Comparing the Daily Schedules in the NHTS from 2009 and 2017

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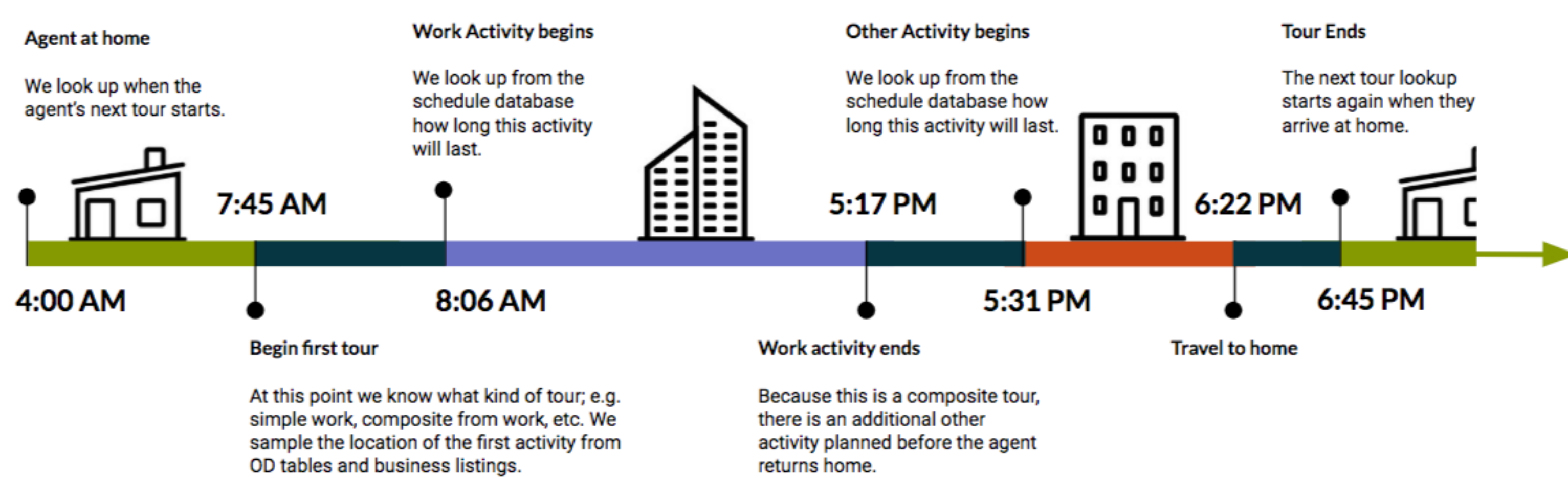
TRANSPORT
FOUNDRY

Intro

Traditional travel demand models are based on behavioral models estimated from small-sample surveys. So-called **data-driven models** instead rely on large passive data products and simulation methods to develop synthetic patterns of travel behavior for a metropolitan region. The NHTS makes a valuable data source in these models as it covers all modes for cities of all sizes.

It is important to understand how the changes between 2009 and 2017 to the NHTS sampling frame, survey methodology, and overall travel trends may affect data-driven models relying on the NHTS.

Data-Driven Methodology

In our data-driven model, synthetic agents look up characteristic tour patterns – when to leave on a tour, how many activities are on the tour, etc. – from probability tables derived from the NHTS. The destinations for the activities on these tours are derived from passive origin-destination tables. This provides an *initial plan* for each agent.


