance diaries on response rates and data quality is scheduled to begin in March 2002 ( $n = 550$ ). A number of important issues will be addressed in this test. First, the Bureau is interested in the effects of advance diaries on contact, response, and refusal rates. The Bureau is concerned that if respondents choose to use the advance diaries, they may not wish to complete the telephone interview, which is necessary to collect detailed descriptions of activities that will permit consistent and accurate coding. Furthermore, the use of paper diaries as the principal mode of data collection is cost prohibitive, primarily because at least one personal visit is needed to drop off the diary and explain the level of detail that the respondent needs to record. Even if the diary were delivered by mail, the costs of mailing out diaries, reminder cards, and return postage would be higher than the cost of telephone interviews. Second, the Bureau is interested in evaluating the effects of the use of advance diaries on data quality. To this end, the test will include measures of the number and variety of activities reported during the telephone interview by respondents who use the advance diary, compared with those who do not. The study will also measure the number of gaps in respondents' time-use diaries (that is, periods for which they cannot recall a primary activity) and the frequency with which they report time anchors.<sup>36</sup> Last, the Bureau is interested in measuring the operational costs associated with advance diaries. The results from this study are slated to be available in August 2002.

A MAJOR OUTCOME OF THE COGNITIVE ASPECTS OF SURVEY METHODS MOVEMENT was the establishment of cognitive research laborato-

ries at the Bureau of the Census, the National Center for Health Statistics, and the Bureau of Labor Statistics. The work of researchers in these laboratories has contributed to the development and redesign of survey questionnaires, notably for household and other demographic surveys. As a result, more attention has been paid to how respondents think about the content of surveys and to the processes respondents

must go through in responding to survey questions. This approach to questionnaire design has been integrated into the development of the American Time Use Survey and should help it avoid the pitfalls of ambiguous wording of questions. Continued testing will further refine its operations and help ensure that the survey delivers high-quality data once it is in full production. □

## Notes

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<sup>1</sup> M. Sirken, "The Role of a Cognitive Laboratory in a Statistical Agency," in Federal Committee on Statistical Methodology, *Seminar on Quality of Federal Data*, Statistical Policy Working Paper 20 (U.S. Office of Management and Budget, 1991), pp. 268–77.

<sup>2</sup> CASM II was held in Charlottesville, Virginia, in 1997.

<sup>3</sup> T. Jabine, M. Straf, J. Tanur, and R. Tourangeau (eds.), *Cognitive Aspects of Survey Methodology: Building a Bridge between Disciplines* (Washington, DC, National Academy Press, 1984).

<sup>4</sup> C. Dipbo and D. Herrmann, "The Bureau of Labor Statistics Collection Procedures Research Laboratory: Accomplishments and Future Directions," in Federal Committee, *Quality of Federal Data*, pp. 253–67.

<sup>5</sup> All civilian noninstitutionalized household members aged 15 years or older are eligible for the survey.

<sup>6</sup> The Current Population Survey (CPS) is a monthly survey of about 60,000 households that provides data on the Nation's labor force. Households are interviewed for 4 consecutive months, are out of the sample for the next 8 months, and then are interviewed again for 4 consecutive months.

<sup>7</sup> Summary questions may be considered "hindsight" questions. Respondents are directed to refer back to the activities they just reported in their diaries and are asked to provide additional details about some of those activities. For example, G. Haraldsen suggests using summary questions to evaluate respondents' subjective experiences of time (for instance, "Were any of the activities that you reported ones that you would not have done had you not been obliged to?"). (See G. Haraldsen, "Framework for Data Collection on Time-Use: Relating Objectives, Design and Resources," paper presented at the Expert Group Meeting on Methods for Conducting Time Use Surveys, United Nations Secretariat, Statistics Division, New York, October 23–27, 2000. By contrast, stylized questions are similar to survey questions that ask respondents to indicate how much time they spent, or how often they engaged, in various activities over a predetermined reference period.

<sup>8</sup> L. Stinson, "Report on Cognitive Testing Phase I: The American Time Use Survey Summary Questions" (Bureau of Labor Statistics internal report, 2000).

<sup>9</sup> Cognitive interviews are intensive one-on-one structured inter-

views designed to gather information about respondents' thought processes as they answer survey questions. Cognitive interviews may reveal information about the memory, language, and decisionmaking processes that underlie people's responses to surveys.

<sup>10</sup> G. Haraldsen, "Framework for Data Collection," notes that paper diaries are better suited to the collection of secondary activities than are recall interviews.

<sup>11</sup> Participants in a cognitive test of the child-care summary questions were asked whether the age cutoff (12 years and younger) made sense to them. Although some parents suggested a lower or a higher cutoff, most agreed that the proposed age cutoff made sense. Parents said that 13 years is a "real turning point," because children become teenagers and are ready to assume more responsibility. Most parents agreed that teenagers require a different kind of supervision than is implied by a question about times when children are in their care.

<sup>12</sup> Stinson, "Report on Cognitive Testing."

<sup>13</sup> Secondary child care is, by definition, an activity that takes place simultaneously with another activity. Therefore, secondary child care could be reported as concurrent with a primary child-care activity. For example, a respondent could report *looking after* a child while reading to that child. When secondary child care was reported as concurrent with primary child care, the time was attributed to the primary activity only and was included in estimates of primary child care.

