

UC Irvine

Recent Work

Title

Experimenting with a Computerized Self-Administrative Survey: Evaluating a Pilot Study

Permalink

<https://escholarship.org/uc/item/47f366f3>

Authors

Lee, Ming S.
McNally, Michael G.

Publication Date

2000-12-01

Experimenting with a Computerized Self-Administrative Activity Survey: Evaluating a Pilot Study

UCI-ITS-AS-WP-00-8

Ming S. Lee ¹
Michael G. McNally ¹

¹ Institute of Transportation Studies
University of California, Irvine; Irvine, CA 92697-3600, U.S.A.
mingshel@uci.edu
mmcnally@uci.edu

December 2000

Institute of Transportation Studies
University of California, Irvine
Irvine, CA 92697-3600, U.S.A.
<http://www.its.uci.edu>

Paper No. 01-3092

Duplication for publication or sale is strictly prohibited
without prior written permission
of the Transportation Research Board.

Title: Experimenting with A Computerized Self-Administrative Activity
Survey: Evaluating a Pilot Study

Authors: Ming S. Lee and Michael G. McNally

Transportation Research Board
80th Annual Meeting
January 7-11, 2001
Washington, D. C.

Lee and McNally

Experimenting with A Computerized Self-Administrative Activity Survey:
Evaluating a Pilot Study

Ming S. Lee and Michael G. McNally*

Institute of Transportation Studies
University of California, Irvine
Irvine, CA 92697-3600

Tel: (949) 824-6571
Fax: (949) 824-8385
Email: mingshel@uci.edu
mmcnally@uci.edu

* Corresponding author

Abstract

The process of activity scheduling is crucial to the understanding of travel behavior changes. In-depth research is urgently needed to unearth this process. A new computer program, REACT!, has been developed to collect household activity scheduling data for this purpose. The program is implemented as a stand-alone program with Internet connectivity for remote data transmission. It also contains a GIS for location identification and a special feature that traces the decisions in scheduling process. A pilot study was conducted in Irvine, California to evaluate the program performance. Preliminary analysis validate the program's capability of guiding participants to complete data entry tasks on their own, thus the objective of reducing the cost and human resource of such a computerized survey is achieved. Other positive results regarding objectives of reducing instrumental biases and expanding program capabilities were also obtained. Areas for improvement were also identified in the pilot. Based on the finding, REACT! represents an ideal platform for a computerized household survey that can produce data for activity-based travel models.

Key word: Household survey, computerized survey, household activity scheduling, activity diaries, personal travel data

INTRODUCTION

In recent years there has been a growing interest in experimenting with new approaches for household activity/travel surveys. These experiments can be generally divided into two groups. One involves the application of new technologies, such as Global Positioning Systems and handheld computers, to obtain high resolution personal travel data (1, 2). Such data has promise to advance existing travel models and may even assist in a paradigm shift for travel forecasting. These data, however, are outcomes of the decision process, often termed activity scheduling, that determines when, where, with whom, and for how long to engage in various activities. Axhausen and Gärling (3) stressed the importance of this process by arguing that it is at the core of travel behavior changes. Effects of transportation policies such as tolling, congestion pricing, and travel demand management measures depend on how people would adjust their daily activity and travel pattern to changes to their everyday lives. They also argued that the process is “largely unknown” and new methods should be developed to conduct in-depth study of the process. This second group of data collection experiments is about the development of innovative approaches to unearth the process of activity scheduling.

The current state-of-the-art application is perhaps the Computerized Household Activity Scheduling Elicitor (CHASE) program developed by Doherty and Miller (4). CHASE is unique in that it collects data on the household activity scheduling process for a week long period. Members of sample households would run the program daily to record activities from their initial plans to final actions. CHASE was tested in several experimental surveys and proved to be an efficient data collection tool for study of household activity scheduling. Several critical areas for improvement have been identified. A research aimed at extending the scope of CHASE produced a new computer program, REACT!. In addition to hardware and software enhancement, significant advancement is made in terms of tracing decisions involved in the scheduling process. The purpose of this paper is to describe the advanced features in REACT! and to present results from the pilot study conducted in Irvine, California.

Review of CHASE

The main objectives of CHASE were to explore a household’s activity agenda from which all activities are drawn and to track the entire process of when and how activities from the agenda are added, deleted, and subsequently modified in a week long period. The program was installed on laptop computers rotated amongst households on a weekly basis. Laptops were dropped off on a Sunday evening and picked up the next Sunday evening. Up-front interviews were conducted with field personnel on weekends (before Sunday evening) and lasted 1.5 to 2 hours. The purpose of the interview is to obtain information on household demographics, available transportation modes, and residential information along with the household’s activity agenda. Household members were asked to describe the specific activities of each type that they perform, along with their attributes, such as frequency, locations, and involved person. Data obtained from the

interview were manually entered by the interviewer into a computer database. After the up-front interview, respondents were trained to use the CHASE program to record their weekly activity scheduling process. Figure 1 shows the main user interface. Participants were asked to log into the program at least once a day for the entire week. On the first Sunday night, they would add activities anywhere in the calendar (from Monday to Saturday) that they have already thought about doing before launching the program. On Monday, they would enter data through the program to reflect what they had done for the day. Respondents were then asked to review, modify and add activities for subsequent days (Tuesday to Sunday). If any changes to these future activities were known at this moment, they should enter the changes. The same process will continue every day until Sunday.

Despite the efficiency of the program, several areas for improvement have been identified. First, a laptop computer needs to be placed in a household for an entire week and field workers were required to deliver laptops and carry out the up-front interviews. Second, although the calendar-like interface greatly accelerated the process of entering activity schedules, it is not known if such an interface biased the decision process. It is reasonable to suspect that, if a time table is presented to the respondents, they might be tempted to “fill-up” the gaps by inserting plans they wouldn't have made under normal circumstances. Third, CHASE does not allow respondents to leave certain activity attributes undetermined when preplanning, except in the case of mode and travel time information. In reality, people's plans may often remain only partially elaborated. Finally, the program would benefit from a streamlined location recording process to enhance spatial precision, previously specified by zone number only using a map booklet.

