



## Sustainable Urban Transport

Mode Decisions and Context Change - What About the Attitudes? A Conceptual Framework

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# CHAPTER 3

## MODE DECISIONS AND CONTEXT CHANGE – WHAT ABOUT THE ATTITUDES? A CONCEPTUAL FRAMEWORK

Annika Busch-Geertsema and Martin Lanzendorf

### ABSTRACT

*Purpose – Theoretical assumptions for explaining travel behaviour changes are frequently limited to disciplinary boundaries. By combining the occurrence of key events with attitudinal dimensions in the ROA model and, furthermore, drawing on the model of cognitive dissonance, an integrated theoretical framework is presented.*

*Methodology/approach – We review several streams of research in different fields of travel behaviour research and develop a theoretical framework for guiding future empirical work on travel behaviour research.*

*Findings – The theoretical framework proposes that due to a key event a window of opportunity opens for behavioural change and adaptation processes of attitudes and behaviour.*

*Research limitations/implications – Further empirical research will have to show the validity and usefulness of the theoretical framework*

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*developed. A panel data analysis is proposed with attitudinal variables before and after a certain key event.*

**Keywords:** Key event; life course; mode choice; attitude; cognitive dissonance

## INTRODUCTION

Daily mobility decisions are strongly mediated by habits as they simplify the process of decision making. However at certain moments in life, at so called key events, habits are interrupted through changes in different life domains, for example through the birth of the first child or a residential relocation. Because of these changing circumstances, a window of opportunity is opening for behavioural change, like for example, changes in mode decisions. But how exactly does that work? Which influences have mobility-related attitudes on travel mode decisions before and after such a context change? How do those attitudes and (new) spatial contexts interact?

In this contribution we assemble and combine several streams for the understanding of the complex process of travel behaviour change. The theoretical framework of our work is based on the one hand on the weakening and break of habits through key events in life course (Lanzendorf, 2003). On the other hand, we use the requirements, opportunities and abilities (ROA) model (Harms, 2003) to understand the relevant factors for travel mode choice. The ROA model includes both internal and external factors for explaining travel choices: the individual life situation, personal values, the subjective norm perceived and formed by the social context and, external mobility conditions like the quality of infrastructure. Drawing on the theory of cognitive dissonance (Festinger, 1957), we maintain that if mode choice and attitudes were dissonant before a key event, the individual tries to harmonise those two inconsistent cognitions by either changing behaviour or changing attitudes. The ultimate objective of this contribution is to add another piece to the puzzle of understanding travel behaviour changes by combining different theoretical models and in particular by focusing on the attitudinal dimension to explain changing travel mode choices after a context change.

We will argue that an improved understanding of travel behaviour changes and related processes during phases of key events is needed for more efficient shaping of adequate interventions and that this requires a strengthening of the theoretical and interdisciplinary assumptions of travel

behaviour research. The theoretical framework presented in this chapter may provide the starting point for future empirical work and, following that, measures to promote sustainable mobility behaviour.

The remainder of this contribution is structured as follows. First, we start with an overview of deliberate mode choice decisions by considering situational as well as personal factors and introducing the ROA model. Following that, we address attitudes and their influence on mode choice and focus especially on attitudinal change with the theory of cognitive dissonance. By bringing in key events in the following section, we indicate specific moments in life, when habits are weakened and cognitions may change. Ultimately, we bring together the different concepts and develop our conceptual framework before we conclude with a short discussion and an outlook on the need for further research.

## MODE CHOICE DECISIONS

In the scientific debate on mode choice decisions starting back in the beginning of the 1970s (Harms, Lanzendorf, & Prillwitz, 2007), a multitude of assumptions and theories exists. Important for the individual mode choice decision are situational as well as personal factors. Personal factors are often divided into socio-demographic characteristics and psychological variables (Hunecke, Haustein, Grischkat, & Böhler, 2007). In the following, we therefore shed some light on all types of influencing factors, but focus on the individual ones. On this basis, we introduce the requirements, opportunities and abilities (ROA) model.

