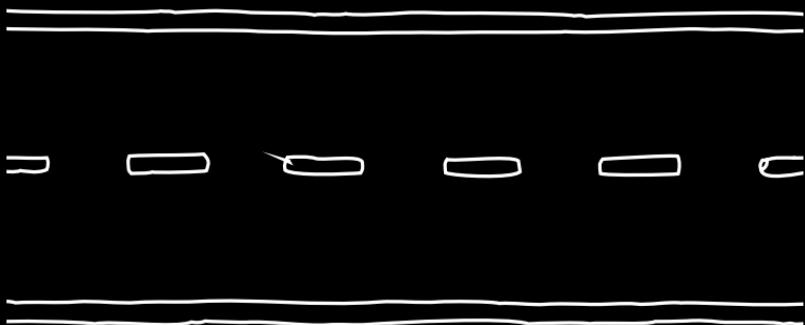


# RESEARCH ON THE ROAD

Methodology and Practice  
of Studying Traffic, Driving Habits,  
and Sustainable Mobility



Edited by  
Dan Podjed and Simona Bezjak



# Research on the Road: Methodology and Practice of Studying Traffic, Driving Habits, and Sustainable Mobility

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Issued by

Research Center of the Slovenian Academy of Sciences and Arts (ZRC SAZU), Institute of Slovenian Ethnology, Novi trg 2, Ljubljana, Slovenia

Represented by

Ingrid Slavec Gradišnik

Publisher

Založba ZRC

For the publisher

Oto Luthar

Editor-in-chief

Aleš Pogačnik

Printing house

Cicero Begunje

Print run

300

First edition

Ljubljana 2017

**CIP - Kataložni zapis o publikaciji**  
**Narodna in univerzitetna knjižnica, Ljubljana**

656(082)

**RESEARCH on the road : methodology and practice of studying traffic, driving habits, and sustainable mobility / [authors of the chapters Saša Babič ... et al.] ; edited by Dan Podjed, Simona Bezjak. - 1st ed., 1st print. - Ljubljana : Založba ZRC, 2017**

ISBN 978-961-05-0025-4  
1. Babič, Saša, 1979- 2. Podjed, Dan  
291261952



This book is accessible for free as an e-document, ISBN 978-961-05-0026-1, COBISS. SI ID=291263488: on ZRC SAZU website (<http://zalozba.zrc-sazu.si/p/1409>) and on the DriveGreen project website ([www.drivegreen.si](http://www.drivegreen.si)).

<https://doi.org/10.3986/9789610500261>

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# ACKNOWLEDGEMENTS

This volume is the result of an interdisciplinary applied research project DriveGreen: Development of an Ecodriving Application for a Transition to a Low-Carbon Society (project ID: J7-6858). The project, which started in 2014 and finished in 2017, was financially supported by the Slovenian Research Agency.

Editor and author Dr. Dan Podjed acknowledges the Institute of Advanced Study and Department of Anthropology at Durham University for awarding him a Fellowship in the United Kingdom from April to July 2016. The stay was financed by the Senior Fellowship Scheme Under the DIFeREns (Durham International Fellowships for Research and Enterprise).



# INTRODUCTION

## Understanding and Changing Habits on the Road

**Dan Podjed and Simona Bezjak**

How do people drive and behave in traffic? How can we change driving habits and encourage more environmentally responsible modes of transportation? These are the two main questions to which this volume tries to answer. It tackles the problems of driving, traffic, transportation, and mobility fully and interdisciplinarily, rather than from a single perspective, which has tended to be the norm so far. In the creation of the book, anthropologists, ethnologists, geographers, psychologists, and electrical engineers worked together to integrate the results of their studies, to cross the boundaries between scientific disciplines and fields, and to show how we can understand and interpret driving in a broader and multifaceted way.

The volume shows that driving habits are a highly interesting topic for research because they are part of one of the most important daily tasks and activities. The fact is that we spend a large part of our lives in cars, on bikes, buses, and other means of transportation. Through constant repetition, driving becomes an integral part of an individual's "habitus" (Bourdieu 1980; Bourdieu 1984; Elias 1991) or learned practices and habits that are so automatic that we talk, listen to music, and even eat while driving. We often do not think at all about how we drive.

