

The Supporting Statement

This is a new information collection request for the Exploratory Advanced Research (EAR) Program, entitled “**Using Behavioral Economics to Better Understand Managed Lane Use.**”

Introduction:

The Federal Highway Administration (FHWA) is supporting a research project under the Exploratory Advanced Research (EAR) Program, entitled “Using Behavioral Economics to Better Understand Managed Lane Use.” The purpose of this research is to improve predictive models currently used by transportation agencies to plan, monitor and manage demand for managed lane facilities. Managed lanes (MLs) are special lanes on freeways and arterials that restrict access for preferential travelers. Those travelers have more commonly included drivers who pay a toll, or fee, to gain access to travel in the lanes. The toll for MLs usually changes based on the expected demand for that facility, with higher tolls during times of peak roadway congestion. Past models have assumed all travelers choose between MLs and general purpose lanes (GPLs) each trip. GPLs are the lanes that are not managed lanes with no toll or access restriction. However, data from real-world MLs indicate that only a small percentage of travelers are consciously making this choice each trip. The research will investigate individual decision-making processes for selecting managed lane trips through the use of computer-based tests and observing real-world observations. The project will collect data from a randomly selected group of participants, who volunteer to participate in simulator tests and partake in field studies. New data and information collection will be required as part of this research.

Part A. Justification.

1. Circumstances that make collection of information necessary:

The Federal Highway Administration manages the Exploratory Advanced Research Program, and the program intends to spur innovation by focusing on higher risk research. This program supports scientific investigations and studies to advance the current knowledge and state-of-the-art in the sciences and technologies employed in the planning, design, construction, operation, maintenance and management of the nation's highways. Strategically, this research will enable and expedite the development of revolutionary approaches, methodologies, and breakthroughs required to drive innovation and greatly improve the efficiency of highway transportation.

A research project awarded under the EAR program will use experiments with behavioral economics (BE) to improve models used to predict travelers' use of priced managed lanes. The application of behavioral and economic sciences could provide agencies with fundamental information on strategic and tactical behavior for different segments of travelers that could support improved predictive analysis used in investment and operational decisions. Testing the behavioral nudge or insight will require access to a pool of participants.

The research will recruit participants who currently travel on freeways with MLs. Based on prior research, travelers either make a pre-determined decision or consciously choose between taking and not taking the ML trip. The laboratory-based tests will incorporate an initial survey of participants and the use of a driving simulator. The tests will also examine whether behavior can change given stimuli. Follow-up field trials will attempt to generalize the results from the BE simulator experiments for use in real-world settings. The field trials will investigate the impact of how the communication of travel information will influence travelers' lane choice. The results from the research will potentially form a new model for estimating travelers' lane choice behavior if findings show a deviation of practice from traditional estimates of ML use.

The study to use behavioral economics to understand managed lane use aligns with the goals and strategic objectives of the Draft 2018-2022 USDOT Strategic Plan. Specifically, the project will advance efforts to improve infrastructure capability and to streamline innovation. A USDOT objective aligned with the infrastructure goal is to improve the reliability of travel movement on the transportation system through targeted, data-driven investments in projects. This research will use collected data in an attempt to develop better prediction models for managing demand and mitigate the potential for congestion in a managed lane. This research also supports the USDOT goal to lead in the deployment of innovative technologies to improve transportation system performance.

2. How, by whom, and for what purpose is the information used:

The research will use behavioral economics (BE) — based experiments to improve models used to predict travelers' use of priced MLs. Improved prediction of ML use has the direct benefit of improving the ability to plan and construct MLs where they are most beneficial. Improved prediction of ML use also has the indirect effect of increasing our understanding of travel behavior in response to pricing. A better prediction methodology leads to better transportation planning models, particularly when a tolled route is part of the network. Priced ML use is predicted using travel demand models. The models rely heavily on travelers' value of time to determine if the traveler is willing to pay the toll for the use of the MLs. The value of time is estimated using stated preference (SP) surveys. Although these SP surveys have become increasingly sophisticated, it is difficult for any survey to capture a respondent's true use of a ML. The research will lead to (1) more accurate predictions of ML use, (2) a better understanding of travel behavior in response to pricing and traveler information, and (3) a new method of categorizing travelers for modeling their behavior. The study will share key findings through the use of project report deliverables, powerpoint presentations, and webinars.

The research addresses these problems through the use of a multi-phased investigation. First, the research team will recruit participants based on their current usage of priced MLs in Dallas, Texas and Washington, DC. The participants will be surveyed to understand their psychological traits and thoughts on ML usage. The proposed research will examine the psychological traits of test subjects with the goal of identifying survey questions. The research team will group individuals according to one of the three groups: (1) those who choose between MLs and GPLs; (2) those who always choose MLs; and (3) those who always choose GPLs.

