Survey Approach for Study of Urban Commuter Choice Dynamics

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A methodology to capture the day-to-day dynamics of user behavior in a commuting context is described. A two-staged survey was designed to obtain detailed information on the commuting habits in the north Dallas area for an extended period of time. In the first stage of the survey a one-page, two-sided questionnaire was sent to 13,000 households in the selected area. Information from the first stage provided a reliable characterization of the population of interest and prevailing commuting patterns. The second stage involved respondents of the first stage who were willing to provide more information on their commuting habits. This stage was considerably more detailed, consisting primarily of an activity diary limited to the commuting trips from home and returning to home. It included information on trip chaining, departure time, and path choice, at a level of detail previously unavailable. The information was obtained for a period ranging from 1 to 2 weeks. The two-staged format proved to be a cost-effective and practical method of obtaining the kind of information needed to study the dynamics of commuting behavior.

Several emerging policy concerns in transportation planning place significant new requirements on the understanding of travel behavior, on the ability to predict it, and consequently on the information available to characterize it and model its various aspects. In particular, efforts toward congestion mitigation, driven in part by concern over air quality attainment and energy efficiency considerations, have generated considerable activity in the area of travel demand management in its various forms. Strategies such as telecommuting, peak spreading actions through flexible hours, and increased vehicle occupancies require information on aspects of travel behavior that go far beyond that available through conventional travel surveys. Similarly, the opportunities for better system operation through information technologies require deeper understanding of the behavior of trip-makers. Central to the successful development and implementation of these strategies and to the attainment of related policy objectives is the consideration of the users' responses over time, which requires the characterization of current choices as well as an understanding of the underlying behavioral decision processes. Of particular concern to congestion-related strategies are work commuting trips, which continue to account for the notorious a.m. and p.m. peak periods in most major urban areas and as such are the primary target for the kind of strategies mentioned earlier.

There is only a limited observational basis on the dynamics of trip-makers' decisions, as these affect their responses to new policies. Commuter decisions are central to peak formation and evolution, and therefore to efforts aimed at reducing or spreading the peak. Virtually no information is available on the daily fluctuations of user decisions and of the resulting flows. Four principal travel choice dimensions are key determinants of those phenomena: trip chaining, trip timing, path choice, and modal choice (including carpooling), with modal choice probably taking place over a longer time frame than the first three. In addition, interactions among these dimensions need to be considered, preferably in context of the pattern of activities in which commuters are engaged.

It has become clear that traditional approaches to planning data acquisition, primarily in the form of cross-sectional home or phone interview surveys documenting a single day of travel, provide only limited information to address the kind of phenomena central to emerging policy concerns. Single-day cross-sectional travel surveys are inadequate as a basis for policy analysis and for studying the essential travel behavior processes. Longitudinal data are required for this purpose, at a level of detail normally unavailable in travel surveys, especially with regard to trip timing and path selection decisions. Pas (*1*) and Pas and Koppelman (*2*) have illustrated the importance of daily variation of travel choices and advocated the use of multiday surveys on both substantive and statistical grounds. Kitamura (*3*) has provided a thorough review of activity-based approaches to travel behavior analysis, indicating their importance to transportation policy analysis and highlighting the need for the kind of data for these studies.

Kitamura and Van der Horn (*4*) and Kitamura and Bovy (*5*) along with other coworkers have highlighted the kind of behavioral and policy issues that can be addressed with longitudinal data and proposed methods to deal with specific methodological issues that arise in connection with such data, with particular reference to the Dutch Panel study. A systematic discussion of the uses of different types of travel survey data for various functional needs in transportation decision making has recently been presented by Taylor et al. (*6*), though the special requirements associated with detailed study of short-term dynamics of commuter behavior are not addressed. Several earlier review papers on travel survey methodologies are available in the literature, such as those by Brog et al. (*7*) and Stopher (*8*).

The dynamics of commuter decisions in congested corridors have been the subject of laboratory-like experiments conducted by Mahmassani and coworkers (*9–11*). These interactive experiments had real commuters supply departure time and route choices in a simulated traffic system. Such experiments provide a useful observational basis for insights into the underlying behavioral processes, but they may not necessarily correspond to the commuters' actual settings. Such experiments must also typically introduce simplifications in

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order to retain sufficient experimental control and avoid overly complex response tasks. For example, trip chaining was not considered in these experiments, even though it is significant in the commuting context as noted by Hanson (*12*) and Oster (*13*). For this reason, observation of commuters in their actual daily commutes is the necessary next step beyond laboratory experiments, as discussed by Mahmassani and Herman (*11*).

The data required to study commuter decision processes in actual commuting are detailed, requiring specific information on times of departure and arrival and intermediate stops and detailed link-by-link descriptions of the paths followed. Such data are not usually available in conventional travel surveys. For this reason, a survey approach was developed to obtain information for the study of commuter behavior dynamics. It consists primarily of an activity diary limited to the commuting trips from home and returning to home. The survey provides a unique level of detail, especially with regard to path choice, for which all links used in each reported commute are listed. In addition, trip chaining information in the form of the location, duration, and purpose of stops made along the commute are reported. The times of all events (departure, stop arrival, stop departure, arrival) are also reported. This information was obtained from commuters for a period ranging from 1 to 2 weeks, with several waves conducted in the Dallas, Texas, area.

