

## MOBILITY BIOGRAPHIES: ELEMENTS OF A BIOGRAPHICAL THEORY OF TRAVEL DEMAND

With 1 figure

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*Zusammenfassung:* Mobilitätsbiographien: Bausteine zu einer biographischen Theorie der Verkehrsnachfrage

Der Beitrag präsentiert theoretische Überlegungen und einen Überblick über vorliegende empirische Erkenntnisse eines Forschungsfeldes, das sich gegenwärtig in der Verkehrsforschung abzeichnet und in dem Verkehrsgeographen eine prominente Rolle spielen. Es geht dabei um die Entwicklung der Verkehrsnachfrage im Lebensverlauf von Personen. Dieser Entwicklungsprozess wird als Mobilitätsbiographie bezeichnet und im Kontext anderer ‚Teilbiographien‘, insbesondere der Wanderungs-, Haushalts- und Erwerbsbiographie betrachtet. Es wird die These vertreten, dass die Verkehrsnachfrage auf der Individualebene aufgrund ihrer Routinisierung mittelfristig relativ stabil ist und sich im Kontext bestimmter Schlüsselereignisse im Lebenslauf deutlich verändert. Zu solchen Schlüsselereignissen gehören beispielsweise Wanderungen, Arbeitsplatzwechsel oder die Geburt von Kindern. Der Beitrag schließt mit einigen methodischen Überlegungen sowie der Identifikation von Forschungsbedarf.

*Summary:* The contribution presents theoretical considerations and an overview on empirical knowledge from a research field recently emerging in transportation research, in which transport geographers play a prominent role. This research field deals with the development of travel demand over the life course of individuals. This process is referred to as ‘mobility biographies’. It is embedded into the context of other ‘partial biographies’, namely residential biography, employment biography, and household biography. The hypothesis is that travel demand on an individual level is relatively stable in the medium term, but changes significantly in the context of certain key events in the life course. Such key events include, among others, residential location changes, workplace changes, and the birth of children. The paper concludes with some methodological considerations and the identification of research requirements.

### 1 Introduction

Spatial mobility of individuals and households has been an important research field in the social and spatial sciences ever since RAVENSTEIN’s (1885, 1889) work ‘the laws of migration’. For a long time this research focused on residential mobility, whereas transport was mainly studied in the context of trade and freight distribution in geography and hardly played any role in sociology. Around 1970, a more detailed interest in individual travel behaviour (in transportation research also referred to as ‘mobility’) began to emerge. Initially, transport engineering, time geography, activity space research and urban economic theory played an important role in this research. Since the 1990s, mobility psychology and mobility sociology also contributed to a deeper understanding of transport.

The main focus of travel behaviour research lies on cross-sectional data. Trends over time are commonly examined on the macro level with aggregate data only. If individual data is used at all, it is mostly based on re-

peated cross-sectional surveys that do not allow for the detection of temporal trends on the individual level. Therefore our knowledge on the development of travel behaviour throughout the individual life course, that would allow for an understanding of travel within the context of other biographical processes, is fragmentary at best. By biographical processes I refer to events in the individual biography that are correlated with specific forms of spatial mobility. These are mainly events in the household biography (e.g. the formation of a household with a partner, the birth of a child, divorce) and the employment biography (e.g. starting apprenticeship, choice of a profession or choice of a workplace).<sup>1)</sup>

So far, biographical approaches for a deeper understanding of spatial mobility have been developed almost exclusively in migration research. Most recently, however, the importance of a biographical theory of travel demand has been emphasised. A few papers are themselves preliminary works for a theory that is to connect different aspects of the life course. The work of LANZENDORF (2003) has to be highlighted here as the

only more comprehensive perspective. In contrast to most of the existing explanatory approaches to travel behaviour, which are based on personal circumstances and external conditions at a certain point in time, a biographical theory emphasises aspects of biographical structures and processes as determinants of the issue to be explained.

The biographical course of travel demand is termed 'mobility biography' in this paper.<sup>2)</sup> To characterise individual travel demand, the terms 'travel behaviour' and 'availability of travel means' or 'car availability' are used for clarification.

The few existing studies tend to concentrate on particular aspects of the mobility biography, e.g. the changes in travel behaviour and motorisation after residential moves or other important life course events (VAN DER WAERDEN et al. 2003; KRIZEK 2003; STANBRIDGE et al. 2004; DARGAY a. HANLY 2004; HANDY et al. 2005; PRILLWITZ a. LANZENDORF 2006; SCHEINER 2006b). Overall the interdependencies between short-term travel decisions and long-term biographical processes have been ignored for a long time in transport science. As a consequence, they are not fully understood yet (WADDELL 2001, 5).

One reason for the small number of studies is the lack of panel or retrospective data on the individual level. This should not come as a surprise, as the collection of such data requires high expenses, time and ef-

fort. What is more, such studies face serious theoretical and empirical complexities. Therefore only an attempt can be made here to collect some elements for a biographical approach to travel demand, and support these elements by existing empirical evidence as far as possible. In doing so, I draw on my own work, besides literature review.