REACT! PROGRAM DESIGN

Design Objectives

The primary objective of CHASE is maintained with REACT!: to record the household activity scheduling process for a week long span. However, several of CHASE's shortcomings have to be addressed, leading to REACT!'s three main design objectives:

- 1) Reduce the cost and human resource associated with using loaned laptops as survey instruments
- 2) Address potential instrumental biases
- 3) Expand program capabilities

To address the first objective, a self-administrating survey design paradigm is adopted where respondents use their own computers to input data with the program providing guidance. In addition, if the survey administrators can remotely conduct the survey over the Internet, the chance of expanding sample size with moderate cost will be greatly enhanced. Instrumental biases may be reduced if the program's graphical user interfaces and other components are enhanced. The third objective involves two experimental features to be implemented with REACT!: a GIS component for location indication and a

series of dialog boxes to trace scheduling decisions. It is expected that the former feature can streamline the processes of location specification and geo-coding. The later is expected to collect responses from users as to why they made certain schedule changes.

Program Features

REACT! is implemented as a stand alone program because it provides the desired speed and stability. The program is written as a windows application with Internet connectivity and packaged with self-executing installation and un-installation files. It inherited the survey structure of CHASE by dividing the process into two self-completing data entry stages: Initial Interview and Weekly Activity Diaries. Initial Interview is a series of questionnaires intended to collect the same information as those collected in CHASE's up-front interview. The process of activity scheduling is collected in the Weekly Activity Diaries. Participants of the survey have to install the program and finish the Initial Interview before the Sunday evening when the recording of Weekly Activity Diaries begins. Data collected from the interview will be automatically written to the main database linked to Weekly Activity Diaries. Thus, participants can enter details (e.g., activity titles, locations, and other people involved) of an activity by selecting from what they have entered in the interview.

Initial Interview

When users launch the program for the first time, they will be guided to complete the Initial Interview. Questions asked in the initial interview are categorized into the following 7 groups. Question groups 1 to 4 are related to the entire household. Only the first person doing the interview need to answer these questions; subsequent members to do the interview begin with group 5.

1. Household Information: Users will enter their home address and answer the following questions:
 - a. Do you own or rent the household?
 - b. What is your housing type (e.g., condo, apartment, and townhouse)?
 - c. How long have you stayed at the current residence?
 - d. What is your annual household income?
2. Frequently Visited Locations: This form is intended to collect a list of locations the respondent household visit at least once per month. Later when they are entering locations where certain activities occurred, they can record it by pointing and clicking. If a desired location is not included in the provided list, users can choose to enter this location by one of the three methods: typing the address, typing the closest intersections and/or land mark, or pointing it out in a GIS map.
3. Household Vehicles: On this form users enter the make, model, and year of the vehicles in the household.
4. Household Members: The first person in the household to run initial interview will enter the first names of all household members.

5. Member Information: Every adult member in the household will enter his/her personal information on this form, including: Gender, age, license to drive, relation to household head, education level, employment status, hours worked in a typical week, occupation, student level (if the person is a student).
6. Activities Information: This group of questions is intended to investigate what activities this household member usually do (i.e., at least once per month). Attributes (e.g., typical frequency, duration, time windows, locations, and involved persons) of these activities will also be explored. Within this group there are five subordinate forms:
 - a. Activity Selection: Users will first select their typical activities (i.e., performed at least once per month) from the list of activities provided (see Table 1). The activity program selected was mainly used to accelerate (i.e., point and click without typing) the data entry process in Weekly and Daily Calendar. However, additional questions were asked in the subsequent interview process to explore attributes of certain activities.
 - b. Activity Frequency: On this sub-form users will enter typical frequencies for certain activities. For example, major grocery (over 10 items): 2 times every *week*.
 - c. Activity Duration: This form is designed to collect information about the typical duration of certain activities. For example, jogging: *30 minutes*.
 - d. Activity Time and Day: This form asks users the typical time windows on which they would do certain activities.
 - e. Involved Persons: If other persons occasionally do this activity for the current interviewee, the interviewee needs to enter their names. In addition, if the interviewee usually does this activity with other persons, their names also need to be entered.
7. Transportation Modes: Users will select the modes they use from a list of local transportation modes, including walk, ride with others, van pool, car, local bus, bicycle, and commuter rail.

Weekly Activity Diaries

Weekly Activity Diaries containing two separate graphical user interfaces for interviewees to record their activity scheduling process. Weekly Calendar (Figure 2) is used to record activity intentions before they occur, and Daily Calendar (Figure 3) is to keep track of what activities actually occur during a day. Instructions on how to enter data to the calendars are given to users through an automatic slide show that launches itself when the program is turned on after Initial Interview is completed.

Weekly Calendar

On the Sunday evening when the surveying week begins, users will be taken to an empty Weekly Calendar on which they will enter activities they know they will do on each day of the coming week. To minimize the potential "fill-up" bias (i.e., encouraging

unnecessary planning by showing respondents time tables), a Weekly Calendar does not contain a time scale as CHASE. In addition, before the calendar shows up, there are always highlighted messages in the automatic slide show warning respondents not to intentionally plan and enter more activities than those they have known before they run the program. Interviewees enter known activities to the calendar. Users can leave details of an activity (e.g., time, location, and duration) as "I don't know" if they are not sure about them at the moment. Activities intended for the future appear in a stack of boxes, showing known details (see Figure 2). The "Any Day" list is for user to enter activities that will be done in the week but the date has yet to be determined. If a respondent enter a specific activity that the survey administrator is interested in investigating why the activity will be done on a particular day, a dialog box will show up to request this information from interviewees (see question 5 in Table 2).

