

A meta-theory for travel-related choices

van Wee, Bert; Mokhtarian, Patricia

DOI

[10.1016/j.trip.2025.101653](https://doi.org/10.1016/j.trip.2025.101653)

Publication date

2025

Document Version

Final published version

Published in

Transportation Research Interdisciplinary Perspectives

Citation (APA)

van Wee, B., & Mokhtarian, P. (2025). A meta-theory for travel-related choices. *Transportation Research Interdisciplinary Perspectives*, 34, Article 101653. <https://doi.org/10.1016/j.trip.2025.101653>

Important note

To cite this publication, please use the final published version (if applicable).
Please check the document version above.

Copyright

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy

Please contact us and provide details if you believe this document breaches copyrights.
We will remove access to the work immediately and investigate your claim.



A meta-theory for travel-related choices

Bert van Wee^{a,*}, Patricia Mokhtarian^b

^a Transport and Logistics Group, Faculty Technology, Policy and Management, Delft University of Technology, Jaffalaan 5, 2628 BX Delft, the Netherlands

^b Georgia Institute of Technology, School of Civil and Environmental Engineering, 790 Atlantic Drive, Atlanta, GA 30332, USA

ARTICLE INFO

Keywords:

Travel behaviour
Theory
Meta-theory
Conceptual model

ABSTRACT

In this paper we propose a *meta*-theory for travel and travel-related choices (MTTC). The *meta*-theory envisions that travel choices are based on five building blocks: (1) *travel motivations* (regarding whether to travel or not in the first place, and regarding the choice of specific alternatives associated with the main decision to travel), (2) the *decision-making paradigm*, (3) the *type of travel choice*, (4) *personal characteristics*, and (5) *context factors*. After explaining each of these building blocks, the paper offers a conceptual model that links them. It closes with some suggested avenues for future research. The MTTC helps researchers to explicitly underpin their methodological choices. In addition, we conclude that there is much heterogeneity with respect to the combinations of the five building blocks of the MTTC, and allowing for this heterogeneity improves our understanding of travel (-related) choices.

1. Introduction

Travel behaviour is a very important topic of research in transportation sciences. Studies in the area of travel behaviour generally have implicit or explicit theoretical underpinnings, the most common being that travel is a ‘derived demand’, and the decision-making paradigm for travel is utility maximization.

In this paper we aim to disentangle and structure the different types of theoretical underpinnings for modelling *travel choices* and *travel-related choices*, the distinction being that the former pertain explicitly to a trip (or set of trips), whereas the latter do not. Consequently, travel choices include choices of mode, destination, route, and departure time-of-day, and travel-related choices include choices such as car ownership, car type, ownership of other vehicles, residential location, and the adoption of teleworking or online shopping – see Section 5. Although some choices are continuous-valued (e.g., activity duration, departure time, and arguably annual distance travelled), our emphasis is on discrete choices as they are probably the most commonly-studied type of travel and travel-related choices. For economy of presentation we focus on a selection of theories only and do not aim to review all insights from all disciplines. In our *meta*-theory, we distinguish *travel motivations* and *decision-making paradigms*, and argue that travellers’ selections for both depend on *personal factors*, *context factors*, and *types of travel (-related) choices* being made.

We integrate the relationships among these underpinnings into what

we call a Meta-Theory for Travel Choices (MTTC). To the best of our knowledge this is the first paper explicitly categorizing all these building blocks for travel and travel-related choices, and making the links between them manifest. Clarifying this structure may be useful because many papers on travel and travel-related choices do not openly refer to their theoretical assumptions, whereas it would be better to make these assumptions overt. In addition, papers that do make theoretical assumptions explicit often do so only partially. More specifically, they often only make clear the travel motivations, or the decision-making paradigm. In contrast, because the MTTC makes it plain that *travel motivations*, *decision-making paradigms*, and *personal factors*, *context factors*, and *types of travel choices* interact, the implication is that choices for theoretical underpinnings should be based on all five factors, and the assumed links among those factors. Consciously attending to all building blocks of the MTTC will arguably strengthen the theoretical bases of research into travel and travel-related choices, which is valuable in and of itself from a scientific point of view, and may, at least upon occasion, lead to different empirical research results. For example, the simplification imposed by the unexamined assumption that travel is purely a derived demand, or that components of utility are always compensatory, may produce errors that are sometimes consequential. In addition, the many relationships between the five building blocks implies that there is likely much heterogeneity with respect to the combinations of the five building blocks of the MTTC.

The organization of the remainder of this paper is as follows. In

* Corresponding author.

E-mail addresses: g.p.vanwee@tudelft.nl (B. van Wee), patmokh@gatech.edu (P. Mokhtarian).

Section 2 we give a brief introduction to the five building blocks of the MTTC, which are further developed in Section 3. Section 4 explains the core of the MTTC we propose. Section 5 discusses research implications of the MTTC, and Section 6 concludes the paper.

2. An introduction to the five building blocks of the MTTC

We provide here an overview of the five building blocks of the MTTC, which will be further elaborated in Section 3. The final aim is to understand the specific travel and travel-related choices that people make, such as the ultimate selection of a particular mode or car type. Those choices depend on the five building blocks and their relationships.

Travel(-related) motivations are the direct reasons why people make travel and travel-related choices. This building block is by far the most complex one. Importantly, motivations can refer to reasons for *putting oneself in the position of having to make a choice in the first place* (for example, the decision to buy a car at all), as well as to reasons for *making a particular choice among a set of alternatives* once the decision to make a choice in the first place has been reached (for example, the choice of one type of car over another). However, it should be pointed out that in the case of complex situations including travel and travel-related choices, “making a choice” actually involves making a *bundle* of choices about various dimensions associated with the main choice. For example, the decision to make a trip (the main choice) necessarily entails a bundle of choices regarding mode, destination, departure time, and so on. Some motivations apply most cogently to the main choice, while others can apply to the selection of an alternative for an associated “sub-choice” as well.

We distinguish four kinds of travel motivations (there may be others yet to be identified): travel as a derived demand (i.e. that it has instrumental utility for reaching desired activities at spatially-separated locations); travel because of the positive (or intrinsic) utility of the trip or because of activities that can be performed on the trip; travel to escape from family, work, or location travel, and travel that is motivated by positionality (i.e., influenced by the choices of other people). These kinds of motivations also apply to travel-related choices. Table 1 provides examples of these four types of motivations, as applied both to the decision to make a choice, and the selection of a specific alternative for

Table 1
Example roles of four kinds of travel (-related) motivations.