The objectives of this paper are to (a) describe the survey approach developed and document its implementation; (b) share the methodological and substantive insights from two such surveys, a small one in Austin, Texas, and a more extensive one in Dallas; and (c) illustrate the kind of information on commuter behavior that can be obtained in surveys of this type. Although the approach was intended primarily for the study of commuter behavior dynamics, it provides a useful foundation for a survey procedure with more general applicability.

SURVEY DESIGN AND IMPLEMENTATION

The survey addressed in this paper was conducted in conjunction with a study on user responses to traffic disruptions and control strategies (*14*). The main objectives were to obtain information on the factors that affect trip-related decision making and capture the day-to-day variability of departure time and route choice of commuters. In addition to the substantive insights, the data were intended to develop user decision making models for a comprehensive day-to-day dynamic framework for the analysis and evaluation of traffic control strategies (*14*).

A study of trip-related decision making and factors associated with it is difficult in a large network due to the many travel options available to the traveler. Since much work-oriented travel tends to take place in a corridor context, the study is focused on a commuting corridor, which is simpler and more convenient for survey and analysis purposes than a general network. Selection of the study area considered the following characteristics:

- The majority of the work trips should terminate in a zone within the study area, and
- The area should contain distinct major facilities that anchor the principal commuting routes (e.g., freeways or major arterials) that are parallel to each other and terminate in a zone within the study area.

In the study area in Dallas, located north of the central business district (CBD), west of the North Central Expressway (Highway 75), and east of the Dallas Tollway (Figure 1), most work-related trips terminated in the CBD. Several parallel facilities passed through or terminated in the CBD: Dallas Tollway, Preston Road, Hillcrest Road, Coit Road, Greenville Avenue, Skillman Road, Abrams Road, and the North Central Expressway.

In addition, major reconstruction was also scheduled along the North Central Expressway around the time of the survey. It was hoped that the survey would therefore also provide data on the adjustment behavior of commuters during a long-term disruption.

The type of information required for the study posed a unique challenge in the design of the survey methodology. The necessary information on traffic, socioeconomic, and workplace characteristics of the commuters could be obtained from routine one-time survey questionnaires, but such questionnaires cannot provide information on the dynamic aspects of commuter behavior. The latter would require data on trip and traffic characteristics over several days. The detailed nature of the data makes it difficult to obtain the information reliably through retrospective-questioning surveys. Taylor et al. (*6*) and Duncan et al. (*15*) have addressed the inadequacies of these techniques, which include the participants' inability to recall details of especially the short-distance trips. They advocated the use of diaries, which could capture 15 to 40 percent more trips than conventional recall procedures. These methods are time-consuming and costly. Participants must be dedicated in order to participate reliably in the study. A one-time bulk mailing of the required number of questionnaires to obtain the desired response rate would have been very inefficient and expensive. A two-stage survey format through the mail was designed for the purpose. The survey was designed along the same lines as one conducted in the Austin area in 1989 (*16*). The first stage consisted of a one-page questionnaire wherein socioeconomic and commuting characteristics of the participants were sought. It also served as a screening device for participants of the second stage. The screening was based on the respondents' willingness to provide information as well as their willingness to participate in the second stage. The second stage consisted of a trip diary sent to selected candidates from the first stage who were willing to provide more information. Both stages were conducted through the mail. The following sections describe the design and implementation of the two stages.

First Stage

The first-stage survey questions were designed to achieve the following objectives:

- Acquire data on items that are relatively constant over extended periods (e.g., commuter characteristics),