### *Situational Factors*

Situational factors include attributes of the personal areas of activity in terms of space, time and facilities and are thereby determining behavioural options. As situational factors, we summarise (1) a land-use component, (2) a transport component and (3) a temporal component following the accessibility concept of Geurs and van Wee (2004). The land-use component affects the transport demand, as it determines the amount, quality and spatial distribution of relevant destinations. The transport component reflects the transport system and therefore the supply and location of transport infrastructure as well as quality characteristics such as speed, cost and

comfort. The temporal component comprises the temporal constraints, which allow or inhibit activities such as business hours of a shopping opportunity or constraints due to the personal schedule (Geurs & van Wee, 2004).

Focussing on the demand side of transport and at the individual level, Hägerstrand (1970) identified several constraints, which restrict peoples travel behaviour and hence, he developed the time-space concept. Following that, individual travel behaviour is limited by the distance a person can reach in a certain time (capability constraints), by private and business schedules (coupling constraints) and by entrance restrictions (authority constraints). A further research field, where spatial factors meet the individual, appears through the discussion around residential self-selection, meaning whether urban form and transport characteristics of the neighbourhood are directly influencing mode choice or whether people are already taking those characteristics into account when moving to or deciding to stay in a neighbourhood (Bagley & Mokhtarian, 2002; Bohte, Maat, & van Wee, 2009; Cao, Mokhtarian, & Handy, 2009; Schwanen & Mokhtarian, 2005). Therefore, situational factors always have to be seen against the background of personal factors and travel behaviour cannot only be explained by the built environment. This reflects also in the accessibility model of Geurs and van Wee (2004), where the fourth and so far not mentioned individual component completes the system.

### *Personal Factors*

The group of personal factors affecting travel behaviour can be divided into external and internal factors (Gather, Kagermeier, & Lanzendorf, 2008). External factors, such as socio-demographics or income characteristics, can be measured easily in most cases, since they can be observed. Most statistics and transport models consider those factors and derive results such as women driving less by car compared to men or that the rich do more likely own a car than the poor (e.g. national travel surveys such as 'Mobility in Germany').

The situation appears more difficult when it comes to internal or attitudinal factors (Hunecke et al., 2007), such as attitudes, norms, needs or preferences. The identification and measurement of internal factors is complicated: disagreement in research led to different definitions and theoretical approaches. Further, the empirical work on it is technically challenging and therefore often leads to unequal operationalisation depending on

the research context, questions and methodologies employed. External and internal factors, however, should not be seen as being independent from another. Bergstad et al. (2011), for example, argued that attitudes mediate the effects of socio-demographics on travel behaviour.

Different mode choice models have been developed in the last decades. Due to the complexity of factors affecting travel behaviour, every model simplifies the decision process. Since researchers frequently belong to different scientific disciplines, they usually focus on one category of factors and neglect or under-represent others. For example, classical discrete choice models mostly neglect attitudinal factors, whereas psychological models often do not take into account external or situational factors (Harms, 2003; van Acker, van Wee, & Witlox, 2010).

#### *Theory of Planned Behaviour and Requirements, Opportunities, Abilities*

Developed in psychology, the theory of planned behaviour (TPB) (Ajzen, 1991; Fishbein & Ajzen, 1975) has been employed frequently in travel mode choice studies in the last years. With the underlying assumption of a rationally deciding individual, the TPB explains mode choices by (1) the personal attitudes towards the behaviour in question, (2) the subjective norm and (3) the perceived behavioural control (PBC) in the choice situation. The subjective norm refers to ‘the person’s perception of social pressure to perform or not perform the behavior under consideration’ (Ajzen, 2005, p. 118) and the PBC encompasses the subjective belief to be able to perform the action of interest. These three constructs, the attitudes, the subjective norm and the PBC affect the intention to perform a behaviour and, ultimately, the behaviour itself (Ajzen, 1991, 2005). However, in non-psychological disciplines, the TPB is often criticised because situational factors were neglected or under-represented (Harms, 2003; van Acker et al., 2010).