Motivation type	The main decision	The choice of a specific alternative associated with the main decision
<i>Travel choices</i>		
<i>Travel as a derived demand</i>	Need to get to work	Choose the mode (and route, and departure time) that minimizes (generalized) cost
<i>The positive utility of travel (and travel-based activities)</i>	Desire for exercise and exposure to the environment	Choose bicycling
<i>Travel to escape</i>	Go “anywhere”, just to get out of the house	Choose a destination where you will be hard to find (and/or to be contacted)
<i>Positionality</i>	Take a foreign holiday	Choose country X because it is the “in” thing to do
<i>Travel-related choices</i>		
<i>Derived demand (extrinsic, functional utility)</i>	Need a new car	Choose a car for its functionality (e.g. fuel economy, aptness of size)
<i>Positive (intrinsic) utility</i>	Want a new car, even though it is not strictly necessary	Choose a souped-up sports car
<i>Escape (mentally/psychologically)</i>	Shop online (browse, buy)	Choose to buy something more “frivolous” than utilitarian
<i>Positionality</i>	Choose to buy a bicycle, since “all” your friends have one	Choose a particularly trendy type of bicycle

an associated sub-choice. Of course, one type of motivation could apply in the first instance (I need to go to the store – derived demand) while a different motivation applies in the second instance (because of its positive utility, I will bicycle to the store instead of driving). Also, as mentioned later, a given decision can entail multiple motivations.

There is a broad consensus on the fact that travel decisions depend on *personal* factors and the *type of travel choice* (such as mode choice) in question (e.g. Ortúzar & Willumsen, 2011). In addition, in many cases people make choices depending on *context* factors, such as social norms as emphasised by the Theory of Planned Behaviour (Ajzen, 1991), constraints as emphasized by Time Geography (Hägerstrand, 1970; see Section 4.3), or social practices, as addressed by Social Practice Theory (Shove et al., 2012; Spotswood, 2016 – again see Section 4.3). Land use patterns are another type of context factor influencing travel choices and related decisions such as residential location, but the literature on this topic is well established and we do not further discuss this literature. The same applies to characteristics of the transport system: the impact of these characteristics on travel behaviour is probably the most studied topic in the associated literature. Weather is also a (less often studied) context factor. For an extensive introduction to these factors we refer readers to Van Wee et al. (2023).

Motivations, types of travel choices, personal factors and context factors explain *who* makes *which* choices and *why*. *Decision-making paradigms* are of another order, and explain *how* people make choices. Specifically, they explain the ‘rules’ by which people are posited to make choices. Therefore, decision-making paradigms are a kind of overarching concept that applies to any choice made (all travel and travel-related choices, but also other choices people make). By far the dominant theory is Random Utility Theory (RUT), assuming that people aim to maximize the utility of decisions made, leading to Random Utility Maximizing (RUM) models (Ortúzar & Willumsen, 2011). Alternatives include Regret Theory (RT), assuming that people minimize regret (the Random Regret Minimisation (RRM) assumption) (Chorus, 2010), and Prospect Theory (PT) (Kahneman & Tversky, 1979), arguing that people have reference points for many decisions, and are averse to losses relative to those reference points – see Section 3.2.

3. Some key theories explaining travel (-related) behavior

3.1. Travel (-related) motivation theories

We now briefly describe the main theories explaining travel (-related) behaviour. It is not our aim to extensively discuss these theories, we only aim to explain the core of these theories. We start with *motivations*, focusing first on motivations to travel, and later on motivations associated with travel-related choices.

By far the most common assumption is that people travel because they want to be at other activity locations, an assumption often labelled as travel being a ‘**derived demand**’, i.e. a demand that is instrumental to achieving a different, primary, goal: people travel because they want to carry out activities such as working, shopping, visiting family or friends, and recreational activities, at different places. The assumption that travel is a derived demand is common in mainstream disaggregate transport models as well as in activity-based modelling (Ortúzar & Willumsen, 2011). It should be pointed out, however, that although this assumption can be conceptually differentiated from the alternative assumptions described below, a vast number of ‘derived’ travel motivations exist, and a singular ‘derived demand’ assumption does little to explain the enormous variety of travel that is thereby derived. For example, it does not explain why one couple eats dinner in their neighbourhood pub while the same-income couple next door prefers an upscale restaurant in the central business district, nor why one person’s ideal entertainment trip is a rock concert while another, observationally-equivalent, person’s ideal is a soccer game. In truth, we generally know very little about the motivation *for the activity from which the travel is derived*.

Beyond the broad and general derived-demand assumption, however, alternative reasons for travelling do exist. As made clear above, people sometimes travel (or choose a certain travel alternative) because of the **positive (or intrinsic) utility of the trip** (Mokhtarian & Salomon, 2001; Mokhtarian et al., 2015). With respect to the enjoyment of travelling itself, people might like to walk or cycle, or drive a touristic route, for its own sake, and consequently make trips they would not have made without this positive utility. In addition to the enjoyment of travel being the motivation for the trip itself, the positive utility could influence specific choices for trips they would make anyway, such as deciding to bicycle rather than drive to work. Another aspect of the positive utility of travel pertains to the benefit of the activities that can be conducted while travelling. This probably most often influences the choice of some element of a trip given that the trip is being made, such as when people choose transit over a shorter driving trip because of the ability to make better use of the travel time on transit than when driving (Malokin et al., 2019). However, in some cases the activities conducted by traveling may influence not only the choice of mode (or route) given that a trip is being made, but may in fact influence the choice to make the trip at all, as when an online version of the activity would have been chosen (and so the trip would not have been made) except for the fact that the time on the train could be used productively.

Escape Theory (ET) assumes that people sometimes have a ‘negative’ motive to travel: they might travel, at least partly, because they do *not* want to be at a given place, and prefer *not* to be able to easily travel to specific destinations (mainly: home, work, residential neighbourhood), nor to be readily accessible by others. People might want to escape from other people, activities, or situations such as a stressful environment (Van Wee & Mokhtarian, 2023). Van Wee and Mokhtarian argue that escaping can apply to different time scales, ranging from one or a few hours (being away from the current activity, for example by getting a cup of coffee), to a period of multiple years, for example by taking a sabbatical leave. The utility of travel to escape depends on personal characteristics and attitudes, the social and environmental context, earlier experiences, and the time since the previous escape.

