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Abstract

In the last decades, a growing body of evidences of the influence of the need for social contacts on mobility, and in particular *leisure* mobility, has been accumulated. The idea that explicitly considering those motives in transport models could improve forecasts is making progress. However, the actual implementation of those ideas is still difficult, in particular due to the lack of data on how do individuals plan joint activities.

This paper will report on an ongoing data collection exercise, that aims at consolidating our knowledge of those processes. The survey is separated into three phases: starting with an activity diary, focussed on group leisure activities, it moves on to stated choice experiments where various determinants of joint activities are varied, to finish with an innovative interactive planning experiment. The paper and presentation will describe the first data collected in the first

phase, and discuss the design of the next steps.

1 Introduction

In developed countries, a continuous increase of the share of trips which are performed for leisure purposes could be observed in the last dozens of years (Schlich et al., 2004; Axhausen, 2005). This represents a challenge for travel behavior modeling, as those trips are much more difficult to capture than commuting trips: they are performed more sporadically, and data about those trips is much more difficult to collect. Understanding better how destination choice for leisure trips is made is therefore essential to improve the accuracy of those forecasts. This increase in leisure travel has been anticipated early, and the social nature of such travel already hypothesized, for instance by Salomon (1985), who stated that *"one particular type of travel, that for* recreational *and* social *purpose, may increase when more leisure time is available"*. This forecast was later confirmed, for instance by Stauffacher et al. (2005), who analyzed the motives behind leisure activities, using the results of a Swiss 12 weeks leisure travel diary survey. They found social contact to be the most important, and that in addition respondents traveled with social contacts for more than 70% of leisure activities. This fact, among others, generated a growing interest in the social dimension of travel, and how travel decisions are influenced not only by the global state of the transportation system, but also by joint decisions and interactions with social contacts — a clear sign for this interest being the regular workshops organized on this theme (Dugundji et al., 2008, 2011, 2012; Scott et al., 2013; Goetzke et al., 2015).

This integration of social networks in multiagent simulation frameworks has already been attempted by other authors. Due to their disaggregated description of the world, such models are particularly well suited to the representation of complex social topologies. Han et al. (2011) present experiments of using social networks to guide activity location choice set formation in the FEATHERS multiagent simulation framework. Using a simple scenario with 6 agents forming a *clique*, they consider the influence of various processes like information exchange and adaptation to the behavior of social contacts to increase the probability of an encounter. They do not, however, represent *joint decisions*, such as the scheduling of a joint activity. The same kind of processes have been investigated by Hackney (2009), using more complex network topologies, within the MATSim framework. Ronald et al. (2012) and Ma et al. (2011, 2012) present agent based systems which do integrate joint decision making mechanisms, based on rule based simulations of a bargaining processes. Frei and Axhausen (2011) demonstrate a simple joint planning model, where 1. social contacts decide to perform a joint activity if it improves the utility of all co-participants, and 2. location of a joint activity is chosen to maximise a group utility. They are not yet integrated into any operational mobility simulation platform.

Interest in the relationship between mobility, social contacts and leisure behavior is not new (Stutz, 1973; Kemper, 1980), but enjoyed a renewed interest in recent years. Previous studies

have been conducted with the idea that an important factor in leisure trip destination choice, or activity duration choice, is the ability to meet social contacts. Examples of empirical work include Carrasco and Habib (2009), Habib and Carrasco (2011) or Moore et al. (2013). All those studies show a significant influence of social contacts on the spatial and temporal distribution of activities. In addition, the influence of the social nature of human beings was shown to generate paradoxical effects. For instance, Harvey and Taylor (2000) show that persons working from home tend to travel *further* for leisure purpose, in order to fulfill their need for social contact, that they cannot fulfill at their workplace. A model ignoring such effects might thus substantially underestimate the traveled distances for such individuals.

Typically, co-participants in activities are classified in household and other contacts. Srinivasan and Bhat (2006) analyzed the American Time Use Survey to search for interaction patterns with household members and other contacts. They found that a significant proportion of activities of all types, be it during the week or the week end, are performed jointly. There are however systematic patterns that come out of the data: joint (out of home) activities during the week tend to be performed with non-household members, the opposite being true on the week-end. In addition, activities with household and family members tend to be longer than activities with friends. Kemperman et al. (2006) observed the same kind of effect between week-end and week day in the Netherlands.

