

Social networks, mobility biography and travel

The survey challenges

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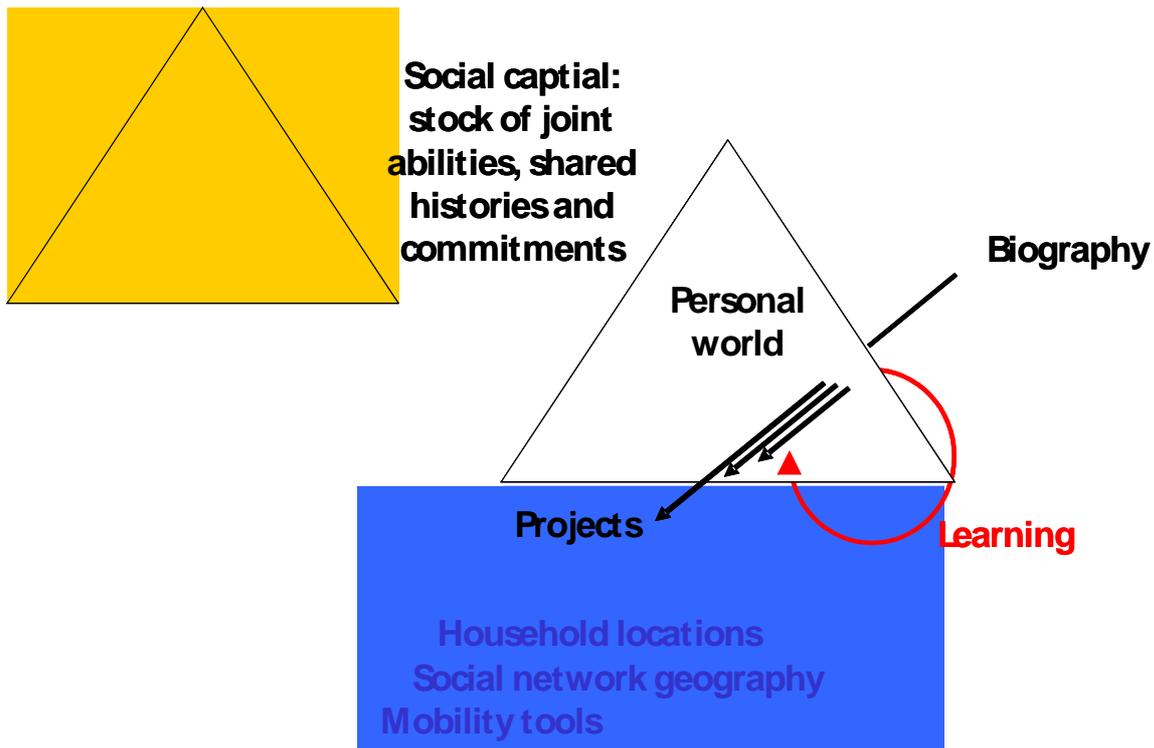
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Paper

Social networks, mobility biography and travel: The survey challenges

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Soziale Netzwerke, Mobilitätsbiographien und Verkehrsteilnahme: Die Herausforderungen für die empirische Arbeit

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Kurzfassung

Dieser Aufsatz diskutiert die Inhalte, um die die heutigen Befragungen zum Verkehrsverhalten ergänzt werden müssen, wenn man die Idee Ernst nimmt, dass die Biographie und die sozialen Netzwerke einer Person ihr Verhalten massgeblich bestimmen. Die Diskussion bezieht sich dabei auf laufende Untersuchungen und konzeptionelle Überlegungen.

Schlagworte

Soziale Netze, Soziales Kapital, Verkehrsverhalten, Mobilitätsbiographien, Empirische Sozialforschung

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Working paper

Social networks, mobility biographies and travel: The survey challenges

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Abstract

Social network membership and biography should influence a person's travel behaviour through the shape of his/her mental map and social network geography. The paper discusses the survey contents, which need to be added to the current set of questions asked in travel behaviour surveys, if we want to capture these concepts. The discussion proceeds conceptually as there is little empirical work so far, on which one could draw.

The challenges involved in integrating these question sets are considerable. The protocols will have to rely on more personal contact between the survey and the respondent, either through the phone or in person.