<sup>14</sup> One respondent in the "looking after" group did not report any time spent in secondary child care.

<sup>15</sup> Respondents who were asked about time spent "looking after" children reported 1:42 hours (SE = 0:21) spent providing secondary child care. In comparison, respondents in the "in your care" group reported 5:23 hours (SE = 1:24) spent. These differences were statistically significant, with  $t(18) = -2.551$  ( $p < .03$ ).

<sup>16</sup> According to the survey definition, child care could occur during either a parent's or child's daytime nap.

<sup>17</sup> In that survey, Statistics Canada collected data on the times that children woke up and went to bed on the designated reporting day. The survey then asked about the times that respondents were looking after their children. (See *Overview of the Time Use of Canadians in 1998 General Social Survey*, catalogue no. 12F0080XIE (Ottawa, ON, Statistics Canada, 1998); on the Internet at <http://www.statcan.ca>).

<sup>18</sup> Data from one respondent were excluded from analyses because the respondent did not engage in any primary or secondary child care activities the previous day.

<sup>19</sup>  $t(23) = -3.602$  ( $p < .01$ ).

<sup>20</sup> In Study 1, respondents provided their own definitions for these

terms. Their responses indicated that “looking after” was narrowly interpreted as “within sight,” whereas “in your care” was broadly interpreted as “caring and being responsible for” a child.

<sup>21</sup> Stinson, “Report on Cognitive Testing.”

<sup>22</sup> “Work at home in 1997,” Current Population Survey press release USDS 98–93, available at <http://stats.bls.gov/news.release/homey.nws.htm>.

<sup>23</sup> Eleven self-employed respondents, 10 multiple jobholders, 12 telecommuters, 8 salaried workers, and 10 freelancers participated in this test.

<sup>24</sup> The American Time Use Survey does not ask respondents to report the individual activities that make up their workday. Instead, respondents are asked to report the time they started work and the time they stopped. These blocks of time include many separate work (and nonwork) activities.

<sup>25</sup> All 51 respondents were asked to identify activities that they performed for pay. Respondents were instructed to exclude previously reported job-related activities. Estimates of activities performed for pay do not include work activities reported in the diary or activities identified as job related in response to the first summary question, “Were any of the (other) activities you mentioned done for your job (or business)?” Estimates of activities performed for pay only include activities identified in response to the summary question, “Were there any (other) activities that you were paid for or expect to be paid for? [Read if necessary: These could include things like crafts that you sell on the side].”

<sup>26</sup> During testing, one respondent was interviewed the day after she had taken paid leave. In response to the question, “Were there any activities that you were paid for or expect to be paid for?” she said, “Well, all of them. I took a paid day off.”

<sup>27</sup> The temporally inaccurate placement of recalled events results in *telescoping*. In *forward telescoping*, events that occurred prior to a reference period are erroneously brought forward and included in it. *Backward telescoping* involves pushing recent events back into a previous reference period. (See S. Sudman and N. Bradburn, *Asking Questions: A Practical Guide to Questionnaire Design* (San Francisco, Jossey-Bass, 1982).) Telescoping is used most often to explain over- and underestimation in judgments involving the aggregation of individual occurrences for the purpose of producing a summary response (for example, “Last month, how much did you spend eating out at restaurants?”).

However, because the American Time Use Survey diary asks about the previous day’s individual activities in a step-by-step, chronological sequence, the effects of memory loss and telescoping bias are minimized.

<sup>28</sup> The fielding period (that is, the length of time a case is active) for the American Time Use Survey is 8 weeks. Respondents will be assigned one eligible interviewing day per week to complete an interview about the previous day’s activities. They will be interviewed on the same day of the week for up to 8 weeks.

<sup>29</sup> Trips can be defined in various ways. A trip may be any movement from one address to another, any movement out from home coupled with a return trip, or any movement beyond a predetermined radius around the home.

<sup>30</sup> K. W. Axhausen, *Travel diaries: An annotated catalog*, 2nd ed. (Innsbruck, Austria, Institut für Strassenbau and Verkehrsplanung, Leopold-Franzens-Universität, 1995).

<sup>31</sup> Respondents are asked, “Who was in the room with you?” when they are at their own or someone else’s home.

<sup>32</sup> B. Noble, “Using Simple Time Use Surveys to Investigate Travel,” paper presented at the International Conference on Transport Survey Quality and Innovation, Kruger National Park, South Africa, August 2001.

<sup>33</sup> A. S. Harvey, “Time-Space Diaries: Merging Traditions,” paper presented at the International Conference on Transport Survey Quality and Innovation, Kruger National Park, South Africa, August 2001.

<sup>34</sup> D. Herz, L. Schwartz, and T. Shelley, “Coding Activities in the American Time Use Survey,” internal report (Bureau of Labor Statistics, 2001).

<sup>35</sup> This issue was raised by council members at a June 2001 Federal Economics Statistical Advisory Committee meeting and by participants in a separate brainstorming session on survey methods also held in June 2001.

<sup>36</sup> Time anchors are activities for which respondents are certain of the time the activity started or stopped. These activities may be landmark events around which the rest of the respondent’s day is organized and are considered indicators of higher quality data. Time anchors have important implications for how time relationships among activities are calculated in the survey’s data collection instrument.