Then, participants will partake in computer-based BE tests. The focus of these experiments will be to determine which of the 3 groups (above) the participants belong to and if they might switch between groups. Half of these participants will then be part of a driving simulator study. In the driving simulator we will examine if some travelers may be influenced/nudged to shift between groups. The examination will also test the message (primarily the travel time and toll on the lanes) and the message delivery mechanism to see the impact of communication on ML choice. The simulator experiment will reveal the traffic condition information-seeking behavior and lane choices of the participants under idealized conditions. The research team will examine potential indicators of indecision from the simulator that include speed, speed variability, lane position, lane position variability, and steering wheel input. Subjective feedback about traveler information and driving incentives from the computer-based test participants will also help inform the design of the later field study.

The final stage of the research will be to have the participants taking part in a field study. The field study will add more realistic conditions for the participants, by adding characteristics such as time pressure and cognitive and visual workload not present in the laboratory conditions. Tracking participants from the subject pool will occur as they make roadway decisions in the Washington, DC and Dallas, Texas metropolitan regions. The research team will inform some subjects of an incentive program that will provide compensation for some tolled ML trips per month. The intent of the providing the incentive is to measure if selected participants will take

more total ML trips. The research team will also work with representatives from Cintra (the private concessionaire that operates the managed lanes) and the developers of the Drive On TEXpress and DC ExpressLanes smartphone mobile application on testing in-application communication messages.

The research team will develop a potential model of ML use using the results from the field study. The new model expects to be similar to current logit models that estimate lane choice, with augmentation and changes to account for findings from the research. The research team would then work with Cintra and use their traffic data to examine how well a new model might predict current traffic on MLs compared to estimates from previous traffic and revenue studies.

3. Extent of automated information collection:

No paper will be used to collect data from the participants for the research. Many data will be collected electronically. Table 1 indicates the eight data collection activities in this project. Items 1, 7 and 8 will be done entirely over the web using a web based survey. Items 2, 3, 4, 5 and 6 will primarily be done electronically, but each will have a short paper intake with instructions and a consent form.

Table 1. Data Collection Activities.

Item Number	Group Name	N	Activity	Freq- uency	Duration	TOTAL (hr)	Payment
1	Potential Participants	24,000	Complete short enrollment/interest survey	Once	5 minutes	2000	\$0
2	Students	400	Demographics , Travel patterns, psychological tests	Once	2 hrs	800	For items 2 and 3 combined students receive \$37.50
3	Students	400	Computer based testing (BE)	Once	2 hrs	800	
4	Urban Drivers	240	Demographics , Travel patterns, psychological tests	Once	2 hrs	480	\$50
5	Urban Drivers	240	Computer based testing (BE)	Once	2 hrs	480	\$75
6	Subset of Urban Drivers in DC	40	Driving Simulator study	Once	2 hrs	80	\$75
7	Subset of Urban Drivers in DC and Dallas	120	Field Study intake and instructions	Once	45 min	90	For items 7 and 8 drivers receive \$250
8	Subset of Urban Drivers in DC and	120	Field Study post-drive survey	Once	30 min	60	

	Dallas						
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4. Efforts to identify duplication:

This research project, nor anything similar, has never been done before.

5. Efforts to minimize the burden on small businesses:

No small business will be involved in this research.

6. Impact of less frequent collection of information:

The research team collects information more than once from the same individuals. The repeated information collection requires an analysis of individual behavior over many months of observation. The research team intends to measure whether any changes occurred in travel behavior. If the information collection occurred less frequently, or only once, the scientific validity of any results would be compromised. For example, collecting information only once from participants would limit the number of data points and time for analysis.

7. Special circumstances:

The research project will collect data through the use of surveys, computer-based tests, and field studies. Study participants will provide data to the research team, either on-site for the computer-based tests or online for the surveys. Data collection needs to occur at frequent intervals to allow refinement of later survey questionnaires and simulator study methodologies. Refinement will consist of changing questions asked of respondents to address key research hypothesis. Examples of refinement may include changing the trip cost, and distance asked of respondents to match the values proffered by the research team to influence trip behavior – to either take or not take a ML trip. Additionally, the collection of responses will occur almost immediately, so the research team can make timely refinements to the project schedule. The research team will retain records and data for more than one year because the research project will extend for a longer period. The research team will need data collected from earlier tasks to refine the methodologies for later tasks.

The research team will not ask respondents to submit copies of responses as part of the data collection. The statistical surveys designed for the research cannot be generalized to the universe of the study because the respondent pool is random, and respondents will consist of individuals who choose to participate in the research. Participants will have a promise of confidentiality for their involvement. Additionally, the study will not require the inclusion of any propriety or trade secrets.