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Keywords

Social network, social capital, travel behaviour, Horizons Programme, UK Department for Transport

Preferred citation style

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1 Social capital formation and travel

The term *social capital* is the result of the attempt to understand differences in economic performance, but also differences in the performance of daily life between groups, cities, regions and even countries (Putnam, 1993, 1995, 1999; Grieco, 1988, 1995, 1996; Coleman, 1988; Bourdieu, 1983; Franzmann, 2002). At the macroscopic level of countries and regions it is employed to account for differences beyond the obvious ones in physical capital, technological ability, regulatory and governance structures, (suitable) land, and labour and its human capital in the form of skills and understandings. Here it overlaps with the concepts of culture, tradition and norms. At the microscopic level of human interaction in daily life it needs to be given a more specific definition to enable its measurement and operational use in conceptual, econometric and simulation models. Axhausen (2005a) proposes that it is the joint skilled ability of the members of a network to perform, act and enjoy each other as the result of their joint history, commitments, references and understandings. In daily life, it encompasses both productive and hedonic aspects of joint human action. This capital is built up through joint activity and therefore travel, but also through technology mediated interaction, such as letter writing, texting via SMS, emailing, chat room talk, instant messaging, phoning employing any number of technologies (land line, mobile, voice-over-IP etc.).

The travel necessary for the building and maintenance of the social capital of a network is tied up with the longer term locational choices of its network members, their homes, their workplaces, their second homes, their holiday locations, their regular meetings etc. The destination choice of an individual is therefore more often than not, the result of joint choices with those others persons, whom the individual wants to meet or with whom he or she wants to travel. The pegs of the daily lives of everybody involved, i.e. residences, holiday homes and accommodations, common meeting places¹, work places form the *social network geography* of a person², and where obviously the locations associated with those with who a person is in immediate and intense contact (*egocentric network*) might be more important to the observed outcomes. Accepting this perspective opens up new perspectives and challenges for transport modelling and travel behaviour research. Instead of relying exclusively on the generalised costs of travel and the hedonic utility of a location as modulated by the socio-demographics of an individual and maybe his or her values, attitudes and life styles, one can add as explanation

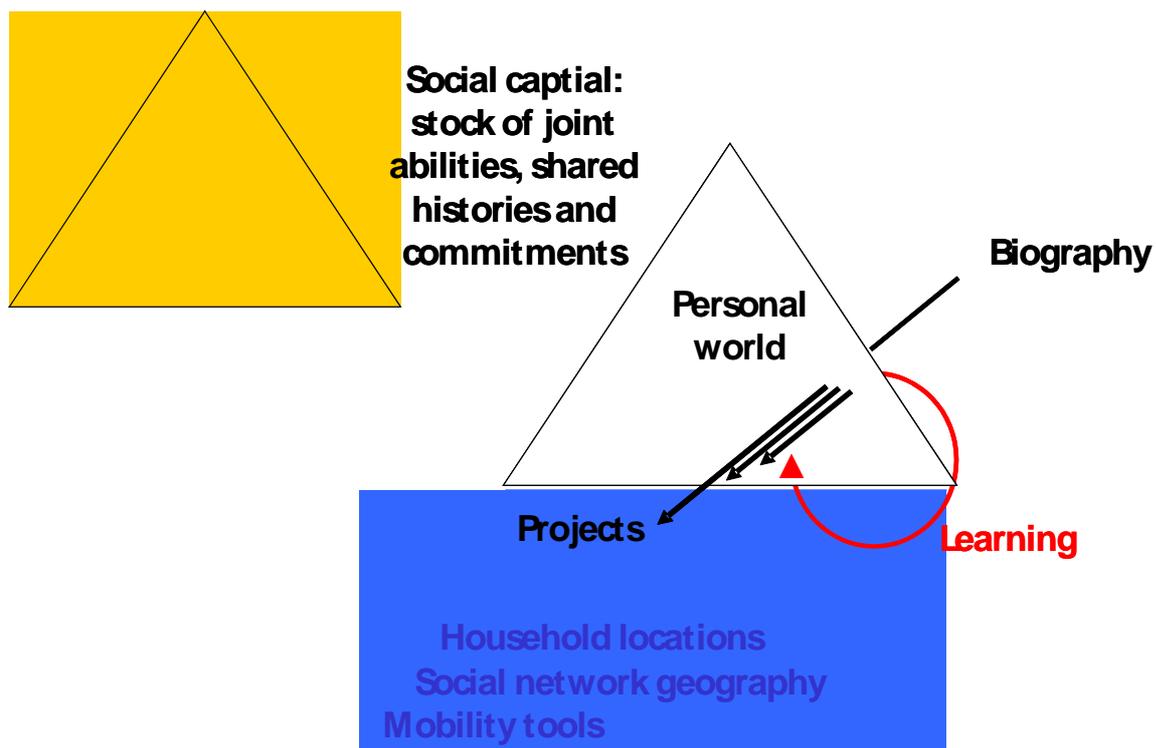
¹ These range from the neighborhood bar to international conference series. For the potential of holiday locations see for example Dienel, Meier-Dallach and Schröder, 2004.

