Mobility Experience Types: Towards Designing a Positive Personal Commuting Experience

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Abstract
To design successful, sustainable future mobility systems, it is crucial to provide incentives for commuters to change to eco-friendly alternative routes and means of transport. We believe that this can be realized by a user-centered, need-based design of a mobility infrastructure combined with an intelligent planning system that provides a positive commuting experience. As a first step towards this goal, we conducted interactive focus groups with commuters to identify their motivational drivers as well as opportunities for a positive, personalized commuting experience. The results reveal the demand to support the *hedonic use of ways* (taking routes for the enjoyable experience itself) and a segmentation into four *mobility experience types (MxT)* describing commuting and interaction preferences of commuters based on their need's profile.

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User needs; user experience design; future mobility system; mobility experience types.

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H.5.2. User Interfaces: User-centered design;
H.1.2. User/Machine Systems: Software psychology.

Introduction

In the past years, increasing attention has been directed towards the design of future mobility systems in urban areas. The most pressing problems are pollution and over-crowding of the streets caused by the high numbers of individual commuters. In the United States, for example, commuting time has constantly been increasing over the years and now reached a peak of an average 26.1 minutes [10]. Over three-quarters (76.3 percent) of the American commuters use their car to get to work. Urban planners do, however, envision an environmental-friendly commuting and reduced individual mobility and car usage for the city of the future. Still, currently no sufficient solutions are available that take into account personal preferences and demands of the individual commuters. Similarly, the development of new vehicles generally takes a technology-oriented perspective, leaving the requirements of the future users aside.

To ensure that new innovative vehicles will be preferred over current mobility solutions such as cars, it is necessary to offer the commuters some incentives to change their commuting habits. Gabrielli et al. describe that this can be done by adopting a number of different persuasive strategies such as goal-setting, rewards, games, self-monitoring, and sharing [4]. They also implemented a mobile application to motivate users to choose sustainable transport options based on these strategies.

Extending this research, our work is aimed at developing design solutions to enhance people's willingness to environmentally friendly transportation not through external factors, but by evoking positive experiences from the commuting journey itself. In additions, we investigate approaches for tailoring this commuting experience to the needs and preferences of the individual commuter. In this paper, we present a qualitative study that was conducted to derive initial user needs and requirements related to future mobility systems, which can serve as an inspirational basis for innovative design solutions.

Positive User Experience

We base our research on methods from User Experience (UX) design, which focusses on promoting positive experiences during human-technology interaction. This can be achieved by satisfying basic human needs through the design of a technical product [6]. Hassenzahl et al. describes, for example self-expression, autonomy and security as basic needs [5]. A comprehensive overview of different needs and their association with long-term effects such as increased product bonding and motivation is provided by the *UXellence®-Framework* [2]. We apply the need-based UX design approach to the activity of commuting and the design of the infrastructure for future mobility solutions as well as an underlying, intelligent planning system. According to the *UXellence®-Framework,* a mobility solution that addresses the commuter's individual needs and makes the activity of commuting a positive one should also facilitate a behavioral change towards a persistent use of this new solution.

Personalization for Experience

Different people have individual needs and experience concrete situations differently. Therefore, especially for systems addressing the general public, a design-for-all approach aiming at one common solution is not appropriate. Most likely, trying to address all relevant needs at once will result in the risk of not creating any

Statement and related Need	
"My commuting way should provide diversion to me."	*Stimulation (I)*
"I am open to commuting with vehicles that I have never used before."	*Stimulation (II)*
"It is important to me to reach my commuting destination on time."	*Security (I)*
"I feel uncomfortable when I do not know how to exactly reach my destination before leaving."	*Security (II)*
"I like it to be able to use my commuting way for physical activity."	*Physical Wellbeing (I)*
"I do not want to be exposed to rain on while commuting but to reach my destination dry."	*Physical Wellbeing (II)*

Table 1: First half of the need statements used in the questionnaire. See Table 2 for the second half.

positive experiences at all. For example, motivational features should "fit specific travel preferences and behavioral profiles of the different users" [3] to increase their effectiveness. The potential of personalized interaction design that aligns to individual characteristics has also been described for the area of gamification or gameful design [9] and presentation of cultural heritage [8], for example.

Interactive Focus Groups

To assess the requirements and needs of commuters for a future environmental-friendly and motivating transportation system we conducted *interactive focus groups*, which combine elements of User Experience, Design Thinking and Lego® Serious Play® into a structured group discussion like classic focus groups [7].

Participants

We conducted three interactive focus groups with a total of 17 participants (nine females) who were between 20 and 47 years old (M=27.1, SD=6.97). All participants had to commute to work or university for at least 15 minutes and had to pass through a large nearby city. The average commuting time was 32.18 minutes (SD=12.57).

