

# Center for Teaching Old Models New Tricks (TOMNET)

## A USDOT Tier 1 University Transportation Center

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### PROJECT PROPOSAL

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#### **Title: The Stability of Transport-Related Attitudes over Time: A Case Study During COVID-19**

**Principal Investigator:** Deborah Salon, Associate Professor, School of Geographical Sciences and Urban Planning, Arizona State University

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#### **1. Introduction/Problem Statement**

Attitudes and preferences are important for modeling travel behavior (Conway et al., 2020). While the importance of attitudinal variables in predicting transport choices is mostly well-established in the literature (de Abreu e Silva, 2014; Belgiawan et al., 2016; Kitamura et al., 1997), some dissent comes from those who dispute the long-term stability (and therefore utility) of at least certain attitudes (Jensen et al., 2013; Borriello & Rose, 2021). While some have found stability in transport-related attitudes (van de Coevering et al., 2021; Willis & Lee, 1980), others have reported instability over time frames ranging from one week to two years (Sunkanapalli et al., 2000; Adams et al., 2013; Thøgersen, 2006).

Given the extensive literature that employs attitudinal variables to help predict and explain behavior, as well as the interest in extending these methods to inform transportation planning and investments, it is critical to settle the question of whether attitudes as measured on surveys are stable over time. This is where the proposed research contributes.

#### **2. Project Objectives**

In this project, we propose to investigate the stability of attitudes as reported on two surveys asked of the same people a few months apart. We will test stability of attitudinal survey responses at the individual question level as well as of attitudinal factors that are derived from the survey data. We will look at patterns in attitudinal stability, both in terms of which types of attitudes are more and less stable over time, and also in terms of which types of people are more likely to have time-stable attitudes.

This deep dive into the stability of survey-based attitudinal data will help those who use attitudinal variables to help predict and understand behavior. Specifically, this research will provide improved information about whether attitudes reported on a single survey are likely to be reliable measures over time, which attitudes are more and less reliable, and for which types of people attitudes are more and less likely to be reliable.

### **3. Proposed Methodology and Data**

To investigate the stability of attitudes, we will use the first two waves of the COVID Future Panel Survey dataset (Chauhan et al., 2021; Salon et al., 2021), which were administered in June 2020 – October 2020 and November 2020 – May 2021. COVID-19's impact on travel, shopping and dining habits, remote working, and learning were major topics covered in the survey.

Important for this project, the COVID Future Panel Survey also included a battery of attitudinal statements covering respondents' perceptions and opinions related to these topics. These were Likert-scaled indicators of travel-related attitudes ranging from environmentalism to opinion on remote work, and exactly the same indicator statements were included on both the Wave 1 and the Wave 2 surveys. Individual responses were recorded three and a half to nine and a half months apart. About 50% of responses were recorded between four and seven and a half months apart, with an average gap between responses of five and a half months.

To achieve a large, representative sample, we contacted respondents through survey organizations (Data Axle and Qualtrics) using a quota-sampling method. The sample is fairly representative of U.S. adults, though older, more educated, more likely to be female, and slightly higher income than the population. All respondents were from the United States, with 45 of 50 states and Washington, D.C. represented.

The analysis approach will be a straightforward comparison of how more than 2,000 individual adults answered the same attitudinal questions when asked a few months apart. We will compare individual statement response consistency and report percent perfect matches, percent within 1 Likert scale point, the mean absolute difference in Likert score, and the intraclass correlation coefficient for each attitudinal statement.

Because travel behavior researchers often use factor-analyzed attitudinal statements instead of the raw Likert scale data, we will do a similar set of comparisons for attitudinal factors. To accomplish this, we will first conduct an exploratory factor analysis to generate attitudinal factors for the Wave 1 data. a factor scoring regression equation based on the Wave 1 dataset, and will then use this same regression equation to create directly comparable attitudinal factors from the Wave 2 dataset. For attitudinal factors, we will report the mean absolute different and the intraclass correlation coefficient for each attitudinal factor.

Finally, we will investigate how the stability of attitudes over time varies by attitude, by characteristics of the person reporting their attitudes, and with the time-stability of the person's other survey responses.

### **4. Work Plan (Project Tasks)**

Because the data has already been collected as part of a different project, the work plan for this research is straightforward, consisting of only 2 tasks.

Task 1: Analyze the COVID Future Panel Survey data as described in Section 3 of this Project Scope.

Task 2: Write up findings into TOMNET Project Report and peer-reviewed journal article, to be published as well as presented during at least one relevant conference.

## 5. Project Schedule

	2020						2021					
Task	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
1												
2												

## 6. Relevance to the Center Theme/Mission

This project is central to the TOMNET Center mission – advancing data and methods to reflect role of attitudes, perceptions, values, and preferences in activity-travel behavior and mobility choice models. If attitudinal variables are not stable over time, then using today’s attitudes to predict future behavior may be a misguided approach. This research aims to unpack the time-stability of attitudinal survey question responses and the variables that are derived from them.

## 7. Anticipated Outcomes and Deliverables

The anticipated deliverable for this project is a research paper and project report. We hope that our findings will inform the extent to which attitudinal data should be trusted to be reliable over time, both in future research and in practice.