Therefore, the ROA model was developed, taking this criticism into account (Harms, 2003). Originating from consumer research in the 1980s (Andrews, 1988; MacInnis & Jaworski, 1989; Robben & Poiesz, 1993), Vlek, Jager, and Steg (1997) applied the forerunner model of the ROA, the needs, opportunities and abilities (NOA) model in environmental psychology. Harms (2003) merged the NOA model with the TPB, thereby creating the requirements, opportunities and abilities (ROA) model and applied it to her study on joining a car-sharing organisation. The TPB is a simple, often employed and proven model to explain conscious decision making. By integrating the core elements of the TPB, the ROA model uses

psychological internal variables on the one hand, and on the other, by adding the new NOA components, it also includes the relevant context and, therefore, the situational factors as well as external personal factors.

In the ROA model, three elements precede the TPB determinants: (1) mobility requirements, (2) mobility opportunities and (3) mobility abilities. Together with the construct values, the requirements and opportunities affect the attitude towards the use of the transport mode. Similarly, the opportunities and abilities affect the PBC. One's life situation and the surrounding mobility conditions influence the requirements, opportunities and abilities (Fig. 1).

As the renaming of the 'R'-element – from 'motivation' (Robben & Poiesz, 1993) to 'needs' (Vlek et al., 1997) to 'requirements' (Harms, 2003) – shows that researchers disagree on the degree of urgency of mobility demand. For applying the model to quantitative research, however, it is useful to narrow down the broad concept of needs, which Vlek (2000) in the NOA measured with 15 indicators of well-being and quality of life. Furthermore, many of these indicators overlap with the social construct values. Values in the ROA model are derived from the TPB and in general, defined as a conception of what is desirable. While attitudes relate to objects, people or situations, values are broader and abstract notions and hence, more general than attitudes (Bordens & Horowitz, 2000). In the

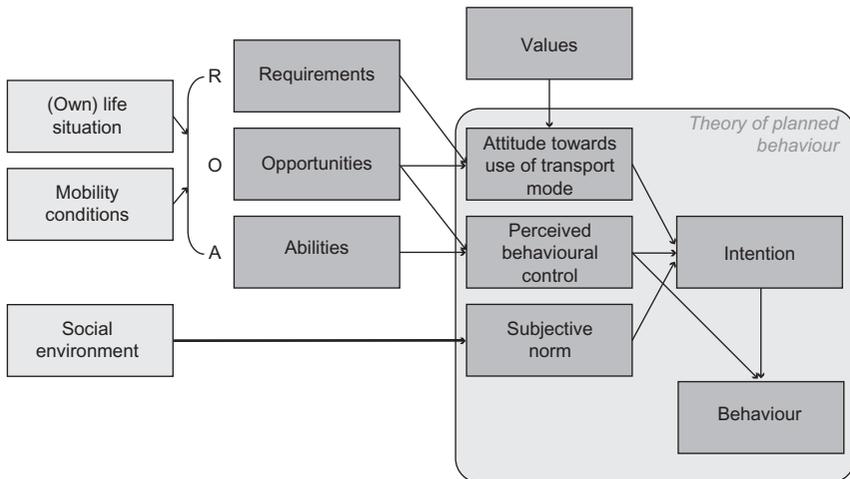


Fig. 1. The ROA Model. Source: Harms (2003, p. 193), own translation and modification.

ROA model, values include, among others, comfort, pleasure, privacy, status, safety and control which thus, more object-related, come into the concept via the attitudes towards a transport mode.

In the ROA model, requirements are defined as the subjectively perceived demand of mobility on the individual's level (Harms, 2003) such as time or distance constraints. The terms opportunity and ability are closer to each other but do not mean the same. Mobility opportunities are environment-related (Robben & Poiesz, 1993) and 'can be seen as a set of external facilitating conditions, such as the objective availability of goods, materials and services, their accessibility, the relevant information that is available, and prices' (Gatersleben & Vlek, 1998, p. 147). Mobility abilities, however, are more person-related skills (Robben & Poiesz, 1993), that enable a person legally, physically and financially to perform a behaviour (Harms, 2003).