The relevance of a dynamic, biographical theory of travel demand for science and transport policy lies, first of all, in raising new research questions that might lead to deeper insight into travel demand. What is more, such a theory may improve the valuation of the sensitivity of various population groups to policy concepts, and therefore improve impact analysis: changes in travel behaviour are an important indicator for the break of habits and, consequently, for the *changeability* of behaviour (PRILLWITZ a. LANZENDORF 2006, 3). If travel behaviour remained unmodified even after far-reaching changes of the relevant frame conditions, then changes in these frame conditions implemented by policy or planning measures would be ineffective.

Furthermore, impact assessment largely depends on cause-impact-relationships. With cross-sectional approaches, however, the reasons and effects of travel demand can not be separated from each other, as far as they may be modified by travel demand itself. An example for this is the finding that the number of trips of car owners is higher than those of individuals without a car. This empirical observation has long been interpreted as a mobility enhancing effect of the private vehicle. More sophisticated analyses lead to the conclusion that it might be the other way round: individuals with a high variety of commitments and activities (and therefore a large number of trips) tend to purchase a car more than others (see for discussion APEL a. ERNST 1980; SCHEINER 2006a). Ultimately, the direction of cause and impact can not be inferred from cross-sectional analyses.

<sup>1)</sup> The respective 'partial biographies' are frequently also referred to as cycles (family cycle, employment cycle). This notion suggests a more or less predetermined course that may be summarised into a few typical stages. However, in the last two decades there was a body of research on individualisation and pluralisation of lifestyles. This research made clear that it is hardly reasonable to assume a small number of typical forms. Instead, there is an intricate diversity of forms and combinations of the 'partial cycles'. This suggests the term 'biography' as being more adequate than 'cycle'. For the same reason I use the term 'household biography' instead of 'family biography' (BIRG et al. 1998), because in the face of declining fertility and increasing divorce rates the term family is not suitable any more to capture the diversity of household forms, particularly in their biographical course.

<sup>2)</sup> 'Travel biography' would indicate a clearer difference from residential biographies. However, 'mobility biography' has already been introduced by various authors (LANZENDORF 2003; OHNMACHT a. AXHAUSEN 2005; SCHEINER 2006b). What is more, in a newly developing research field it may be an advantage to conceptually include the relevant context. The notion 'mobility biography' performs well in this respect, as it refers to other relevant 'partial biographies', particularly with regard to residential mobility, but social mobility as well.

## 2 Theoretical considerations

### 2.1 Elements

The term mobility biography describes the development of travel demand including the demand for cars and other means of transport over a person's life course. It suggests that changes in travel demand do not occur arbitrarily but have a certain relation to important key events in the life course that trigger such changes. Various aspects of travel demand are possibly affected by such events. They include activity or trip frequency within a given time, the covered distances,

activity spaces and travel mode use, as well as the preceding decisions on the purchase of a car, a bicycle or a season ticket for public transport (PT).

An important element for the explanation of travel demand is residential location. Therefore a person's mobility biography has to be seen in the context of his or her residential biography, i.e. the sequence of the places of residence. As BIRG et al. (1998) have shown, the residential biography itself has to be understood in the context of other 'partial biographies', namely household biography and employment biography. There are interdependent relationships between these elements; i.e. unidirectional cause-impact-relationships can not be assumed. Consequently, it depends on the respective research question what is regarded as the 'dependent variable'. In this contribution the focus is on a better understanding of travel demand, which accordingly is regarded as a dependent variable.

The complex interrelations between employment biography, household biography and residential biography can not be addressed here in detail, neither can the determinants of these partial biographies be discussed in depth. Both, interrelations and determinants, are topics of sociological and demographic life course research (WAGNER 1989; ARL 1992; BIRG et al. 1998; STOVEL a. BOLAN 2004). The decision processes underlying travel behaviour are also to a large extent excluded (see WADDELL 2001). Instead, I will concentrate on the interrelations between the said partial biographies on the one hand, and travel demand on the other hand. In spite of the methodologically narrowed focus on travel demand as a 'dependent variable', it will become clear that neither residential biography nor employment biography have unidirectional cause-impact-relationships with mobility biography.

For the description of the interrelations a frame model is being suggested (Fig. 1) whose 'demographic components' are oriented at BIRG et al. (1998) who examine the interdependent relations between employment biography, household biography and residential biography. Here, these three elements play a role as an explanatory background 'only', the relations between them are less in the focus. However, events in one of these three partial biographies may affect the mobility biography. In the mobility biography itself, a distinction is made between availability of transport means and travel behaviour. In doing so, the decision to purchase a certain means of transport (availability) may be regarded as a relatively stable pre-decision over its actual use, even though there are delays between the purchase of a transport means and its use (SIMMA a. AXHAUSEN 2001a). The purchase of a certain means of transport is therefore essential for the development and stabilisa-

tion of routines of travel mode choice. The car is particularly important here due to its high purchase costs, as compared to a bicycle or a PT season ticket. The high costs make it a long-term investment whose net benefit increases with the frequency of its use (because the total costs per kilometre driven decline with increasing use).

However, in contrast to the USA, the decision in favour of a PT season ticket (BahnCard, regional or local monthly ticket) does play a relevant role in Germany. This is negatively correlated with the decision on a car (SIMMA a. AXHAUSEN 2001a); nevertheless there is a considerable potential of multi-modal users who use PT despite owning a car (BECKMANN et al. 2006).