## 8. Research Team and Management Plan

The research team for this project is led by Deborah Salon, Associate Professor in the School of Geographical Sciences and Urban Planning (SGSUP) at Arizona State University. Key contributors will also include Peter Kedron, also Associate Professor at SGSUP, Matthew Wigginton Conway, PhD Candidate at SGSUP, and Laura Mirtich, undergraduate student at ASU.

Salon has extensive experience analyzing survey data to investigate travel behavior questions, and she often incorporates attitudinal variables into these analyses. Kedron’s research focus is broadly spatial data science and quality of research methods. Because this project is centered on a data and methodological question, Kedron’s expertise is highly valuable. Conway and Mirtich worked with Salon on a comprehensive literature review of the attitude/travel behavior literature, and are therefore also key and highly qualified team members.

The research team will meet regularly via Zoom to discuss project progress. Mirtich and Conway will take the lead on the data analysis using R. The full team will use Overleaf to collaboratively write a paper reporting on our findings.

## 9. Technology Transfer Plan

We will aim to publish our findings in a peer-reviewed journal, as well as to present them during at least one relevant conference.

## 10. Workforce Development and Outreach Plan

As described above, two key team members are current students at ASU. One is a PhD student and the other is an undergraduate in her senior year. Their participation in this project will help them both to hone their data analysis and writing skills. Conway's participation will also help him develop as a mentor, as he will be directly working with and overseeing Mirtich's work and progress.

## 11. References

- Adams, E., Goodman, A., Sahlqvist, S., Bull, F., & Ogilvie, D. (2013). Correlates of walking and cycling for transport and recreation: Factor structure, reliability and behavioural associations of the perceptions of the environment in the neighbourhood scale (PENS). *International Journal of Behavioral Nutrition and Physical Activity*, 10. <https://doi.org/10.1186/1479-5868-10-87>
- Belgiawan, P., Schmöcker, J., & Fujii, S. (2016). Understanding car ownership motivations among Indonesian students. *International Journal of Sustainable Transportation*, 10, 295–307. <https://doi.org/10.1080/15568318.2014.92184619>
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- Conway, M. W., Mirtich, L., Salon, D., Harness, N., Ross, A., & Hong, S. (2020). How important are attitudes in travel behavior models? [Presented at Bridging Transportation Researchers, presentation available at <https://bridgingtransport.org/blog/archive-of-jan-2020-meeting/>].
- de Abreu e Silva, J. (2014). Spatial self-selection in land-use travel behavior interactions: Accounting simultaneously for attitudes and socioeconomic characteristics. *Journal of Transport and Land Use*, 7, 63–84. <https://doi.org/10.5198/jtlu.v7i2.696>
- Jensen, A., Cherchi, E., & Mabit, S. (2013). On the stability of preferences and attitudes before and after experiencing an electric vehicle. *Transportation Research Part D: Transport and Environment*, 25, 24–32. <https://doi.org/10.1016/j.trd.2013.07.006>
- Kitamura, R., Mokhtarian, P., & Laidet, L. (1997). A micro-analysis of land use and travel in five neighborhoods in the San Francisco Bay Area. *Transportation*, 24, 125–158. <https://doi.org/10.1023/A:1017959825565>
- Salon, D., Conway, M. W., Capasso da Silva, D., Chauhan, R., Shamshiripour, A., Rahimi, E., Mirtich, L., Khoeni, S., Mohammadian, K., Derrible, S., & Pendyala, R. (2021). COVID Future Wave 1 Survey Data v1.0.0. ASU Library Research Data Repository. <https://doi.org/10.48349/ASU/QO7BTC>

- Sunkanapalli, S., Pendyala, R., & Kuppam, A. (2000). Dynamic Analysis of Traveler Attitudes and Perceptions Using Panel Data. *Transportation Research Record*, 1718, 52–60. <https://doi.org/10.3141/1718-07>
- Thøgersen, J. (2006). Understanding repetitive travel mode choices in a stable context: A panel study approach. *Transportation Research Part A: Policy and Practice*, 40(8), 621–638. <https://doi.org/10.1016/j.tra.2005.11.004>
- van de Coevering, P., Maat, K., & van Wee, B. (2021). Causes and effects between attitudes, the built environment and car kilometres: A longitudinal analysis. *Journal of Transport Geography*, 91, 102982. <https://doi.org/10.1016/j.jtrangeo.2021.102982>
- Willis, C., & Lee, J. W. (1980). Time Stability of Attitudes Toward Transit Use in the Orlando, Florida, Urbanized Area [Presented at the 59th Annual Meeting of the Transportation Research Board, available in *Transportation Research Record*, issue 761, pages 56-58.].