Procedure

Each focus group lasted three hours and was structured into three blocks:

- **Block 1 – Status Quo:** Requirements of daily commuting were assessed by having participants characterize their own daily commuting route and experience on a special template.
- **Block 2 – Future:** Potentials of new sustainable mobility options were identified by letting participants experience innovative small electric vehicles and evaluate their use for commuting. In addition, participants were asked about potential needs related to mobility.
- **Block 3 – Vision:** Participants were asked to build their own vision of future commuting with Lego® bricks.

Positive Commuting Experiences

In the first and third block we identified two different clusters of reasons why commuters take a certain route: The first cluster describes ways and means of transport that serve a certain additional *purpose*, e.g. going shopping or picking up children from Kindergarten. The purpose does not always have to be a stop on the way, but can also be found in the way itself. Some people, for example, use their commuting time to prepare for work or make private phone calls. This *purpose-related* way supports a pragmatic use of time, but does not explicitly promote positive experiences.

The second cluster includes all choices of ways related to the *hedonic* use: Specific ways are chosen because they provide a certain positive experience compared to possible alternatives and are, for example, more comfortable, more silent or more aesthetic. We found that the *purpose-related* use of ways is much more common than the *hedonic* use. Most participants regarded commuting as an annoying expenditure of time which should be filled with meaningful other activities. Participants said that a way that evokes positive experiences was a desirable idea, but it seemed to be difficult for them to take an alternative

Statement and related Need
"I like to try new means of transport and tell friends about it." *Popularity (I)*
"I want to commute using means of transport that do not attract attention." *Popularity (II)**
"I express my personality through the means of transport I use." *Self-Expression (I)*
"My way of commuting has to match my personal values." *Self-Expression (II)*
"I want to choose the vehicles I commute with myself." *Autonomy (I)*
"I would like it if my commuting way would be planned for me in advance without requiring me to make any decisions myself." *Autonomy (II)**

Table 2: Second half of the need statements used in the questionnaire. Inverted statements are marked with *. See Table 1 for the first half.

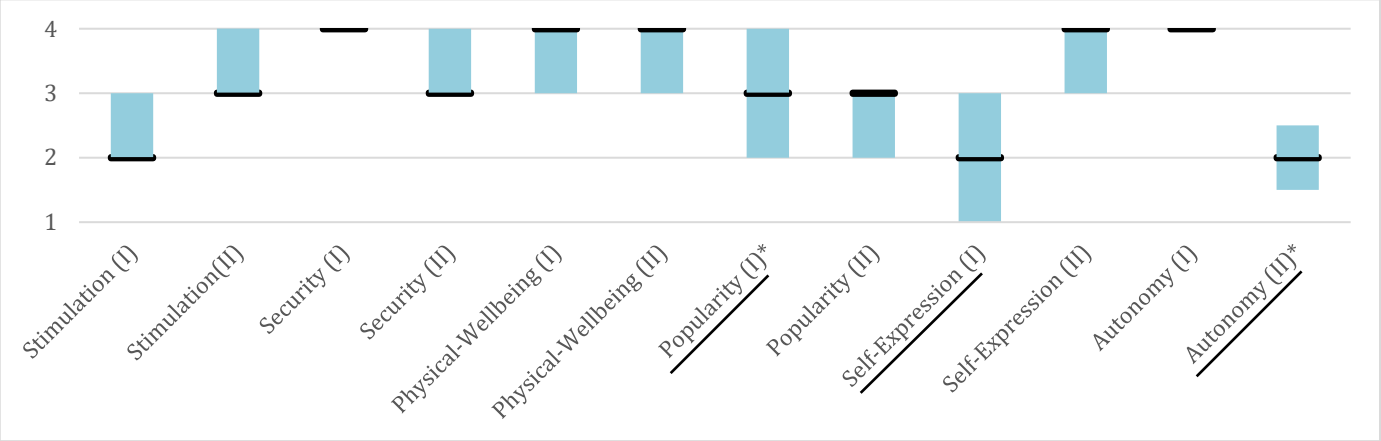

Figure 1: Boxplot of participants' ratings for each need statement from 1 = "do not agree at all" to 4 = "completely agree". Inverted statements are marked with *. Statements having an interquartile range (blue box) symmetric to the median (bold line) are underlined.

route that matches the *hedonic* criteria with the available means of transport and infrastructure. Some participants would, for example, like to take a route through the forest instead of the city center, but never do it, because the region is too hilly for comfortable cycling and using public transportation is simply the obvious, easy option.

