Transportation Research Part F 44 (2017) 20–29

Contents lists available at ScienceDirect

Transportation Research Part F

journal homepage: www.elsevier.com/locate/trf

Individually constructed criteria for perception of urban transportation means – An approach based on Kelly's personal construct theory

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ARTICLE INFO

Article history:
Received 15 October 2014
Received in revised form 3 August 2015
Accepted 7 October 2015
Available online 12 November 2016

Keywords:
Battery electrical vehicles
Repertory grid technique
Comparison of modes of transport
Subjective perception
Emotions

ABSTRACT

Understanding of acceptance of electric mobility has been typically discussed by a comparison of vehicles with different types of propulsion engines, battery electric vehicles and vehicles with an internal combustion engine. Nevertheless, electric mobility comprehends a combination of public transport and electric vehicles. The aim of this paper is to understand peoples' outlook on electric mobility by identifying shared aspects of the assessment of battery electric vehicles and different user perspectives on transportation. A special research design in the form of repertory grids provides an opportunity to study the underlying causes of the cognitive perceptions and emotions relating to electric mobility. Cognitive interviews motivate respondents to reflect beyond the insights provided by standard forms of interview. Especially for the topic of battery electric vehicles, prejudices - for instance, those propagated by the media - are discarded and the actual requirements and patterns of mobility become visible. The special tasks involved in the interviews lead, for example, to deliberation on how to integrate battery charging processes into existing mobility patterns.

This special method reveals that individuals take an interest in more characteristics of modes of transport than those that are usually analysed when researching electric mobility. In addition, three anticipation clusters can be identified for individuals with a higher affinity for cars. First, the perception of battery electric vehicles shows high levels of similarity to cars with internal combustion engines and that differentiating between types of engines is meaningless. Second, battery electric vehicles are perceived as a part of urban public transport. Third, battery electric vehicles are viewed as similar to pedelecs and segways, whereas questions of range, innovation and environmental aspects play a greater role in perceptions. These results lead to the conclusion that when studying the acceptance of BEVs, a comparison between cars with internal combustion engines and battery electric vehicles is not sufficient to grasp the complete user perspective. An analysis within the framework of a wider range of modes of transport is required in order to address people's transportation needs.

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http://dx.doi.org/10.1016/j.trf.2015.10.010
1369-8478/

1. Introduction

Electric mobility comprises a variety of transportation systems, notably the combination of public transport and electrically powered vehicles. It serves as an inherent part of future urban integrated mobility concepts. For the users' perspective, electric mobility has so far been discussed based on a comparison between cars with internal combustion engines (ICEVs) and battery electric vehicles (BEVs). Therefore, the focus has been placed on range, costs and charging times. However, cognitive perceptions and emotions play a significant role in the formation of preferences in mode choices. The potential for a shift towards electric mobility can only be successfully identified if these perceptions and emotions are considered in the development of products and business models.

When analysing and interpreting the acceptance and perception of electric mobility, previous studies have treated BEVs in isolation from other modes of transport or simply compared them to ICEVs (Axsen & Kurani, 2008; Dütschke, 2012; Globisch, Schneider, Peters, Roser, & Wietschel, 2013; Götz, Sunderer, Birzl-Harder, & Deffner, 2011; Jarass, Frenzel, & Trommer, 2013; Neumann, Cocron, Franke, & Krems, 2010). The focus has been on aspects such as acceptable ranges or initial costs. Quantitative surveys aimed for identifying connections to socio-demographic backgrounds, experiences, mobility patterns, preferences for other modes of transport and other persuasive factors such as attitudes towards environment or technology: For the majority of BEV owners and potential customers consistent socio-demographic characteristics have been identified. According to international studies, early adopters of BEVs show a higher income and education, they are middle-aged men usually living in a household with more than one car (Globisch et al., 2013; Peters & Hoffmann, 2011). Overall, characteristics regarding attitudes are not as consistent and even contradicting: The EV market segment generally shows a higher environmentally awareness and technological affinity (Jensen, Cherchi, & Mabit, 2013; Neumann et al., 2010; Schuitema, Anable, Skippon, & Kinnear, 2013). Most of the studies reveal lifestyle (Peters & Hoffmann, 2011) as well as technological and economic reasons as important motivating factors for buying an EV (Tran, Banister, Bishop, & McCulloch, 2013). Other studies contradict, naming interest in cutting-edge technologies as the crucial factor and not environmental issues (Pierre, Jemelin, & Louvet, 2011). Qualitative surveys presented mainly associations, disadvantages and fears regarding electric cars such as analysing range anxiety (Götz et al., 2011; Nilsson, 2011). Moreover, apart from ICEVs, no other modes of transport have been taken into consideration while studying respondents' perception. When respondents were asked about their preferences, they had to select from options provided by the researchers; personal perspectives have hardly been taken into account.

In the 1950s, George Kelly developed the personal construct theory, which considers personal perspective when attempting to understand and analyse individuals (Kelly, 1955, 1963). Kelly refused to accept an objective truth and allowed people to construct their own systems of how to perceive and interpret their environment. This system of constructs is changeable and reflects a situation as it is perceived at a specific moment in time. The importance of single constructs in interpreting one's surroundings and even the constructs themselves can readily change. Kelly created a method for eliciting these constructs to help understand the world as it is seen by each individual. This repertory grid method, as it is known, sheds light on the unique and specific perception of an individual, on how a single respondent sees and evaluates the surrounding world. Originally used for therapeutical purposes (Kelly, 1955; Riley & Palmer, 1975), the scope of the method broadened in order to provide answers to questions about the perception of objects and people, situations and topics, and it is now used in many other fields of science (Fransella, 2003). Although Kelly originally established his qualitative method as a counter to methods that seek to measure objective factors in order to categorise people, in many newer studies the quantitative data of grids was used to identify respondents' scope of perception and cluster them accordingly. By comparing the grids of different respondents, common patterns of perception can be identified. Since the aim of the present study is to show the range of perceptions concerning electric cars, respondents were asked how they see BEVs not in isolation from, but rather in comparison with, other modes of transport, so as to take the focus off the direct comparison with ICEVs. Thus, the aim of the present paper is to identify the scope of perceptions concerning BEVs and to show which aspects lead to a positive or more positive assessment of BEVs and to gauge the relative impact of these aspects. The second aim is to situate BEVs within the personal systems of a given individual, in contrast to other modes of transport, including public transport facilities and electric vehicles such as pedelecs (electric bicycle) and segway (self-balancing personal transportation device with two wheels). Therefore, the research question is: What is the scope of the ways BEVs are perceived among respondents affinitive to cars and where are BEVs situated compared to other modes of transport?

2. Method

As a first step, the foundation of the repertory grid technique (RGT) – namely, Kelly's personal construct theory (PCT) – will be presented, followed by the design of the interviews and the sampling for our study. Lastly, we present the approaches of analysis to answers our research question.

2.1. Personal construct theory and repertory grid technique

Kelly (1955, 1963) refused to categorise people and accepted subjective differences in personal perceptions as more than just noise. Instead, he focused on this noise in order to understand how people anticipate and predict the world around them.