The **Theory of Positional Goods (TPG; Hirsch, 1977)** assumes that the utility of some goods or services not only depends on the characteristics of that good or service, and of the decision maker, but also on the distribution of that good or service over a larger group of people, and the relative position a candidate choice has for a person. This first of all applies to choosing a particular alternative. For example, the utility of a specific car (type) may not only depend on the characteristics of that person, and the car (type), but also on which cars others have, such as their family, friends, colleagues, and neighbours (Hoen & Geurs, 2011). Similarly, Van Wee (2021) argues that the utility for a person of a certain travel or travel-related alternative could depend on the position of that alternative with respect to the choices of others. For example, a Dutch person could be more satisfied with a holiday trip to the South of France if her peers travel only as far as The Netherlands or Belgium, than she would be with a trip to Greece if her peers travel intercontinentally, even if she would “theoretically” (ignoring positionality considerations) prefer Greece over France. Secondly, however, as mentioned in Section 2, positionality can also apply to putting oneself in the position of having to make a choice, such as in the case that a person decides to buy a (second) car, motivated by comparing oneself with others.

As Van Wee (2021: 2) argues, positionality can also apply to accessibility: ‘Accessibility could be subject to positionality because it is possible that people compare their levels of accessibility with the levels of others, and therefore the utility of their level of accessibility could be influenced by the accessibility level of others’. For example, people may ‘derive a certain status from living in a nice area with many options to reach nearby destinations, the centre of Paris or London being candidate examples.’ Another example: the value an individual places on his residential location being transit-accessible may be diminished if none of his associates or role models chooses such a residential location.

For the first three of the four motivations presented, we have so far

focused specifically on travel (as opposed to travel-related) choices. As made clear above, travel as derived demand only applies to travel choices (trips), strictly speaking. But in a broader sense, the notion that choices are based on instrumental motives also applies to the travel-related choices of car ownership and car type, and – most obviously – to residential choice. Positionality and the wish to escape can also influence travel-related choices. Buying a(n additional) car, motorbike or bike, or house can also be because of the positive (or intrinsic) utility of the choice, such as enjoying a fancy car or a very attractive (second) dwelling. The wish to escape can also be the motivation to buy a second home, or a(n) additional car. Shopping can be a form of (short-term, mental or psychological) escape for some people, which may result in travel to stores, or may be realized as a travel-related choice instead, through online shopping.

Note that the distinctions between the different types of motivations to travel will be less strict in practice. People can combine the desire to escape (a negative driver) with the desire to visit a touristic place (derived demand), the positive utility of the travel itself (see Van Wee & Mokhtarian, 2023), and positionality. For example, the desire of academics for a sabbatical abroad can be driven by the need to escape the daily routine, the utility of the sabbatical itself, and the interest in living in a particular ‘exotic’ location, but also by the knowledge of whether, and how frequently, their peers had a sabbatical abroad. Even the choice to take a sabbatical in the first place can be motivated by positionality, especially if an academic thinks that a sabbatical gives them a certain status.

Psychologists, of course, have thought a great deal about behavioural motivations in general. For the purposes of the present discussion, we mention the Theory of Self-determination (e.g., Deci and Ryan, 1985), which distinguishes *intrinsic* and *extrinsic* motivations. Extrinsic motivations consider the action/choice/behaviour to be a *means to an end* (valued for its instrumental role in achieving another purpose), while intrinsic motivations consider it to be an *end in itself* (valued for its own sake, “autotelic”). Mokhtarian et al. (2015) offer an extended discussion of these two kinds of motivation for travel and other choices (such as shopping and eating). Here, we simply note that the derived demand and positionality motivations are extrinsic (in the first case viewing travel as the means to the end of accessing desired activities; in the second case viewing travel as a means to the end of positioning oneself favourably with respect to others); the positive utility motivation is clearly intrinsic, and the escape motivation can be either (Van Wee and Mokhtarian, 2023), depending on whether the travel itself is (part of) the escape, or whether (as a thought experiment) teleportation would do just as well for removing oneself to another place.

Table 2 summarizes the distinctions between these theories with respect to the choice to travel itself. In addition, because the role of other people comes to the fore in later discussions, we also note the distinctions in this role across the four theories.

Table 2
A comparison of travel motivation theories.

Theory	Motivations to travel	The role of other people
Derived demand	To carry out activities at different places	Not explicitly included, but could be a factor in choosing activities and/or making travel choices
Utility of a trip	The positive utility of a trip or activities performed during the trip	Not explicitly included, but could be a factor in choosing the trip and/or travel characteristics
Escape theory	To be away from places/people, and not being accessible	Explicitly included: escape from others
Theory of positional goods	To position one’s choice relative to those of others	Explicitly included: comparison of one’s choice with those of others

3.2. Decision-making paradigms

We now turn to the *decision-making paradigms*. **Random Utility Theory (RUT)** assumes that people want to maximize the (expected) utility of their decisions. Specifically, each alternative an individual faces is presumed to have a (person-specific) utility, and the individual chooses the alternative with the highest utility. The assumption (implicitly or explicitly) made in the case of travel as a derived demand is that the utility of the activity for which a trip needs to be made is larger than the disutility of the trip (monetary costs, travel time, perceived safety, discomfort, ...; Goodwin and Hensher, 1978). Disutility components are often jointly addressed by the term Generalized Transport Costs (GTC). RUT provides the theoretical basis for mainstream disaggregate transport models (Ortúzar & Willumsen, 2011). The portion of an alternative’s utility that is influenced by observable factors is typically assumed to have a ‘linear compensatory’ form, i.e. to be a linear combination of those factors.

Regret Theory (RT) deviates from this assumption and assumes that people want to minimize the expected regret of their choice (Chorus, 2010). For example, a person buying a car wants to avoid the situation that in hindsight s/he regrets the choice of a specific car type. The Random Regret Minimization Model, which is based on RT, ‘assumes that attributes of competing alternatives serve as reference points which are used to evaluate a considered alternative: more specifically, the model postulates that choices are determined by the wish to minimize anticipated regret – regret being conceptualized as the emotion that is felt when one or more non-chosen alternatives perform better than the chosen one, in terms of one or more attributes’ (Liebe et al., 2023: 9). Note that the concept of reference points originates from Prospect Theory – see below.

Prospect Theory (PT) (Kahneman & Tversky, 1979) also deviates from the utility maximizing assumption. Although the theory incorporates several more ingredients, the most often used concepts are first the concept of loss aversion, explaining that people dislike losses more than they like equally large gains. Another assumption is that people compare choice options (either the full option, or specific characteristics of an option) with a reference point. For example, people searching for a new car might consider their current car as a reference, and next prefer a car that performs at least equally well with respect to characteristics such as fuel economy, space, or power. Combining both concepts, people dislike losses relative to a reference point more than they like equally large gains. For example, people might dislike an increase in travel time as a result of a job farther away from home more than they like an equally large reduction in travel time as a result of a job closer to home, because they do not want to be worse off with respect to travel time.

Table 3 compares the inclusion or not of reference points in RUT, RT and PT.