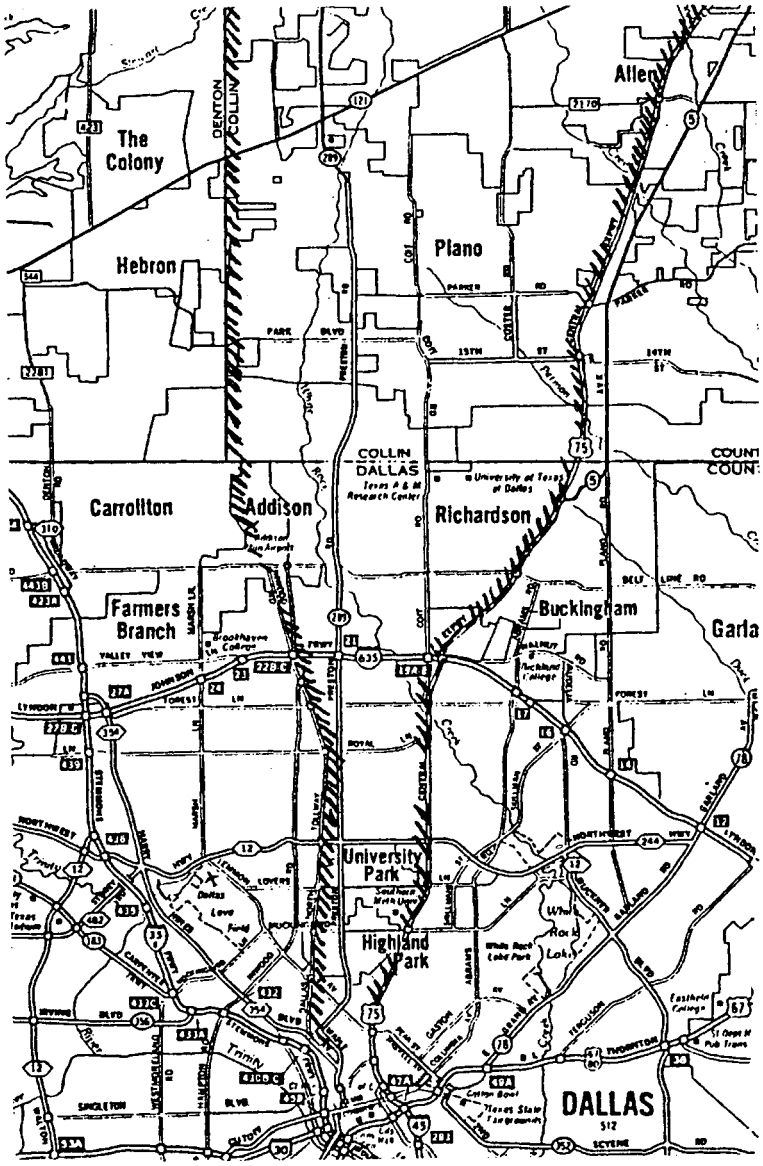


FIGURE 1 Survey area.

- Obtain information on commuter attitudes and other potentially important factors that contribute to the decision-making process, and
- Provide a mechanism to screen for prospective candidates for the second stage.

Questions in this survey can be split into three categories. The first category addressed the first survey objective and included questions on the workplace address, mode of travel to work, type of work, and usual commuting time. Responses to these questions were expected to remain constant during the survey period and used to characterize the commuter trip-making situation. This information was also used in screening and sampling candidates with the desired characteristics for the second stage.

The second category of questions addressed commuter attitudes and other decision factors, including the following:

- Decision state—whether the behavior of the commuter appears routinized, limited problem solving, or extensive problem solving with respect to trip-related decision making (e.g., the question asking the commuter if he or she normally adjusts the departure time or route specifically with traffic conditions in mind;
- Decision mediators—the factors that affect the decision (e.g., the commuter's attitude toward the various factors affecting route choice, such as number of signals or safety);
- Information acquisition process—whether the commuter actively or passively acquires information for trip-related decision making (e.g., whether the commuter owns a cellular phone or normally obtains information on traffic conditions before or during the trip); and
- Evoked set of alternatives—the possible alternatives that the commuter considers during trip-related decision making (e.g., the frequency of use of the various routes).

A question with significant implications on commuter behavior asked for the commuters' preferred arrival time (PAT) at work, which was found to be an important determinant of the dynamics of commuter behavior in previous experiments (*17*). This question was subject to different interpretations by the commuters. For example, a commuter may have had an initial PAT that was unattainable in the current situation because of congestion or parking problems. The commuter may have reconciled to another attainable PAT, which would have been reported in response to the question. Two versions of the question were designed. About half the households were asked to provide the PAT with no conditions set (Case 1), and the other half were asked to provide it under the assumption of no congestion and parking difficulties (Case 2). Analysis of the distributions of the PAT obtained from both versions indicated statistically significant differences between the two cases, with a higher fraction of commuters indicating a PAT of 0 in Unconstrained Case 1. However, in both cases, about 50 percent of respondents indicated a preference for arrival at the workplace within 10 min before the official work start time (*18*). A related question asked how important it was for the commuter to be on time for work. The response to this question would reflect the combined effects of the actual policy at the work place, the perception of the policy by the commuter, and the personal characteristics (attitude) of the commuter toward arriving late for work. Interestingly, more than a third of the respondents indicated unlimited lateness tolerance and more than half reported no lateness tolerance (*18*).

The third category of questions addressed the socioeconomic characteristics of the commuters that may be related to commuter behavior. These included job title, owning or renting a home, number of children, and the like. Although these questions were primarily used to generate sample demographics, it was also expected that some of these variables would bear on certain aspects of commuter behavior.

A final question asked if the participant was willing to provide more detailed information on his or her commuting status. Three responses were possible: yes, no, and possibly. The "possibly" option was included to retain potentially agreeable commuters who were not yet willing to commit without obtaining information. This option was included after the previous experience from the survey in Austin suggested that there was a considerable pool of candidates who were not willing to participate in the second stage simply because they were not sure of what was expected of them. A comparison of the fraction of positive responses from this survey with those from the Austin survey clearly established the advantages of including this option.

Implementation of First Stage

Several steps were taken to promote the professional appearance, comprehensibility, and user-friendliness of the questionnaire, which consisted of a two-sided, single letter-size sheet. The questions were all numbered and grouped into major sections in a logical pattern and laid out to maximize readability. A code number was used instead of the respondents' names to preserve the confidentiality of responses. Before the questionnaires were mailed a pilot survey was conducted at the University of Texas, Austin, to determine if changes needed to be made for clarity and proper interpretation of the questions. No significant problems were identified.