A similar concept has been developed and employed by Thøgersen (2006, 2009) with the motivation, opportunity and ability concept. Similar to Harms, Thøgersen integrates the TPB into a framework existing of individual and external constraints. However, he sees the elements of the TPB as the motivation part, whereas in the ROA the three elements (requirements, opportunity and ability) come prior to the elements of the TPB.

Using similar determinants (motivation, opportunity and capacity), Morel, Poiesz, and Wilke (1997) developed the Triad model. The authors name several underlying assumptions such as a multiplicative relationship among the three determinants and the precondition of reaching some minimum level of all three determinants simultaneously for the engagement in a particular behaviour to be possible. Furthermore, they underline the importance of the subjective assessment of the factors for an engagement in the behaviour in question and the combination of subjective assessment and objective constraints when it comes to determining whether or not the behaviour will be expressed. However, they see the three determinants as exhaustive, which is not the case for the ROA model, where the subjective norm is not dependent from requirements, opportunities and abilities.

## ATTITUDES AND MODE CHOICE

Attitudes are personal factors affecting travel behaviour. In this section, we first summarise findings from the psychological literature on attitudes. Next, we examine how attitudes are applied in travel behaviour research

and, since the chapter focuses on a longitudinal perspective, how attitude changes over time can be explained with the theory of cognitive dissonance.

### *Definition of Attitudes in Psychology*

In social psychology, we usually discern three different types of definition for attitudes: the one-component, two-component and three-component attitude models (Hogg & Vaughan, 2008).

First, Thurstone specifies attitude as ‘the affect for or against a psychological object’ (Thurstone, 1931, p. 261). In this one-component model, affect can have a positive or a negative form and can be more or less intense.

Second, a bit more complex, emerges the definition derived from Allport’s theory (1954). He understood attitude as ‘a state of mental readiness, or an implicit predisposition, that has a generalising and consistent influence on evaluative (judgemental) responses’ (Hogg & Vaughan, 2008, p. 149). The two components of attitude are (1) the state of mental readiness that leads to (2) an evaluation of an object. Eagly and Chaiken see attitude in a similar way as ‘a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour’ (Eagly & Chaiken, 1993, p. 1).

Third, the three-component attitude model brings in three parts in which attitudes are often structured: (1) affective, (2) cognitive and (3) behavioural components (Rosenberg & Hovland, 1960). Attitude is then defined as ‘a relatively enduring organisation of beliefs, feelings and behavioural tendencies towards socially significant objects, groups, events or symbols’ (Hogg & Vaughan, 2008, p. 150). Although, or even because of its comprehensiveness, this definition is often criticised as implying a strong causal relationship between attitude and behaviour, which some researchers question (Hogg & Vaughan, 2008). Eagly and Chaiken (1993) employ in their standard work on the psychology of attitudes the ‘three classes of evaluative responses but eschew the formality of a three-component model of attitudes’ (Eagly & Chaiken, 1993, p. 14) since they observe obstacles in the statistically sound distinction of the three components.

At least three factors influence the strength of the relationship between attitude and behaviour: (1) situational factors (e.g. mood of the moment, strength and cognitive accessibility of attitude), (2) personal factors (e.g. idealism, self-awareness, self-monitoring) and (3) methodological reasons in the data collection (e.g. a specific attitude potentially forecasts behaviour better than a more general attitude) (Gollwitzer & Schmitt, 2009).

*Implementation and Operationalisation of Attitudes in Mobility Research*

Transport researchers are either interested in attitudes towards travelling in general (e.g. ‘Travelling is safe’), towards a specific travel mode (e.g. ‘Bicycling is safe’) or in a specific situation (e.g. ‘on my way to work’). Additionally, sometimes more general attitudes or, as defined above, values are used (e.g. ‘We live in a safe world’ or ‘Safety is important to me’).