These theories do not give a full overview of all decision-making paradigms. Already as early as 1956, Simon introduced the concept of ‘Satisficing’, making clear that individuals’ decision-making strategies do not always include an evaluation of all pros and cons of all choice options. Instead, people sometimes make a decision once they find an option that is ‘better’ than a certain threshold level of acceptability (Simon, 1956). Satisficing is one type of non-compensatory decision-making strategy; for an introduction to others, see Foerster (1979).

Table 3
Treatment of reference points in key decision-making paradigms.

Theory	Reference points relevant?
Random Utility Theory	Not explicitly
Regret Theory	Explicitly: minimize regret of decisions, and compare decisions with reference points
Prospect Theory	Explicitly: avoid losses relative to reference points

Several scholars (e.g. Brathwaite et al., 2017; Cantillo et al., 2005; Swait, 2001) have shown how (at least some of) such strategies can be incorporated directly into a RUM choice model, and even more can be used by the decision-maker as a preliminary step to filter alternatives out of the choice set. For economy of exposition we do not further include non-compensatory paradigms in this paper, although we consider them to be important additions to decision-making theory.

In addition, some forms of travel behaviour, especially frequently made trips like commuting, are habitual (Verplanken et al., 1997): people do not each time they travel compare pros and cons of choice options. In our opinion, habitual behaviour does not have to conflict with the assumptions made in utility theory: it can be very ‘rational’ not to compare all choice options every day, because the transaction costs of the effort likely exceed the benefits of the exceptional cases in which a choice different from the default utility-maximizing option would be made – for example because of unexpected congestion or train delays. However, it is certainly true that in the operationalization of RUT, information/transaction costs and benefits are seldom included in the observed portion of an alternative’s utility function. Related to the roles of satisficing and habit, some travel behaviour researchers build on the assumption that people make decisions based on heuristics (e.g. Arentze & Timmermans, 2004). We see heuristics as a way to reduce the effort of comparing the pros and cons of all choice options, and therefore as a way to operationalize decision-making paradigms. Heuristics can be based on previous searches for information on choice options, and on previous choices made plus experiences. The decision-making paradigms discussed above can underpin these previously made decisions, and consequently heuristics-based decisions do not necessarily violate the idea that decisions are based on utility maximizing, regret minimization, or loss aversion. In any case, we do not further discuss habitual and heuristic decision-making behaviour in this paper.

3.3. Theories addressing context factors

Finally, we discuss theories explicitly addressing *context factors*. The Theory of Planned Behaviour (TPB) (Ajzen, 1991) assumes that behavioural choices of people depend on their intentions, and their perceived behavioural control (PBC). Intentions are influenced by PBC, attitudes and social norms. In the case of travel as a derived demand, people travel because of the intention to fulfil an activity at another location. PBC factors could include the perceived availability of useful travel options from which a person could choose, as well as the capability of operating a vehicle, following directions, and so on (also see the discussion of time geography, below). Attitudes could, for example, relate to the environment, and a pro-environmental attitude could reduce the willingness to fly or drive. The theory emphasizes the context factor ‘social norms’: these make explicit that the context, or more specifically the social environment, of a person matters. For example, in some orthodox Christian communities the norm is that people should not drive on Sundays and such a norm could reduce the willingness to drive on Sundays of a person in such a community.

The theory of **Time Geography** (Hägerstrand, 1970) also explicitly includes context factors. It assumes that people make choices within three types of constraints: *capability* constraints (imposed by biological, mental or instrumental limitations), *coupling* constraints (imposed due to scheduling activities jointly with other people, at specific times and frequently also at specific places), and *authority* constraints (imposed by authorities, examples being the opening hours of shops or kindergartens). Coupling and authority constraints address the importance of contexts.

Next, **Social Practice Theory (SPT)** emphasizes the importance of context factors. SPT (Shove et al., 2012; Spotswood, 2016) is a theory that explains behaviour in part by addressing the impact of communities of importance to the decision-maker. Mode choice can be an example of a social practice: a person might, for example, cycle frequently because the bike has always been the default travel mode of her parents, and her

parents have taught her to cycle if that mode is a reasonable option. In some communities a specific car or car type – for example, an expensive but fuel-inefficient car – might be appreciated positively whereas in another community the same car (type) might be valued negatively, and the fact that other people do or do not buy such cars (a social practice) can influence a person's car type choice.

3.4. How do the various theories relate?

Note that some of the theories conflict, but others do not. We here first discuss relationships between RUT and other theories, in view of the dominance of RUT in travel behaviour studies. RUT and RT have fundamental points of departure: utility maximization versus regret minimization. The TPG does not conflict with RUT, but simply includes in the utility function of a particular choice option a component measuring the position of that option relative to the distribution of relevant other people's choices of that same option. This first of all applies to choosing amongst different alternatives, such as car types. However, it can also apply to the decision to make a choice in the first place. For example, if positionality is influencing the decision to buy a(n extra) car, this does not conflict with RUT: the positionality-related utility can be included in the utility of buying a(n additional) car (versus not doing so). Although we are not aware of any examples, studies on travel-related choices (such as destination choice, or car type choice) that assume positionality can also be regret-based. The importance of the valuation of losses versus gains as addressed by PT can also be expressed in terms of utility: the disutility of a loss can be valued higher than the positive utility of an equally large gain. The TPB also does not conflict with RUT: the intention to make a specific travel choice can be expressed in terms of the utility of that alternative relative to the utility of other alternatives. With respect to TG, it is first of all important to realize that TG focuses on constraints with respect to travel choices. It does not explicitly focus on the motivations to travel at all. These motivations can be explained by other theories as explained above, and consequently the fact that people make choices within constraints as addressed by TG, is not in conflict with TG. Focusing on the links between constraints and other theories, a first notion is that capability constraints can be included among other personal characteristics in a utility function, while coupling and authority constraints can define what alternatives appear in the choice set, or, in some cases, can be interpreted in terms of a very high (or even prohibitively large) value of time (VOT) and via the VOT be expressed in terms of utility.

Next, we briefly discuss links between TPG and other theories, more specifically the role of other people. First of all, the question is how others should be included in the MTTC. The impact others have on people's decisions occurs both in motivations and context factors, and the distinction between those two cases is not always very sharp. If the impact of others relates to *comparing one's own choices directly with the same types of choices of others*, the impact of others is assumed to be included in motivations (thus constituting an application of the TPG). This applies whether others directly motivate people to put themselves in the situation of having to make a choice, or whether the choice of a specific alternative is influenced by others' choices of the same alternative. If the role played by others is not via explicit comparisons with respect to the same choice, but rather in another (often less direct) way, we assume that impact to be included via context factors. For example, if car type choice is influenced by the explicit comparison of the car to be bought with car type choices of relevant others, the positionality motivation postulated by the TPG is at work, whereas if this choice is influenced by social norms, other people (in their role of generating those social norms) are serving as a context factor.