The survey area comprised nine ZIP code zones and encompassed the major part of the North Central Expressway and its alternative routes. A sample size of 13,000 households was selected from the area. The number of households randomly selected from each zone was proportional to the population within the zone. The 13,000 households were further split into two groups, each receiving one of the two versions of the questionnaire.

Each of the selected households was sent a packet in the mail consisting of a cover letter, two questionnaires (same version), and a self-addressed business return envelope. The cover letter described the seriousness of traffic congestion and discussed ongoing research to develop new and innovative solutions to curb the problem at the University of Texas. The purpose was to generate interest in the study and hopefully increase the response rate. The University of Texas letterhead and envelopes were used to convey a sense of sincerity and importance and to distinguish it from junk mail.

Second Stage

The second stage provided the central information desired of the survey, namely, information on individual daily decision making and the variation of departure and route choice decisions. Commuters were asked to provide information on their trip characteristics for several days. The implementation costs per participant and the effort on their part were considerably more than in the first stage. The screening process in the first stage was intended to identify a pool of interested and willing candidates.

Two types of diaries, a long and short version, were designed to record the day-to-day behavior of the participating commuters over a 2-week period. The duration of the trip diary (10 working days) was considered sufficient for examining short-term dynamic behavior but not so long as to harm the respondents' goodwill.

The second stage differed from the first stage in that the amount of interpretation and recollection was reduced while the level of detail was greatly increased. Data from this stage were expected to be more accurate than those from the first stage. On the long version of the diary, the commuter was asked to record, for each trip to work, the departure time, target arrival time, actual arrival time, official work start time, link-by-link details of route selected, and the time, duration, and type of intermediate stops made. The target arrival time was meant to indicate the commuters' predicted time of arrival at work. Information on the number, type, and nature of the stops during commutes should provide insights into the importance of trip chaining and extent of pretrip planning. Insights into the commuter prediction and decision-making process could be obtained from the target arrival time, extent of early/late arrivals, and the associated changes made to trip schedules subsequently. It was realized that different commuters might interpret the question on the target arrival time differently. For example, commuters may consider the target time as the time at which they were required to arrive at their

workplace rather than a consequence of some sort of travel time prediction process.

If reconstruction activity was observed during a particular trip, the commuter was asked to note down the street along which this occurred. Two questions were directed toward the acquisition of information on traffic conditions before and during the trip. From the responses to these, valuable information on the extent of pretrip planning, states of commuter decision making (e.g., routinized, extensive problem solving, etc.), and the potential for information-based strategies (e.g., ATIS/ATMS) can be extracted. Commuters were also asked to indicate if they had observed any accidents or traffic jams during their trip.

The level of detail required in route description was significantly different in the long and short versions of the diary. In the long version, a link-by-link description of the route including minor deviations was required, but only the name of the major facility used along the commuting route was requested in the short version. Similarly, commuters were asked for the details of every intermediate stop in the long version (the arrival and departure times and the purpose of the stop); only the number of stops was required in the short version.

Questions pertaining to the trip from work were similar to those for the trip to work. At the end of the survey, commuters were asked to respond to six final questions on the last page of the diary. The first three questions were related to parking and included the type of parking, cost of parking, and time to travel from the parking lot to the workplace. The last three questions were related to information acquisition and measured the propensity to acquire and use information if provided and the potential of various information sources. A detailed description of the questions is found elsewhere (*14*).

Implementation of Second Stage

The primary screening criterion for the second-stage survey was based on the response to the question, in the first-stage survey, on whether the respondents were willing to provide additional information on their commuting habits. In the first stage, 2,658 (10.22 percent) total responses were obtained. Of the 2,521 useful responses, 1,249 indicated "yes," 804 indicated "possibly," and 468 indicated "no" in response to the participation question. The advantage of including the "possibly" option is clearly indicated by the greater fraction of probable participants than in the Austin survey (about 80 percent in this survey, compared with about 55 percent in the Austin survey) (*16*). Only commuters responding with a "yes" or "possibly" in the first stage were considered for the second stage. From this set of respondents, those with unsuitable characteristics (e.g., retired, very short travel time, frequent out-of-state travel, work at home, no fixed work location, walk or bike to work) were deleted. The diaries were mailed during the first and second weeks of April 1990.

As explained earlier, the maximum duration for the participation of a given commuter was limited to 2 weeks. To obtain information on commuter patterns in the area over a longer period during the initiation of the freeway reconstruction activity, two overlapping subwaves involving different participants were administered. The first subwave extended from June 11 to June 22, 1990. The second subwave extended from June 18 to June 29, 1990. A second wave was conducted about a year later in an attempt to capture any long-term effects of the reconstruction activity on commuter patterns (this paper does not address the results of the second wave). Participants in the second wave included a combination of new participants and participants who had taken part in the previous wave. To enhance the response rate on the diaries, telephone calls were made to a considerable number of prospective participants at strategic times to retain their participation.

The sample for the first wave was divided into four groups on the basis of the type of work of the participants. About half the participants were sampled randomly from these groups for each subwave. Adjustments were made to the final sample to ensure that two eligible candidates from the same household were always grouped together to participate in the same subwave of the survey.