² See Schönfelder and Axhausen, 2003a and b for approaches to their measurement

both the social network geography of the person and his or her biography and network-based decision making. In the terminology of choice modelling the social network geography and biography shape the choice set of the decision maker and that decision maker is a group of individuals. Substantial progress has been made in the modelling of joint decisions, starting with households, but also addressing larger and more amorphous groupings, such as neighbourhoods (See the other papers in this issue for examples and review).

The traditional perfectly informed and unilaterally utility maximising traveller is transformed into a *network actor*, who drawing on the resources of his or her network, but constraint by its expectations negotiates productive solutions for his or her daily life (see also Figure 1). A primary resource for this task is the *personal world* of the network actor. This personal world can be seen from three perspectives as a *mental map*, as an *activity repertoire* and as an *expectation space*.

Figure 1 The concept of the network actor



The term *mental map* is well established and focuses on the ability of the traveller to position activity locations relative to each other, to assess the separation between them in either time or distance and to construct paths to reach one from the other (Tolman, 1948; Lynch, 1960; Downs and Stea, 1973 and Golledge and Stimson, 1998). Speaking of *activity repertoire* stresses the fit between locations and activity types, the quality and price level of such a loca-

tion, and of their suitability for certain combinations of people and particular events, say a drunken evening with a crowd or a romantic evening for two. Finally, the traveller generalises his or her experiences and information obtained from third parties to form expectations of how the world works, which guide him or her in areas with which the traveller is less familiar. The *expectation space* would, for example, suggest the presence of car rental agencies in and around an airport, of big-box retail towards the older and cheaper periphery of a city or urban area, etc.

This personal world is the result of the biography of a person, of the on-going learning from experience, reading and listening. We would expect it to be larger and more detailed for persons, which engage more with the world through travel or membership in social networks with many members. We would also expect it to be uneven in its resolution reflecting the varying intensities with which a person has interacted with a particular region or area.

The *projects*, to whom a person is committed, structure the future of a person (Nuttin, 1984). These might range from the trivial, such as a brief holiday, to the profound, such as an education, restoring a house, or caring for a relative with a long-term illness, where the term project becomes slightly inappropriate. From a travel behaviour perspective the projects provide frames and logic for the otherwise for an observer disjoint sets of activities, such as those, for example, involved in preparing a holiday: buying clothing, research time at the PC and in the travel agency, book purchases, visits to friends or acquaintances, who already visited the place

In the short and medium term the travel behaviour of a person is further structured by those commitments, which cannot be easily or cheaply revoked at short notice: home and other residences, work place, public transport season tickets and vehicles, working relationships with colleagues, friendships, partnership and parenthood.

The concept of the network actor makes in the first instance no assumption about the spatial scale of his or her engagement. Wellman's image of "network individualism" (1999, 2000, and 2001) suggests that the network actor lives a life, which requires him or her to build and maintain his or her own multiple networks, of which only some are local³. Larsen, Urry and Axhausen (2005) or Ohnmacht and Axhausen (2004) document such lives. Still, they also document that the whole range of scales occur. Some people live – still – in "Little boxes"

³ This larger scale of their interactions raises the governance issue of what such an actor would consider his or her home region with claims to his or her allegiance: Is it still the town or village of residence or is it the normally amorphous metropolitan area or some bigger entity?

(Wellman, 1996), where their various network memberships strongly overlap embedding the individual in a local community.

Having discussed so far new elements for the explanation of travel behaviour, it is useful to repeat that the current approaches have strong explanatory merit and that the new approaches will have to be added to them and that they will not replace them. The generalised costs of travel and of activity locations, time and income budgets, values, attitudes and life styles structure the choices of the travellers in the first instance, as far as we know today.