The importance of other people is also recognized in the TPB via 'social norms'. But a key difference between TPG and TPB is that (as just indicated) TPG explicitly positions the choice of a person relative to the choices others make with respect to the *same* (type of) good, e.g. buying a(n additional) car or not, or car type choice: how does my choice relate

to the car ownership levels or car types of others? Social norms as included in TPB are not explicitly about such comparisons, but express the impact that more general social norms have on the choices people make. If a person decides to not fly to a remote touristic destination because her peer group limits their flying for environmental reasons, that general norm is what influences the decision, not the comparison of touristic destinations per se. Similarly, SPT recognizes the role of others, especially communities. But, as with TPB, other people are not explicitly included in the sense of the decision-maker evaluating how commonly an option that she is considering is chosen by her reference group. This distinction between TPG on the one hand (direct comparison of choices) and TPB and SPT on the other hand (no direct comparison of choices) may be clear in theory, but it is important to note that the question of whether a person is sensitive to comparing her or himself with others, might depend on context factors. For example, if during a person's childhood parents always compared their car with the cars of their relatives and friends, a person might be more sensitive about such direct comparisons once s/he buys a car in adult life.

The difference between SPT and TPB is that SPT is based on behaviour: other people's real-world behaviour is what influences the decision-maker. In the TPB the impact of others (so: context) does not have to be related to a specific behaviour of others– it is based on (perceived) attitudes of others and more general norms.

As explained above, the core difference is that in the case of TPG one compares her/his choice with the *choices* of others, whereas in SPT and TPB this does not have to be the case – one's choice can be influenced by *what others would think* of a choice made. Building upon the car choice example: even non-car owners might think it is not done to buy an expensive fuel inefficient car, and a non-car owner can admire someone who owns such a car.

4. A Meta-Theory for travel choices

The MTTC includes the following premises:

- Specific travel (-related) choices made by individuals depend on decision-making paradigms, travel (-related) motivations, types of travel (-related) choices, personal characteristics and context factors.
- Types of travel choices, person characteristics and context factors (jointly referred to as TPC factors) interact.
- The decision-making paradigms (utility maximizing, regret minimizing, loss aversion relative to reference points) could differ between TPC factors.
- The decision-making paradigms can differ between different travel motivations (derived demand, for the fun of it, escaping, positionality).
- Travel motivations mutually interact with TPC factors.

Below we explain this MTTC in more detail and propose conceptual models for the MTTC.

Several of the ingredients for the MTTC are not new; the novelty is in the combination and integration of those ingredients, which is why we use the term 'meta-theory'.

We next conceptualize these premises. We suggest a hierarchical structure conceptualizing all factors relevant for specific travel choices. A first step is the combination of the types of travel choices, the characteristics of a person, and context factors (TPC).

4.1. Types of travel and travel-related choices (T)

As made explicit above, *travel choices* include mode choice, route choice, time-of-day choice, and destination choice. *Travel-related choices* include car ownership, car type choice, choices with respect to the ownership of other vehicles (bikes, e-bikes, motorized two wheelers, ...), residential choice, and the adoption of teleworking or online shopping. Residential choice and destination choice make the importance of land

use patterns explicit. Travel-related choices are a quite broad category, and we do not present a sharp definition or demarcation. In addition to the previous examples, such choices also include adoption of teleworking, e-shopping or videoconferencing, travel payment alternatives (day-tickets versus yearly passes), and vehicle financing options. Travel (-related) choices are made on different time scales, ranging from long-term choices (e.g., residential location, some destination choices, like workplace), medium term (e.g., vehicle ownership), and short-term choices (e.g., route, time-of-day, some destination choices like the choice for a specific restaurant).

It is important to distinguish this category, the *type of travel (-related) choice*, from the ultimate *travel (-related) choice* itself (see Section 4.5 and Fig. 2 below). The distinction is best clarified as we proceed, but at this juncture we simply comment that “travel mode” is a type of choice, while “bicycling” is an example of the choice itself.

4.2. Personal characteristics (P)

The characteristics of a person include socio-demographics like age, gender, education level, income, household characteristics, physical limitations, and also attitudes.

4.3. Context (C)

As made explicit above, because the impact of the transport and land use system on travel choices has been extensively studied we do not further discuss this topic, but refer to Ortúzar & Willumsen (2011) and Van Wee et al. (2023). Other context factors are less easy to describe sharply. We mention some context factors, but do not pretend to give a precise definition and demarcation. We suggest that an initial context factor is whether a person travels with others (‘travel party’): people may then make choices jointly. Some further context factors are coupling and authority constraints (see Section 3.3 re Time Geography). Another context factor is the peer group considered with respect to a given choice of a given person: with whom (if anyone) do people compare themselves for a specific choice? Next, as explained in Section 3.3, social norms are context factors. Social norms of the peer group might matter, but so also might more general societal norms.

Note that context factors do not have to be stable over time. The trend of flight shaming (e.g., Flaherty & Holmes, 2020) and, related, the increasing awareness of climate change, are recent examples of changing context factors. And at the fully opposite extreme from ‘constant over a long period of time’ is ‘quite ephemeral’, e.g. weather as a context factor (in, e.g., bicycle as a mode choice, departure time choice, etc.), or a roadway crash as a factor in route choice.

4.4. Links between types of travel choices, personal characteristics, and context

The three blocks – the types of travel choices, personal characteristics, and context – are related. Fig. 1 conceptualizes the interactions between these three blocks. We label this part of our conceptual framework as the TPC block: Type of travel choice, Personal characteristics, Context. It is important to point out that Figs. 1 and 2 (below) are not intended to represent the individual’s decision process, but rather

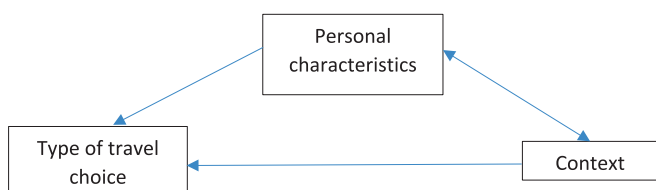


Fig. 1. Interactions between types of travel choices, personal characteristics, and context factors.

decisions that analysts (consciously or unconsciously) make in helping them to understand how all building blocks interact, and in case of modelling, to formulate a model or set of related models.