8. Compliance with 5 CFR 1320.8:

Publication of the Federal Register notice occurred on December 21, 2017, to request comments for a new information collection. The notice appeared on Pages 61659-61660 of the Federal Register. There where no comments.

9. Payments or gifts to respondents:

The respondents will receive payment for making research contributions. Different payment amounts will exist for different types of contribution, with higher payments offered for tasks that need a greater level of effort. The research team will individually offer survey respondents \$50.

Students who survey and partake in a computer-based simulation will have an offer of \$37.50. Non-student respondents who partake in a computer-based simulation will have an offer of \$75. Respondents who partake in a driving simulator test will have an offer of \$75. Participants who partake in the field study will have an offer of \$250. Overall, respondents will receive a total of \$78,000 as a payment for their research contribution. All of these payments were budgeted in the project. The amounts are similar to amounts paid in projects with similar levels of effort required of participants.

10. Assurance of confidentiality:

FHWA does not provide assurance of confidentiality. The assurance of confidentiality will occur through the use of an informed consent form reviewed and approved by Texas A&M University's Institutional Review Board. The board received accreditation from the Association for the Accreditation of Human Research Protection Programs, Inc. All members of the research team will be required to complete human research subject protection training offered through the Collaborative Institutional Training Initiative (CITI) as required by Texas A&M University. Each participant will be arbitrarily assigned a subject identification number. Any personally identifiable information provided by the participant will be stored only for contact purposes and will be destroyed at the conclusion of the study. The key linking this information to the subject identification number assigned to the data set will be stored separately and be accessible only to key personnel of the research team.

11. Justification for collection of sensitive information:

The collection of sensitive information will not occur.

12. Estimate of burden hours for information requested:

As noted in Table 1, approximately 24,000 potential participants will complete a short survey to gauge interest for later research activities, with each respondent needing 5 minutes each to complete the initial survey (see Appendix A for preliminary surveys for all 8 items notes in Table 1). Approximately 400 students will complete one survey collection and one in-person computer-based test, with each respondent needing 3 hours to complete both tasks. A 240-person respondent pool will complete one survey collection and one in-person computer-based test, with each respondent needing 2 hours to complete both tasks. An approximate subset of 40 participants from the 240-person respondent pool will participate in a second simulator test to help pre-test the methodology for the latter field trials. The 40-person subset will need 2 hours per person to complete the driving simulator study. An approximate subset of 120 participants from the 240-person respondent pool will participate in the field test, with each respondent needing 45 minutes for the test. The research team estimates that participants will need to contribute a total of 4,790 hours across all research tasks. Approximately 2,000 hours will go toward completing the initial 5-minute survey. Approximately 2,790 hours will go toward all the other activities.

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13. Estimate of total annual costs to respondents:

Respondents will have a burden associated with driving to the location of the computer-based test. Approximately 240 respondents will drive to a computer test center in either Washington, DC or Dallas, TX. The research team estimates that respondents will have to drive an average of 20 miles from their home location to the test center. The individual cost burden per computer test respondent is \$21.80, assuming a 40-mile round trip and a standard mileage rate of \$0.545 per mile (as established by the Internal Revenue Service on January 1, 2018). The estimated total cost burden for the computer-based test pool is \$5,232. The other respondent pools will not have an additional cost burden.

14. Estimate of cost to the Federal government:

The total cost of the research project is \$1,425,716. Labor accounts for approximately \$1.2 million of the costs encumbered on the projects. The table below (Table 2) provides an allocation of labor costs by classification and average annual salary.

Table 2. Project Costs by Labor Classification.

Labor Classification	Average Annual Salary	Total Project Cost
Professor	\$201,812	\$404,517
Research Scientist	\$111,807	\$220,539
Research Engineer	\$109,172	\$69,225
Research Specialist	\$168,151	\$31,884
Research Assistant	\$55,673	\$114,880
Project Manager	\$112,659	\$128,800

Software Developer	\$77,441	\$43,620
Editor	\$81,619	\$16,377
Office Associate	\$64,088	\$11,823
Graduate Student	\$40,934	\$160,106

15. Explanation of program changes or adjustments:

The proposed research plan does not have any program changes or adjustments. This is a new collection.

16. Publication of results of data collection:

Publication of the results and subsequent report will occur approximately six months after contract expiration. September 1, 2021, is the anticipated publication date.

17. Approval for not displaying the expiration date of OMB approval:

FHWA is not seeking approval to not display the expiration date.

18. Exceptions to certification statement:

FHWA is does not need an exception to the certification statement.