The interrelations shown in the model are examined in the following section on the basis of existing empirical knowledge. A new workplace may serve as an example for a significant event in the employment biography. It may lead to the decision to purchase a car, if the longer trip distance does not allow for the use of a bicycle any more, which was used for the trip to the old workplace. But the change of workplace may also directly affect travel behaviour without touching the availability of transport means, e.g. if the work trip distance changes.

This relationship turned the other way round can also be studied with biographical data. For instance, it has been argued that car availability enhances access to work places and that the car may therefore be regarded as an instrument for integration into the labour market, particularly for women because of women's complex trip patterns (DOBBS 2005).

## 2.2 *Habits and their breaks: key events in the life course*

Besides asking for life domains relevant for mobility biographies, another question relates to the reasons why a person's travel demand should considerably change in the context of certain events, but remain stable in between. This assumption refers to the habituation of travel behaviour and the observation that such habits may be broken only once the context changes.

Everyday action generally appears to be highly habitual (ESSER 1991). This is also true for travel behaviour. Habits (or routines) make action easier and less risky. They are used when the search for alternatives is likely to require search costs too high to accept, or when the benefit expected is too small or too unsure (GÄRLING a. AXHAUSEN 2003, 2). Routines manifest themselves in the repeated execution of action sequences (ibid.), although this is not a sufficient criterion to define

a certain action as a routine. A constitutive attribute of routines is the un-scrutinised schematic execution of pre-stored action patterns working as 'recipes' (ESSER 1991, 61ff.). STANBRIDGE et al. (2004) point out that mode use may be maintained after residential relocation although the routine has been broken and alternative modes have been considered. The consideration given to alternative modes may simply have reaffirmed the original modal choice as the best solution.

Most recently the day-to-day variability of travel behaviour has become part of the research agenda. Thereby the belief in the strength of travel behaviour habits has been challenged, as detailed analyses indicate a high degree of variability (SCHLICH et al. 2000). On the other hand many an analysis shows the high stability of travel behaviour. SIMMA and AXHAUSEN (2001b) show that the daily number of trips as well as the daily travel distance is closely correlated with the respective same variable measured the days before. SUSILO and KITAMURA (2005) find rather stable activity spaces over a six week period, particularly for workdays. In terms of travel mode use, the results of SCHAD et al. (2001) indicate high stability over the week. 63% of their respondents use PT not once throughout the whole survey week. It is self-evident that the share of flexible transport mode users increases with the length of the survey period (BECKMANN et al. 2006).

By and large, travel behaviour can be regarded as rather stable in the short to medium term. Residential location as well as many activity places and the trip distances connected to these places do not change rapidly: the place of work or education, relatives' and friends' places of residence, leisure places, the location of doctors or other regularly visited services, familiar shopping places. Travel mode choice as well can be assumed to be more stable than variable.

If there are medium to long biographical periods of stable travel behaviour, then certain moments within an individual's biography may be assumed when remarkable changes take place. The biographical theory of migration research speaks of 'long-term commitments' (BIRG et al. 1998, 104) that have to be accepted, even though the consequences are hardly (or not at all) reversible and the risks of the decisions can not be overlooked (e.g. formation of a family, house building).

Such commitments may be referred to as biographical key moments that are connected to certain events. The following biographical events have been identified as transport relevant (LANZENDORF 2003; VAN DER WAERDEN et al. 2003). They can be summarised in three categories:

a. household biography: leaving the parental home; formation of a household with the partner/founding

a family; children's birth; divorce; move-out of the children

b. employment biography: commencement of job training or university entry; entry into the labour market; change of job or education; retirement

c. spatial mobility: gaining a driver's license; purchase or disposal of a car; residential move.

In addition, two more biographical periods are considered here:

d. childhood: there is ongoing debate in transport psychology on the importance of socialisation in childhood and adolescence for travel demand in adult age

e. entry into high age: in gerontology a distinction is made between 'third age' (the 'young old') and 'fourth age' (the 'old old'), because adaptations of everyday life due to physical and health constraints generally do not become necessary before about 75 years of age ('fourth age'). Even when the entry into the 'fourth age' does not meet a defined biographical key event, setting an age limit seems reasonable.

It has to be mentioned that the purchase and disposal of a car are rather regarded as parts of the mobility biography than as determinants, as both are pre-decisions that can be interpreted as a kind of 'self-commitment' with respect to travel mode choice (SIMMA a. AXHAUSEN 2001a).

Another important point that has to be stressed here is the asymmetry of certain changes. KRÄMER-BADONI and KUHLM (2000) argue that the activity options the car permits, once established, can not be developed back. According to this, the likelihood of a car purchase after a certain event (e.g. increase in income, moving from a city to a suburb) should be higher than the likelihood of a car disposal after the contrary event (decrease in income, moving from a suburb to a city). Indeed there is some evidence for this asymmetry (see below). This means that in a biographical perspective one can not assume symmetrical inverse developments. Instead, trends have to be examined with regard to both directions, based on theoretical arguments.