2 Policy and modelling challenge

Survey programmes are the joint result of our conceptual understanding of the behaviour of the system of interest and of the policy challenges at hand. Often, the capabilities of the modelling approaches or, worse, the associated soft ware tools, influence the survey contents, as well. Equally, the budget constraints of the survey work are shaping the survey contents. It is therefore useful to discuss these policy challenges briefly, after having set out the conceptual framework above.

Five main challenges can be identified:

- The total amount of travel and its impact on global warming
- Local imbalances between slot⁴ supply and demand
- Potential impacts of the amount of travel and local social imbalances, such as localised anomie (Axhausen, 2005b; Axhausen, Forthcoming) or social exclusion (Hine and Mitchell, 2003)
- Long-term funding of the infrastructures and publicly provided services, in particular the railways.
- Optimising the regulatory structure for efficient and environmentally low impact transport industries

⁴ The term *slot* is used here as the generic product of transport infrastructures. It is a section of the time-space system which is reserved on a particular set of infrastructure or services for a particular traveller or vehicle. In some cases, these slots are allocated explicitly by a control system, e.g. slots for aircrafts at terminals, the slot for a train on a railway line, green time for a car at a signalised junction, but in the rest of the cases the slots emerge from the self-organisation of the travellers who compete for the same time-space location, e.g. car drivers on a motorway, persons getting into a lift, pedestrians passing each other on a sidewalk.

The first three challenges hinge directly on the choices of the travellers, especially with regards to their activity locations, while the last two do not need to impact the choices of the travellers, although particular solutions to them might.

Policy makers, who want to dampen the total amount of travel and its impacts on global warming, have two levers: reduction in the amount of travel and reduction in CO₂ – emission per mile travelled. Ignoring the second for the moment, the policy maker has to form a judgement about the different components of travel and their relative importance. Recently, many policy makers have singled out leisure travel as a possible target for action. The policy discussion of leisure travel has often adopted a language, which questions the necessity of such travel, in spite of the fact, that it makes up the relative majority of trips and miles travelled in many industrialised countries (Table 1 and Table 2). The respondents' stories and answer in Larsen, Urry and Axhausen (2005) make clear, that leisure travel is anything but unnecessary. It is central to their social life and the building and maintenance of their social capital, and by extension of society's social capital. When asked to describe their travel experience, they also stress, that business and leisure are not useful as exclusive categories, as a single journey can easily accommodate so many purposes, that a categorisation with a main purpose becomes to some extent arbitrary: What is a business journey, which was arranged to permit the employer-subsidised attendance at a family wedding ? The policy challenge is therefore to find ways, in which travel can be reduced without reducing the social capital of the population (See Putnam and Feldstein, 2003 for ideas). This requires initial information about the current levels of social capital and the spatial interactions involved.

Table 1 Share of trips by trip purpose [%]

Trip purpose	CH	Germany	UK	USA
Leisure	39.5	35.0	26.5	26.7
Work/School	35.5	18.2	25.3	25.2
Shopping/Private business	19.1	34.8	31.3	37.6
Escort	4.8	6.4	12.6	10.2
Others	1.0	5.6	4.3	0.2
Total	100.0	100.0	100.0	100.0

Source: Bundesamt für Raumentwicklung (2000), Deutsches Institut für Wirtschaftsforschung (2003), Department for Transportation (2004) and Bureau of Transportation Statistics (1995)

Table 2 Share of miles travelled by trip purpose [%]

Trip purpose	CH	Germany	UK	USA
Leisure	44.8	38.3	33.7	32.2
Work/School	35.0	29.7	32.0	31.3
Shopping/Private business	11.2	21.7	19.7	27.6
Escort	4.9	4.5	7.6	8.5
Others	1.8	4.8	7.1	0.5
Total	100.0	100.0	100.0	100.0

Source: Bundesamt für Raumentwicklung (2000), Deutsches Institut für Wirtschaftsforschung (2003), Department for Transportation (2004) and Bureau of Transportation Statistics (1995)

The second challenge is generally being addressed by differential charging, as long as the capacity gap has not been closed (Mohring, 1976 for the theory and Richards, 2006 for the London Area Licensing Scheme, as a typical example). For the policy maker it would be crucial to know, how which social network (group) can adjust their travel or if the members are so constraint that they are unable, at least in the short term, to respond.