The research on travel behaviour attitudes distinguishes three dimensions of attitudes affecting travel behaviour: (1) instrumental, (2) affective and (3) symbolic ones. First, instrumental attitudes are derived from cognitive-reasoned behaviour models (Steg, Vlek, & Slotegraaf, 2001) and were for many years the focus of travel behaviour research (Gatersleben, 2007). They may be further classified into (a) rather short-term, individual ones relating to a particular trip such as convenience, flexibility or monetary costs, and (b) rather longer term, collective ones such as health, fitness and the environment (Anable & Gatersleben, 2005). Second, affective attributes are emotions evoked by travelling, for example stress, excitement and pleasure (Anable & Gatersleben, 2005). Third, symbolic and social attributes are mentioned in the literature (Steg, 2005), which are sometimes combined with the affective dimension to one category (e.g. Bergstad et al., 2011; Hunecke et al., 2007; Steg et al., 2001). Steg argues that ‘people can express themselves and their social position by means of (the use of) their car, [and] they can compare their (use of the) car with others and to social norms’ (Steg, 2005, pp. 149–150). Hunecke (2000) subdivides the symbolic, respectively symbolic-affective dimension, into four dimensions: autonomy, status, excitement and privacy, which ‘depend strongly on processes of social interpretation’ (Haustein & Hunecke, 2007, p. 1859). Unlike Hunecke, who understands independence, or as he writes autonomy, as part of the symbolic or symbolic-affective dimension, Bergstad et al. (2011) argue that independence is rather an instrumental attitude. They understand independence as a need playing a ‘more important role for car use in rural areas and for multi-person households with children but a weaker role for members of younger, urban, or single households’ (Bergstad et al., 2011, p. 34).

Not surprisingly, some correlations between the instrumental, affective and symbolic dimensions of travel related attitudes have been discovered in earlier research. However, the results do not allow any conclusions for a causal relationship assumed from instrumental attitudes to affective or symbolic ones (Gatersleben, 2007). Schuitema, Anable, Skippon, and Kinnear (2013) show with the case of intention to adopt an electric vehicle, that the effects

of instrumental factors are mediated by affective and symbolic attributes. Furthermore, the impact of instrumental, affective and symbolic factors on travel behaviour depends also on the specific choice situation. For example, [Anable and Gatersleben \(2005\)](#) put forward that instrumental attitudes are more important for work trips while the affective and symbolic dimensions are more important for mode choices on leisure trips. This finding supports more general findings of research in psychology acknowledging that attitudes explain behaviour much better if they are more related to the specific behaviour in question ([Ajzen & Fishbein, 1973](#)).

### *Attitude Change*

For every person, his or her attitudes are relatively stable over time, especially accessible attitudes come to mind more easily and are likely to be stronger ([Gollwitzer & Schmitt, 2009](#); [Hogg & Vaughan, 2008](#)). Nevertheless, attitudes may change over time. Moreover, daily experience may affect specific attitudes, especially when the attitudes are weaker. For example, a respondent's attitude towards public transport may be affected by a bad experience a few hours ago, for example, a delay of a train. Thus, for the respondent the reliability of public transport may be more important in this moment than at another day when the train was on time. Therefore, the assessment of attitudinal changes is a particular challenge for research.

Attitudes may either change by convincing arguments of others (persuasive communications) or by experiencing a behaviour that affects one's attitude (compliance, conformity) ([Hogg & Vaughan, 2008](#)). The internal process of attitudinal change can take two routes: First, attitude change is a response to feelings, heuristics, conditioning or social identification, for example because an expert, a peer group or a friend has this attitude (e.g. elaboration likelihood model, heuristic-systematic model). Second, attitude change may result from a cognitive effort with the gathering and processing of relevant information (e.g. message-learning approach) ([Bohner, 2003](#); [Cacioppo, Petty, & Crites, 2012](#); [Eagly & Chaiken, 1993](#)).