This affects the political consequences of analytical studies. Assume that, say, the increase in household motorisation after moving to a suburb is higher than the decrease in motorisation after moving to a central city. Then the attempt to reduce motorisation through incentives for moving to the city can only count on the smaller change rates of car disposal after relocations into the city, while the high increases in motorisation after relocations to the suburbs can not be rolled back. On the other side, policy measures aiming at avoiding residential moves to the suburbs, e.g. by making inner city neighbourhoods more attractive for families with

children, may hope for comparatively strong effects as they might prevent car purchases in the first place.

### 3 *What do we know about the importance of biographical key events for travel demand?*

#### 3.1 *Childhood*

There is ongoing debate, particularly in mobility psychology, about the effects of travel mode experiences of children on their later travel mode choice as adults (FLADE 1999). However, there is not yet conclusive evidence about such effects. MIENERT (2003) finds that attitudes towards the car and driving are only to a very limited degree bequeathed from parents to children (if at all, from fathers to daughters). However, this does not necessarily say anything about actual car use.

Migration research gives some hints on the effects of childhood (or adolescence) experience on spatial mobility. Individuals who had moved frequently in their childhood tend to move more often than average as adults. This is interpreted as a result of learning processes and ‘inheritance’ of social status (WAGNER 1989, 158ff.; MYERS 1999).

Moreover, there is some evidence for an impact of location experiences during childhood on location choice. In a study in the region of Dresden such associations became evident: adults who had spent their childhood in urban areas tended to live in Dresden or in medium-sized towns in the urban fringe, while adults originating from rural areas tended to settle in a smaller peripheral community. The analysis was limited to persons originating from other regions, for whom a location decision independent from family ties could be assumed (BAUER et al. 2003). BRECKNER (1998) describes such return migrations to a certain type of area as ‘biographical compasses’.

#### 3.2 *Founding a family, child birth, separation / divorce*

The household biography plays a major role for the motorisation of households. Household motorisation changes considerably with the increase or reduction of the number of adult household members (DARGAY 2001; MOHAMMADIAN a. MILLER 2003; DARGAY a. HANLY 2004; KASPER a. SCHEINER 2006). Changes in spatial context by relocations play a notably smaller role.

HEINE and MAUTZ (2001) examine the motorisation process of families throughout the family biography by detailed qualitative interviews. According to the youngest child’s age, they distinguish four stages: (1) be-

fore the birth of the first child, (2) up to nursery school entry, (3) nursery school to the first school years, (4) advanced grades of primary school to driver’s license age. In the first stage, HEINE and MAUTZ detect the degree of car dependence as mainly determined by residential location, but later on constraints of coordination and time budget as well as a number of child-centred narratives become responsible for an ever increasing car dependence. The child-centred narratives are primarily based on the child’s optimal self-development (that feeds the argument ‘quality over proximity’ for the child’s activities) and on protection and safety arguments (HEINE a. MAUTZ 2001, 99ff.).

According to these results, car dependence becomes ever stronger while the family cycle proceeds, particularly for the mothers. At the beginning there is the claim for all-round care for the first child. After the second child is born, at the latest, a car for the mother becomes indispensable. This makes a second car or an arrangement with the father necessary, who, as the case may be, has to get to work by public transport. In the third stage coordination and time budget constraints get even worse for many mothers when they want to re-enter the labour market, a wish that further increases car dependence. In the fourth stage car dependence could possibly decrease, but then again may increase due to new, self-produced necessities, e.g. when the mother wants to change from part-time to full-time employment, a change that leads to higher household income and possibly to the purchase of a second car.

Overall these findings show considerable gender specific differences in the development of travel demand over time. These are, above all, determined by the gendered distribution of education and childcare and the temporal abandonment of employment by many mothers.

On the effects of other key moments in household biography on travel demand, such as separation or divorce, one can only speculate. Motorisation and car use in single households is considerably lower than in larger households, a fact that is presumably due to financial reasons, besides less coordination constraints. However, this does not necessarily imply car disposal or a reduction in car use after the break up of a relationship, even when this seems plausible because of the financial losses after breaking up.

#### 3.3 *Retirement*

Going into retirement brings about a notable loosening of time budget constraints. This goes along with considerable changes in travel behaviour. The number of trips declines and the daily travel distances get

shorter because of the cessation of job trips. At the same time, this allows for new out-of-home activities (or higher frequency of activities already undertaken before). Indeed there is some evidence for a rapid increase in leisure activity frequency after retiring, however without a compensation of the saved job trip kilometres by longer leisure travel distances (HOLZ-RAU a. SCHEINER 2004). If this is true, the additional activities are mainly micro-spatial events within the neighbourhood, such as going for a stroll, walking the dog or visiting cafés.

At the same time car dependency declines, but this rarely leads to car disposal. Notwithstanding, PT marketing campaigns using the key moment of retiring are quite successful, such as free trial tickets for new retirees (STAMMLER a. WAGNER 2003). For reasons of health, social contact and maintenance of self-dependence, many senior citizens like walking. This is one reason for the comparatively small-scale activity spaces of the elderly (SCHEINER 2004). However, this is not likely to be tied to the moment of entry into retirement, but more a trend throughout post-employment age that points to old age.