Four hundred candidates who responded with a "yes" to the participation question were sent the long version of the diary, on the hypothesis that commuters who respond "yes" rather than "possibly" are likely to be more committed to participating and would therefore be more likely to fill out the longer versions of the diary. The remaining section of the sample (which included a few remaining "yes" responses and all the "possibly" replies) were sent the shorter version. Again, two eligible members of the same household always received the same version of the diary regardless of their response to the participation question. If for example, one of the two participants of the household was selected to receive the longer version, the other would automatically be included in the list and sent a long version even if he or she responded with "possibly" to the participation question. Figure 2 and Table 1 show the sampling strategy and sample details for the second stage.

Each of the selected households received a package consisting of a cover letter; one or two diaries (same version), depending on the number of participants; and a reply envelope. The cover letter thanked the respondents for their participation in the first stage and described in brief what was expected during the second stage. A phone number was also provided for questions that participants may have before or during the survey period.

The diary booklets were 8.5 in. long and 3.5 in. wide. They were constructed so as to easily fit into the return envelopes (which was a size smaller than the mailing envelopes) provided without folding. The booklet was designed to be convenient for the commuter to handle while in the car. Each day had separate predated pages for the morning and evening commutes. Also included in the booklets were detailed instructions and a sample of a completed day's entries. The cover of the diary was made of thicker material to protect the contents from excessive wear and tear. Codes rather than return addresses were also used in this stage. Figures 3 and 4 illustrate sample pages from the short and long diaries, respectively. The decision to use stamped instead of business reply envelopes for this stage was based on considerations of the mailing costs per package and the expected response rates.

Of the 2,053 willing candidates, those with commuting characteristics that were unsuitable for the survey were eliminated. This resulted in 1,973 eligible participants. During the first

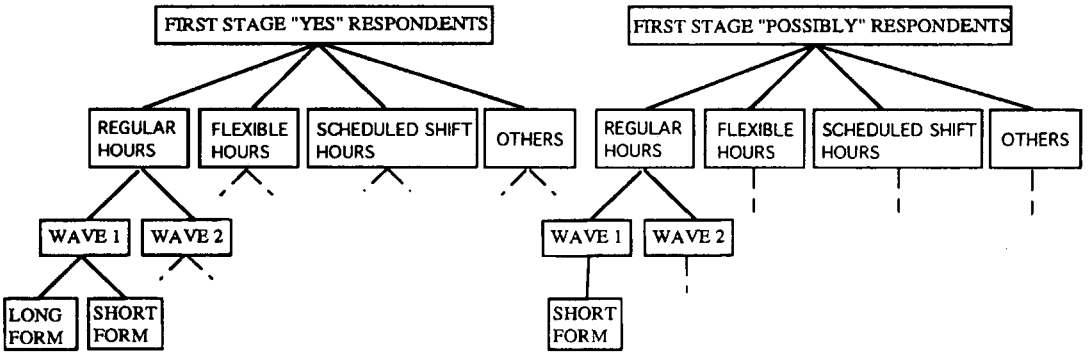


FIGURE 2 Sample page from diary (short version).

wave of the second stage, 783 long and 742 short versions of the diary were sent; 221 of the long and 231 of the short diaries were returned (Table 1). Not all of the returned diaries were useful for the study. Figure 5 displays the useful responses to Wave 1 on a daily basis. A mild trend toward a decreasing response rate is observed. The more significant trend is, however, the reduced response rates on all the Fridays of the survey duration. This is possibly because of the lower number of commutes made on Fridays or early weekends taken by certain participants.

SURVEY RESULTS

Several types of analysis were performed on the data obtained from the questionnaires and the diaries. First, an exploratory analysis of behavior with respect to the departure time and route choice and the stops was conducted. Frequency models (Poisson regression models) were also developed for departure and route switching and number of stops made. Finally, discrete choice models were developed to explain the day-to-day variations in the departure time and route choice. These models were of the multinomial probit type with a large number of alternatives and a general error structure. Comparisons were also made to the results from the earlier survey in Austin and those obtained from the laboratory-type experiments conducted at the University of Texas. A full report of all the analyses is found elsewhere (*18*). Table 2 presents a summary of characteristics from the first-stage survey. Some important observations made on the basis of the second-stage survey results are discussed in the following.

Only 75.1 percent of all morning and 64.1 percent of all evening commutes contain no stops at all, indicating that trip chaining is an essential feature of urban commuting. As expected, commuters stop more often during evening commutes, because of possibly less severe time constraints after work, as well as the availability of more stopping opportunities (more stores open, etc.). Although 32.2 percent of commuters did not make any stops on the way to work, only 18.6 percent never stopped on the way home. At the other extreme, only 6.8 percent of the commuters made stops on every morning trip and 5.8 percent of them made stops on every evening trip. The results indicate a wide spread of commuter trip-linking habits and daily variability in the commuting population.