Driving is not only an individual's habit, but also a social process (Kuipers 2012). Drivers imitate each other, "learn" the formal and informal rules of traffic, adapt to situations on the road, and communicate with each other verbally and non-verbally – perhaps most obviously when they get angry at each other (Podjed and Babič 2015). What we learn on the road becomes part of individual and community processes. Traffic education plays an important role in the creation and transfer of these processes. Often it begins before even starting school, continues when we get our license to ride a bike, and later in a driving school, where we learn how to properly hold the steering wheel, shift gears, accelerate and break, understand traffic signals, communicate with other road users, and the like. Many other factors affect our driving style, and often they are subject to economic, technological, social, cultural, and geographical conditions (e.g., the state of infrastructure, the age of vehicles, traffic rules and penalties, equipment of the vehicles, climatic conditions, etc.).

While making this compilation, we took into account factors that affect the ways of driving around the world. We have described how we can weave together qualitative and quantitative approaches, how useful interviews are for

understanding driving comfort, the power ethnography has to help us understand the lifestyle of drivers, which technological tools and approaches are the most useful for analyzing styles of driving, how to explore vehicles and traffic by analyzing language, how traffic might improve or worsen our way of life from a psychological point of view, and how we can encourage environmentally friendly behavior and practices on both the road and in life in general.

In the first chapter, Dan Podjed focuses on the integration of ethnography, or rather its upgrade, and technology. He uses the “part man, part machine” metaphor to explain how we can use a vehicle to learn about habits in traffic at various locations. In doing so, he tries to find a balance between qualitative and quantitative approaches and show how they can interweave. The findings from fieldwork eloquently testify how mobility affects our everyday lives in this chapter.

In the second chapter, Tatiana Bajuk Senčar highlights interviews as an important method for understanding comfort and convenience. These are two important factors that influence why people choose to use cars instead of bikes or public transportation and other more sustainable forms of transportation. The chapter is structured in a way that provides useful recommendations for further research on transportation and mobility.

In the third chapter, Alenka Bezjak Mlakar presents how we can use ethnography to study the lives of professional drivers and how the results of such research can be beneficial by improving work processes in transportation and other businesses. The chapter is especially important and relevant because it shifts from descriptive anthropological approaches to concrete application of ethnographic findings into practice and the preparation of development guidelines and recommendations.

The fourth chapter, written by Gregor Burger and colleagues, is the most unusual and fascinating from the perspective of the humanities and social sciences because it opens up the field of driving styles research using methods with technological solutions. In the chapter we learn, for example, how a vehicle can be equipped with cameras and sensors, and how to fit the driver with a device for measuring their heart rate. The results of such research, as the authors note, are important not only for further research but also from a development perspective, as they can help in the development of mobile applications and technical solutions for influencing drivers.

In the fifth chapter, Jernej Tiran and colleagues answer an important question related to sustainable mobility: why do the inhabitants of Ljubljana decide to (not) use public transportation? On the basis of a thorough analysis of the public transportation network of Ljubljana, they offer solutions that will undoubtedly be interesting and important to traffic planners in the city.

Saša Babič looks at traffic from the language perspective. In the sixth chapter, she presents various established phrases which we use to talk about vehicles and transportation. With colorful examples obtained with interviews in the field, as well as from media publications, she clearly shows what an important role “beasts on wheels” have in our day-to-day lives.

In chapter seven, Marko Polič looks at traffic from a psychological point of view and explains why people on the global scale still use vehicles with internal combustion engines even though they undoubtedly pollute the environment at a local level and contribute to the global release of greenhouse gases, which may even lead to a catastrophe of global proportions. Much like Tatiana Bajuk

Senčar, he describes how and why we are chained to our habits, including the use of personal vehicles, and burdened with our own amenities and comforts. In the conclusion, he adds some important recommendations which could affect our way of thinking and changing habits. He particularly highlights the importance of education and the focus on positive solutions and examples, which are more effective than displaying catastrophic scenarios for the future of the planet.

A sustainable lifestyle is the focus in chapter eight by Simona Bežjak. In this reviewing chapter, she describes different approaches from social sciences which can be used to interpret and encourage environmentally responsible practices. She uses the concluding chapter to clearly show that the technological solutions, that give feedback about our impact on the environment, are also important tools that change how people live and contribute to the creation of new, environmentally and socially responsible practices.