### *Theory of Cognitive Dissonance*

Cognitions are a central concept in psychology. In general terms, we understand them as content of consciousness, which includes (1) perceptions,

(2) thinking processes, (3) opinions and attitudes and (4) behaviours (Gollwitzer & Schmitt, 2009). The theory of cognitive dissonance (Festinger, 1957) is one of the most frequently applied and cited theories in social psychology (Cooper, 2012; Hogg & Vaughan, 2008). It states that people prefer to adjust their attitudes with actual behaviour. If attitude and behaviour are conflicting, an unpleasant state of arousal is created and the person tries to reduce this so-called cognitive dissonance. To create a cognitive consonance, meaning to harmonise the cognitions, people tend to add new or change cognitions (Festinger, 1957). One example adapted to mobility research may illustrate this. Let us assume that Mr Smith does not like using public transport and usually drives to work by car (cognition 1: 'I do not like using public transport'). If Mr Smith's car is broken and he has to use the bus (cognition 2: 'I go to work by public transport'), both cognitions are conflicting and a cognitive dissonance arises. To reduce this dissonance, he can add a new cognition to make his whole system of cognitions more consonant (e.g. cognition 3: 'I do not have the money to repair the car'). Now, he can keep cognition 1 as there is an excusing reason, the dissonant behaviour is justified. Another possibility to reduce the dissonance is to change one of the conflicting cognitions: either the attitude ('Public transport also has advantages') or the behaviour (e.g. paying the money for the car repair and continuing driving by car).

However, cognitive dissonances and, thus, the impulse to reduce it, only develop if several preconditions are matched. The two cognitions, in our case attitude and behaviour, must stand in a relevant relation and the person must be aware of it (Festinger, 1957). Following a revised cognitive dissonance model, it is important, if this counter-attitudinal behaviour does have negative consequences and if those are attributed to the behaviour. Further, the voluntariness of the behaviour needs to be given (Cooper, 2012).

As it may be a strategy to change one's cognitions to get cognitive consonance, it might as well occur that cognitions are generated or changed due to changing conditions in one's life situation or in the environment. Besides the change of the two conflicting cognitions, a third way of reducing the dissonance is mentioned by Festinger: The changing of an environmental cognitive element. Usually, it is not that easy to change environmental cognitive elements as one must have a degree of control over one's physical or social environment (Festinger, 1957). But, thinking for example of relocation, this change of environmental cognitive elements seems to be much more plausible. These changes may lead to changes in mobility requirements, opportunities and abilities and thus, may bring along new cognitive dissonances and/or chances to reduce those.

## HABITS, KEY EVENTS AND MODE CHOICE

Daily mode choice is strongly influenced by habits. Similar to the formation of attitudes, the formation of habits is a mechanism to make life easier. By not spending too many cognitive resources on everyday tasks, one does not need to re-evaluate every day which mode of transport her or she will take to go to work (Gärling & Axhausen, 2003). Instead, the complexity of daily decision making is reduced by habitual behaviours activated with certain cues. Empirical work on the importance of habit first evolved in the 1960s, but the topic did not gain momentum until the 1990s. Today, the importance of habit in travel behaviour is widely acknowledged (Aarts, Verplanken, & van Knippenberg, 1998; Gärling & Axhausen, 2003; Oullette & Wood, 1998; Verplanken, Aarts, van Knippenberg, & van Knippenberg, 1994).

If the behavioural context changes (e.g. the physical environment with its spatial, social and time components (Verplanken, Walker, Davis, & Jurasek, 2008), the cues that activated habitual behaviour may not work anymore (Wood, Tam, & Guerrero Witt, 2005). Therefore, decisions are made more deliberately and behavioural intentions become more important (Verplanken et al., 2008). Thus, context changes may modify the mobility requirements, opportunities and abilities of a person and, ultimately, changes in attitudes or in the PBC may result. In literature, this moment is often called a window of opportunity (Franke, 2001), since at this moment or phase a person may be more open for behaviour-relevant information and thus, for a behavioural change, for example towards more sustainable behaviour. In this respect, Verplanken et al. (2008) put forward the habit discontinuity hypothesis.