Context factors can influence people’s attitudes (van Wee and Kroesen, 2022) (in Fig. 1: arrow from Context to Personal characteristics), such as in the cases of the increasing awareness of climate change and flight shame. And vice versa (arrow from Personal characteristics to Context): changing attitudes of people can change social norms. Characteristics of a person can influence the type of travel (-related) choice being considered (arrow from Personal characteristics to Type of travel choice). For example, a higher-income person is more likely to consider taking a holiday in a foreign country (we refer to this as a Type of travel choice, taking a holiday trip to a foreign country in general, not the specific destination choice, which would be the actual Travel choice), whereas a lower-income person may not consider such a choice at all. Context factors can influence Types of travel choices. If the built environment makes it unattractive to own a car, this may influence whether a person considers actively making a car ownership choice of some kind¹ (in Fig. 1: arrow from Context to Type of travel choice).

Note that Fig. 1 does not include specific Travel choices, such as the specific destination choice or the specific car ownership level. Such specific choices are only included in Fig. 2 – see below. And Fig. 1 conceptualizes relationships at the disaggregate level. At the aggregate level more relationships become relevant. An example: Types of travel choices can influence Context factors, an arrow not included in Fig. 1. With respect to the impact of the Context factor ‘built environment’ on the Type of travel choice – in this case car ownership level – a reversed effect can exist: if many people living in a dense area reduce their car ownership level, these specific choices might make it easier for policy makers to further downplay the role of the car (changing context), for example by reducing parking options, which changes the built environment context. But that effect is not conceptualized in Fig. 1.

4.5. Links between TPC, decision-making paradigms and travel motivations

Now that we have explained the TPC block, we move to the next

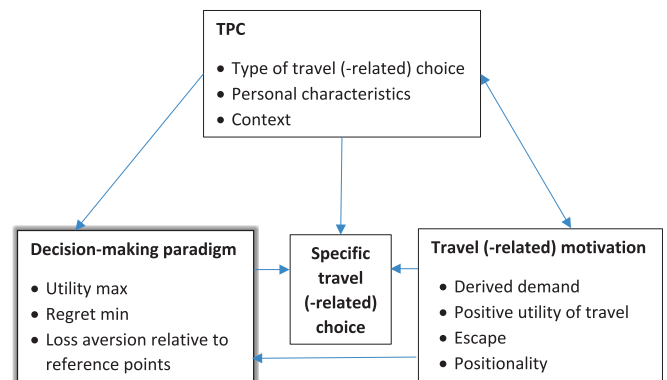


Fig. 2. Connections among (a) travel, person, and context characteristics, (b) decision-making paradigm, (c) travel (-related) motivation, and (d) specific travel (-related) choice.

¹ We realize that ‘maintain the status quo’ can also be a chosen alternative, but we distinguish the case in which it is an actively chosen alternative (therefore making it a ‘travel choice’) from the case in which a choice to change the status quo or not is not even actively considered (in which case that ‘type of travel choice’, i.e. the choice of whether to change one’s car ownership or not, is not made).

higher level in the hierarchy, arguing that TPC, the Decision-making paradigms (utility, regret, reference points), and the Travel motivations (derived demand, travel because of the positive utility of travel itself, escape, positionality) are related, as visualized by Fig. 2.² To fully address all relationships conceptualized in Fig. 2 we first repeat that specific travel (-related) choices depend on TPC factors, Decision-making paradigms, and Travel motivations. Next we discuss links between TPC and Travel motivations. TPC factors can influence Travel motivations: for example, some types of Personal characteristics might generate stronger desires to escape, or the inclination to escape may depend on Context factors such as the atmosphere at work. The Type of travel (-related) choice may also determine or influence the strength of various Travel (-related) motivations: for example, Positionality could play a role for a person with respect to the utility of a holiday destination choice, but not in the case of car ownership level or car type choice. On the other hand, Travel (-related) motivations can influence the TPC factor 'Type of travel (-related) choice'. For example, the desire to compare oneself to others (Positionality) can influence a person to consider buying a(n additional) car.

TPC can also influence the Decision-making paradigm. For example, some types of people might be more prone to regret choices or to set reference points than others. And for some Travel choices or Contexts, Regret or Reference points play a more important role than for others. For example, for car type choice people might compare candidate choice options with others (Reference points, based on Positionality), or with their current car (aiming to avoid regret). But for the choice about where to buy their groceries, Reference points and Regret minimization may hardly play a role.

Next, we suggest that Travel motivations can influence the Decision-making paradigm used by the traveller. For example, if Positionality is a motive, people could anchor the utility of an alternative to a given reference point, such as the car types of nearby peers, or they might want to avoid regretting that their car type is considered to be positioned lower than the current or expected near future car types of their peers. But in the case of travel as Derived demand, Utility maximizing (ignoring Regret or Positionality) could be the Decision-making paradigm for many people.

In Fig. 2, for reasons of simplicity we omitted feedback links from Specific travel choices to TPC, Decision-making paradigms and Travel motivations, although such feedbacks can exist. For example, previously made Travel choices can influence people's attitudes towards travelling by specific modes (for explanations and conceptual implications see Van Wee et al. 2019, for empirical evidence see Kroesen et al., 2017). Furthermore, Fig. 2 conceptualizes the behaviour of individuals (or small groups, like households), not aggregate behaviour. Especially if the figure were to be used to conceptualize aggregate behaviour, such as for all people living in a region, state or country, travel choices influence TPC. For example, these choices influence congestion levels and travel times, or crowding in public transport (context factors). And such changes could lead to indirect effects, like expanding transport infrastructure or land use changes. In addition, it is possible that the causal structure could differ from what we suggest, at least for some combinations of people and decision types. More specifically, mediation effects can occur. For example, it could be that the Travel motivations are a mediator for the impact of TPC on Decision-making paradigms.

One important note is that people make choices based on expected utility, but the experienced utility can differ from the expected utility (e.g. Chorus & De Jong, 2011; De Vos et al., 2016). Expected utility is the utility a person expects to derive from a choice, at the moment s/he

makes the choice, whereas experienced utility expresses the utility a person experiences after the choice is made. For example, a person buying a car might expect a certain utility of that car, but the experienced utility might differ, such as in the case of the expected fuel efficiency of that car (promoted by the car seller, and based on test conditions), as opposed to the fuel efficiency of the car in practice.

We limit ourselves to the choices people make, not to the experienced utility of their choices. But these experiences can update the expected pros and cons of future choices, so experiences do influence people's future choices. And although we developed the MTTC primarily to help understand travel and travel-related choices, conceptually it can also be used to understand the experiences of travel choices of people. For example, a European person might have bought a prestigious diesel car in 2014, but after 'Dieselgate' the reputation of diesel cars has worsened, and therefore the experienced utility, as far as positionality plays a role, could be lower than expected.

