

Modeling the Impact of Time Pressure on Activity-Travel Rescheduling Heuristics

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Abstract : Time pressure could have an influence on the productivity, quality of decision making, and the efficiency of problem-solving. This has been mostly stemmed from cognitive research or psychological literature. However, a salient scarce discussion has been held for transport adjacent fields. It is conceivable that in many activity-travel contexts, time pressure is a potentially important factor since an excessive amount of decision time may incur the risk of late arrival to the next activity. The activity-travel rescheduling behavior is commonly explained by costs and benefits of factors such as activity engagements, personal intentions, social requirements, etc. This paper hypothesizes that an additional factor of perceived time pressure could affect travelers' rescheduling behavior, thus leading to an impact on travel demand management. Time pressure may arise from different ways and is assumed here to be essentially incurred due to travelers planning their schedules without an expectation of unforeseen elements, e.g., transport disruption. In addition to a linear-additive utility-maximization model, the less computationally compensatory heuristic models are considered as an alternative to simulate travelers' responses. The paper will contribute to travel behavior modeling research by investigating the following questions: how to measure the time pressure properly in an activity-travel day plan context? How do travelers reschedule their plans to cope with the time pressure? How would the importance of the activity affect travelers' rescheduling behavior? What will the behavioral model be identified to describe the process of making activity-travel rescheduling decisions? How do these identified coping strategies affect the transport network? In this paper, a Mixed Heuristic Model (MHM) is employed to identify the presence of different choice heuristics through a latent class approach. The data about travelers' activity-travel rescheduling behavior is collected via a web-based interactive survey where a fictitious scenario is created comprising multiple uncertain events on the activity or travel. The experiments are conducted in order to gain a real picture of activity-travel reschedule, considering the factor of time pressure. The identified behavioral models are then integrated into a multi-agent transport simulation model to investigate the effect of the rescheduling strategy on the transport network. The results show that an increased proportion of travelers use simpler, non-compensatory choice strategies instead of compensatory methods to cope with time pressure. Specifically, satisfying - one of the heuristic decision-making strategies - is adopted commonly since travelers tend to abandon the less important activities and keep the important ones. Furthermore, the importance of the activity is found to increase the weight of negative information when making trip-related decisions, especially route choices. When incorporating the identified non-compensatory decision-making heuristic models into the agent-based transport model, the simulation results imply that neglecting the effect of perceived time pressure may result in an inaccurate forecast of choice probability and overestimate the affectability to the policy changes.

Keywords : activity-travel rescheduling, decision making under uncertainty, mixed heuristic model, perceived time pressure, travel demand management

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