We then take this initial plan and route it on a transportation network using the MATSim open-source transportation simulation engine. Agents who experience congestion or downtime in their schedules will re-plan their days; the system iterates until each agent has their optimal plan.
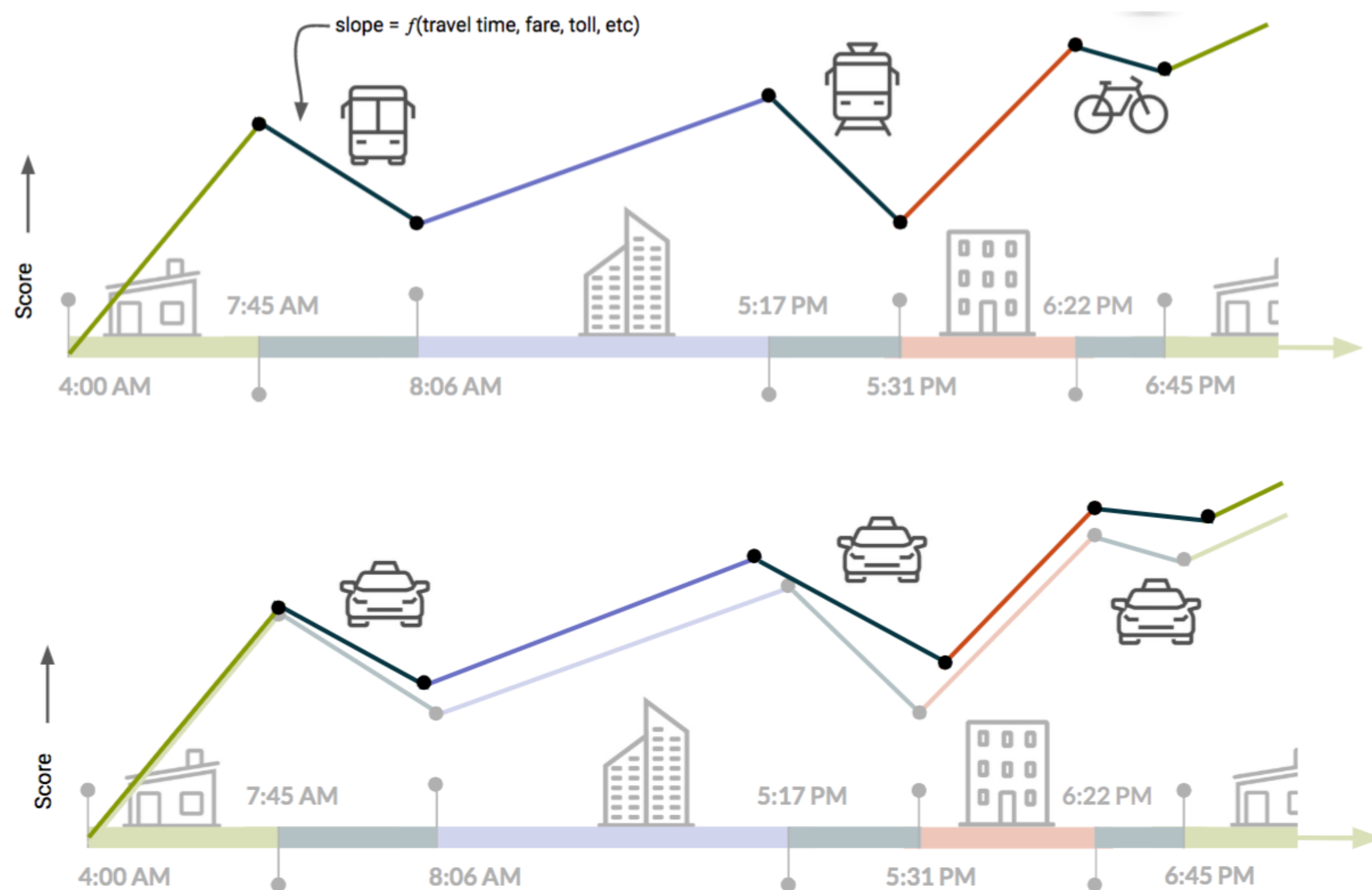
Daily Distribution of NHTS Tour Start Times