This book is, therefore, a motley collection of approaches and insight to help us study driving habits and sustainable mobility. The primary consideration when making the book was the realization that such a complex and everyday area, such as mobility practices, can be understood and changed only with the participation of various sciences and crossing the borders between them. The chapters of the book, of course, cannot be expected to give a completely comprehensive view of the topic under consideration or definitive answers to the opening questions about how we drive and how we could change our habits. Nevertheless, the book offers a multifaceted view of the methodological and content point of view and opens up new possibilities and opportunities for finding new insight and solutions that will contribute to a more secure and sustainable-oriented driving habits on the road.

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# AUGMENTED ETHNOGRAPHY ON THE ROAD

**Dan Podjed**

*This chapter presents the possibilities for extending and upgrading ethnographic research approaches by using different technologies and quantitative research methods. Using examples of researching traffic, the author explains how we can combine qualitative and quantitative methods to get a complete picture of how and why driving habits and mobility patterns change from one socio-cultural environment to another and which factors are crucial for their formation, endurance, and transfer. The author presents in detail the ethnographic approaches used for the study, including interviews, focus groups, observations of traffic, and participant driving, i.e., participant observation in vehicles. It is further explained how it is possible to combine these approaches by measuring driving styles through telematics solutions, and use of wearable sensors to monitor drivers' physical parameters.*

*Keywords:* driving habits, traffic, ethnography, mixed methods research, research methodology

## INTRODUCTION

"Part man, part machine, all cop," was the tag-line for Robocop, an iconic 1980s sci-fi movie directed by Paul Verhoeven. The plot of the movie is about a terminally wounded policeman returning to the force as a cyborg – stronger, more accurate, with better than human vision. We could describe the researchers of the DriveGreen project in a similar manner (perhaps only with slightly fewer superlatives). They drove through different cities in passenger cars, rode bicycles, and took public transportation and tried to experience, understand and analyze how traffic operates. In addition, the vehicles they used were equipped with cameras and sensors which helped the drivers remain focused on the road and still record what was going on around them and how their bodies reacted to situations in traffic.

This chapter presents and compares different research approaches, methods, and techniques, ranging from more subjective qualitative methods, including interviews, focus groups, and participant observation, to more objective and quantifiable approaches, such as measuring driving styles using telematics solutions. The main goal of this chapter is to present new opportunities for merging ethnography with other research approaches and to provide a starting point for further interdisciplinary studies of traffic and mobility. Therefore, it presents possibilities for extending and upgrading the existing ethnographic approaches, which have often put anthropologists and other social scientists in the ambiguous position of simultaneously being researchers and the main research instruments – all in one person. The text explains how it is possible to establish and utilize a new kind of researcher – "part man, part machine" – with enhanced senses and capabilities for understanding complex dynamic social systems, such as traffic in a city.

## THEORETICAL FRAMEWORK

The chapter is based on derivatives of the actor-network theory (Latour 1994; Latour 2005; Law and Hassard 1999) which explains that objects provide humans and other beings a new type of agency. For example, it is never people by themselves who shoot other people; it is, in fact, *humans with guns* whose agency is transformed by the possession of the weapons. "The programme of action of both subject and object is transformed once they come together – combined they may act towards a quite different goal that either could have achieved independently," explains Tim Dant (2004: 70) in his article on *driver-car assemblage*. From this perspective we can better understand a vehicle with a driver as a "form of social being that produces a range of social actions," including driving, parking, polluting, and even killing (2004: 61–62). Dant explains that such a hybrid on the road is "neither a thing nor a person; it is an assembled social being that takes on properties of both and cannot exist without both" (2004: 74).