Results of the departure time switching analysis indicate that commuters engage in a substantial amount of departure time switching for both morning and evening commutes. Departure time switching for evening commutes is more frequent than that for morning trips. One of the useful contributions

TABLE 1 Diaries Sent in Second Stage

		Short version		Long version	
Response to participation question	Type of work hour	subwave 1	subwave 2	subwave 1	subwave 2
Yes	Regular	65 (24)	59 (28)	262 (79)	294 (91)
Yes	Scheduled shift	5 (2)	2 (1)	11 (1)	4
Yes	Flexible	16 (3)	16 (4)	75 (20)	78 (19)
Yes	Other	3	3	9 (3)	7 (1)
Possibly	Regular	206 (59)	207 (76)	20 (3)	7 (2)
Possibly	Scheduled shift	13 (2)	8 (2)	1	1
Possibly	Flexible	58 (11)	63 (16)	5 (2)	2
Possibly	Other	9 (2)	4 (1)	2	2

Note: Number in parentheses is number of diaries returned.

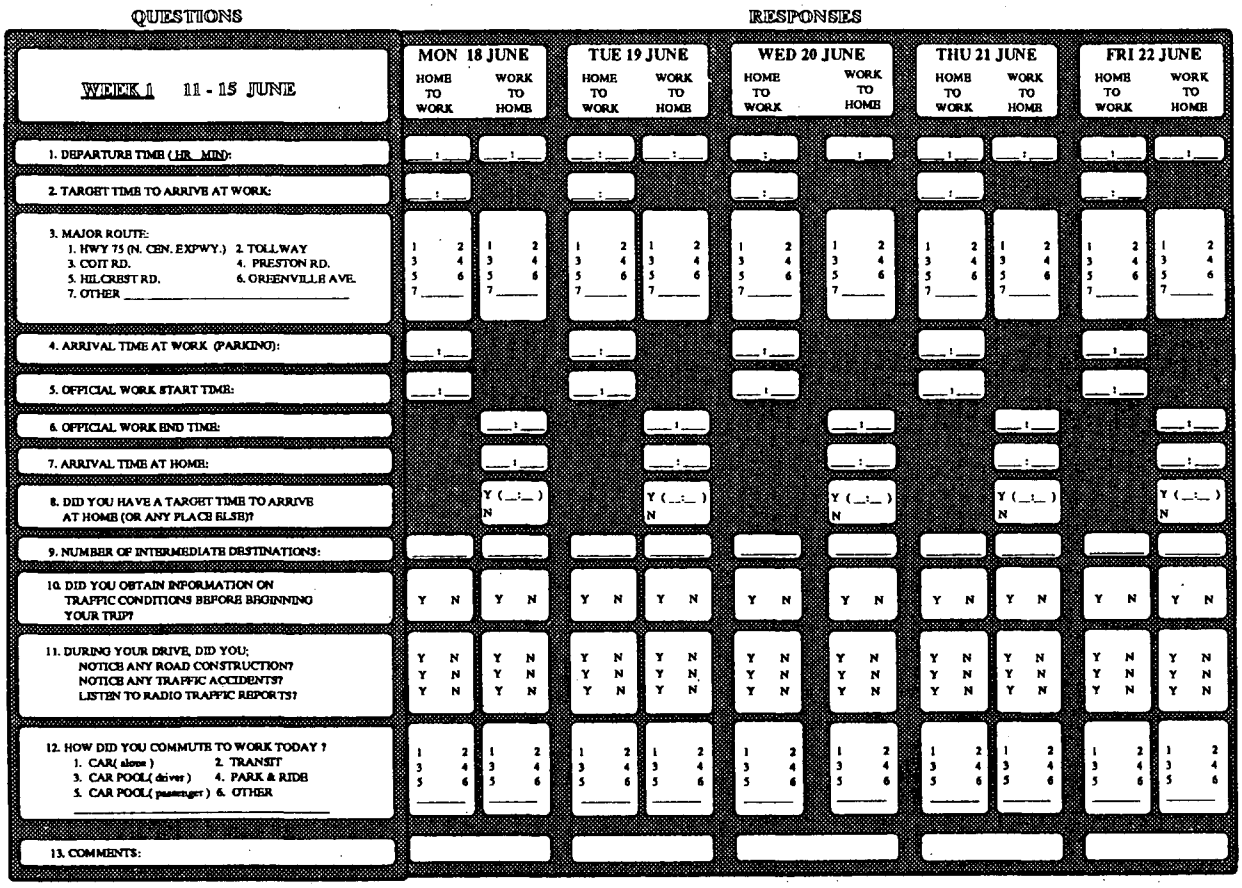


FIGURE 3 Sample page from diary (long version).

of this analysis is that it captures actual decisions of commuters in an uncontrolled environment, yielding a characterization of the natural variability of these decisions in a real system.

An analysis of the repetition and variability of the commuters' route choices during the 2-week survey period indicates that route switching is not as frequent as departure time switching for a.m. and p.m. commutes. Like departure time switching, route switching is more frequent during p.m. commutes than during a.m. commutes. The lower frequency of route switching relative to departure time switching is consistent with the results of stated preference experiments under simulated traffic conditions (*10*). These results suggest the potential of real-time information to influence the temporal distribution of trips to a greater extent than the spatial distribution of trips over the network routes.

