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# An examination of the relationship between social interactions and travel uncertainty ☆

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ABSTRACT

Recent advances in travel behaviour research hypothesise that travellers, in particular under uncertain conditions, take a number of decisions not in total independence but as members of a social network. The travel decisions could relate to a range of choices including transport mode choice and time of departure. This paper seeks to provide an answer to the following question: Do travellers, both prior and during travelling, refer to their social network when taking travel decisions in uncertain conditions?

An internet-based survey was conducted with over 2000 respondents in the two United Kingdom cities of London and Glasgow. Respondents were asked to name those within their social network and to provide information on their contacts including age, gender, relationship length, car availability, and the type and frequency of social interaction.

Insights are also provided from the analysis of relationships between an individual's socio–demographic characteristics, their ego-centric social network, their social interactions and the location in which they live, through the use of clusters analysis, and how this links to two key travel behaviour aspects: who respondents would turn to in particular for advice on travel decisions, and who (and why) they would contact, if they were experiencing an uncertain situation while travelling. It is shown that the first named member of the social network member is a key person for individuals facing travel uncertainty, and that individuals will turn to others, often within their social network, for emotional as well as decision-making support. In addition, older people, those with a lower number of contacts, and those living in smaller households are more likely to decide by themselves in uncertain travel situations.



## 1. Introduction

There has been increasing recognition within travel behaviour research of the importance of both social (e.g. interactions between individuals) and spatial (e.g. the influence of the locations where individuals live) environments in shaping preferences and choices (Dugundji and Walker, 2005). There are a number of reasons why social, as well as spatial, influence should be considered when analysing transport situations. First of all, social motifs often generate the need of travelling (Carrasco and Miller, 2009; Farber and Paez, 2009; van dern Berg et al., 2012), and travel behaviour and mobility are therefore motivated and shaped by the need of interacting with other people as well as their locations in the geographical space. Secondly, exchanging information with other individuals in the social space has been identified as an important strategic tool for travellers, together with personal experience and information from transport operators (Avineri and Prashker, 2006; Denant-Boemon and Petiot, 2003), for general travel decisions, and when facing uncertainty due to day-to-day variability in the performance of the transport systems (Bonsall, 2004), as travellers often react and cope with uncertainty not individually but as members of a social network (Barton, 2011; Schwanen, 2008). This can happen in case of minor congestions or partial road closures during road works, as well as during severe disruptions caused by adverse weather conditions.

Social networks are therefore an important source of information and decision support for individuals in the planning of activities and related trips, as they represent relatively low-cost choice heuristic solutions. Their support to decision-making can materialise in various way. Travellers may either simply conform to the behaviour of others (observed or unobserved) or directly ask for suggestions when choosing a departure time, a route, a mode or a vehicle. Neglecting the consideration of social interactions in the analysis of the way travellers generally behave, and perceive and react to uncertainty can therefore leave aside important



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aspects that need to be considered, especially when transport operators and local or national authorities have to deal with various types of disruptions.

Social influence on individual behaviour may come from the overall society, and therefore based on simple observation or belief, or from a more restricted group of individuals the decision makers have contacts with. These groups have often been defined in the existing studies in accordance with general information that has rather reflected data limitation than research purposes (Soetevent and Kooreman, 2007), as a proper identification of the individuals likely to have a considerable impact on choices can be complex. In many cases, data and resource limitations have forced researchers to define reference groups using common sample characteristics as a proxy of reference and therefore limit their analysis to anonymous rather than named networks. For this reason, in recent years, economic choice theory, and transportation research, have begun to borrow the sociological concepts and methods of Social Network Analysis (SNA) (Carrasco et al., 2008; Carrasco and Miller, 2009; Sunitiyoso et al., 2011).

This paper seeks to provide an answer to the following question: Do travellers refer to member(s) of their social network when taking travel decisions in uncertain conditions? The transport-related behaviour examined in this paper relates to two aspects of travel decision-making: who respondents would turn to in particular for advice on travel decisions, and who (and why) they would contact, if they were experiencing an uncertain situation while travelling. As mentioned above, understanding this process is of particular importance to transport policy-makers for two main reasons. First of all, transport operators need to know how their users may react to uncertainty in order to better shape their contingency plans. Second of all, it is important to understand how information travels amongst users (and non-users) in order to better plan both marketing and emergency communication efforts.