Localised anomie as a condition, where the network actors with mostly non-local links are well integrated globally but feel unsafe in the immediate environment of their home and work, can co-exist with the social exclusion of their spatial neighbours, which are part of other, often strongly localised social networks, who are unable to link up effectively with the regional labour markets and public services, such as hospitals, specialised schools or others. The policy maker has to ask the question, how one can increase the local integration in the first case and the regional integration in the second case. The policy maker has to ask, if one can address both issues with the same policies, or if they require different policies, and if these are mutually compatible.

3 Survey challenges

Transport research, but also sociological research has in the past not looked at the link between social networks, locational choices and travel. Past benchmarks or longitudinal observations are therefore missing. Given the policy challenges discussed it would seem necessary to fill this gap through new survey work. In terms of content two groups of items are im-

portant: (a) those capturing the social content of the activities and their participants and (b) those describing the social network geographies and their underlying mobility biographies. In addition, there are groups, which would need special attention, and benchmarks beyond those capturing travel and their underlying social geographies. The discussion here follows closely Axhausen, Larsen and Urry, 2006.

New items

The social content of an activity has many layers, which will differ for the various participants or beneficiaries of an activity, which do not have to be necessarily present. From the perspective sketched the following new items would be a start:

- A more detailed coding of the activity, maybe at the level of detail typical for time-use studies
- A description of the social purpose of the activity and of the obligations fulfilled with it
- Beneficiary of the activity
- Composition of the party travelling together to the activity
- Composition of the party participating in the event and having meaningful interactions with the respondent
- The locations of the fellow travellers and participants prior to the trip or activity
- Distribution of the travel and activity costs among the participants and beneficiaries.

In addition it would be useful to capture

- The planning horizon of the activity
- Number of previous visits to that location, in particular, if it was the first visit ever.
- The secondary activities undertaken during the trip and the activity, if any.

Individual items of this list have been tested in recent diary surveys (see Löchl, Schönfelder, Schlich, Buhl, Widmer and Axhausen, 2005; Axhausen, Löchl, Schlich, Buhl and Widmer, Forthcoming; Schlich, Simma and Axhausen, 2002; Axhausen, Zimmermann, Schönfelder, Rindsfuser and Haupt, 2002), but their joint impact is still unexplored.

The structural information about the egocentric social network of a respondent is the second block of items, which are new to travel behaviour research. Given the perspective above, it will not be enough to transfer the approaches and items, which sociologists working on social network structures have developed (See Wasserman and Faust, 1994 for an overview). While there are survey approaches to obtain lists of social contacts (*name generators*) from respondents, they tend to focus on relatives and primary contacts, who are solicited with questions such as “Whom would you ask for help or discuss personal problems with?”. In our case, we would assume that it is often also the less prominent contacts, such as co-workers, professional colleagues, former classmates, for example, living in an interesting location abroad, which shape activity choices.

In any case, we would need information, which sociologists do not normally ask for:

- (Geocoded) home location of the contact
- (Geocoded) work location of the contact
- Frequency, geocoded location, type of meeting place, mode of travel and cost allocation of joint meetings

This would be complemented by questions about the frequency of other forms of interactions, such as phone calls, chat, instant messaging, email, SMS, letter writing. Information about the cost allocation for these interactions would be useful, as well. In specific circumstances, it might be of importance to know, where the interacting persons were at the point of the interchange.

Unless one imagines a detailed diary or record based analysis the answers to these questions will force the respondents to generalise over longer time period. It is well known, that respondents tend to overestimate the frequency of rare, but significant events (see Schlich and Schönfelder, 2001 for an example and further references). As visits to contacts living far away belong into this category, methods are needed to adjust the estimates of travel accordingly. In addition, there is a need to be careful even with regular local events, as persons will be tempted to impose regular patterns, even when they participate irregularly: think of the mismatch between reported and observed church attendance. Equally, even the commute of many persons is not as regular as one expects due to vacations, holidays, sick days, business trips, training courses etc.