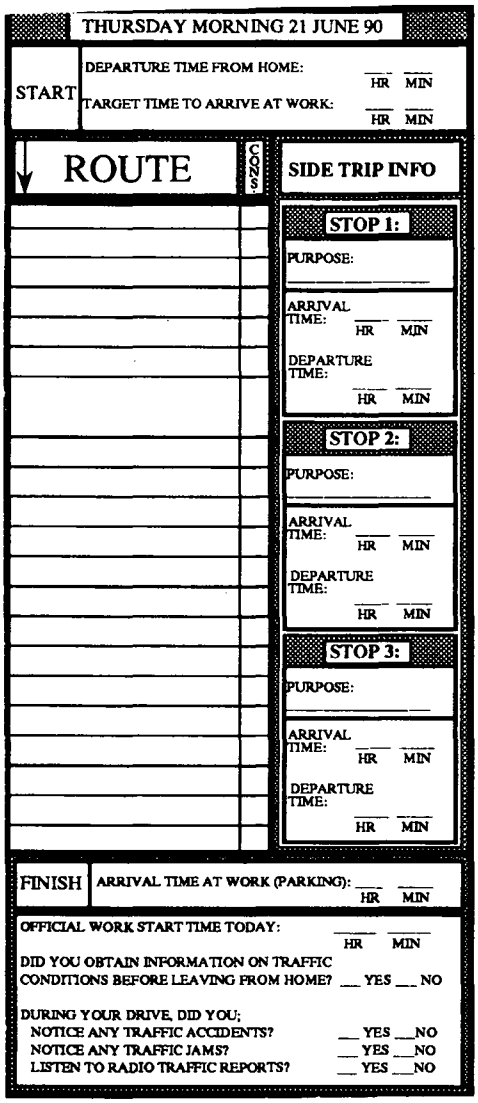
Very little switching relative to the mode route occurs if only no-stop routes are considered, as 56.9 percent of the users never switch routes under these circumstances in the morning and 60.8 percent never switch routes in the evening. Clearly, the need to link one or more activities along the commute influences path selection and accounts for much of the variation in the selected routes.

CONCLUDING COMMENTS

This paper has presented a survey approach intended to capture the dynamic aspects of traveler behavior, specifically in connection with the home-to-work and work-to-home commuting trips. The survey information has yielded information on the extent of trip chaining associated with the commute and its variability from day to day. It has also documented the extent of daily fluctuations in the departure times for the commuting trip chains. The results suggest that the picture obtained from conventional single-day surveys of household trip making is incomplete and of limited use in connection with travel demand management and congestion mitigation strategies. The journey to work, considered among the more stable elements of urban travel demand, is itself variable from day to day and the magnitude of this variability is not insignificant, especially in connection with the aforementioned types of strategies. Similarly, the symmetry usually assumed between a.m. and p.m. trips is limited, with the p.m. commute subject to more variability than its a.m. counterpart.

Another unique feature of the survey is the level of detail of the information obtained, especially with regard to the selected paths through the network. Such information has been previously unavailable yet is of utmost relevance to current studies of electronic route guidance systems.

It is remarkable that commuters have generally been able to provide the information requested at the desired level of detail. The authors' analyses have uncovered only a relatively small number of inconsistencies in the responses, and follow-up contacts with the participants have confirmed some of the answers obtained and the participants' general comfort with the survey instruments. Considerable effort was invested on our part to ensure clear and user-friendly instruments.



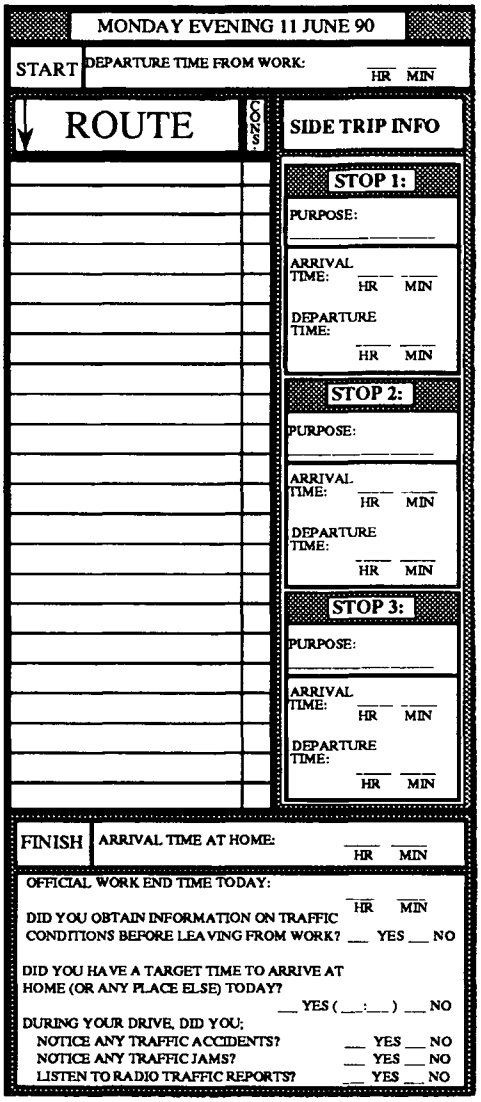
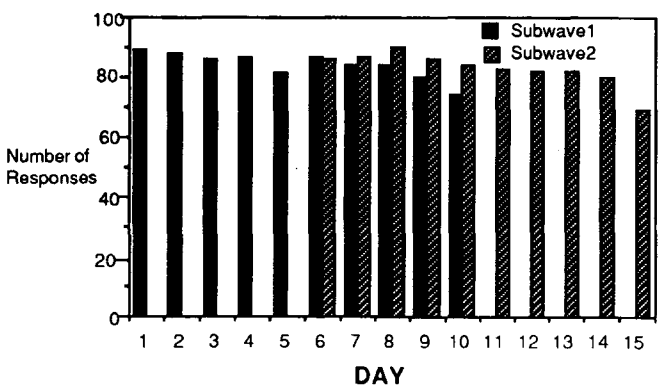


FIGURE 4 Sampling plan for second-stage survey.