5. Implications for research, policy and practice

A first implication of our *meta*-theory is that it may help researchers to position their research more explicitly: what is (not) included. And related: it can help them to discuss the limitations of their research. And a general conclusion is that much heterogeneity exists with respect to the combinations of its five building blocks, and allowing for this heterogeneity improves our understanding of travel (-related) choices.

How would the MTTC be operationalized in an empirical study of travel choices? Several methodological implications present themselves. One implication is that for modelling choices a tiered structure may be appropriate, where in the lower level the interactions among TPC components are modelled, and in the higher level the links between TPC, travel motivations, and decision-making paradigms.

A next implication is that for the decision-making paradigms, models that allow for heterogeneity in these paradigms may be desirable. Several papers have shown that it is possible to use finite mixture (latent class) models to specify multiple decision-making paradigms within the sample, not knowing which paradigm any single individual follows – see Kim & Mokhtarian (2023) for an overview of the literature and Chorus et al. (2013) for an example.

An overarching idea for empirical research pertains to questionnaires about travel and travel-related choices. Because the framework is quite complex, and there are so many choices (trip motive, frequency, mode choice, route choice, car type choice, residential choice, ...), it is uncertain whether it is possible at all to fully explore all elements of the MTTC in combination, and it is quite unlikely that a megaproject involving multiple surveys that would systematically and comprehensively cover the full framework will ever be designed and funded. Rather, it seems more likely that individual projects will test various combinations of the elements of the theory. For example, one (or a multi-wave sequence of) survey(s) might focus on comparing the mix of decision-making paradigms applied to two strategically-chosen types of travel choices across a few different contexts, controlling for diverse motivations. In general, we would expect the questionnaires to explicitly include questions addressing TPC, and motivations. They could, but do not have to, include questions about the decision-making paradigms – the applicability of a given paradigm can also be based on the analyses of the data. Because some ingredients of the MTTC might apply to a relatively small share of all respondents and decisions made (travel to escape, positionality, travel because of the positive utility of the trip), a relatively large sample would be needed if these research topics are to be included. Preferably such research would involve a multi- (at least two-) wave survey, because TPC can influence travel motivations and vice versa, and a multi-wave design would allow for the exploration of both directions of causality. But if research were to show that the impact of motivations on TPC is limited, a result that seems possible to us, later research could also be based on cross-sectional data.

It seems promising to apply Latent Class Analyses (LCAs) to explore

² As made clear in Section 2, the Decision-making paradigm is of another order than the other building blocks of our MTTC: it explains *how* people make choices, and can also apply to domains other than travel and travel-related choices. That is why we applied another type of border for its representation in the figure.

which latent classes exist, where these classes are the combinations of TPC, decision-making paradigms and travel motivations. Preferably this would be latent class transition models, so that the dynamics and causalities can be studied explicitly. Also in case of LCAs, multiple questionnaires are needed. Even if this would narrow down the scope of each questionnaire, a complication could be that there are too many variables to be included in such an LCA, so this could be a challenging job. Then it could be an idea to send out multiple questionnaires, each covering part of Fig. 2, for a specific part of the choice type included.

A range of studies in this area would allow researchers to better understand travel and travel behaviour choices. That improved understanding could be useful for specific types of research. For example, positionality could be relevant for some choice types, such as car ownership and car type and residential choice, at least for some categories of people, and could lead to a better understanding of demand forecasts and the impact of policies aiming to influence such choices. That improved understanding could also contribute to a more holistic understanding of travel and travel behaviour choices. Such understanding is first of all fruitful for science. And it can also help policy making, if it were to identify latent classes of people and decision types that could be more or less than average influenced by specific types of policies. But it is presently too early to address examples of latent class and policy types.

A final suggestion would be to analyze previously executed travel behaviour research by studying the methods used: which travel and travel-related choices did researchers study, which TPC factors did they (not) include, which decision-making paradigms did they (implicitly or explicitly) assume? This could shed light on which combinations of our building blocks are understudied, resulting in a research agenda. It could also identify combinations that may be especially prone to generating consequential biases or simply errors, with resulting policy implications.

The implications for policy and practice (planning, design) are less specific. In debates about candidate policy interventions that have travel behaviour implications, participants could check whether in the estimates (quantitative or qualitative) and modelling efforts the insights of this paper are included. Policy interventions can be policies like pricing/subsidies or regulations (such as maximum speeds), the design of public transport services, and also planning interventions, mainly infrastructure and land use planning. If, for example, there is a debate about cycling infrastructure expansions, this paper could help them realize that not all cycling is utilitarian cycling, but there is also recreational cycling. And people who cycle for recreational reasons can have other priorities than people who cycle for commuting or other utilitarian reasons. For recreational cycling the attractiveness of a route is probably more important than for utilitarian cycling, but travel times are probably more relevant for utilitarian cycling than for recreational cycling.

Next, there are indirect policy implications for policy and practice. These arenas can benefit from new insights from research and improved modelling based on this paper. This is because these new insights and improved models can result in better estimates of the travel behaviour impacts of policy and planning interventions, and consequently the impacts on accessibility, safety, the environment, health and wellbeing that result from the travel behaviour changes.

6. Concluding Remarks

We do not want to suggest that all travel choice research should address every element of the MTTC. There be good can reasons to limit a study to, for example, the assumption of derived demand and utility maximization theory. But then it is good to be aware of possible limitations or bias.

Researchers studying travel behaviour need to make choices for their theoretical underpinnings. Considering the heterogeneity in decision-making paradigms for travel choices, and the importance of context factors, an important question is: which assumptions with respect to decision-making paradigms and motivations are 'best' in the sense that

they are most capable of capturing human behaviour in quantitative choice models? On the basis of the MTTC we argue that the answer to the question of which assumptions are best is: it depends. There is no one best model or set of assumptions; the answer to which assumptions are 'best' depends on (1) the type of travel choice, (2) characteristics of persons, and (3) context factors. Nevertheless, there is more to be learned about what *combinations* of assumptions might work best under various circumstances.

We also want to point out that the precise definitions of building blocks, and consequently labelling of specific factors, are open to debate and interpretation, and may themselves be context-dependent. For example, in some studies trip purpose can best be labelled as a context factor (within which specific choices are studied /modelled), whereas in other studies it can best be considered a motivation. Researchers can adapt and further specify our MTTC for their specific purposes.

We only discuss travel choices in this paper but the underlying ideas apply to making choices in other areas as well. Especially the interactions between personal characteristics, types of choices at stake (in our case: travel choices) and context factors, but also the idea that different types of motivations and decision-making paradigms for choices can co-exist, is a notion that could apply to many other types of choice making, such as with respect to job, family, sustainable energy investments of home owners, and housing type choice.