So far, researchers have focused on people as research "subjects" on the road, embodying or habituating different driving practices and using or expressing them in a way that became taken-for-granted. Maurice Merleau-Ponty (1962: 143) explained that getting used to an object which helps people move, for example, to a walking stick, a car, or a bicycle, is comparable to being "transplanted into them, or conversely, to incorporate them into the bulk of our own body." It has been investigated how such "hybrids" (cf. Haraway 1991) of humans and objects are socially defined and mediated through some form of language (Dant 2004: 69). We tend to say, for example, that a pedestrian was hit by a car, which is not completely true; the pedestrian was in fact hit by the driver-car assemblage. The driver will be, after all, the one to blame and perhaps even tried in court (for more examples see Podjed and Babić 2015; see also Babić's chapter in this volume).

In addition, several researchers have tried to explain how vehicles are understood and utilized in different social and cultural settings (e.g., Conley and Tigar McLaren 2009; Freudendal-Pedersen 2009; Miller 2001; Paterson 2007; Vanderbilt 2008) and what the connection between driving habits and national identities is (Edensor 2004; Kuipers 2012). They have paid a lot of attention to the meaning of infrastructure (Dalakoglou 2017; Harvey and Dalakoglou 2014; Harvey and Knox 2015; Yazici 2013), described local narratives about roads (Argounova-Low 2012), and analyzed culture-specific attitudes to driving and speed (Árnason, Hafsteinsson and Grétarsdóttir 2007). However, there are several questions relevant to this volume that remain unanswered or only partly answered in previous studies of traffic and driving habits, especially in connection with methodology, analysis, and interpretation of research findings. How does driving influence the researchers and change their perspective? How can ethnographers' senses and sensibilities (cf. Pink 2009) be upgraded by vehicles or technologies? What kind of research findings may arise from such an *augmented ethnography* (cf. Churchill, Gooen and Shamma 2010; Jordan 2013; Laaksonen et al. 2017)?

## RESEARCH APPROACHES AND SELECTED FINDINGS

In the DriveGreen project, we tried to explore the foundations on which driving habits and mobility patterns are formed in five researched cities; three of the cities are located in Central or Southeastern Europe and two of them in Western Europe, more specifically in the United Kingdom. In Ljubljana, Slovenia, the study was carried out from July 2014 to September 2015, in Belgrade, Serbia, from September to December 2015, in Budapest, Hungary, from January to March 2016, and in Durham and Newcastle, both in the UK, from April to July 2016. The five researched cities significantly differ in population size, geographical specifics, traffic infrastructure, and also in their driving habits and practices, which are formed and influenced by

many subjective and objective factors that frame the daily mobility of people. These factors include, for example, age and experience of the drivers, types, and age of vehicles on the roads, local weather conditions, etc. The factors were identified through a multi-sited ethnographic research, which explored, as George Marcus (1995) suggested, transnational processes, groups of people in motion, and ideas that extend over multiple locations. Multi-sited and comparative ethnography was enhanced by driving style measurements taken with telematics devices for tracking vehicles and monitoring driving styles and with other technology-based solutions, such as high-speed and high-resolution cameras for recording traffic and heart-rate monitors for measuring the physical condition of the driver.

We decided to combine qualitative and quantitative approaches because the combination enabled us to get a better overview of how and why driving habits and mobility patterns change from one country and city to the next, which factors are crucial for their formation, endurance, and transfer, and how traffic actually influences people. The *mixed methods research* (e.g., Brannen 2005; Cresswell and Plano Clark 2011; Morgan 2014; Morse and Niehaus 2009; Teddlie and Tashakkori 2009) in the five locations was used for recording and analyzing driving habits on different locations and in various social groups. It took into account drivers of different types of vehicles, including private cars, taxis, commercial vehicles, people who ride bicycles or use public transport, and it also included pedestrians. In this way, we tried to investigate and understand the driving habits from different angles and use the findings for designing a smartphone app for promoting sustainable mobility, which was the main development output of the DriveGreen project. This chapter focuses on the project methodology and presents selected examples of each research approach, which are used to illustrate how, when, and why it is worth relying either on qualitative or quantitative approaches – or a combination of both.