### 3.4 Old age

In the 'fourth age' mobility declines severely, but this decline can not always be tied to a clearly definable key moment. According to the results of SCHEINER (2006a), a severe decrease in (leisure) mobility of the elderly does not take place before there are serious health restrictions, as they typically occur in old age. The decline in mobility in old age relates to trip frequency, activity variety, travel distances and travel time budget (see also TACKEN 1998).

In this observation age and cohort effects interfere with each other. Cohort effects are the main reason for the notably lower motorisation of the very old (particularly women) compared to younger adults at present (BECKMANN et al. 2005). A second reason for the lower motorisation of the very old is the age-related decrease in household size by the passing of one partner (mostly the licensed, male partner). Combined with health restrictions and decreased activity level, this makes the maintenance of a car unnecessary or impossible for some elderly. But the cohort effect is probably not the exclusive explanation for the lower motorisation of the elderly. This is supported by the fact that even among elderly license owners motorisation steeply declines with age (HOLZ-RAU a. SCHEINER 2004). This suggests (although this has not yet been proven by life course data) that even former car owners partly dispose of their car. Frequently the cessation of driving goes along

with decreased activity frequency (MAROTTOLI et al. 2000), although clear evidence on cause and impact is not yet possible.

### 3.5 Residential moves

Residential moves (migrations) are closely linked to changes in housing and location needs. These changes correspond with events in employment and household biography, such as household formation, child's birth or workplace change (DIELEMAN a. MULDER 2002). As many such events are age-related, the outcome is by and large a universal age-specific curve of migration rates (ibid.).

Generally spoken, the consequences of a residential move for travel demand lie in changes in the accessibility of opportunities due to the location change. Such opportunities include, on the one hand, activity places, such as the workplace, retail and leisure facilities, relatives' places of residence et cetera. On the other hand, the transport system (particularly PT) provides opportunities as well (VAN DER WAERDEN et al. 2003). From these considerations, two important distinctions of migration type may be derived for the examination of interrelations between migration and travel demand:

- Firstly, the combined spatial differentiation of migration origin and destination is highly important, as a change in accessibility is not only implied by the spatial context at the new place of residence, but also at the former place. For instance, there is no reason to assume that moving into an inner city neighbourhood leads to increased PT use, as long as the former place of residence was a neighbourhood of the same type.

- Secondly, migration distance has to be considered, as it indicates in how far activity places can be maintained after the move. Long-distance migration might lead to more long-distance travel to visit relatives, whereas the former workplace is not likely to be maintained (indeed in most cases a workplace change may well have triggered the long-distance migration).

There is already some interesting evidence from recent research on the effects of residential moves on travel demand that can be summarised in two key points:

- Changes in car availability and travel mode use in the context of residential moves
- spatial orientations and travel distances after residential moves.

*Changes in car availability and travel mode use after residential moves* have recently been shown in a number of studies. These changes are associated with changes in accessibility. For spatial planning they play an important role, as there is increasing doubt as to whether spatial

differences in travel demand, as observed in cross-sectional analyses, may be interpreted with respect to the spatial context. Instead, these differences may have to be seen as an outcome of individual location decisions of the respective residents (SCHEINER 2006b), who choose a location according to their individual location needs and their available (or preferred) means of transport. There is substantial evidence now for such ‘residential self-selection’ effects:

- BAGLEY and MOKHTARIAN (2002) find that spatial effects are of limited, if any, importance for travel mode choice when lifestyle and attitudes towards transport modes and locations are being controlled for. The results of KITAMURA et al. (1997) and HANDY et al. (2005) point into a similar direction. According to these, the effects of attitudes on travel mode choice outweigh the effects of urban form and sociodemographics by far.

- SCHEINER (2005) proves the motorisation of suburbanising households *before* their move to be distinctly higher than the motorisation of their neighbours who stay in the city (‘stayers’) (similarly BAUER et al. 2003). Demographic differences between the groups have been controlled for.

- A finding concerning PT season ticket ownership indicates self-selection as well: although moving to an inner city quarter of Cologne frequently involves the purchase of a season ticket, the share of respondents who own a season ticket before *as well as* after the move is notably higher (KASPER a. SCHEINER 2006).

However, if spatial differences in travel demand were exclusively caused by such self-selection effects, then travel demand must not change after residential relocations. This does not meet the results yielded so far, as transport mode habits indeed appear to be broken after relocations:

- HANDY et al. (2005) find that travel mode use as well as travel distances by car change significantly after residential moves even when location attitudes and travel mode attitudes are being controlled for. This is interpreted by the authors as evidence for a causal impact of spatial context. KRIZEK (2003) confirms this with regard to travel distances, while the changes in mode use are smaller (a result that indicates self-selection effects).

- SCHEINER (2005) finds, beside the self-selection effects discussed above, adjustments in motorisation after residential moves. As expected, the direction of the adjustments is associated with the direction of the move: motorisation increases following moves from the central city to the urban fringe and decreases whenever the migration is in the opposite direction. In terms of travel mode to work this is confirmed by DARGAY and HANLY (2004). But even after moves from the city to the periphery there are margins for car dependence to increase more significantly or less significantly, for instance by choosing between a small community and a central place in the periphery, when the latter offers an acceptable PT supply (‘multi optional location’, HEINE a. MAUTZ 2001, 124; BAUER et al. 2003). Anyway, leaving the city normally narrows the margins for travel mode choice. Hence, income elasticity of car travel is lower in rural areas than in the city (DARGAY 2002), because the decision in favour of a location far from a high-quality PT supply hardly allows a reaction on changes in the transport system anymore.