Other studies have also focused on the processes behind group decision making, and on the corresponding data collection challenges. For instance, Aribarg et al. (2002) designed surveys were dyads parent-teenager negotiated about the acquisition of a good, asking first each member separately, and then the two members together. Aribarg et al. (2010) extended this method by testing the possibility to get rid of the need to perform group interviews, by presenting interviewees hypothetical preferences of the other participant — prior to a group exercise. Their results show that this methodology allows to predict group decisions accurately, without needing to interview the decision makers in groups. Their model of preference aggregation uses the classical aggregation of individual's utilities in a group utility — but only after considering a *revision* of individual's preferences given the preferences of the other decision maker. In the field of transportation, group interviews were used, for instance by Brewer and Hensher (2000) or Rose and Hensher (2004). Those authors use a survey method they call *interactive agency choice experiment*, where they do not monitor only the outcome of the decision process, but the different *stages* of the decision process itself. Such data collection exercises are of great value to understand preference aggregation — which the authors model using joint utilities aggregating the individual utilities. Arentze (2014) uses another approach, by presenting respondents with the hypothetical preferences or costs of co-participants in an activity. His study reveals a preference for fair solutions, much more so in terms of costs (travel time) than preferences.

However, data is still missing to carry out the goal to simulate social travel. First, there is very little data on the characteristics of joint social activities, in particular in terms of party composition. Second, we are aware of no data allowing to reveal the tradeoffs between meeting social contacts and travel time and costs; which is problematic if one assumes the meeting of social contacts is the main cause for travel. Finally, progress is needed in understanding the way individuals with possibly conflicting preferences and constraints come to an agreement.

The survey presented here aims at making progress on those fronts.

2 Survey Description

The survey aims at eliciting the processes underlying joint activity planning. This contains three elements:

- eliciting the characteristics of joint activities, in particular in terms of party composition
- eliciting the trade-offs between activity characteristics and party composition
- eliciting the structure of joint decision process

Those 3 elements are measured in 3 successive phases:

1. a leisure activity diary
2. a stated choice experiment
3. an interactive choice experiment

2.1 First Phase: Activity Diary

During the first phase, the respondents are asked to report all leisure activities performed during the course of two weeks. The main attributes asked for, for each activity, are:

- description of the activity

- location
- cost for the respondent
- spatial and temporal flexibility
- type of the previous and next activity
- time frame of the decision to perform the activity (spontaneous, planned, routine)
- Group composition
  - group size
  - age, gender, type of social contact (family, friend, colleague. . .)
  - cost sharing
  - Type of organisation (one decider, group decision. . .)

In addition, basic socio-demographic information is collected, as well as a 10-questions "Big Five" questionnaire (Gosling et al., 2003). The "Big Five" framework is a model of personality traits, which represents personality as the combination of the levels of five main traits: extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience. It is assumed those traits have a major influence on behavior in joint activities, be it in the type of activities undertaken or in the planning behavior.

2.2 Second Phase: Stated Choice

At the end of the first phase questionnaire, respondents are asked whether they accept to be further contacted for the sake of this study. Those respondents that answer positively receive a second questionnaire, consisting of stated choice experiments.

The aim of those experiments is to assess the "value of social contact".

2.3 Third Phase: Interactive Experiment

The third phase is the most experimental. It consists of a computer-mediated experiment, where respondents interact through a computer to plan a joint activity.

3 Next Steps

The activity diary questionnaire is ready and will be sent soon.

The stated choice experiment still needs to be designed. The choice experiments will be based on situations reported by the respondents. The two main attributes to be varied are distance and party composition. The main results to get out of those experiments is a "value of social contact" (and if such a generic parameter can be found), or how far one is willing to travel to meet a social contact.

The interactive experiment will be carried away either with the remaining respondents, either with a new sample of respondents, depending on the drop-out rate. It will be based on the NodeGame Javascript framework (nodeGame, 2015), that allows to deploy such experiment both in the lab and on the web. The structure will be similar to the Interactive Agency Choice Experiments of Brewer and Hensher (2000) or Rose and Hensher (2004): respondents will be asked to make propositions in turn, until convergence is reached. The exact design will be based on insights from stage 2.

4 References

Arentze, T. A. (2014) Individuals' social preferences in joint-activity choice: The role of fairness and asymetric evaluation of costs and rewards, paper presented at the *93rd Annual Meeting of the Transportation Research Board*, Washington, D.C., January 2014.

Aribarg, A., N. Arora and H. O. Bodur (2002) Understanding the role of preference revision and concession in group decisions, *Journal of Marketing Research*, **39** (3) 336–349.

Aribarg, A., N. Arora and M. Y. Kang (2010) Predicting joint choice using individual data, *Marketing Science*, **29** (1) 139–157.

Axhausen, K. W. (2005) Social networks and travel: Some hypotheses, in K. P. Donaghy, S. Poppelreuter and G. Rudinger (eds.) *Social Dimensions of Sustainable Transport: Transatlantic Perspectives*, Ashgate, Aldershot.

Brewer, A. M. and D. A. Hensher (2000) Distributed work and travel behavior: The dynamics of interactive agency choices between employers and employees, *Transportation*, **27** (1) 117–148.