### *Making detours in interviews*

In the study we relied on interviews as a common ethnographic technique to determine how people behave on the road, with an emphasis on how individuals understand and accept traffic and mobility in their daily lives. Interview questions were usually semi-structured, meaning that we allowed interviewees to steer the conversation and open new topics. In Ljubljana in June 2015, for example, we conducted a semi-structured interview with a 58-year-old taxi driver who started doing his job 35 years ago. Questions, prepared for the interview, were initially focused on boredom on the road. The answers in that part of the debate were not surprising; the taxi driver told us how seriously he took driving, especially when he had his clients, i.e. passengers, in the vehicle. He explained what he did to avoid boredom while driving, for example, that he focused on the edge of the road and tried to keep the same distance from a sidewalk as long as possible. After approximately 20 minutes, the interview started to become more intriguing, which is when we accidentally steered away from the initially set theme, and the interviewee began to talk about an accident he had had approximately two decades ago. He told us how he had hit a pedestrian who was crossing the road and suddenly appeared in front of the car from behind a bus. When the pedestrian heard braking, he jumped forward, and the taxi driver could not avoid him anymore. *"The story is particularly dirty because for two days after I thought that the man was actually dead,"* the taxi driver explained. After the accident he called the police, and a policeman explained to him that the injured man had died. *"It's a horrible feeling,"* he remembered with a worried expression on his face. *"You look into a mirror and you see a murderer. You start thinking what could you have done and go through the situation a million times. However, everything else does not matter. You are a murderer – you killed a man."* After two days, he found out that the man who was hit by his car in fact survived

the accident. Afterward, the driver was tried in court and got six months' probation. The interviewee then began to talk about hypothetical situations on the road, which had become his constant "*nightmare*": to accidentally slide off the road while driving and hit a group of people on the sidewalk. On the other hand, he also became a more careful driver after the accident; he keeps observing what is going on in front of him while driving and his attention does not slip away from the road anymore.

The debate then strayed to another relevant topic for studying driving habits: after three years on the road, the taxi driver realized that he should actually not stick to official rules and regulations. Instead, he started to use his own rule that says he never has the right of way in traffic. "*You should forget about traffic signs*," he said and explained to us about the first car accident he had when a police vehicle, arriving from a side street, hit him. Improvising on the road had shown to be an important research topic throughout the project and in several other interviews, especially when we tried to understand the traffic from a cross-cultural perspective. On the roads of Ljubljana, Belgrade, and Budapest, we could see much more improvisation and "bending" of the rules and regulations than in the UK. The aforementioned interview with the taxi driver thus accidentally strayed to a topic which has proven to be relevant for the "participant driving" as one of our main research approaches (see below). On the road, either behind a steering wheel or on a bicycle seat, we could experience what the interviewee talked about: in some cities, strictly following rules and regulations can be actually more dangerous than improvisation and constantly adapting to the situations in traffic. Carrying out an interview is similar to improvising on the road. As we can see from the example, it is advisable to be prepared for improvisation and making detours from the interviewing protocol, since each interview can be understood as a journey of discovery which constantly produces its own new questions. Serendipity and happenstance (cf. Hazan and Herzog 2012; Rivoal and

Salazar 2013) should, therefore, be taken into account in an interview, even – or especially – if the debate strays into an uncharted territory.

### *Moving from place to place in focus groups*

Focus groups have proven to be a useful research tool for studying traffic and driving habits, since they allow researchers to study people in a less structured conversation pattern than typically occurs in a one-to-one interview. When organizing focus groups, we tried to follow the recommendation that it is better to recruit participants who do not know one another than to create groups consisting only of friends, colleagues, relatives, or acquaintances, since the people who know each other very well may share some take-for-granted knowledge or assumptions and reproduce it in the debate (Agar and MacDonald 1995). However, we did not – or could not – strictly follow that rule, which is what happened with a focus group carried out with the postgraduate students of anthropology at Durham University in the UK.

The focus group was carried out in the formal environment of a university building; however, the setting was relaxed due to the food and drinks prepared by the Ph.D. student club. The main theme of the debate was initially focused on the promotion of sustainable mobility in different cities. Eight participants, most of them in their twenties or thirties, knew each other before they met at the focus group, but formed at the same time a very diverse group of people coming from different countries – from Spain, Italy, Slovenia, China, Malaysia, the Netherlands, and the UK.