- Travel mode options are reconsidered to a considerable degree after residential moves. According to this, habits may be broken even if there is no actual change in travel mode use (STANBRIDGE et al. 2004). In a field experiment where free trial tickets for PT were distributed to the participants it was shown that the change of travel mode can be given direction, even for individuals with strong car habits. Thus, routines may well be broken in a new context situation (BAMBERG et al. 2003).

*Everyday spatial ties to the former place of residence after residential moves* have been examined in a number of

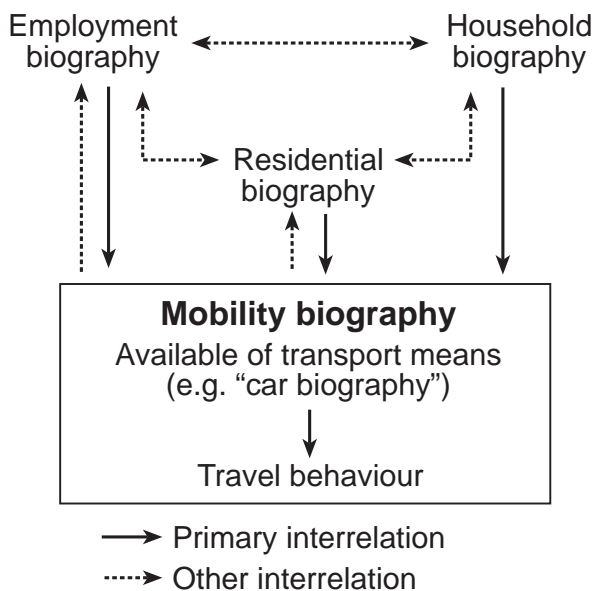


Fig. 1: Model of the interrelations between mobility biography and other relevant ‘partial biographies’. Source: own concept

Modell der Beziehungen zwischen Mobilitätsbiographie und anderen relevanten ‚Teilbiographien‘

Quelle: Eigener Entwurf

studies. As mentioned above, their strength depends on migration distance.

– After suburbanisation, activity places in the central city are frequently maintained in the medium term (HOLZ-RAU 2000). Micro-spatial ties to former places of residence have been shown for inner-city moves as well. They are particularly evident for activities which are connected to trustful personal relationships, such as private visits or doctors appointments (SCHEINER 2000).

– Because of persistent ties to the central city, the covered travel distances increase after moving to a suburb. Vice versa, travel distances drop after moving to a city, albeit less distinctly, a difference pointing to an asymmetry in the dynamics of travel demand (KLOAS et al. 2001, 118ff.). Compared with ‘old-established’ residents in remote communities, ‘new suburbanites’ who moved in from the central city cover longer travel distances due to their ties to the city (BAUER et al. 2003; KASPER a. SCHEINER 2006).

Spatial ties to the former place of residence as well as habits brought along from the former place of residence were irrelevant in terms of transport if they were maintained only short-term. Indeed, results of HOLZ-RAU (2000) indicate that the ties of ‘new suburbanites’ to the central city concerning job trips drop distinctly after some years, indicating lagged workplace changes. According to other findings, however, movers from the city to suburbia who have been living in suburbia for at least four years travel distances equally as long as those of ‘new suburbanites’ with a residential duration of not more than three years. This is true for job trips as well as shopping and leisure travel (KASPER a. SCHEINER 2006). The long-term stability of ties in leisure activity spaces to the former place of work has also been shown for senior citizens (SCHEINER 2004).

Two more findings point to general inter-individual differences in ‘mobility disposition’ or willingness to be mobile in terms of sensitivity against distances and/or travel time budget.

Firstly, daily travel distances increase markedly with the distance of the last residential move (KASPER a. SCHEINER 2006). This is particularly true for leisure travel – indicating the maintenance of private relationships –, but also for job and shopping trips. Secondly, SIMONSOHN (2006) shows that the duration of the job trip among those who moved into a city depends on the individual job trip duration at the former place of residence as well as on the *mean* job trip duration of *all* employees at the former place of residence. The former may be interpreted as *individual* mobility disposition, while SIMONSOHN interprets the latter as an effect of *collectively* practised, ‘place typical’ habits for mobility

disposition that can be summarised in the phrase ‘New Yorkers commute more everywhere’. Whether or not this is also true for commute distances or travel mode choice, remains an open question.

### 3.6 Workplace change and employment biography

A classical model of urban economic theory (ALONSO 1964) sets housing location choice as dependent on workplace location. In more recent models, since about the 1980s, it is assumed that workplace location must not be set exogenous in modelling residential location choice. Rather, both have to be varied simultaneously (SIMPSON 1987; WADDELL 2001). Longitudinal analyses by KALTER (1994) indicate that a given combination of residence and workplace location is rather abandoned by workplace change than by a residential move. Contrary to ALONSO’s model workplace location appears to be adjusted to residential location rather than vice versa.