Daily Calendar

At the end of each day in the week, interviewees will be taken to the Daily Calendar as soon as they turn on the program. On this calendar (see Figure 3), activities indicated for the current day are listed in a stack of boxes on the Tentative Activities column (on the left hand side). "Any Day" activities are listed in the same fashion on the right hand side. The Final Schedule for the current day is placed in the middle with a specific time scale. It is noted that displaying the current day's schedule along a standard line (as in the original CHASE survey) is not subject to the "fill-up" bias at this stage, as these activities have already been executed. Users first review the Tentative and Any Day activities and identify those that were actually executed in the current day. Then they need to specify all the details about these activities. Immediately after they enter all the details, a series of dialog boxes with questions may show up if an activity was executed in a way different from their intention (see the section of Decision Tracing Dialogs for details). When questions in the dialog boxes are answered, they can move this activity to the Final Schedule by pressing down the left (from Tentative to Final) or right (from Any Day to Final) arrow buttons. Interviewees will continue to finish their Final Schedule by adding activities and travel events (see Figure 12) that actually occurred but were not indicated as either the Tentative or Any Day activities.

After users finish updating their Final Schedules to the current time, they will be taken back to the Weekly Calendar and asked to review the activities for the subsequent days and update them if changes have been made (e.g., a new appointment has been scheduled for one of these day). Before users see their Weekly Calendars, the automatic slide show will launch again to warn interviewees not to intentionally plan and change activities if they have not learned or thought about the changes before they run the program. When changes are made, the question boxes will show up again to trace the reasoning process. The process of updating Daily and Weekly Calendars will continue everyday until the coming Sunday when the survey ends.

Decision Tracing Dialogs

REACT! is implemented with mechanisms intended to trace decisions involved in everyday activity scheduling. When a respondent manipulates a specific activity record in a certain way, a series of dialog boxes will show up to trace the decision process underlying the manipulation. Nine different questions will show up as soon as interviewees change or add a specific activity record in their Daily Calendars. Table 2 lists each specific data manipulation and its corresponding question. It is important to note that interviewees are warned that they should not force themselves to come up with a reason. In case the decision was made without much reasoning, they can always select an option called "No specific reasons". Depending on the answer selected, subsequent dialogs can be triggered to trace other information that may be relevant to the decision. First, the time horizon when the decision was made may be asked. This question is followed by a simple question "Do you often make such a decision in a similar situation?". Finally, the last dialog questions if respondents ever thought about anything as the benefit of the manipulation.

The Send Data Utility

When all the adult members in a household finish recording their activity diaries, the last person will establish Internet connection then activate the Send Data utility of REACT!. Currently, the program databases reside on the clients' end to achieve privacy and efficiency with a minimum deployment cost. When Send Data is activated, the program will compress the database of the entire household with encryption. The data package will be sent to the survey administrative server via FTP. The entire Send Data process is performed automatically without user intervention. When it finishes, users will receive notification to exit the program.

PILOT STUDY

The major purpose of the pilot study is to evaluate program performance through a small set of sample households. The survey was officially classified as Exempt Research (i.e., does not require extensive human subject review) by the Institutional Review Board of the University of California, Irvine (UCI). As a result, minors could not be involved in the study and adults were asked to enter data for their children under 18. Although it is desirable to have older children access the program by themselves, the Exempt Research classification gave the survey administrators the flexibility to adjust survey procedure for better participation rate and better data quality without experiencing a lengthy review process.

Prior to execution of the pilot study, the prototype of REACT! went through a month (from late February to the end of March, 2000) of beta testing with 9 households. The testing was intended to detect errors and inefficiencies of the program. During this period, 2 to 3 households were recruited each week to participate in the testing, and program was incrementally modified each week until the pilot version was completed.

Study Area and Survey Procedure

A total of 47 households finished the pilot study from April to June, 2000. During the process, 4 households were withdrawn by the survey administrator, because they did not run the program within the designated time. Most of the participants were students residing in two student communities, located adjacent to the main campus of UCI. A small number (i.e., 4 households) of participants were non-students living in an apartment complex several miles away from UCI. The center of the study area, the city of Irvine (population 136,600 in 1999), is located about 40 miles south of Los Angeles. Irvine and two of the neighboring cities, Costa Mesa and Newport Beach, form a large, thriving area with numerous opportunities for most activities. In the pilot study, the study area includes these three cities. Locations within this area were pre-defined in the program for users to indicate their activity locations. In addition, the GIS component displays map of the entire area when users activate the component for location indication.

The pilot was executed in the following manner. First, flyers and emails bearing the same messages were sent to residents in the study area. In addition, a Web site (www.its.uci.edu/~react) was established to give potential participants a brief introduction of what questions and tasks they should be expecting from the survey. Interested participants would contact the survey administrator by phone or email. A package containing REACT! program CD and other administrative materials (i.e., survey consent forms, instruction on when to run the program, user manual, and program installation guide) was subsequently sent to each participant. After that, participants would execute all the tasks on their own, although a dedicated phone line was available for technical support. The survey administrator would occasionally send out email to alert interviewees potential mistakes they might make on a specific day. Emails would also be sent to remind participants if investigators detect individual households that forgot to

send in data on the previous day. After the survey ended, a set of questions were sent by email to every participating household asking for their evaluation of the program (see User Evaluation below). Participants in the pilot were financially compensated.

A special procedure was designed for parents to enter data for their children. The purpose was to investigate how children's schedules affect parents' without substantially increasing entry load for parents. First, in the Initial Interview, a category of activities was defined for children (see Table 1). Parents were asked to select exclusively from this category to describe what their children typically do. Before the surveying week begins, parents should put down when their children would be engaged in activities away from them, such as school, school events, or day care centers. Everyday in the week they would update their children's activities in the same way as they would do for themselves. Decision tracing dialogs would not appear during children sessions.