The socio-cultural diversity of the participants has proven to be an important advantage in the debate about driving habits, which significantly differ in various places. In fact, the most significant output of the focus groups was a comparison of driving habits in different places. The participants explained how driving habits differ between

the place where they had lived in the past and Durham, UK, and verbalized their observations about the differences in driving styles in different locations they had visited as tourists or researchers. *“Basically, at home I never learned to cycle,”* emphasized a female participant of the discussion, *“because it was not a necessity in Spain. There you didn’t need a bicycle.”* The reason was, as she explained, a well-organized public transport system and good infrastructure for pedestrians in her hometown. She learned how to ride a bicycle later in London because she thought it would be better for her health. Afterward, she made an unexpected move in her narration to Indonesia, *“where everybody would use a car,”* which is, in her opinion, closely connected to the concept of family, *“going all together for a trip.”* Another participant, originally from the Netherlands, said she cycles everywhere at home, but that it is more difficult to use a bicycle in Durham, because of hills on the one hand and because of the way people in the city drive on the other. *“They are not as used to bikes as they are at home,”* she emphasized and she does not feel safe on the road. In addition, the roads of Durham are *“really bad in some places.”* In spite of the bad infrastructure and driving habits, she uses her bicycle on a daily basis, even when she goes to a nearby shop. A student from Slovenia was surprised about a local student’s habit of ordering food online at a supermarket because in Ljubljana she always walks to a store since she is used to doing so. The topic of the focus group in Durham then moved from driving habits to optimal approaches for supporting sustainable mobility in different places and then back to driving habits.

The main output of this focus group – and other similar research activities carried out in other locations – was the realization of the “agency-cum-patency” principle of establishing and maintaining driving habits. Michael Carrithers (2005) explains such a principle of “doing-and-being-done-to” on the basis of morality, which is constantly being recreated and reaffirmed. The traffic and driving habits can be similarly analyzed and interpreted with the use of the

actor-network theory and other theoretical approaches that try to go beyond the dichotomy between the creativeness of the individual and pressures of social structures (Bourdieu 1980, 1984; Latour 2005; Law and Hassard 1999). In this way we can better understand how the actions of individuals, i.e., drivers in their vehicles, intertwine with the traffic system and existing driving practices – they accept them and simultaneously have the opportunity to influence them.

### *Observing clashes on the road*

In the DriveGreen project, we didn't just talk to people but also observed the traffic at different locations in cities, especially at crowded intersections in the city center. There we observed and recorded traffic events at specific times of the day (e.g., during morning and afternoon rush hours), and later analyzed how people behave in traffic and how they express their feelings and emotions on the road.

In Ljubljana, this approach was used at an intersection in the city center. At this location we observed and recorded traffic events on a daily basis and at "critical" times, during morning and afternoon rush hours when the traffic was most condensed. In this way we were able to follow the dynamics on the road: what the traffic "flow" was like, how drivers reacted in certain critical situations, how they interacted with each other, and how they communicated with each other (for details see Podjed and Babič 2015).

Our initial intention was to observe how drivers in cars perceive and accept "foreigners", i.e., car drivers from other cities and countries, and how they express their emotions towards them. What surprised us was that we noticed hardly any of the expected expressions of anger or hate towards "the Other" on the road. Instead, we witnessed different "culture clashes" which were not based on the provenance of a driver, but instead on the type of vehicle, which was how the drivers defined subcultures on the road. At the intersection we observed cyclists riding in the opposite direction to the road, which made car drivers angry, and they

warned people on bikes by vigorously utilizing the horn, explicit gestures by hands, and angry facial expressions. Since a car functions as a “closed box”, we usually couldn’t hear what the drivers said; therefore, we had to rely on other approaches which enabled us to become a part of the traffic flow either as drivers or passengers.

### *Participant driving*

A large part of our field research took place in vehicles, as we carried out interviews mostly with drivers and front seat passengers or even passengers using public transport. As part of the research, we also performed what we dubbed “participant driving” – a term we employed to refer to participant observation in vehicles – which allowed us to monitor driving practices in urban areas. This part of the research included different means of city transportation. For the most part, we traveled in personal cars either as drivers or passengers and observed the traffic from these roles. In addition, we observed traffic and the habits and practices of drivers as passengers of the public transportation system (e.g., buses, trams, trolleybuses), and occasionally also as cyclists and pedestrians.