The third new element is the mobility biography of the respondent (See also Lanzendorf, 2003 or Axhausen and Beige, 2003). This retrospective reconstruction of the major stages of

the respondent's life with an emphasis on the aspects relevant to travel is in itself nothing unusual. Life course and biography research has adopted such instruments for some time (see for example Blossfeld and Huinink, 2001; Brückner, 1990 or Mayer, 1990 for sociological work and Pooley, Turnbull and Adams, 2005 for a very interesting transport application). The range of questions is obviously open, but as a minimum one would expect information about:

- Residence
- Second homes, if any
- Work status and work place
- Mobility tools owned (bicycle, motorcycle, cars and vans, public transport season tickets, public transport discount cards; licences)
- Household composition and major household events
- Personal and household income
- Preferred mode to work or school
- Locations of major holidays

for a fixed number of points in time over a period of appropriate duration, say anything from ten years to the year of birth. In this context it would be interesting to add information about the changes in the social networks to which a person belongs by adding questions about

- club memberships
- church attendance or membership in civic and political associations

and by adding items to the description of the members of current social network:

- data of first acquaintance
- context of the initial contact (e.g. work, sport, school, church etc.)
- important joint activities involving travel for the respondent
- meeting frequency as part of general contact frequency

To enrich the information about the social network further, one could ask these questions about contacts, which have lapsed or have become so weak, as to be considered lapsed.

The measurement of social exclusion has been the subject of substantial research, but the issue of localised anomie has received less attention, and in particular has not been linked to the amount of local presence of the residents. There is a need to review the existing literature on trust (Seligman, 2000) and its measurement and feeling of safety in the public domain. Suitable scales would need to be integrated into transport oriented survey work (for first examples see Sullivan and Transue, 1999; Newton, 2001 or Glaeser, Laibson, Scheinkam and Soutter, 2000 on the measurement of trust and Greene and Greene, 2003; Pain, 1997, Blöbaum and Hunecke, 2005; Zani, Cicognani and Albanesi (2001) or Gilroy, Madani Pour, Roe, Thompson and Townshend (1995) on perceived safety).

Groups of special interest

The required benchmarking will aim to draw representative samples to allow the characterisation of the current situation and latter the determination of trends. Never-the-less, certain groups deserve special attention, as they either contribute disproportional shares of the total mileage travelled, or because they are deemed to be at risk of social exclusion. The following types fall in the first category:

- Household and families divided between different locations for the bulk of the time, e.g. couples regularly working/living in different towns; parent with children boarding away for their education
- Households regularly circulating between different locations, e.g. the switch between pied-a-terre and home in the country; long term stays at holiday homes in the UK or abroad.
- Migrant families and their travelling to the place where the parental generation grew up
- Migrant families travelling to the location, which defines the post-migration centre of gravity of their networks, if they live away from it
- Diaspora families returning to the ancestral country of origin

In each case, we should see above average travel budgets and mileage for their income group. In each case we would expect that the social networks shape the travel of the groups with respect to timing, duration and form. Think for example of festivals, such as Divali for Indians, Thanksgiving for US Americans, but also a simple Annual Fair, which will serve to reunite people from the same village.

The persons at risk of social exclusion will be characterised low incomes, long spells of unemployment and low education levels, higher levels of physical health problems. If such persons are spatially concentrated and live in areas far away from basic services, then one would want to monitor and benchmark their experience.

Challenges in survey design

The questions fall into two areas: a) extensions of the trip or activity description and b) additions to the person description through the mobility biography and the social network questions.

The first area should be relatively unproblematic. The diaries are a very flexible framework, which can incorporate new items easily. As long as the items are well motivated and obviously linked with the stated purpose of the study respondents should be willing to co-operate, as none of the questions is substantially more intrusive than those already asked by travel and activity diaries (For an overview of these instrument see Richardson, Ampt and Meyburg, 1995 and Axhausen, 1995). The issue of response burden will be discussed below.

The name generators and the mobility biography are a more substantial challenge. While it is possible to build on the existing literature, the first transport experiences show the difficulties with each of these survey elements. Lanzendorf (2003), Axhausen und Beige (2003) and Ohnmacht and Axhausen (2005) used grid presentations in a face-to-face interview, which was filled out by or with support from the interviewer. Beige and Axhausen (2005) employed a grid in a postal survey (see Appendix), following examples in the literature (See in particular , Kluge and Helle 2001). The quality of the responses was good, but the response rate was low with 15% for those not reached for a motivation call and 31% for those reached. No monetary incentive was offered⁵.

Larsen, Urry and Axhausen (2005) replaced the grid with independent lists, which seemed to be easier for the respondent, many of which found a grid uncomfortable. Schiffmann (2005) also turned to lists, which he found well filled in. In the absence a detailed study, a final assessment is not possible at this time.

⁵ De Haan and Peters (ETH Zürich) (personal communication) conducted 2005 a survey including a grid for the mobility biography, which focused on car details and purchasing behaviour. They report a 30% response rate for a postal self-completion protocol with two written reminders.