Mobility-related Needs

During the second block of the interactive focus group we asked the participants to fill in a questionnaire about their personal needs. It consisted of 12 statements (listed in Table 1 and Table 2) describing the core aspects of six different needs that we had identified as important in relation to mobility (stimulation, security, physical wellbeing, popularity, self-expression, and autonomy). Each statement was rated on a four-point Likert scale ("do not agree at all" to "completely agree").

As depicted in Figure 1, five statements received a median rating of "completely agree". Accordingly, we interpret these statements as must-have requirements for future mobility systems that apply to all potential users. For almost all of them it is important to arrive at their destination in time (*security (I)*) and to choose the vehicles they use themselves (*autonomy (I)*).

Personalized Commuting Experiences

Looking at the needs statement analysis, we found three statements with a symmetric interquartile range in their ratings (*self-expression (I), popularity (I), and autonomy (II)*; see Figure 1). These statements therefore offer a high potential for personalization. Using the individual ratings for these statements, we identified four groups, which each represents a *MxT* as follows (see Figure 2 for an overview):

Way-oriented Self-Expressionist

Goal: to enjoy a nice way
Important needs: self-expression, autonomy
Desire: act according to values and personality

Vehicle-oriented Self-Expressionist

Goal: to arrive with driving pleasure
Important needs: security, self-expression
Desire: explore new vehicles

Control-oriented Pragmatist

Goal: to travel fast and efficient
Important needs: security, autonomy
Desire: optimize the route themselves

Delegating Pragmatist

Goal: to arrive fast without personal effort
Important needs: security
Desire: delegate routing to reduce effort

Figure 2: Overview of mobility experience types and their characteristics.

Way-oriented Self-Expressionists
…express their personality through the means of transport they use (*self-expression (I)*). Unlike others, it is not their top priority to reach their destination in time. They prefer to plan their routes on their own to ensure a nice, natural and green experience. To be able to collect those impressions from the surroundings, they tend to choose a suitable vehicle themselves or to walk part of their way. They do not want to attract attention in public and are open to sharing solutions.

Vehicle-oriented Self-Expressionists
…also express their personality through the means of transport they use (*self-expression (I)*), but are more focused on vehicles. To be able to try new vehicle concepts and tell their friends about it (*popularity (I)*), they prefer to explicitly choose vehicles and plan their routes. Accordingly, they accept to attract attention in public while driving these vehicles. Despite all welcome stimulation, they want to be sure to reach their destination in time before leaving.

Control-oriented Pragmatists
…want to plan routes and choose vehicles themselves, just like both types before (*autonomy (II)*), but based on another motivation. Their primary focus is to arrive at their destination fast and on time, without waiting time. They are only sure about that if they exactly know how about the course of their journey in before. Accordingly, they care about the availability of sharing vehicles which they prefer to drive themselves. In addition, their selected means of transport has to be cheaper than alternatives.

Delegating Pragmatists
…set their main focus on arriving at their destination in time, easy and comfortable. In contrast to control-oriented Pragmatists they want to reduce their personal planning effort. Therefore, they would like to have their way planned by an intelligent system in before. However, it is important for them to know about that plan before leaving.

While the two types related to *self-expressionism* describe needs and preferences for the journey of commuting and infrastructure, the *pragmatic* types are more focused on the route planning (e.g. by the intelligent panning system). It should be noted that each user does not necessarily correspond to one MxT.

Discussion

Our study was aimed at investigating how to provide positive experience for commuters to encourage them to use alternative means of transportation. Our results reveal interesting opportunities for design solutions for a future infrastructure and intelligent planning system that enables positive commuting experiences.

In today's mobility research the *purpose-related* view on ways is the predominant perspective. Dungs et al., for example, describe that people value additional activities regarding productivity, communication and basic requirements the most while traveling in autonomous vehicles [1]. New innovative (electric) vehicles have the potential to enable commuters to realize a *hedonic* use of ways and significantly extend their travelling options. The intelligent planning system could present new vehicles and describe the ideal route for the individual user. To do so, it should take into account the user's *MxT*, which enables the system to

adjust (a) the recommendation for the route and vehicle and (b) the way of how the recommendation is communicated to and refined in interaction with the user.

Future Work

The *MxT* have been defined based on qualitative results of the interactive focus groups. To verify and substantiate this segmentation, a quantitative evaluation has to be conducted with a larger sample size. As a next step, we will then transfer the insights about positive commuting experiences and *MxT* into concrete design concepts for a future mobility system including the required infrastructure as well as interaction with and personalization functionalities of the intelligent planning system. Hedonic aspects of the user profile are very personal data. This requires a careful consideration of privacy issues and data security when designing for *MxT*.

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