Because of the ‘revolutions of accessibility’ during the last decades a loosening of the spatial ties between residential location and workplace may be assumed over time. This becomes visible in increasing commute trip lengths (FROST et al. 1998; SCHAFFNER 2000). After a change of workplace the job trip tends to become longer in terms of distance (KLOAS a. KUHFIELD 2003) and, if less so, trip duration (DARGAY a. HANLY 2004). Proximity to the workplace therefore seems to be less important as a location criterion, high accessibility given. What is more, workplace changes, as residential moves, are significantly associated with changes in travel mode (*ibid.*).

With the mentioned loosening of the spatial ties between residence and workplace over time, the interrelations between employment biography and residential biography should tend to disassociate as well. This process may also be observed in transport. Long-distance commuting increasingly becomes a substitute for residential moves, even if long-distance commuting is in some cases only a precursor of moving closer to the new workplace. In contrast to an assumption of individualisation theory we do not appear to be a ‘fully mobile single society’. Instead, we try to maintain our anchored social ties. Valuing residential immobility we tend to accept the trade-off in form of greater commuting distances (KALTER 1994). This has to be interpreted with respect to the partner’s employment biography, as in dual-earner households the net benefit of a residential move closer to the workplace is potentially diminished or even turned into negative by the increase in distance to the partner’s workplace.



Income changes are another key moment in employment biography. DARGAY (2001) finds lagged changes in motorisation following income changes; the car may be purchased up to a few years after the income increase. The observed dynamic is asymmetrical: the motorisation increase following an income increase is larger than the motorisation decrease following an income decrease. The same is true, albeit less significantly, for car travel distances (DARGAY 2004).

This asymmetry may be interpreted as a normative power of the car concerning time accessibility standards and self-determination over one's own time (HEINE a. MAUTZ 2001) that leads to a kind of 'biographical closing process': as soon as the vehicle is there, it becomes indispensable. "This multiplication of options, their integration into one's own daily life can not be rolled back" (KRÄMER-BADONI a. KUHM 2000, 168). This explains the low price elasticity of the vehicle (DARGAY 2004; HAUTZINGER et al. 2005), as compared to PT (BRESSON et al. 2003): customers react significantly to price increases in PT, but less so to price increases in individual motorised transport. This inequality might have become even more pronounced over time, as the income elasticity of car travel has declined (DARGAY 2004).

### 3.7 *Interrelations between the key events*

The various key events in employment biography, household biography and residential biography must not be considered in isolation. Two points have to be highlighted that can only briefly be outlined here due to lack of space.

Firstly, the various key events are intertwined in many ways, as shown by demographic and sociological research on residential biographies (WAGNER 1989; BIRG et al. 1998). For research on mobility biographies, this is not just an aspect of theoretical background. Rather it has practical implications for empirical research. One example: the close interrelation between residential moves and changes of the household type (or household size) has already been stressed by ROSSI (1955). The examination of the effects of residential location changes on travel demand therefore need to closely consider changes in the household context. Otherwise, car purchase would possibly be misattributed to location change, although in reality the birth of a child was the decisive factor.

Secondly, the reverse effects of the mobility biography on other partial biographies, f.i. on residential biography, have to be taken into account. The freedom of location choice heavily depends on car availability; the location options of households without a vehicle are

significantly limited compared to motorised households (VAN WEE et al. 2002; SCHEINER 2006c). But travel behaviour affects other life domains as well. Long commuting trips lead to serious burdens for the commuter himself and his family (STUTZER a. FREY 2004; SCHNEIDER et al. 2002) and to decreased fertility (ibid.). Consequently, long-distance commuters tend to change workplace or residence more than other employees (KALTER 1994).

### 3.8 *The relevance of external conditions*

At first glance, mobility biographies are an individualistic research approach, as a biography 'belongs to' an individual. Nonetheless it is essential to take external conditions into account. External conditions do not refer here to conditions on the individual level that may change during the life course – when a better PT system is available after a move from the rural to the city, or when the car is no longer available to one partner after a divorce. Rather it refers to macro-economic, technological or political conditions relevant to the whole population. These may be regarded as constant in cross-sectional approaches, as long as they are valid for the whole study population. In the long-term perspective, however, their consideration is imperative. Otherwise there is the risk to misinterpret changes over time as biographically generated, while in reality they are caused by external developments, such as transport price changes or a generally enhanced income level.

For instance, the extreme increase in motorisation after suburbanisation that has been observed in East Germany in the 1990s (HERFERT 1997) was partly an effect of the general motorisation process that happened anyway. More examples for such trends on the macro level are the development of telecommunication with the potential consequence of increasing spatial separation between workplace and residence (see discussion in MOKHTARIAN et al. 2004) and the extension of transport infrastructure with its chain reaction of induced travel that in turn triggers new infrastructure upgrading (CERVERO 2003).

It can not be expected that the relevance of external conditions for one's own acting is always correctly evaluated by individuals, such as respondents in a survey. Rather it may be assumed that a given historical situation, taken as an everyday life-world, remains un-scrutinised and is simply regarded as 'normal', so that a person will tend to attribute his or her acting to his/her autonomous decisions to a (too) great extent. Therefore the importance of frame conditions changing slowly over long periods may be detected best by searching for cohort effects (f.i. in motorisation, DARGAY 2002),

although this, admittedly, requires large sample sizes. Indirect evidence might also be found with qualitative methods. From retrospective qualitative interviews POOLEY et al. (2006) find that the motives and decision structures underlying travel mode choice have not altered significantly during the last century. They interpret this as an indication of changing technological and economic frame conditions.

