Vejdirektoratet

Impact of the household on person travel demand: the notion of family priority time in activity based models

Goran Vuk, John Bowman, Andrew Daly and Stephane Hess

Short abstract

The paper describes an activity-based model for Copenhagen, introducing the concept of 'Primary Family Priority Time' (PFPT) which postulates that for pre-agreed work-days all family members spend time together at home in shared activities, e.g. dinner or childcare, and that PFPT has higher priority than each person's own related activities, such as work and leisure. The conference paper will present the concept of PFPT and discuss how it fits into the activity based model framework of the ACTUM research project. Model estimation results will be presented, including sub-models for PFPT participation, as well as its impacts in the model estimation results of the other AB model components.

Long abstract

Although many activity and travel decisions relate to individual persons, anyone living in a household is affected by the presence of other household members, and the effects are likely to include activity and travel choices. Activity based (AB) models accommodate budget constraints by using household income to condition choices. They also condition individual travel choices on household vehicle ownership. Some AB models have also begun to condition individual activities and travel on modelled joint travel, and to model individual execution of household out-of-home maintenance activities. However, state-of-the-art and state-of-practice models do not thus far deal with the impact that families have on individual activity and travel by choosing to spend time together at home. Spending time together as a family is of high importance in some cultures, notably that of Denmark. For instance, two parents, both working, usually have only a couple of hours at their disposal to spend with their child (children), especially if the kids are small. Accordingly, work schedules are often arranged to allow time together in the evening. In that time period, child care has a high priority, just as planning of household activities for the next day.

The present paper reports on developments in accommodating the impact of household priorities on individual activity and travel within an activity based model under development for the Danish capital Copenhagen in a research project known as ACTUM. ACTUM defines Primary Family Priority Time (PFPT) as time spent by all household members together at home in a shared activity, and postulates that *PFPT has higher priority than a person's own related activities, such as work, shopping and leisure*. This is to say, for example, that parents may agree that tomorrow all household members will have dinner together in the period 7pm-8pm, and require all other

activities to fit into the remaining time in the day; additional work might have to be conducted after the end of that period. Models of PFPT participation, duration and timing are thus implemented at the top of the conditional hierarchy of models in the AB model system. PFPT then conditions the remaining models in two ways. First, the time committed to PFPT is blocked out and all subsequent activity generation and scheduling is explicitly constrained by the remaining available time. Second, the presence or absence of PFPT conditions the remaining models directly as an explanatory variable.

PFPT and the remaining conditional demand models comprise the within-day demand model component of a greater model called COMPAS (COpenhagen Model for Person Activity Scheduling). COMPAS is the first European operational AB traffic model for a large urban area. The within-day AB component of COMPAS is implemented on the DaySim AB model software platform. The model is being developed using data collected for the ACTUM project, in the form of a survey of 900 households (around 2,000 persons) from the Greater Copenhagen Area, where, in addition to the travel information for all members of each household, information about at home activities is collected in a way that enables the incorporation of the PFPT model components.

Model estimation results to date show that the probability of PFPT participation drops in larger households and those with cars. Conversely, it is higher in households with children, single parent households, households with both parents working, and households with high education for at least one adult. The presence of PFPT in a household's day increases the likelihood of working at home, joint tours for non-mandatory purposes, and partially joint half tours—where one person drops and/or picks others at their work or school location on the way to or from work or school. PFPT decreases the likelihood of stops for business purposes during the workday.

The conference paper will present the concept of family priority time and discuss how it fits into the activity based model framework for Copenhagen. It will then turn to data collection, model estimation results, and how PFPT impacts the model estimation results and behaviour of the other AB model components.