Since context changes may affect travel behaviour, the term key event (Lanzendorf, 2003; Scheiner, 2007; van der Waerden, Timmermans, & Borgers, 2003) has appeared in the last decade. A key event is defined 'as a major event in a personal life that will trigger a process of reconsidering current behaviour' (van der Waerden et al., 2003, p. 2). Sometimes we also find the term life (course) event derived from psychology (e.g. de Groot, Mulder, Das, & Manting, 2011; Klöckner, 2005).

Key events can be foreseeable, planned or come suddenly. They may relate to travel directly or indirectly (Klöckner, 2005) and they can happen at a certain point in time, but can also last longer forming a phase (Scheiner & Holz-Rau, 2013b). Behaviour may also adapt delayed to the key event (Chatterjee, Sherwin, Jain, Christensen, & Marsh, 2012;

Dargay, 2001). However, the perception of a context change as a key event is subjective (Klößner, 2005).

Busch-Geertsema, Lanzendorf, Müggenburg, and Wilde (2015) discern three categories of key events (1) personal biography, (2) long-term mobility decisions and (3) exogenous interventions. First, events in the personal biography encompass private, job-related and leisure trajectories (Lanzendorf, 2003). Private key events are, among others, the birth of a child (Lanzendorf, 2010), starting or ending a relationship, marriage, divorce and death of the partner or, more simply, changes in the number of household members (Beige & Axhausen, 2012; Dargay & Hanly, 2004; Scheiner & Holz-Rau, 2013a). Less frequently investigated is the case of job-related key events such as ending apprenticeship or education and starting work life (Fuji & Gärling, 2003), changing jobs (Beige & Axhausen, 2012; Prillwitz, & Lanzendorf, 2006) or retirement (Evandrou, Falkingham, & Green, 2010; Hjorthol, Levin, & Sirén, 2010). Second, long-term mobility decisions are key events such as residential relocations (Bamberg, 2006; de Groot et al., 2011; Kley, 2011; Scheiner & Holz-Rau, 2013b) and changes in mobility tools (Beige & Axhausen, 2008, 2012; Harms, 2003; Prillwitz & Lanzendorf, 2006; Scheiner & Holz-Rau, 2013a). Third, exogenous interventions relate either to the individual or the spatial level. Individual exogenous interventions are, for instance, incentives for behavioural changes such as free or reduced tickets for public transport (Bamberg, Rölle, & Weber, 2003; Fujii & Kitamura, 2003; Thøgersen, 2009) or rewarding the avoidance of driving during rush hours (Ben-Elia & Ettema, 2011). An example for spatial interventions is a (temporary) change in infrastructure such as the closure of a freeway (Fuji & Gärling, 2003).

The interaction of habits and key events was analysed in a study by Klößner and Matthies (2011). With a three-wave panel study, they surveyed car use, habit, personal norm ('activated feelings of moral obligation to act environmentally friendly', p. 15) and PBC of 277 students from three German universities. Over the three waves conducted every four to five months, personal norm and PBC were the most stable. The correlation between car use and habit was strong, whereas the correlation between PBC and personal norm – simply interpreted the deliberated part of mode choice – was weaker. Interestingly, Klößner and Matthies (2011) found a cross-lagged effect. In one of the three university towns they discovered a disruption of the correlation of habit and car use, which they attribute to the introduction of a public transport season ticket for students. A question

that remains unanswered is what influence intention had on car use after the key event of introducing the semester ticket.

Verplanken et al. (2008) brought together attitudes and key events in a survey conducted with 433 employees from a British university with regard to their mode choice, environmental concern and the date of their last residential relocation. They grouped the participants into  $2 \times 2$  groups: people with high or low environmental concern and people who moved within the last year and people who did not. They found no main effect of car use between people who moved and people who did not. Participants with high environmental concern drove less than people with a low environmental concern. A comparison of all four groups, however, gives evidence for our assumption, that if mode choice and attitudes were dissonant before a key event, the individual tries to harmonise those two inconsistent cognitions by either changing behaviour or changing attitudes. Car use of people who recently moved and with a high environmental concern was significantly lower than car use of all three other groups, including the non-movers with a high environmental concern. 'If our results reflect a genuine spontaneous shift in modal split (i.e. a change without an intervention of any sort), this may at least demonstrate that environmentally concerned individuals are more receptive to act upon their values when they face a situation of context change' (Verplanken et al., 2008, p. 125f.). Taking the theory of cognitive dissonance into consideration, a higher consonance of cognitions between environmental concern and behaviour exists after the key event relocation than before.