CRedit authorship contribution statement

Bert van Wee: Writing – original draft. **Patricia Mokhtarian:** Writing – original draft, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

We thank Dr Eric Molin, Dr Sander van Cranenburgh and Dr Maarten Kroesen (TUDelft, the Netherlands) for their excellent suggestions addressed after a presentation of the draft version of this paper, and NECTAR conference attendees who made useful comments at the conference at Brussels University, 3-5 July 2024. Comments from anonymous reviewers have also improved the paper.

Data availability

No data was used for the research described in the article.

References

- Ajzen, I., 1991. The theory of planned behavior. *Org. Behav. Hum. Dec. Process.* 50, 179–211.
- Arentze, T.A., Timmermans, H.J.P., 2004. A learning-based transportation oriented simulation system. *Transp. Res. B* 38 (7), 613–633.
- Brathwaite, T., Vij, A., & Walker, J. L. (2017), Machine learning meets microeconomics: The case of decision trees and discrete choice. Available at <https://arxiv.org/abs/1711.04826>, accessed January 23, 2020.
- Cantillo, V., de Ortúzar, J., D., 2005. A semi-compensatory discrete choice model with explicit attribute thresholds of perception. *Transp. Res. B* 39, 641–657.
- Chorus, C.G., 2010. A new model of random regret minimization. *Eur. J. Transp. Infrastruct. Res.* 10 (2), 181–196.
- Chorus, C.G., de Jong, G.C., 2011. Modeling experienced accessibility for utility-maximizers and regret-minimizers. *J. Transp. Geogr.* 19 (6), 1155–1162.
- Chorus, C.G., Rose, J.M., Hensher, D.A., 2013. Regret minimization or utility maximization: it depends on the attribute. *Environ. Plann. B. Plann. Des.* 40 (1), 154–169.
- De Vos, J., Mokhtarian, P.L., Schwanen, T., Van Acker, V., Witlox, F., 2016. Travel mode choice and travel satisfaction: bridging the gap between decision utility and experienced utility. *Transportation* 43 (5), 771–796.
- Deci, E.L., Ryan, R.M., 1985. *Intrinsic Motivation and Self-determination in Human Behavior*. Plenum Press, New York, NY.

- Flaherty, G.T., Holmes, A., 2020. Will flight shaming influence the future of air travel? *J. Travel Med.* 27 (2), taz088.
- Foerster, J.F., 1979. Mode choice decision process models: a comparison of compensatory and non-compensatory structures. *Transp. Res.* 13A, 17–28.
- Goodwin, P., Hensher, D., 1978. The determinants of travel choice: an overview. In: Hensher, D., Dalvi, Q. (Eds.), *Determinants of Travel Choice*. Praeger, New York, pp. 1–65.
- Hägerstrand, T., 1970. What about people in regional science? *Pap. Reg. Sci. Assoc.* 24, 7–21.
- Hirsch, F., 1977. *The Social Limits to growth*. Harvard University Press, Cambridge, MA and London, England.
- Hoen, A., Geurs, K.T., 2011. The influence of positionality in car-purchasing behaviour on the downsizing of new cars. *Transp. Res. D* 16 (5), 402–408.
- Kahneman, D., Tversky, A., 1979. Prospect Theory: an Analysis of Decision under risk. *Econometrica* 47 (2), 263–291.
- Kim, S.H., Mokhtarian, P., 2023. Finite mixture (or latent class) modeling in transportation: Trends, usage, potential, and future directions. *Transp. Res. B Methodol.* 172, 134–173.
- Kroesen, M., Handy, S., Chorus, C., 2017. Do attitudes cause behavior or vice versa? an alternative conceptualization of the attitude-behavior relationship in travel behavior modelling. *Transp. Res. A Policy Pract.* 101, 190–202.
- Liebe, U., Van Cranenburgh, S., Chorus, C., 2023. Maximizing Utility or avoiding losses? Uncovering Decision Rule-Heterogeneity in Sociological Research with an Application to Neighbourhood Choice. *Sociol. Methods Res.* 1–43. <https://doi.org/10.1177/00491241231186657>.
- Mokhtarian, P.L., Salomon, I., 2001. How derived is the demand for travel? some conceptual and measurement considerations. *Transp. Res. A Policy Pract.* 35 (8), 695–719.
- Mokhtarian, P.L., Salomon, I., Singer, M.E., 2015. What moves us? an interdisciplinary exploration of reasons for traveling. *Transp. Rev.* 35 (3), 250–274.
- Malokin, A., Circella, G., Mokhtarian, P.L., 2019. How do activities conducted while commuting influence mode choice? using revealed preference models to inform public transportation advantage and autonomous vehicle scenarios. *Transp. Res. A* 124, 82–114.
- Ortúzar, J.de D., Willumsen, L.G., 2011. *Modelling Transport*, 4th Edition. Wiley.
- Shove, E., Pantzar, M., Watson, M., 2012. *The Dynamics of Social Practice. Everyday Life and how it changes*. Sage Publications, London.
- Simon, H.A., 1956. Rational Choice and the Structure of the Environment. *Psychol. Rev.* 63 (2), 129–138.
- Spotswood, F., 2016. *Beyond Behaviour Change. Key Issues, Interdisciplinary Approaches and Future Directions*. Policy Press, Bristol.
- Swait, J., 2001. A non-compensatory choice model incorporating attribute cutoffs. *Transp. Res. B* 35B (10), 903–928.
- Van Wee, B., 2021. Accessibility and mobility: Positional goods? a discussion paper. *J. Transp. Geogr.* 92, 103033.
- Van Wee, B., De Vos, J., Maat, K., 2019. Impacts of the built environment and travel behaviour on attitudes: Theories underpinning the reverse causality hypothesis. *J. Transp. Geogr.* 80, 102540.
- Van Wee, B., Kroesen, M., 2022. (2022), Attitude changes, modelling travel behaviour, and ex ante project evaluations. *Transp. Res. Interdiscip. Perspect.* 16, 100724.
- Van Wee, B., Mokhtarian, P., 2023. Escape theory: explaining a negative motivation to travel. *Transp. Res. A* 169, 103603.
- Van Wee, B., Annema, J.A., Banister, D., Pudane, B. (Eds.), 2023. *The Transport System and Transport Policy. an Introduction*, Second edition. Edward Elgar, Cheltenham.
- Verplanken, B., Aarts, H., Van Knippenberg, A., 1997. Habit, information acquisition, and the process of making travel mode choices. *Eur. J. Soc. Psychol.* 27 (5), 539–560.