## **12. Qualifications of Investigators (added after budget page)**

### 13. Budget Including Non-Federal Matching Funds

**Institution:** Arizona State University

**Project Title:** The Stability of Transport-Related Attitudes over Time: A Case Study During COVID-19

**Principal Investigator:** Deborah Salon

**Budget Period:** 8/1/2020 - 07/31/2021

CATEGORY	Budgeted Amount from Federal Share	Budgeted Amount from Matching Funds	Explanatory Notes; Identify Source of Matching Funds
Faculty Salaries	\$ 5,553	\$ 8,655.61	Salon 5% AY + 0.5 summer month
Other Staff Salaries	\$ -	\$ -	
Student Salaries	\$ 15,000.00	\$ -	PhD student summer salary + undergraduate student hourly salary
Fringe Benefits	\$ 2,002.74	\$ 2,337.01	ERE for above
<b>Total Salaries &amp; Benefits</b>	<b>\$ 22,556</b>	<b>\$ 10,993</b>	
Student Tuition Remission	\$ 8,500.00	\$ -	PhD student 1 semester graduate tuition
Operating Services and Supplies	\$ -	\$ -	
Domestic Travel	\$ -	\$ -	
<b>Total Direct Costs</b>	<b>\$31,056</b>	<b>\$ 10,993</b>	
F&A (Indirect) Costs	\$12,405.66	\$6,045.94	
<b>TOTAL COSTS</b>	<b>\$43,461.40</b>	<b>\$17,038.56</b>	

**DEBORAH SALON, Ph.D.**

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**EDUCATION**

- University of California at Davis, Davis, CA, USA
  - Ph.D., Agricultural and Resource Economics, May 2006
- Carleton College, Northfield, MN
  - B.A., Physics, June 1994

**PROFESSIONAL EXPERIENCE**

- Arizona State University
  - Associate Professor, School of Geographical Sciences and Urban Planning, 2020-
  - Assistant Professor, School of Geographical Sciences and Urban Planning, 2014-2020
  - Graduate Faculty, School of Sustainability, 2016-present
  - Senior Sustainability Scientist, Global Institute of Sustainability, 2014- present
- University of California, Davis, Institute of Transportation Studies
  - Professional Researcher, 2008-2014
- The Earth Institute at Columbia University
  - Post-Doctoral Fellow, 2006-2008

**RELEVANT REFEREED PUBLICATIONS (Total: 28 Refereed Publications)**

1. Conway M, Salon D, Capasso da Silva D, and Mirtich L. (2020). How will the COVID-19 pandemic affect the future of urban life? Early evidence from highly-educated respondents in the United States. *Urban Science*, 4(4). DOI: 10.3390/urbansci4040050.
2. Salon D, Conway M, Wang K, and Roth N. (2019). Heterogeneity in the relationship between biking and the built environment. *Journal of Transportation and Land Use*, 12(1): 99-126. DOI:10.5198/jtlu.2015.556.
3. Salon, D. (2015). Heterogeneity in the relationship between the built environment and driving: Focus on neighborhood type and travel purpose. *Research in Transportation Economics*, 52, 34-45. DOI: 10.1016/j.retrec.2015.10.008.

**JOURNAL EDITORIAL ACTIVITIES**

- CO- EDITOR OF SPECIAL ISSUE, *RESEARCH IN TRANSPORTATION ECONOMICS* (ELSEVIER), 2015
- EDITORIAL BOARD, *JOURNAL OF TRANSPORTATION GEOGRAPHY* (ELSEVIER), 2016-present
- EDITORIAL BOARD, *TRANSPORTATION RESEARCH PART D* (ELSEVIER), 2017-present

**EDUCATION AND STUDENT ADVISING**

- Thesis/Dissertation Major Advisor/Chair: 1 PhD student in progress; 4 MS (Thesis) students completed
- Thesis/Dissertation Committee Member: 2 PhD students completed; 1 PhD student in progress; 6 MS (Thesis) students completed

## Grant Deliverables and Reporting Requirements for UTC Grants (November 2016)

### Exhibit F

UTC Project Information	
Project Title	The Stability of Transport-Related Attitudes over Time: A Case Study During COVID-19
University	Arizona State University
Principal Investigator	Deborah Salon
PI Contact Information	dsalon@asu.edu
Funding Source(s) and Amounts Provided (by each agency or organization)	TOMNET: \$43,461.40 ASU, SGSUP: \$17,038.56
Total Project Cost	\$60,499.96
Agency ID or Contract Number	
Start and End Dates	11/2020 – 7/2021
Brief Description of Research Project	<p>In this project, we will investigate the stability of attitudes as reported on two surveys asked of the same people a few months apart. We will test stability of attitudinal survey responses at the individual question level as well as of attitudinal factors that are derived from the survey data. We will look at patterns in attitudinal stability, both in terms of which types of attitudes are more and less stable over time, and also in terms of which types of people are more likely to have time-stable attitudes.</p> <p>This deep dive into the stability of survey-based attitudinal data will help those who use attitudinal variables to help predict and understand behavior. Specifically, this research will provide improved information about whether attitudes reported on a single survey are likely to be reliable measures over time, which attitudes are more and less reliable, and for which types of people attitudes are more and less likely to be reliable.</p>
Describe Implementation of Research Outcomes (or why not implemented)	TBD
Place Any Photos Here	
Impacts/Benefits of Implementation (actual, not anticipated)	TBD



Web Links <ul style="list-style-type: none"><li>• Reports</li><li>• Project Website</li></ul>	TBD
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