Carrasco, J. A. and K. M. N. Habib (2009) Understanding the social embeddedness of activity-travel participation: The case of frequency and duration of social activities, paper presented at the *12th International Conference on Travel Behaviour Research (IATBR)*, Jaipur, December 2009.

Dugundji, E. R., A. Páez and T. A. Arentze (2008) Social networks, choices, mobility, and travel, *Environment and Planning B*, **35** (6) 956–960.

Dugundji, E. R., A. Páez and T. A. Arentze (2012) Urban mobility and social-spatial contact — introduction, *Environment and Planning A*, **44** (5) 1011–1015.

Dugundji, E. R., A. Páez, T. A. Arentze, J. L. Walker, J. A. Carrasco, F. Marchal and H. Nakanishi (2011) Transportation and social interactions, *Transportation*, **45** (4) 239–247.

Frei, A. and K. W. Axhausen (2011) Collective location choice model, *Working Paper*, **686**, IVT, ETH Zurich, Zurich.

Goetzke, F., R. Gerike, A. Páez and E. R. Dugundji (2015) Social interactions in transportation: Analyzing groups and spatial networks, *Transportation*, **42** (5) 723–731.

Gosling, S. D., P. J. Rentfrow and W. B. J. Swann (2003) A very brief measure of the Big-Five personality domains, *Journal of Research in Personality*, **37** (6) 504–528.

Habib, K. M. N. and J. A. Carrasco (2011) Investigating the role of social networks in start time and duration of activities: Trivariate simultaneous econometric model, *Transportation Research Record*, **2230**, 1–8.

Hackney, J. K. (2009) Integration of social networks in a large-scale travel behavior microsimulation, Ph.D. Thesis, ETH Zurich, Zurich.

Han, Q., T. A. Arentze, H. J. P. Timmermans, D. Janssens and G. Wets (2011) The effects of social networks on choice set dynamics: Results of numerical simulations using an agent-based approach, *Transportation Research Part A*, **45** (4) 310–322.

Harvey, A. S. and M. E. Taylor (2000) Activity settings and travel behaviour: A social contact perspective, *Transportation*, **27** (1) 53–73.

Kemper, F. J. (1980) Social contacts of an urban-population within an activity-space framework, *Geographische Zeitschrift*, **68** (3) 199–222.

Kemperman, A., T. A. Arentze and H. J. P. Timmermans (2006) Social commitments and activity-travel scheduling decisions, *Transportation Research Record*, **1977**, 242–249.

Ma, H., T. A. Arentze and H. J. P. Timmermans (2012) Incorporating selfishness and altruism int dynamic joint activity-travel scheduling, paper presented at the *13th International Conference on Travel Behaviour Research (IATBR)*, Toronto, July 2012.

Ma, H., N. Ronald, T. A. Arentze and H. J. P. Timmermans (2011) New credit mechanism for semicooperative agent-mediated joint activity-travel scheduling, *Transportation Research Record*, **2230**, 104–110.

Moore, J., J. A. Carrasco and A. Tudela (2013) Exploring the links between personal networks, time use, and the spatial distribution of social contacts, *Transportation*, **40** (4) 773–788.

nodeGame (2015) nodeGame website, webpage, `http://www.nodegame.org/`. Accessed on 20/03/2015.

Ronald, N., T. A. Arentze and H. J. P. Timmermans (2012) Modelling social interactions between individuals for joint activity scheduling, *Transportation Research Part B: Methodological*, **46** (2) 276–290.

Rose, J. M. and D. A. Hensher (2004) Modelling agent interdependency in group decision making, *Transportation Research Part E: Logistics and Transportation Review*, **40** (1) 63–79.

Salomon, I. (1985) Telecommunications and travel: Substitution or modified mobility?, *Journal of Transport Economics and Policy*, **19** (3) 219–235.

Schlich, R., S. Schönfelder, S. Hanson and K. W. Axhausen (2004) Structures of leisure travel: Temporal and spatial variability, *Transport Reviews*, **24** (2) 219–237.

Scott, D. M., E. R. Dugundji and A. Páez (2013) The social dimension of activity, travel and location choice behavior, *Journal of Transport Geography*, **31**, 212–215.

Srinivasan, S. and C. R. Bhat (2006) Companionship for leisure activities: an empirical analysis using the american time use survey, paper presented at the *Innovations in Travel Demand Modeling (ITM'06)*, 129 – 136, Austin, May 2006.

Stauffacher, M., R. Schlich, K. W. Axhausen and R. W. Scholz (2005) The diversity of travel behavior: Motives and social interactions in leisure time activities, *Working Paper*, **328**, IVT, ETH Zurich, Zurich.

Stutz, F. P. (1973) Intra-urban social visiting and leisure behavior, *Journal of Leisure Research*, **5** (1) 6.