Survey Results

Initial Interview

Household and personal information

Although respondents could skip questions they did not wish to answer, they answered most questions that applied to them. The most notable exceptions are household income (5 households selected not to reveal), home address (1 household did not enter), and age (1 single adult did not answer). Among the 47 households (81 adults, 16 children), 14 of them are single adult households (one with a child). There are also 20 couples without children and 13 couples with 1 to 2 children. Ten of the children are under 3 years old and six of them are between 6 to 16. Educational levels of all respondents are high. Over half (45) of the adults are either working on or have a master's degree or higher. 28 have bachelor's degrees. The remainders (8) are either graduated from 2 year colleges or currently undergraduate students.

Recording of locations

In the Initial Interview, respondents were asked to select from the provided list of 24 commonly visited locations, including various shopping complexes in the study area, to build their frequently visited locations. These pre-defined locations were all geo-coded in the database. At the end of the survey, an average household entered 11.3 locations as its frequently visited locations. Among them, 7.8 were selected from the provided list, while 3.5 were recorded by users themselves.

Overall, 242 locations were recorded by users themselves: 59 of them were recorded by entering full addresses; 81 were entered by closest streets or land marks; 72 were entered with the GIS component; and 30 were out of the study area and entered with city names. Records of these locations can all be geo-coded in a GIS with various precision.

Locations recorded by the GIS components appeared in the database as pairs of longitude and latitude that can be directly managed and analyzed by a GIS. Address matching is needed for locations in street addresses and closest streets. For locations out of the study area, no precise geo-coding is intended. However, if the location itself is a landmark in a particular city, it may still be precisely located.

Activity program characteristics

Participating adults selected a total of 2099 activities, or an average 26 activities per person, as their typical activities (i.e., perform at least once per month). Only six persons ever added activities (a total of 7 activities) on their own. According to the results of user evaluation, most respondents indicated that activities in the pre-defined list were sufficient for them to describe their typical activities (see User Evaluation below).

Activity Diaries

Scheduling process

During the pilot, the program recorded 12766 scheduling steps from the 81 adults, including 9210 additions (1205 were repeated events), 818 deletions, and 2738 modifications. Data entry steps per adult per day is illustrated in Figure 4. On Sunday, users performed the most data entry steps when entering known activities for the entire week. This is followed by a sudden drop on Monday. It is noted that on Monday users only updated their schedules from 12 midnight till the evening when they ran the program, as opposed to in rest of the week they needed to update almost a full day (i.e., from previous evening till the current one) every night. Comparing to other days in the week, the peak on Tuesday seems abnormal. After examining the data, it was discovered that several respondents encountered errors and performed extra steps to correct them, when they tried to finalize the remainder of Monday (i.e., Monday's schedule should be completed without time gaps and conflicts). This represents an issue for improvement in program design. No obvious fluctuation is observed for remainder of the week, except on the ending Sunday when some respondents entered for the skipped Friday and/or Saturday. Overall, no significant decline in entry steps existed throughout the week. This suggests the amount of daily entry load did not cause evident fatigue effect.

Entry time

The average data entry time is presented in Table 3. For the Initial Interview, the first person to run the program would enter household and vehicle information for rest of the family. The average time to complete the self interview is 26 minutes for the first adult and 13 minutes for the second adult. When filling out the interview for children, parents dealt with a small set of activities when describing children's activity programs. As a results, the average interview time is only 6 minutes.

On the beginning Sunday, although respondents were asked to look ahead of the entire week and record activities they know they would do, the entry time on this day was not the longest in the week. The main reason is that users can copy and paste activity records that repeat on other days of the week. This feature accelerated the entry process on the Weekly Calendar. Monday was the most intensive session when users learned to use the Daily Calendar to update activities. After that, daily entry time gradually decreased, as respondents became familiar with the program, until a slight surge during weekends. This small increase can be explained by the fact that a certain number of people ran a longer session to make up what they skipped on Friday and/or Saturday. Among couples, the second person to enter data usually spent less time than the first person. This may be an indication that couples learned from each other how to run the program. For the time parents spent for their children, it reveals the same pattern as that of adults but with a much shorter duration each day. Decision tracing dialogs were suppressed when parents entered for their children and, in general, children have less activity information to enter.

The number of skipped days were also tabulated in Table 3. Overall, 59 of the 648 (9%) adult data entry sessions and 25 of the 128 (19%) children data entry days were skipped. No one skipped the beginning Sunday since if a household missed the day they would be instructed to begin the process next Sunday (i.e., data from the Initial Interview remained valid in the database). Friday and Saturday were the days that were skipped the most. Note that the program always asks respondents to first finish entering the skipped days then continue with the current day. Therefore, activities on these days were all collected later. Five households did not finish the survey on the ending Sunday due to various reasons.

Responses to the decision tracing dialogs

During the pilot study, REACT! collected 6155 responses from the 81 adults as to why they made certain schedule changes. Changes made to basic activities (e.g., night sleep, shower, regular meals) were not questioned. The purpose was to keep the length of each data entry session short. These responses will be analyzed in conjunction with the entire scheduling steps. It is expected that answers to these questions can provide information about decision rules of activity scheduling.

Final schedules

Overall, 6738 activities and 1602 trips were entered by 81 adults in the sample for themselves. 9 of the activity records were indicated as “don’t know/don’t remember”. 5099 (76%) activities were in-home, while 1639 (24%) were out-of-homes. Note that the number of resultant activities and trips do not equal the numbers of addition minus deletion, because five households did not finish the Sunday’s schedule. The activities and trips per adult per day are shown in Figure 5 and 6.

No obvious trends exist over the course of the week for different types of activities, except for the decrease of work/school activities over the weekend and the increase of shopping activities on Saturday. On Sunday, respondents finished their schedules up to the time they ran the program. As for average number of trips, the most notable fluctuation are the increase of car trips on Saturday and the total trips decrease on Sunday.