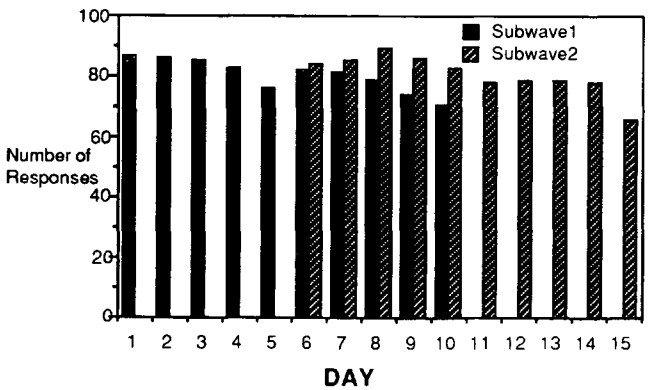


FIGURE 5 Daily responses for Wave 1 of Stage 2, a.m. (*left*) and p.m. (*right*).

TABLE 2 Summary Statistics for First-Stage Survey Results

Mode of Travel for Commuter (2518*)		
	Car(alone)	93.6%
	Car Pool	2.4%
	Transit	1.0%
	Park and Ride	1.3%
	Other	1.7%
Type of Work Hour (2518)		
	Regular Work Hours	70.5%
	Scheduled Shift Work	2.9%
	Flexible Work Hours	20.0%
	Other	6.6%
Preferred Arrival Time at Work Place		
	Case 1: No Conditions Specified (1178)	16 minutes
	Case 2: In the Absence of Congestion or Parking Problem (1192)	15 minutes
Tolerance to Late Arrival at Work Place (2492)		
	Unlimited	38.2%
	Given Time	7.3%
	None	54.5%
Average Daily Travel Time		
	From Home to Work(2485)	25 minutes
	From Work to Home(2346)	27 minutes
Commuter Adjusting Departure Time		
	From Home to Work(2489)	52.9%
	From Work to Home(2461)	31.4%
Commuter Modifying Route		
	From Home to Work(2487)	47.1%
	From Work to Home(2467)	46.1%
Arrival after Intended Time (2482)		
	More than Five Times	8.3%
	Between 1 and 5 Times	42.3%
	None	49.4%
Commuter Listening to Radio Traffic Report (2494)		70.6%
Commuter Having Cellular Car-Phone (2503)		10.5%
Age (2504)		
	Under 18	0.6%
	18-29	14.9%
	30-44	46.5%
	45-60	31.3%
	Over 60	6.7%
Gender (2505)		
	Male	63.3%
	Female	36.7%
Commuter Willing to Help Further (2514)		
	Yes	49.6%
	No	18.6%
	Possible	31.8%

* Total sample size is 2521. Value in parentheses is the number of responses for each question.

In retrospect, the short version of the second-stage survey was not as successful as anticipated. The response rate was not any higher for it than for the longer full diary. It would have been preferable to go only with the latter, which was done for the second survey wave.

Although the survey was intended for commuter trips, the insights gained suggest that the approach could be used to obtain a more complete record of trips and activities. The two-stage strategy was helpful in improving the cost-effectiveness of the second-stage survey by better targeting of households likely to yield usable responses. In addition, the first-stage survey yielded very useful information in its own right, in terms of providing a reliable characterization of the population of interest and prevailing commuting patterns. The nature of the questions in the first questionnaire and the elapsed time between the first and second stages provide interesting opportunities to contrast the diaries of actual behavior with previously reported responses. Such questions, along with the fundamental processes underlying the dynamics of traveler decisions, are the subject of ongoing and future work in connection with the rich observational basis obtained in this survey.

ACKNOWLEDGMENTS

The Dallas survey described in this paper is based on a survey initially conducted in Austin. Gregory S. Hatcher and Christopher G. Caplice were instrumental in the conduct and analysis of the Austin survey. Richard Rothery and Robert Herman contributed to the design of the survey instruments for the Austin survey as well. Chee-Chung Tong played a key role in both the Austin and Dallas surveys. Several individuals helped in the logistical aspects of the Dallas survey reported in this paper—in particular, Eileen Egan and Laura Brod played a major role in the coding of the diary information for computer analysis. The participation of Ray Derr, of the Texas Department of Transportation (TxDOT), in various stages of the survey is greatly appreciated. Funding for the work on which this paper is based was provided by TxDOT.

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The views and findings expressed and described in this paper are the authors' and do not necessarily reflect those of TxDOT.

Publication of this paper sponsored by Committee on Travel Behavior and Values.