The problems of the name generators are well known (for a comprehensive review see Marsden, 2005): conveying the type of social contact, which is of interest to study to the respondent; trade-off between respondent burden and the number of contacts retrieved; the level of detail of the contact description.

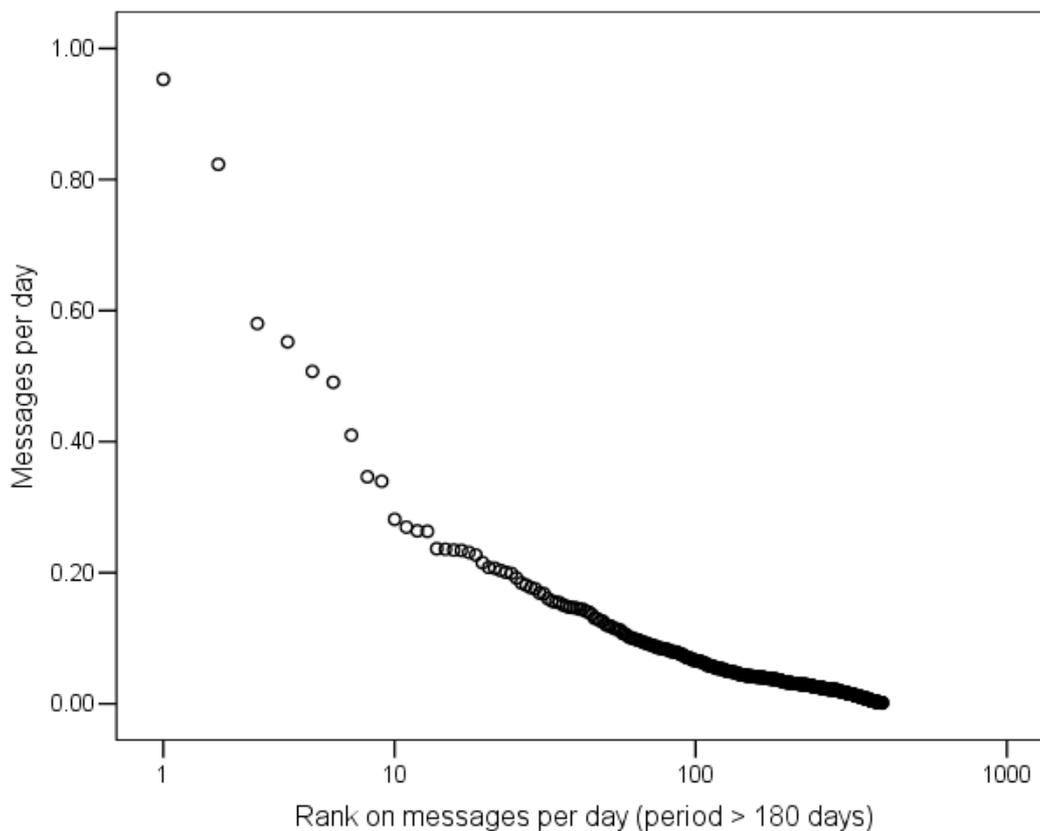
The type of contact of interest will vary with the study: some are interested in relatives, some in physical neighbours, some in fellow students or employees, some in friends. While some of these categories are unambiguous, such relative or neighbour, others involve the judgement of the respondent. Given the subtle differences and graduations in our interactions with others, it is difficult to be sure, that the respondent has been able to identify the intention of the study. Where are the frontiers between good friend, friend, workmate, colleague, acquaintance? What is meant, when we ask for people who would help the respondent? What is meant, when we ask respondents for people with whom they would discuss problems? Carrasco, Hogan, Wellman and Miller (2006) invite respondents to indicate closeness through a physical mapping of the names of the contacts relative to the name of the respondent in the centre of the map. Frei and Axhausen in an on-going study differentiate between close friends and others, with whom the respondents have on-going contact. None of these really focus on those contacts, which have an impact on travel exclusively.

The estimate for the number of contacts a person has range into the thousands (Pool and Kochen, 1978). Figure 2 below underlines this point by showing that the author, for example, has exchanged at least two email messages over a period of 180 days with about 350 people in the last five years.