User evaluation

After the end of the surveying week, a set of 11 questions (see Table 4) was sent to each participating household by email. These questions were intended to assess, from users' viewpoints, if the program design achieves its goals. Answers to these questions were provided by the persons who acted as the correspondent to the survey administrator. Since couples were allowed to learn how to run the program from each other, the opinions of the second person were not sought. Responses from 33 households were received. Table 4 shows the results. Households that did not send in their responses are listed as missing. According to the results, majority of the respondents indicated that the program features did convey the survey designer's instructions. Although it remains to be examined, most interviewees indicated that they were aware and followed the principle of not intentionally plan activities.

SUMMARY AND DISCUSSIONS

A new computer program, REACT!, has been developed to collect data on household activity scheduling process. The program was tested in a pilot study in Irvine, California. Preliminary analysis validate the program's capability of guiding participants to complete data entry tasks on their own, thus the objective of reducing the cost and human resource of such a computerized survey is achieved. Other positive results regarding objectives of reducing instrumental biases and expanding program capabilities were also obtained, although the data remain to be further examined. The pilot survey identified several areas for improvement. First, the procedure for parents to enter children's schedules was intended for pre-school children (i.e., the primary age group for children in the target sample households). For children from middle to high school levels, it may not be appropriate. Ideally, they should enter data by themselves using a set of specially defined activities. Second, according to user comments, the design of Daily Calendar should be more user-friendly. The coordination between a couple's schedules should also be improved. For example, it might be beneficial to list husband's and wife's schedules side by side to enable copy and paste activities that were done together. Finally, the full potential of the Internet has yet to be explored. Currently, the program performs one-way interaction through the Internet by loading its data to survey server. Although the administrators can examine the data on the server side, emails and phone calls are used to inform participants errors in previous entry sessions. The program will be adapted with the capability to directly retrieve corrected data and instructions from server.

Lawton (5) noted the inefficiency of the current data collection methods and stated, “We should seriously evaluate the use of more carefully chosen, smaller samples, using direct contact and paying for cooperation (their time). Data collection needs to be automated (laptop, etc.), and we need to design interactive stated response experiments that key directly from revealed data at the same collection time.” According to the finding from this study, REACT! represents an ideal platform to realize Lawton's vision of a computerized household survey. The Decision Tracing Dialogs can be easily adapted to stated-response or stated-preference questions. In addition, the sample size of such a survey can be augmented by providing potential participants who do not have PCs a laptop on which to complete the survey.

Acknowledgements

The authors wish to thank Dr. Sean Doherty, Ramesh Sabetiashraf, and Craig Rindt for their assistance in program development. Funding for this research has been provided by the University of California Transportation Center.

REFERENCES

1. Battelle Transportation Division. *Global Positioning Systems for Personal Travel Surveys: Lexington Area Travel Data Collection Test*. A report to FHWA, September, 1997.
2. Guensler, R., and J. Wolf. Development of a Handheld Electronic Travel Diary for Monitoring Individual Tripmaking Behavior. Paper presented at the 1999 TRB Annual Meeting, January, 1999.
3. Axhausen, K., and T. Gärling. Activity-Based Approach to Travel Analysis: Conceptual Frameworks, Models, and Research Problems. *Transport Review*, Vol. 12, No. 4, 1992, pp. 323-341.
4. Doherty, S. T., and E. Miller. A Computerized Household Activity Scheduling Survey. *Transportation*, Vol. 27, 2000, pp. 75-97.

Lee and McNally

5. Lawton, T. K. Activity and Time Use Data for Activity-Based Forecasting. Paper Presented at the Activity-Based Travel Forecasting Conference, New Orleans, June 2-5, 1996.

Category	Activities	Category	Activities
Eat/Sleep/Shower	Night sleep	Recreation/ Entertainment	Jogging, biking, roller-skating
	Shower/dress/pack		Fitness center
Dinning out at restaurants	Golf		
Snack	Spectator sports		
Breakfast	Bars		
Lunch	Movies in theaters		
Dinner (at home)	Watching videos		
Work/School	Work		Regular TV programs
	School (only if you are a student)		Browsing Web sites
Household Obligation	Meal preparation		Relaxation/Rest
	Cleaning/Maintenance (at home)	Hobbies at home (crafts, gardening, and others)	
	Pick-up/drop-off kids	Pleasure driving	
	Pick-up/drop off others	Social	
Attending to children (at home)	Visiting		
Services & Errands	Medical care		Hosting visitors
	Personal services (Hair, nails,...)	Phone/email (over 10 minutes)	
	Professional services (dry clean, auto repair...)	Church and other religious events	
	Banking/ATM	Volunteer work	
	Post office/Shipping	Only for Children	
	Library		Sleep (for children)
Gas station	With parents (or others in my household)		
Shopping	Video rental store		Shower/dress/pack (for children)
	Major Grocery (10+ items)		Snack (for children)
	Minor Grocery (<10 items)		Dinner (for children)
	Housewares/clothing/personal items	Lunch (for children)	
	Drug Store	Breakfast (for children)	
	Mostly browsing	Attend practice/lessons (for children)	
	Convenience store	School related activities (for children)	
	School (for children)		
	Play (or study) with other children		
	Play (or study) on his/her own		
	With baby sitters		
	Day care center (preschool, kindergarten)		

TABLE 1 Pre-defined Activity List

Activity Manipulation	Question ID	Questions Triggered
An intended activity was canceled during the day.	1	Why did you cancel this activity?
An activity was executed at a time different from the intended.	2	Why is the time different from what you entered before?
An intended activity is postponed.	3	Why is the day different from what you entered before?
An activity was executed at a location different from the intended.	4	Why is the location different from what you entered before?
A specific activity is added to the Weekly calendar.	5	Why do you want to do this activity on this day?
An activity not known before the day was executed during the day.	6	You did not enter this activity before. Why did you do this activity at the time?
The start or end time of an executed activity was originally left as "I don't know".	7	You did not enter the time for the activity before. How did you decide to do it at this time?
The location of an executed activity was originally left as "I don't know".	8	You did not enter the location for the activity before. How did you decide to do this activity at this location?
An "Any Day" activity was executed or it has been scheduled on a certain day in the week.	9	You did not know on which day this activity would be done. How did you decide to do it on this day?

