

CHAPTER 6

ATTITUDES, BELIEFS, AND TRANSPORTATION BEHAVIOR

Several studies were done as part of the UTDFP that were based substantially on subjective data, reflecting travelers' beliefs, attitudes, and intentions. The research topics were: (1) the importance of various travel attributes as influences on choices among car, bus, and BART commuting, (2) attitudes reflecting basic preferences for auto and transit travel, and (3) people's beliefs about the costs of driving.

These studies are described in detail in Volume VI of the UTDFP final report series. This volume is summarized below.

Definitions

The first chapter of Volume VI presents definitions of beliefs, attitudes, and intentions for use in the remainder of the volume. (These terms, especially "attitude," have been used with much ambiguity by transportation researchers, which has hindered communication and led more than once to inappropriate substantive conclusions.) In addition to defining these terms, the chapter discusses the relationships of the concepts to each other, to objective measures of physical phenomena, to the concept of utility (a concept central to much of the research done on urban travel behavior), and to behavior.

Attribute Importance

The next chapter describes a study of ten different travel attributes and their relative importance as influences on choices among car, bus, and BART for traveling to work in the San Francisco Bay Area. The attributes were: (1) cost, (2) total travel time, (3) dependability, (4) relaxation, (5) safety from accidents, (6) use of time while traveling, (7) flexibility, (8) seat availability, (9) safety from crime, and (10) waiting time.

A sample of 258 commuters were interviewed. Each was asked to rate his satisfaction with car, bus, and BART on each of the ten attributes. Each commuter was also asked how he usually traveled to work. The relative importance of the attributes was inferred by examining the attribute ratings and the relationships, over the study sample, between the ratings and the usual choice of travel mode.

The first step in the data analysis was to examine the intercorrelations of the attribute ratings. The purpose was to identify any groups of highly intercorrelated variables for which the relationships to behavior might reflect the influence of common underlying determinants. Three groups of intercorrelated attribute ratings variables were identified: (1) total time, dependability, waiting time, and, to a lesser extent, flexibility, (2) relaxation, time use, and to a lesser extent, safety and seat availability, and (3) crime safety and waiting time. None of the groups of variables was sufficiently intercorrelated to suggest that the variables measured predominantly the same phenomena; however, the intercorrelations should be considered when evaluating the study results.

(It is common in research of this type to combine each group of intercorrelated variables into a composite variable for the purposes of subsequent analysis. However, the appropriateness of composite variables based on attribute ratings depends on assumptions that cannot be tested without additional data. When these assumptions fail, the creation of composite variables can lead to a serious loss of information and invalid conclusions. Consequently, composite variables were not formed in this study.)

One consideration in evaluating the importance of any attribute was the extent to which average attribute ratings differed for the three travel modes. To investigate this, average ratings of car, bus, and BART were calculated for each attribute.

On the average, the car was rated as much superior to bus and BART on total travel time, dependability, and flexibility. On the other attributes, car commuting was rated as slightly inferior to transit travel, especially so with respect to safety from accidents. The average ratings for bus and BART commuting were generally similar to each other, although BART commuting was rated as slightly better in terms of safety from crime, waiting time, and relaxation.

Seat availability, crime safety, and waiting time were not rated for car travel; assuming, however, as seems reasonable, that car would have been given the highest possible rating on these attributes, the differences in evaluations between car and the two transit modes were substantial.

To evaluate the extent to which the average differences in ratings reflected average differences in utility, and to estimate other components of attribute importance, it was necessary to analyze the relationships, over the study sample, between the attribute ratings and preferences among the rated modes. This was done with maximum likelihood logit analyses. In general, the analyses indicated that the ratings for all of the attributes were strongly related to travel mode choice; however, the relationships were somewhat weaker for the attributes of relaxation, time use, and accident safety.

Attribute importance was measured with a recently devised statistic that combined utility coefficients estimated from the logit analyses with values of the attribute ratings, over the sample. This statistic estimated the extent to which each attribute contributed to differences in utility among the choice alternatives.

In terms of overall importance, considering choices among all three modes, the attributes seemed to cluster into several groups having roughly equal importance statistics. Waiting time, dependability, total time, and crime safety appeared to be the most important attributes. Cost, seat availability, and flexibility appeared to be next in importance, followed by relaxation and accident safety. Time use appeared to be the least important attribute.

For choices between the different pairs of alternatives, the relative importance of the attributes appeared to be about the same as for choices among all three modes. The major differences were that waiting time and crime safety appeared relatively less important for choices between car and BART, flexibility appeared relatively less important for choices between bus and BART, and seat availability appeared relatively less important for choices between car and BART.

Several of the attributes judged to be most important--including crime safety, dependability, and seat availability--are not typically included in quantitative planning procedures, such as travel demand forecasting or cost-benefit analysis. The results of this study suggest that these attributes should be taken more into account in transportation policy decisions.

These conclusions must be qualified by uncertainties, discussed above, regarding the extent to which the observed relationships to behavior for intercorrelated attribute ratings actually reflected the influence of different underlying policy variables. Additional research, along lines suggested in the complete report, is required to clarify these relationships.

In addition to the substantive findings, this study had value as an illustration of research methodology. The definitions of attribute importance and corresponding measurement methods can be applied to research, based either on subjective or objective data, on a wide variety of choice behaviors.

Basic Preferences

The next chapter of Volume VI describes two studies of attitudes related to the basic characteristics of auto and transit travel, that is, characteristics that do not vary substantially for different trips. There are many such characteristics. For example, transit travel involves conforming to a route and schedule and sharing a common space with strangers; auto travel does not. Auto users typically own and drive the vehicle in which they travel; transit users do not.