This approach was significant for the study as it gave us a broader view of the driving habits in the cities where our research took place. Observation of traffic and participant driving provided us with an overview of how people maneuver through cities by using various means of transport. Driving in passenger cars was, we noticed, often stressful for the participants in traffic, especially during rush hours. The drivers used swear words and gestures to express their anger, and they also showed it *through* their vehicles, for example by tailgating, overusing the horn, suddenly changing lanes, flashing headlights, speeding, forcing their way, and overlooking other traffic participants (Podjed and Babić 2015). However, these practices have proven to be culture-specific and connected to socially accepted ways of driving and using the vehicles.

We also used this approach for studying public transportation, where we were able to observe how drivers interact with passengers and communicate with other drivers on the road. This part of the research was often experiential and not planned – we might even describe it as “deep hanging out” (Geertz 1998), which highlights the anthropological research method of immersing oneself in a group or social experience on an informal level. In the end, observations collected in this informal and less structured way were often the most relevant insights from our anthropological research. We were able to experience, for example, traveling by public transport in Belgrade with three children, who were at the time of research nine, three, and one years old. In such situations we could often witness something unexpected: a completely packed bus or tram stopped and passengers, usually men, came out, picked up the stroller of the youngest child, helped children climb the stairs up the bus, put them in laps of other passengers, since all the seats had already been taken, and started a debate with the researcher. These kinds of events motivated our research interest in solidarity on the road, especially in public transport, which has proven to be different in each researched location. We noticed that in Ljubljana and Budapest people tend to be more reserved while helping others than in Belgrade. In the UK, the situation was even more extreme. A bus driver in Durham, for example, didn’t want to take us on board when we were traveling with children since there were already two strollers in the vehicle and according to the regulations this was also the security limit of the vehicle. It turned out that it was more difficult to avoid obeying the regulations in public transport in Durham and Newcastle than in Belgrade and Ljubljana.

Traveling in taxis has also proven to be an excellent opportunity to experience and understand traffic in the cities, especially since we were able to penetrate the “shell” of a vehicle and witness first-hand how locals use their vehicles and communicate with passengers and other

drivers on the road. This part of the study depended again on coincidences, including traffic situations and talkativeness of drivers who were important informants about transport and traffic. However, we didn't record conversations with them as we did in the interview mentioned above. Instead, we relied on jotting down notes after each ride and later interpreting them in a more concise way (see example *Through a shower of profanity*).

*Through a shower of profanity*

An October evening in Belgrade. It's raining and treetops are swaying in a cold, easterly wind. This is the weather I have to go through to get to a presentation of some new book. I've decided to take a cab since there's no way I'd drive in this weather.

The second I step outside, a gust of wind inverts my umbrella, and I have to struggle to set it right, all the while cursing the bent ribs. When I get out in the yard, the taxi is waiting for me by the gate. Not exactly by the gate, really, it's actually about a hundred and fifty feet down the road, slowly backing up towards me. I run down the sidewalk and wave to the driver to stop. I jump over a giant puddle, open the car door, and say hello. "I missed your house, so I parked here because someone behind me was giving me a hard time," explains the driver without returning the greeting, an older man with a grim, shadowy appearance. He looks like a character from a crime film – not on the side of order and justice, but on the other, darker side. I hesitate for a moment, then get in the car and we drive off into the rainy night.

The driver is firmly gripping the steering wheel and grimly stares straight ahead. There's a rosary swinging from the rear-view mirror next to his head. I ask him if there is a lot of work in such horrible weather – partly out of curiosity, and partly just to break the silence. "Of course there is," he replies sharply, "the problem is everyone starts driving like an idiot in this weather. You wouldn't believe the things that happen on the road." While he is explaining how drivers in Belgrade behave on a rainy evening, he's already blowing the horn in a warning to someone and waving a hand at him, telling him to get out of the way and quit changing lanes if there's no need to.

We make it to a big roundabout where several roads converge, including “ours” which gets there from Voždovac, as the Belgrade region where we are temporarily settled is called. We hit the melee of cars, trams, and buses in the roundabout like a speeding bullet in a gangster movie – from a gun held by a thug similar to “my” taxi driver. Right away, a small car forces its way from the right and cuts in front of us. “Sonofabitch, go screw yourself!” roars the driver, blaring the horn and struggling with the steering single-handedly (his other hand is busy honking and waving). We shoot out of the roundabout into the dark as if we tragically got unseated on a high-speed carousel.