TABLE 2 Decision Tracing Dialogs

Average Data Entry Time (min)										
	Initial Interview	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
Adult	0:21	0:19	0:25	0:21	0:19	0:17	0:16	0:18	0:17	2:44
Children	0:06	0:04	0:07	0:07	0:06	0:04	0:05	0:03	0:09	0:55
Skipped Day (persons)										
Adults		0	4	9	7	7	18	10	4	59
Children		0	3	2	3	4	5	6	2	25

TABLE 3 Average Data Entry Time and Skipped Day

Questions	Number of Yes	Number of No	Missing*
Part I Initial Interview			
1. Did the survey questions provide clear instructions on what and how to enter your responses?	33 (71%)	0	14 (29%)
2. Did you ever click on the [Help] button?	10 (22%)	23 (49%)	14 (29%)
If yes, did you find answers to your questions?	8 (80%)	2 (20%)	0
3. When you were asked to enter your frequently visited locations, were you able to select most of the locations you often visit from the list provided?	30 (64%)	3 (7%)	14 (29%)
4. When you were asked to select your typical activities, were you able to select most of the activities you often do from the list provided?	31 (67%)	2 (4%)	14 (29%)
Part II. Weekly Calendar			
5. On the first Sunday: (a) Were you aware that you should not intentionally plan and enter more activities than you had already planned prior to beginning the program?	31 (67%)	2 (4%)	14 (29%)
(b) Do you think you follow this principle reasonably well?	31 (67%)	2 (4%)	14 (29%)
6. Were you aware that if there were any details about an activity that you did not know you should leave the field as a [I don't know] response?	31 (67%)	2 (4%)	14 (29%)
7. Were you aware that if there was an activity you know you would do in the survey week but the exact date had yet to be determined you should enter the activity in the [Any Day] column?	31 (67%)	2 (4%)	14 (29%)
Part III. Daily Calendar			
8. Were you aware that, if you ever walked, rode a bicycle, took a bus, or drove a car for over 5 minutes to get to your next activity, you should enter this travel time between activities to your Final Schedule ?	29 (62%)	4 (9%)	14 (29%)
9. When there were boxes popping up to ask you for reasons, were you aware that you can select "No specific reasons" or "I was not thinking about anything", if indeed that was the case?	32 (68%)	0	15 (32%)
10. Did you find the Daily Calendar easy to use when you saw it for the first time? If not, could you tell us what we can do to improve it?	29 (62%)	4 (9%)	14 (29%)
11. Do you have any comments on any aspect of the survey research process?			

TABLE 4 User Evaluation

Activity Scheduler
 Exit Add Modify Delete Help

	Thursday	Friday	Saturday	Sunday
03:00 PM	Work, McMaster [Zone 1]	Work, McMaster [Zone 1]		
03:15 PM				
03:30 PM			Shopping, Mall [Zone 45]	
03:45 PM		Soccer, Same as previous		
04:00 PM				
04:15 PM				Painting, At Home
04:30 PM				
04:45 PM				
05:00 PM	Banking, Bank [Zone 4]			
05:15 PM	Groceries, Store [Zone 2]			
05:30 PM				
05:45 PM	Meal Prep, At Home			
06:00 PM		Restaurant, Pizza [Zone 9]		
06:15 PM	Eating, At Home			
06:30 PM				
06:45 PM	Playing, At Home			
07:00 PM				
07:15 PM				
07:30 PM	Attend to Child, At Home		Visiting, Toronto	
07:45 PM				
08:00 PM	Watch Video, At Home			
08:15 PM				
08:30 PM				
08:45 PM				
09:00 PM				
09:15 PM				
09:30 PM				
09:45 PM				
10:00 PM	Night Sleep, At Home	Night Sleep, At Home		Night Sleep, At Home
10:15 PM				
10:30 PM				

