A Before-After Intervention Experiment and Survey

Konstadinos G. Goulias   University of California Santa Barbara
Elizabeth C. McBride   emcbride@ucsb.edu

Project Objective

Improve data collection for before-after studies and identify theoretical/conceptual research gaps that can be filled by experiments of data collection and data analysis. Develop the foundation for a smartphone application and guidelines for future studies.

Problem Statement

In this project we develop of comprehensive conceptual framework model structure enumerating the determinants of behavioral change and create an experimental data collection to test some of its components. We also develop the first stages of a smartphone app for data collection.

Research Methodology

The research methods include online survey design, data analysis using latent profile and class analyses, and code development for smartphone applications.

Results

The behavioral determinants in this conceptual formulation are extracted from research in social psychology and applications in travel behavior. These include behavioral intentions (underlined by attitudes, social factors, and affect), habit, and context/facilitating conditions. This model was then used to design a survey customized to the newly opening Crenshaw/LAX metro line that did not proceed as originally planned due to the upheaval and major disruption of COVID-19. This same conceptual model was then used for a COVID-19 customized survey to collect data about the impact of the pandemic and to test strategically selected correlations between attitudes and mode choice using behavioral clusters.

The COVID-19 survey asks respondents about their work, school, and travel behavior before and during the COVID-19 restrictions. There are also a few questions about people's predictions for how their work behavior might change once restrictions are lifted. For employment, they are asked about employment status, number of workdays, how often they work from home, and how often they participate in online meetings. In travel behavior, respondents are asked what travel modes they use to commute, then they are asked to estimate the distance and time from their homes to work/school by each mode. Everyone, regardless of work/school status, is asked what means of transportation they use for all their trips. They are then asked how many trips they estimate making in a typical week by each of those modes. Respondents were asked to provide the city they live in, ZIP code, household income, gender, and age. A unique aspect of this survey is the questions about whether people moved because of COVID-19. Many people changed home locations during this pandemic, either temporarily or permanently. Some moved in with friends or family to get their social needs met, others were obligated to move to take care of family members, or to separate households when some members might be exposed to COVID-19. In data analysis of this survey in terms of the attitude-behavior relationship, we confirmed the existence of more diversity in attitudinal groups of people with respect to their position towards the private

automobile and found that these attitudes are strongly correlated with the use of different modes. The survey design and conceptual model form the foundation for subsequent data collection and analysis based on the pilot examples of this project.

During this study a pilot experiment was also completed on the design of a smartphone application. Based on this experience we developed guidelines for survey design, survey contents, tradeoffs among different options, and coding options and testing. This pilot is part of an ongoing research effort at UCSB that continues beyond the project reported here to complement the survey described above and support data collection based on the conceptual behavioral model.

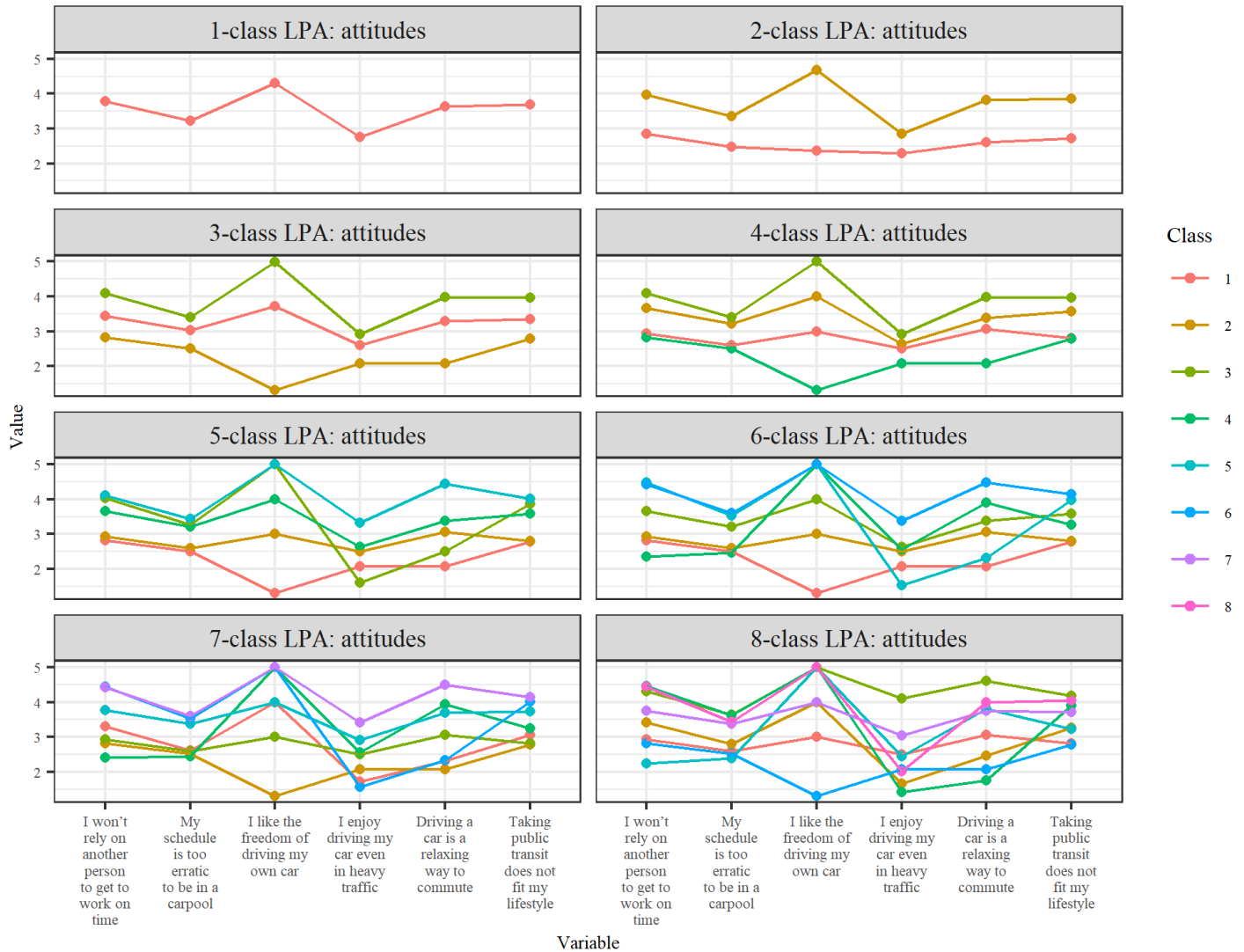**Figure 1. Item Probability Plots for Attitude LPA (latent profile analysis)**

Figure 1 shows the 5-class model. On the y-axis, 1 is "strongly disagree", 3 is "neither agree nor disagree", and 5 is "strongly agree". The Cars Haters group members, making up 6.4% of the sample, do not think of cars as providing freedom, and they do not like using cars to get around. Unlike any other class, this one has a strong negative response to the prompt "I like the freedom of driving my car." They also have negative responses to whether they enjoy driving their car in traffic and whether driving a car is a relaxing way to commute.