Attitudes related to such characteristics can be considered to reflect basic preferences for auto and transit travel. The studies described in this report investigated that influence of various attitudes of this sort on people's choices between auto and transit travel for commuting to work. Very little research has previously been done on this subject.

In the first study the attitudes investigated fell into four categories: (1) enjoyment of the experience of driving, (2) tolerance of traffic stress, (3) enjoyment of automobile ownership, and (4) evaluation of bus travel in terms of comfort and freedom from distraction. In the second study more general attitudes were investigated that reflected feelings and tendencies regarding: (1) security from crime, (2) time pressure, (3) privacy, (4) punctuality, (5) ecology issues, and (6) personal energy and activity. Although the attitudes investigated in the second study seemed likely to influence evaluations of auto and transit travel, the attitude measures themselves were not primarily oriented to transportation.

Both studies used survey data from the San Francisco Bay Area. The first study examined choices between auto and bus commuting; it was based on a 1972 home interview survey of 213 people. The second study examined choices among auto, bus, and BART commuting; it used data from a 1975 mailback follow-up survey of 125 people who had previously been interviewed by telephone about related transportation topics.

The method of analysis used was essentially the same in both studies. A large number of individual attitude items were combined into a small number of composite attitude variables, reflecting the concepts enumerated above. Each composite variable was made up of highly intercorrelated items, as identified with a factor analysis procedure, that also had similar apparent meanings. A multiple logit analysis was done to determine the relationships, over the sample of people interviewed, between the values of the composite attitude variables and the choices between auto and transit commuting. Also included in the logit analysis were a number of non-attitudinal variables describing the people in the sample

and the travel modes available to them, in terms of travel times, costs, and other factors conventionally used to explain travel mode choice.

In the first study the most pertinent result was that the composite attitudinal variable reflecting tolerance of traffic stress had a statistically significant relationship to behavior, comparable in size (as measured with a standardized utility coefficient) to the more important non-attitudinal variables. This suggested that the basic attribute underlying this variable--presumably, the necessity to drive in stressful circumstances--was a relatively important influence on people's preferences between auto and transit commuting. This conclusion was consistent with a finding from the interviews that avoiding the strain of driving was the reason most frequently given for preferring bus to auto commuting, hypothetically, assuming that times and costs were equal.

In the second study the composite attitude measure reflecting energy and enjoyment of activity had a substantial and statistically significant relationship to travel mode choice. This result suggested that people who are active and energetic (or at least view themselves that way) are more likely to use transit, while people who tend to avoid effort are more likely to travel by car. This is consistent with the notion that the easiest way to travel in urban areas is to jump in the car and drive off.

For all of the attitude variables in the second study the relationships to travel mode choice were in the expected direction, conforming to the joint hypothesis that transit use is associated with not worrying about personal security not feeling pressed for time not minding crowds, tending to schedule activities, being concerned with ecology issues, and feeling active and energetic.

The two studies were concerned primarily with the extent to which variations in the measured attitudes seemed to influence choices between auto and transit travel. Also of interest, however, was the extent to which average attitudes determined mode choices. Unfortunately, the scaling of the attitude items did not allow a quantitative examination of the extent to which average attitudes contributed to utility differences among the auto and transit modes examined. In the first study, however, it was possible to reach some qualitative and judgmental conclusions.

Average responses tend to be somewhat critical of driving and auto ownership and favorable to bus use. This was inconsistent with the preponderant preference of the sample (about four to one) for auto over transit as a usual method of commuting, which suggested that the average attitudes were not an important influence on travel mode choice.

In conclusion, the relationships observed in these two studies suggest that measures of basic preference attitudes may have useful applications in quantitative planning methods, such as travel demand forecasting. (Even if it is not feasible to obtain attitude measures for many planning applications, they should be taken into account in the calibration of models used for the applications in order to accurately estimate coefficients for other variables. Accurate estimation of model coefficients requires that no important influence on behavior be omitted during the calibration.)

Because of the small sample size and exploratory nature of the attitude measurement the conclusions of these two studies should be considered tentative, especially conclusions that particular attitude dimensions are not related to travel behavior. Nevertheless, the positive results that were observed suggest that further research on this subject will prove interesting and useful.

Perceived Costs of Driving

The final chapter of Volume VI describes a study of people's beliefs about the costs of driving.

Driving is expensive. Nevertheless, on a day-to-day basis the costs of driving are relatively easy for people to ignore or misjudge. To learn how people perceive the costs of driving, 701 commuters in the San Francisco Bay Area were questioned in a telephone survey about what they believed it cost them to drive to work. (Transit commuters were asked about what they thought it would cost them if they drove.)

Only one-third of those interviewed had ever estimated the costs of driving to work and back. Of these, only 42 percent said they figured their estimates on a cost-per-mile basis--which the researchers considered the appropriate method--the rest used some "other" unspecified procedure.

The driving cost estimates that were made varied widely. Among those who estimated on a cost-per-mile basis, a typical individual's estimate was likely to differ by more than six cents a mile from the average estimate made by people driving a car of similar size (as indicated by a root mean square deviation statistic, with estimated costs over fifty cents a mile eliminated from the analysis).

Whether or not driving costs had been estimated, how costs were estimated, and the accuracy of the estimated costs were related to easily measured personal characteristics such as sex education income and availability of transit service. Notably, thirty-eight percent of the men interviewed had estimated the costs of driving to work, but only twenty-three percent of the women had done so.

One implication of the study was that quantitative methods of travel demand forecasting may possibly be improved by taking into account the personal characteristics related to estimation of driving costs. Another implication is that campaigns to promote awareness of driving costs may influence transportation behavior.