The paper is organised by firstly providing a background to the SNA approach and the implications for a travel behaviour survey conducted in the two United Kingdom cities of London and Glasgow. Secondly, the methodology behind the survey is presented. Thirdly, the survey results are analysed and discussed. Within this section background spatial/socio-demographic information and social network characteristics are presented, a cluster analysis is performed on these spatial and social elements, and then these results are applied to the survey questions relating to travel both generally and in uncertain situations. Finally, some conclusions are drawn.

## 2. The Social Network Analysis (SNA) approach and implications for a travel behaviour survey

Sociological theory defines social networks as the sum of personal networks, which represent the group of persons (alters) with whom a given individual (ego) considers having a link of any nature and has contacts with over a lifespan (Degenne and Lebaux, 2005). Social networks have two main components: actors (persons, groups, organizations) who interact with each other, and relationships. The latter can be derived, for example, from control, dependence, competition, and information exchange (Carrasco and Miller, 2009). The main objective of SNA is then to explore these links between people and organizations, their formation and their dynamics (Larsen et al., 2009). The ties forming social networks appear and disappear and have a considerable variability in their intensity over a life time, and choices made by their members in different situations have also an important effect on their structures and dynamics (Bidart and Degenne, 2005; Feld et al., 2007).

In practical terms, in sociological analysis, various survey techniques have been used to identify personal and social networks and assess their structure and dynamics. Among these techniques, the name generator appears to be one of the most popular tools. Other methodologies involve identifying social contacts by using personal sources (like social media contacts, email address books) or institutional sources (like memberships to clubs, mailing lists etc.). In transport settings in particular, travel diaries have been used to identify social contacts (Axhausen, 2008).

The name generator technique identifies the social network members through in-depth interviewing techniques whose purpose is to identify, for example, the people with whom respondents discuss important matters, the people they really enjoy socialising with, and the people they have the most contacts with (Carrasco and Miller, 2009; Marin and Hampton, 2007). Interviewees reveal first a set of alter names and then information about their characteristics in order to assess the nature and magnitude of the relationship (Carrasco et al., 2008).

The identification of members and the consequent assessment of the size of the network and the nature of the relationships are only the first steps in the definition of the structure of a network. When the purpose of SNA is to identify social activities (i.e. travel) that can be performed by the various members individually or in group, it is also necessary to assess the potential activity level between alters (Carrasco and Miller, 2009). The activities the individuals undertake in both their social and geographical spaces have an important impact on the probability of meeting another individual. Then, the probability of beginning a social interaction depends on the size of the agents' current networks and their need for information. The agents' utility depends on the similarities with the other agents and how the interactions with them satisfy their social and information needs. Trust and credibility play an important role as well (Arentze and Timmermans, 2008).

## 3. Methodology

An internet-based survey instrument was developed through two workshops (March 2010, January 2011) attended by a number of experts in both travel behaviour and SNA, and two pilot tests (November/December 2010 and April 2011) on a combined sample of 170 respondents. The main survey was distributed between August 2011 and February 2012, to over 2000 respondents, split equally between the United Kingdom cities of London and Glasgow. Quotas were set for age, gender and socio-economic characteristics of respondents.

Internet surveys have been a popular tool amongst researchers in recent years. They possess considerable cost and time advantages over equivalent mail, phone or face-to-face surveys. However, they seem to generally produce lower response rates and fail to cover those segments of the population which are not connected. In particular, internet respondents are generally more educated than other types of respondents (Olsen, 2009). It has to be observed though, that recent studies in the environmental economics literature, for example, have provided evidence that internet surveys do not seem to produce biased results with respect to face-to-face interviews (Hatton MacDonald et al., 2010; Lindhjem and Navrud, 2011).

Glasgow respondents were sampled from the entire urban area of the city. Due to the large population size of London, spatial information could be examined by focusing on selected sub-areas. The London respondents were sampled from four sub-areas (represented as London Borough areas) selected according to the following criteria: one from each of a North-East-South-West quadrant, a