Child 2
 Child 1
 Parent 1

FIGURE 1 Main Interface of CHASE

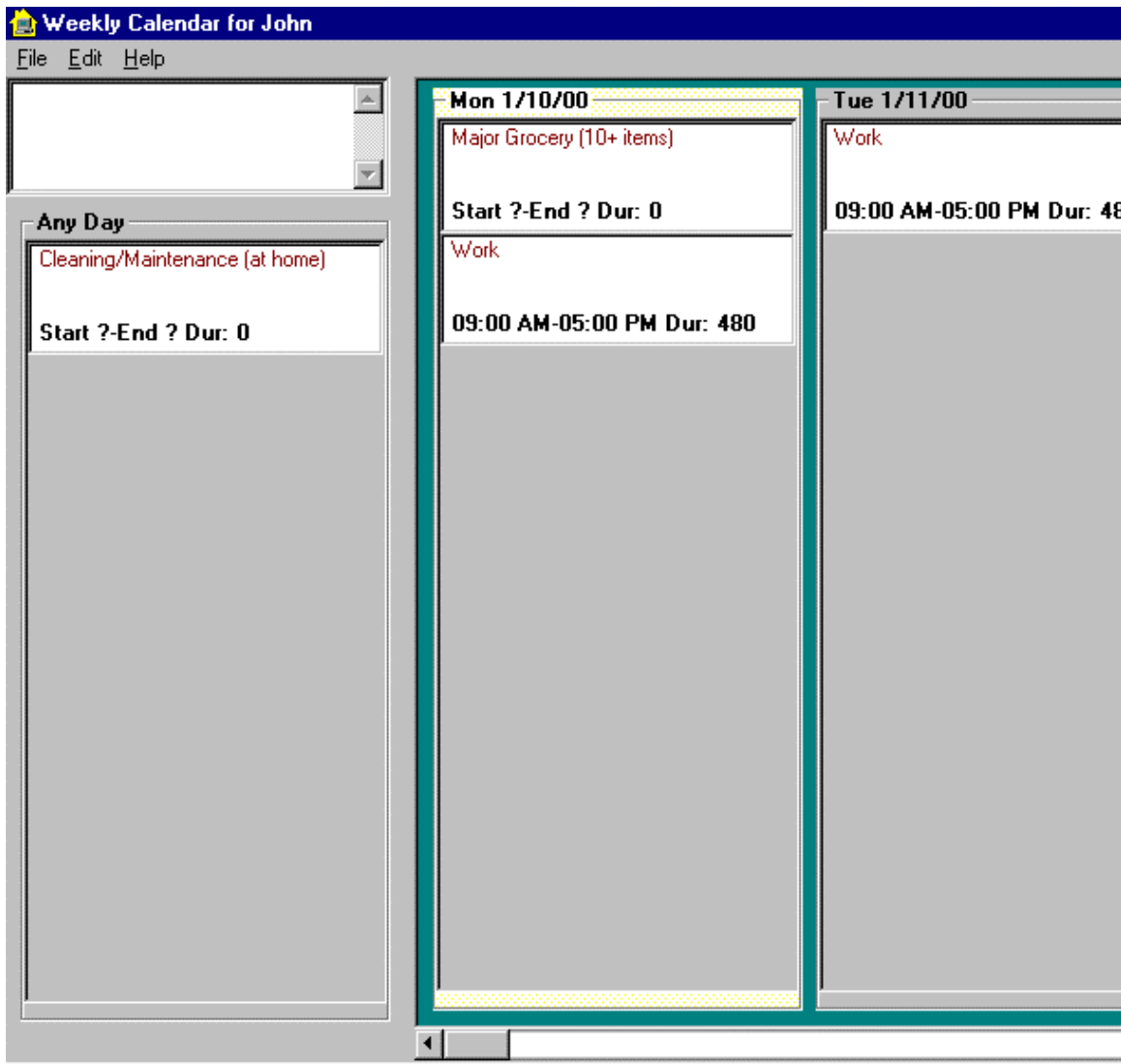


FIGURE 2 Weekly Calendar

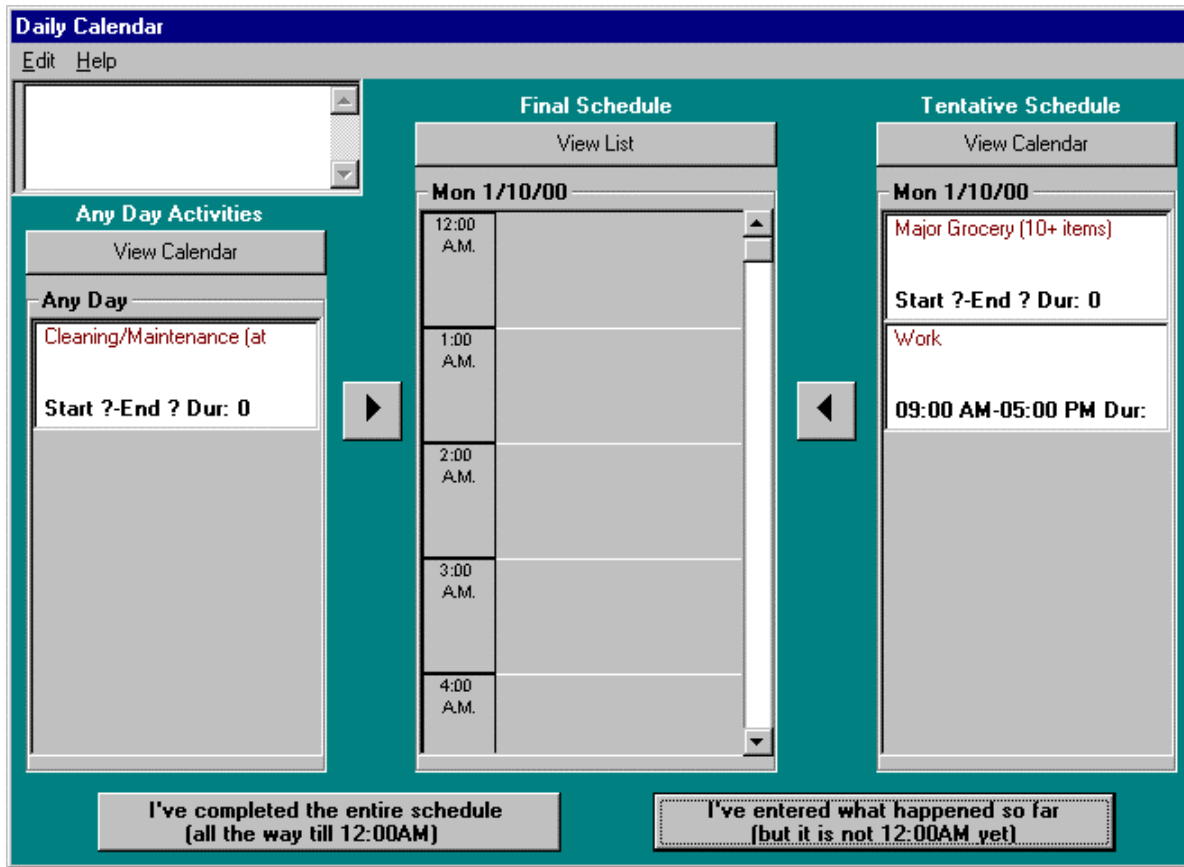


FIGURE 3 Daily Calendar