#### 4 *How can mobility biographies be examined? – Methodological considerations*

Mobility biographies shall help to reconstruct the development of the individual travel demand in the context of other important events in the life course. The reconstruction of temporal processes meets an important – although not sufficient – criterion for statements on the causality of interrelations that is not met by the cross-sectional approaches to travel demand dominating to date.<sup>3)</sup> The complexity of the outlined research field calls for high standards in empirical surveys and data. At least these have to include information on employment biography, household biography and residential biography, as well as the mobility biography. This means that places of education and work, places of residence and relevant attributes of the household context (household structure) have to be asked for with sufficient exactness in their respective temporal course. To allow for analyses, the data complexity has to be reduced in a reasonable manner, e.g. by categorising places of residence into a limited number of spatial types, or by attributing residential moves to certain life cycle phases. Even so, the manifold combinations of key events in employment biography, household biography and residential biography will require large samples, if statistically significant results are aimed at.

To collect such data, there are essentially three techniques (LANZENDORF 2003): panel surveys, retrospective surveys, and the construction of pseudo-panels from time series. Because of the detailed methodological discussion in LANZENDORF (2003) this shall only briefly be outlined here.

<sup>3)</sup> The temporal precedence of an event is usually regarded as a necessary criterion for being a cause for a succeeding event (HANDY et al. 2005). However, this is not necessarily true. An action may be carried out in expectation of a certain event. Then this action is an impact of the anticipated event, although it precedes the event. Generally spoken, however, the cause precedes the impact.

Panel surveys suffer from the disadvantage of high expenditure, time and effort. Strictly speaking, to extract comprehensive mobility biographies from panel data requires repeated surveys over a whole life course, a task that does not appear to be realistic. But even with a limited number of repeated surveys – three in the German Mobility Panel (Deutsches Mobilitätspanel) – some elements of mobility biographies may be examined.

Retrospective surveys, as used by POOLEY et al. (2006) to reconstruct some aspects of mobility biographies over a period of about 100 years, may be realised without much difficulty, but confront problems of validity due to missing, selective or mistaken memory of the respondents and wrong valuations of their own action.<sup>4)</sup> Retrospectively collected detailed indicators of travel demand, such as activity spaces, trip frequencies and travel distances may not be valid; changes in lifestyle and attitudes over the life course are equally difficult to discern retrospectively (for an attempt see VAN DER WAERDEN et al. 2003). However, key attributes of the various partial biographies are likely to be collectable retrospectively in acceptable quality, such as household biography, places of residence and work, car availability and travel mode to work. The respective partial aspects may support and verify each other in the memory process during the interview. In qualitative surveys the collection of (as far as possible) standardised retrospective data before or during the interview may serve for validation.

The construction of pseudo-panels from time series data has the advantage that there are some repeated cross-sectional surveys available. In pseudo-panels, cohorts (usually birth cohorts) are pursued over a certain period. This allows, firstly, for an observation of the mean behaviour of cohorts over time and, secondly, for comparisons between cohorts. However, this methodology does not meet a genuine biographical approach, as the observations relate to the 'mean development' of whole generations rather than individual life courses. As a consequence, the effects of individual biographical key events on travel demand may not be examined.

<sup>4)</sup> For instance, two studies observe the same distortion in the self-reported changes in mode use after residential relocations: the frequency of trips by foot increases significantly, respectively (HANDY et al. 2005; KASPER a. SCHEINER 2006). Conversely, HANDY et al. report a general decrease in car trips after residential moves. What is more, data reaching far into the past can hardly be validated by aggregate benchmark figures from other sources, because before 1970 there was worldwide hardly any travel behaviour survey that included non-motorised trips.

## 5 Conclusions

Studying mobility biographies possibly yields substantial new insight into the dynamics of travel demand over time. Concerning a number of biographical key events, there is already promising knowledge from international as well as German research. Above all, this includes the interrelations between residential moves and travel, although there are still substantial knowledge gaps in this research area. By contrast, interrelations between employment biography and travel demand can indirectly be deduced from cross-sectional comparisons between different population groups. Furthermore, there is little research on the effects of key events in the household biography on travel demand. And last, but not least, we do not yet know much about the effects of a child's 'mobility socialisation' on travel demand and location choice in adult age.

The complete 'monolithic' description of mobility biographies over the whole lifespan will remain impossible in the near future. However, partial analyses of mobility biographies bear substantial challenges for research. The existing empirical knowledge is promising enough to make more efforts appear worthwhile. A look to the biographical theory of demographic processes shows that the explanation of migration frequencies exclusively on the basis of biographical determinants yields good results in terms of variance explanation rates (BIRG et al. 1998, 118ff.). This is no evidence for the goodness of fit of similar research approaches in the sector of travel behaviour. Yet it is an incitation and an invitation to find out more about the biographical backgrounds of travel demand.

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