The plots below show the daily distribution of archetype tours by workers. From this plot, it appears that workers in the 2017 survey are somewhat less likely to make tours overall, though there is an increase in early and mid-day tours. There is also less of an afternoon peak in 2017. Overall however, the distributions are comparable.
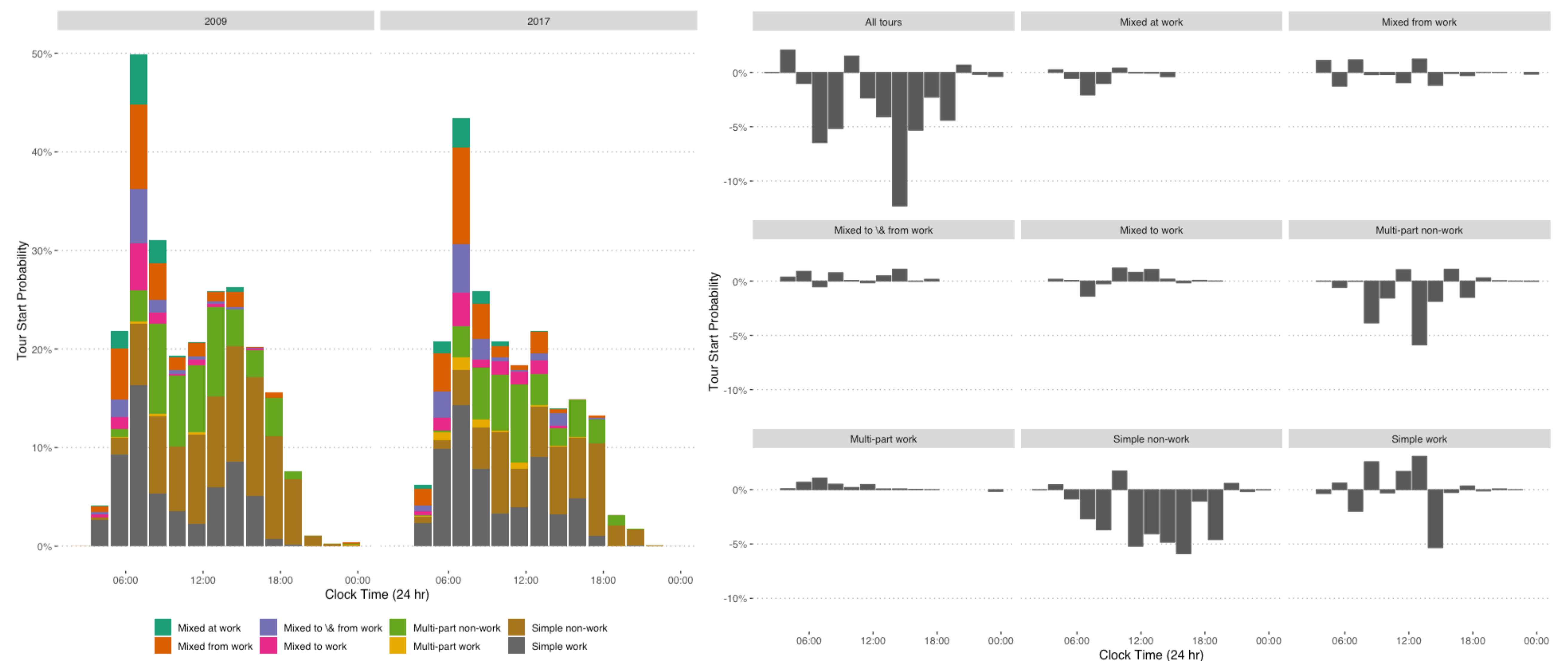
Planned and Simulated Trips-in-Motion

We ran the data-driven model to generate travel demand for a synthetic population in Asheville, North Carolina using the 2009 and 2017 NHTS as a tour archetype database. We subsequently ran the routing and replanning simulation in MATSim. The figure at right shows the distribution of trips-in-motion in 15 minute bins.

The demand simulation initially generates a higher share of mid-day trips than the NHTS source data, but the replanning simulation seems to re-peak the distribution, particularly for work trips. Both the demand and replanning simulations seem to have a longer tail in the evening, with more trips still on the road than the NHTS data suggests.