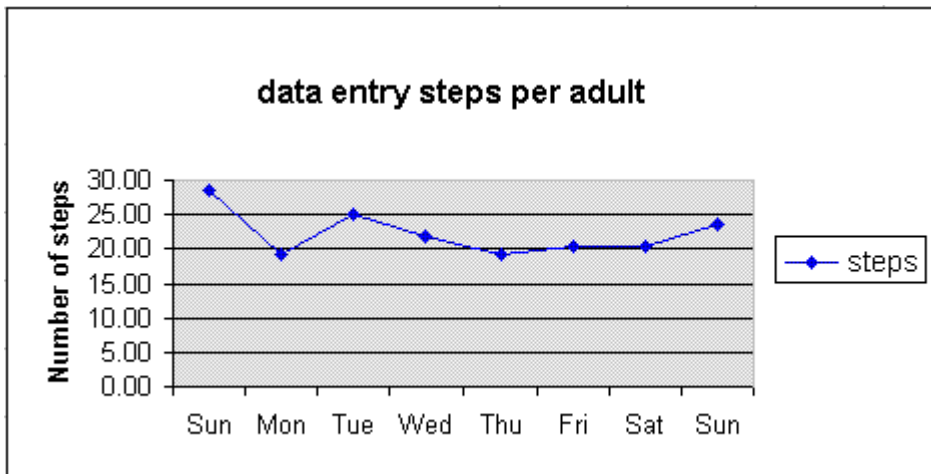


FIGURE 4 Data Entry Steps per Adults

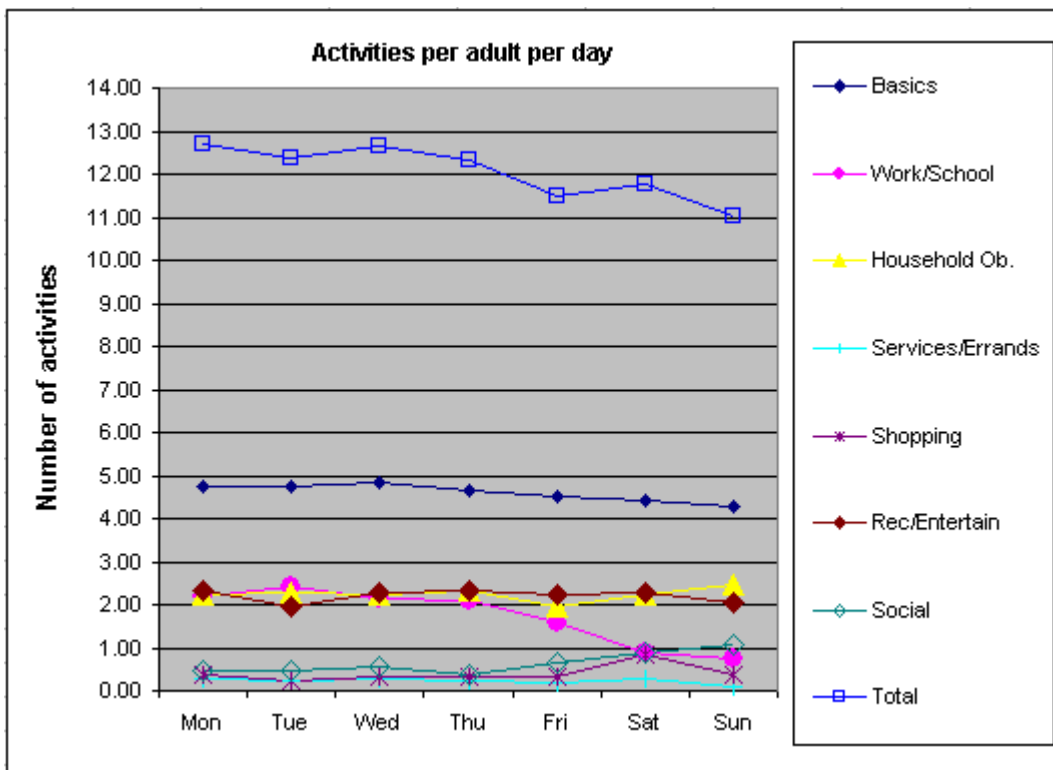


FIGURE 5 Activities per Adult per Day

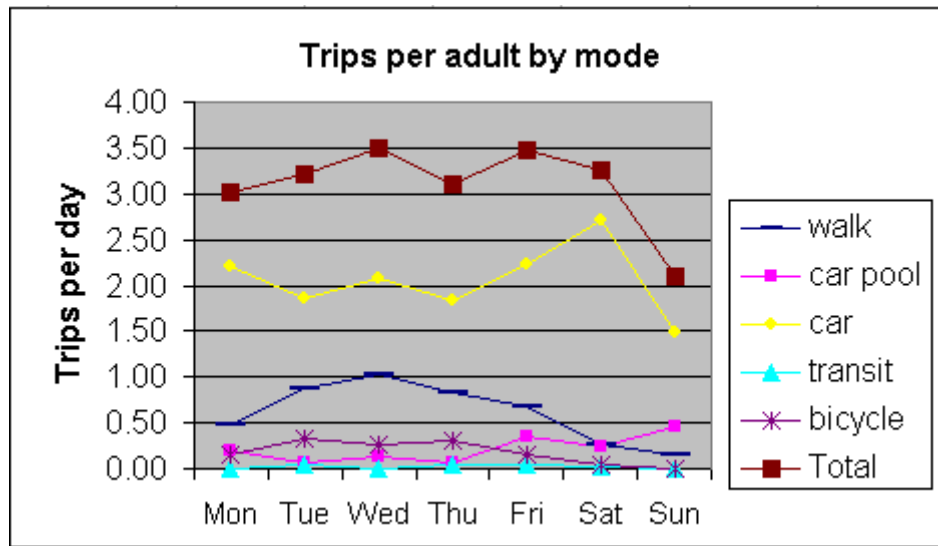


FIGURE 6 Trips per Adult by Mode