Bringing the theories and results of the studies mentioned above together, we derive a conceptual framework of how a key event affects travel behaviour with special regard towards attitudes (Fig. 2). Before the key event becomes important, everyday travel behaviour is mainly guided by routines. With the entrance of a key event (or in preparation to it), we often observe changes in the life situation on the one hand and changes of the surrounding mobility conditions on the other. Habits may not work

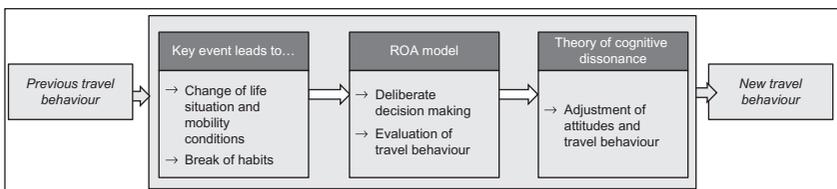


Fig. 2. Conceptual Framework: How a Key Event Affects Travel Behaviour.

anymore to the same extent as before because requirements, opportunities and abilities have changed. When habits are weakened, deliberate decision making comes to the forefront. The person now thinks actively about the travel behaviour in question and is more open to new information which may further change mobility opportunities or attitudes (i.e. by mobility management campaign for new citizens or parents-to-be). Furthermore, attitudes and behaviour are directly connected in the process of active decision making, which is not compulsory for habitual behaviour. Therefore, cognitive dissonances between attitudes and behaviour can arise when evaluating one's behaviour and the (maybe unconscious) process of reducing those dissonances may automatically be triggered. This leads to the assumption that it is more likely that travel behaviour will change in connection to a key event rather than changing without it. Furthermore, when cognitive dissonance between behaviour and attitude exists before the key event, we expect adjustment processes in both directions, towards the attitude or towards the behaviour, and therefore less appearance of cognitive dissonances after the key event.

## **DISCUSSION, CONCLUSION AND FURTHER RESEARCH**

In the previous sections, we presented the ROA model as a theoretical framework for the analysis of travel behaviour change over time. The ROA model combines both internal and external factors as explanations: personal values and attitudes, the subjective norm, the perceived behavioural control, all are seen in the background of the individual life situation, the social context and the external mobility conditions.

Furthermore, we shed light on the weakening of habits through key events in the life course. With context changes, a window of opportunity is opened for behavioural change. We assume that a key event usually leads to changing circumstances of the ROA. Inspired by the theory of cognitive dissonance, we suppose that this may lead to changes in cognitions and therefore might bring along behavioural adaptations as well. Following the assumption that in the period before a key event takes place, behaviour is guided more strongly by habit than by deliberate mode choice decisions; we also suspect that attitudes are not always in line with behaviour. Due to key events, not only a 'window of opportunity' for behavioural change, but also for attitudinal change will open and we expect adaptation processes in

both ways. We assume less behavioural change, when habit is strong and less attitudinal changes, when attitudes are strong.

To verify or falsify those hypotheses, empirical research is needed. Therefore, it would seem logical to conduct a longitudinal study, analysing behaviour and attitudes before and after a key event. As such an empirical study would have to focus on attitudes, conducting a panel is clearly preferable, as it is problematic to survey especially attitudinal data retrospectively.

The results emerging from such research will disclose, whether there are adaption processes, in which direction and after which circumstances they appear and therefore will be essential for mobility management. A better understanding of the interaction between mobility-related attitudes and mode choice before and after key events provides a valuable contribution for sustainable mobility management and aids in shaping adequate interventions in the future more efficiently. We hope to gain insight how and when mobility management tools can persuade attitudes or affect behaviour specifically in phases of changing contexts or even before a key event starts.

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