It is obvious, that comprehensive or at least very long listings can only be retrieved from written records of some kind: email archives, telephone bills, address books, telephone numbers stored on mobile phones, Christmas mailing lists, publication lists as personal sources, year-books, membership lists, internal telephone directories, and minutes of meetings as institutional sources. The literature exploiting such sources is growing quickly (See for example Huberman and Adamic, 2005 or Kossinets and Watts, 2006), but it is by design partial, as it has to omit the other channels of interaction. Comprehensive fusion of all relevant administrative sources and diary data has not yet been attempted. Still, the core of the personal networks should be retrievable, if Dunbar (1992) and Zhou, Sornette, Hill and Dunbar (2005) are correct. They suggest that the core should have 5 to 15 members, of which only 3 to 5 are the central reference group. The problem, as observed above, is that this central group might not be most relevant to some of travel we are interested in. These journeys are often to contacts, which are strong enough to host the respondent, but not necessarily to members of the core

group. A survey strategy, which tries to amass large number of contacts, is likely to backfire, as the attendant response burden increases the likelihood of systematic survey non-response. The field will need to develop strategies to identify such contacts, in addition to the mostly local core group. As part of this development, the field will have to identify the descriptive variables which explain this travel.

Figure 2 Rank of contact versus email messages per day for an academic



the social networks does not simplify the issue. The recent face-to-face interviews lasted between two and three hours covering among other items the social networks and the mobility biographies (Ohnmacht and Axhausen, 2005), for which about 60 minutes were required. It is possible to include an incentive into the protocol, which then might become large enough to raise worries about the motivation of the participants.

At this point, it is not clear, which theme is most appropriate for which survey mode (written, oral by phone or face-to-face) or with which support (motivation call, written explanatory notes and examples, presence of an interviewer). A CATI-based approach should be robust enough for the expanded diary, as the interviewer can explain and motivate the new items. With careful recruitment and initial instruction, a self-completion questionnaire might also be possible. See the experiences with the recent demanding 6-Week and 12-Week diaries (Axhausen, Zimmermann, Schönfelder and Rindsfuser, 2002; Axhausen, Löchl, Schlich, Buhl and Widmer, Forthcoming or Schlich, Simma and Axhausen, 2003).

A small incentive payment in conjunction with a motivation call might be sufficient to raise the response rates for a self-completion mobility biography above 50%. One would need to test, if the survey costs of such an approach are actually much lower than those of a short face-to-face interview. There is no experience of the combination of mobility biographies with name generators outside face-to-face interviews. Experimentation is needed to establish an efficient approach, as large representative samples of face-to-face interviews are difficult to fund under normal circumstances.

In addition, or alternatively, there is a need to explore the possibilities of using existing evidence in a way, which minimises the work load of the respondent. Telephone bills, email archives, address books and databases provide rich data. It would be worthwhile to develop tools, which can extract the information from the respondent's archives, allow the respondent simple corrections and grouping and finally anonymises it for the researcher's use. Among the important simple corrections are the recoding of the various login names the same person might have to a unique identifies. Similarly, the respondent should be able to remove messages without real social meaning, such as advertising, news group messages, mailing list traffic, work-related announcement etc.

4 What are the next steps?

Realising the explanatory potential of the idea of the network actor requires us to expand the range of the existing survey data, which was designed to match the utility maximising individual actor of the current model generation. The discussion above has made it clear, that we are at the very beginning of this process. While we can draw on experiences elsewhere, the combination of question complexes, which are substantial in their own right, raises challenges considering the difficulties of obtaining the co-operation of respondents in the first place.

The work ahead has to address the issue of question formulation and standardisation, so that one can be sure, that the theoretical constructs are measured reliably and validly. Prime examples are the social content of activities, the types of contacts and what they mean for social interaction (travel) and resource flows, or reliable frequency assessments of rare activities.

The second block of work is to find survey protocols and sampling strategies, which allow us to obtain representative samples. Given the scope of intended surveys, it seems unlikely today that simple CATI or self-completion questionnaires will be appropriate. Multi-modal approaches distributing the contents among different instruments, of which some will be self-completion, some with interviewer or information system support, some face-to-face, are more likely. The exact mixture of these elements needs to be identified in conjunction with efficient sampling and recruitment strategies, involving for example incentives.

Finally, before embarking on this very large programme it would be useful, to have one or two example exercises which are large enough to allow a provisional test of the conceptual framework of the network actor. Only, if it indeed has the assumed benefits, one should proceed further.

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Appendix: Mobility biography grid from Beige and Axhausen, 2005