Planning Time Horizon of Activities and Activity Attributes

Kelly van Bladel[1], Tom Bellemans[1], Davy Janssens[1] and Geert Wets[1,2]

[1] Transportation Research Institute
Hasselt University - Campus Diepenbeek
Wetenschapspark 5, bus 6
B - 3590 Diepenbeek, Belgium

[2] Corresponding Author
e-mail Geert.Wets@uhasselt.be
phone +32 11 26 91 58
fax +32 11 26 91 99

Keywords
Activity scheduling; Planning time horizon; Activity-based modelling; Activity-travel surveys

Abstract
Over the past decade an increasing interest in the development and application of activity scheduling models could be witnessed in the area of travel behaviour research (*1*). These models are applied to forecast travel demand and to predict the impact of transport demand management measures on traffic flows, based on the assumption that travel is derived from the dispersal of activities across different locations. It is generally accepted in activity-based research that executed activity-travel patterns are the result of complex decision processes, in which activities are inserted, deleted and modified. Scheduling models aim at reproducing these decision processes as realistically as possible. However, the planning time horizon of activities is often neglected in these models or simplified by entering activities in the scheduling process in a fixed order, usually defined by activity type (*2, 3*).
Recent studies have argued that the behavioural realism – and hence the travel demand forecasts – of scheduling models would benefit if the time horizon of activity planning would be taken into account (*4, 5, 6, 7*). These studies present different empirical analyses and statistical models that examine activity insertion, adjustments and trip-planning time horizons. The effect of various explanatory variables on the planning time horizon and on the time elapsed between planning and execution of pre-planned activities is also analyzed. The findings of these studies confirm that activity scheduling is a complex decision process in which a variety of influencing factors interact and that activity type alone may not suffice to explain the planning time horizon of activities.
This paper aims at contributing to this line of research by examining the activity scheduling process and in particular the planning time horizon of activities in detail. The time elapsed between the planning and execution of an activity is examined as well as the sequence of the scheduling decisions made between initial planning and actual execution or deletion of the activity. The effect of various activity, schedule, individual and household characteristics on the activity planning time horizon is estimated and discussed. Similar analyses are presented for the planning time horizon of trips. Furthermore, the planning process of individual activity and trip attributes such as start time, duration and location or transport mode, is also studied to assess which attributes are routinely planned and which are consciously decided on.
Analyses about planning and scheduling of activities require specific scheduling process information that is not available from traditional trip- and activity-based surveys. Therefore, some specific computer-

based survey instruments have been developed to gather empirical data on the process of activity planning and scheduling (*8, 9*). The analyses in this paper are based on data from a large-scale activity-travel survey that is conducted in Flanders (Belgium) in the period 2007-2008. In addition to detailed data on executed activity-travel patterns, the survey also collects activity scheduling process information. The information on the successive planning decisions is gathered by means of PARROTS, a software application that is installed on a hand-held personal digital assistant (*10*). Respondents are asked to insert, adjust and delete activities and trips for seven consecutive days and every modification in the planned or executed activity-travel schedules is stored by PARROTS.

The findings presented in this paper will enhance the understanding of the overall activity planning process and might incite other researchers to take the planning time horizon of activities and activity attributes into account when developing simulation models for activity scheduling. If the fixed planning sequence of activities in these models is replaced by a sequencing rule that incorporates a dynamic planning time history, the predictive power of the models will enhance.

References

1 Timmermans, H. J. P. Models of Activity Scheduling Behaviour. *Mobilitat und Stadt, Stadt Region Land*, No.71, 2001, pp.33—47.

2 Arentze, T. A., F. Hofman, H. van Mourik and H. J. P. Timmermans. Albatross: Multiagent, Rule-Based Model of Activity Pattern Decisions. In *Transportation Research Record: Journal of the Transportation Research Board, No.1706*, Transportation Research Board of the National Academies, Washington, DC, USA, 2000, pp.136–144.

3 Miller, E. J. and M. J. Roorda. Prototype Model of Household Activity-Travel Scheduling. In *Transportation Research Record: Journal of the Transportation Research Board, No. 1831*, Transportation Research Board of the National Academies, Washington, DC, USA, 2003, pp.114–121.

4 Doherty, S. T. How Far in Advance Are Activities Planned? Measurement Challenges and Analysis. In *Transportation Research Record: Journal of the Transportation Research Board, No.1926*, Transportation Research Board of the National Academies, Washington, DC, USA, 2005, pp.41–49.

5 Mohammadian, A. and S. T. Doherty. Mixed Logit Model of Activity-Scheduling Time Horizon Incorporating Spatial–Temporal Flexibility Variables. In *Transportation Research Record: Journal of the Transportation Research Board, No.1926*, Transportation Research Board of the National Academies, Washington, DC, USA, 2005, pp.33–40.

6 Mohammadian, A. and S. T. Doherty. Modeling Activity Scheduling Time Horizon: Duration of Time between Planning and Execution of Pre-Planned Activities. *Transportation Research Part A: Policy and Practice,* Vol.40, 2006, pp.475–490.

7 Ruiz, T. and M. J. Roorda. Analysis of Planning Decisions During the Activity-Scheduling Process. Presented at the 87th Annual Meeting of the Transportation Research Board (TRB), Washington, DC, USA, 2008.

8 Doherty, S. T. and E. J. Miller. A Computerized Household Activity Scheduling Survey. *Transportation,* Vol.27, 2000, pp.75–97.

9 Rindsfüser, G., H. Mühlhans, S. T. Doherty and K. J. Beckman. Tracing the Planning and Execution of Activities and Their Attributes - Design and Application of a Hand-Held Scheduling Process Survey. Presented at the 10th International Conference on Travel Behaviour Research (IATBR), Lucerne, Swiss, 2003.

10 Bellemans, T., B. Kochan, D. Janssens, G. Wets and H. J. P. Timmermans. In the Field Evaluation of the Impact of a GPS-Enabled Personal Digital Assistant on Activity-Travel Diary Data Quality. In *Transportation Research Record: Journal of the Transportation Research Board, No.2049*, Transportation Research Board of the National Academies, Washington, DC, USA, 2008.