“So who would you say are the rudest drivers?” I cautiously ask once we settle back on the road. I ask the question in a conciliatory, almost obsequious way, so as not to incense him again, but I lit a match under the explosives again. “Who, who... Well, what do you think?” is his inflamed response. He beckons his head through the windshield towards a gigantic SUV of a Japanese make, waiting at the traffic light in front of us. “Do you think that that guy needs such a car because he lives on a farm?” he mumbles through his teeth. I’d rather not answer that question because I have a feeling that it’s rhetorical only, and that any answer would be a potential last straw (and there really weren’t many anyway). When the green light comes on, he steps on the gas and tears past the SUV on the right, giving him a belligerent look. “The assholes are showing off, that’s all,” he explained. “The SUVs are nothing but assholes showing off!” he adds more loudly, to strengthen his statement.

“Have you been doing this long?” I ask him when we get to the next gigantic roundabout. “I’ve been driving a taxi for twenty-six years,” he explains more quietly, almost dolefully, while driving dangerously close to a tram. He is silent for a few moments. I don’t know whether he’s quiet because

of traffic or because he's browsing his memory to see if he's done the math of the years on the road correctly. "You know," he sighs after a pause, "I've worked myself to the bone all these years. Today, for example, I've been working since four in the morning, and now it is nearly seven o'clock in the evening. Another hour, and then the wife comes home from work." "Then you don't have to work tonight?" I ask him, while firmly holding onto the handle above the door to avoid being bounced all over the car. "No," he replies with a frowning face, and sort of squints at a car blocking his way out of the roundabout. "I don't work at night anymore; I'm too old for that. I don't have the energy to transport drunk and stoned kids around. If I was younger, I wouldn't care, I'd get into a fight if necessary. Now, I don't feel like that anymore. I'm old."

We're driving past Hotel Moskva towards Republic Square, and we're turning right and left and right and left along unknown streets. The taxi starts to slow down. I look at the clock above the car radio – it shows 6:52 PM. This means that we're on time, even a few minutes early. "We're here," the driver spits out when we're near the cultural center, where the presentation of the book is starting in a few minutes. "Now I'm going to stop somewhere here... It'll probably be best to stop across the road from this building," he says, turning on the hazard lights and stopping in the middle of the road. "I need a receipt," I meekly say, pulling my wallet out of my pocket. "Okay, no problem," he says glowering and with such a voice that I immediately understand that what I asked for is in no way good and that it can be a serious problem for the both of us, especially since we're standing in the middle of the road and he's pulling a receipt booklet from the glove compartment above my legs. "Please include today's date" I warn him, just as another



Figure 1: Belgrade from the driver's perspective (photo: Dan Podjed, 30 September 2015).

taxi exits a side street and impatiently honks and flashes the headlights. "What the hell? What the hell is the matter with you, are you crazy?" shouts my driver. He's already opening the door and dips one leg into a puddle – in a clear warning that it will swiftly be joined by the other if the impatient man doesn't immediately calm down. It is quite clear that he is ready not only for a verbal but also nonverbal confrontation to maintain the primacy of the road.

I leave him a tip, and he just nods and says: "See ya." He slips into the darkness and the rain, and I'm again struggling with the wind and the umbrella. Instead of to the cultural center, I make a beeline for the bar next door, where I plan on having a beer before the presentation starts. It turns out that the ride over considerably diminished my thirst for knowledge and culture.

### *Tracking driving habits using technologies*

In our research, the ethnographic methods were supported and upgraded by several technology-based approaches. Researchers were able to gather their own driving style data, track daily routes, measure fuel consumption and CO<sub>2</sub> emissions, and monitor the key elements of a driving style (acceleration, braking, idling, driving speed, etc.) via CVS Mobile telematics solution, based on GPS tracking devices. The solution helped us to identify the driving habits prevalent in the cities and to observe and record how driving habits change when we move by car from city to city. In addition, we could track our daily routes through time and observe when and where we used passenger vehicles the most.

During the research, we did not pretend that we will be able to objectively measure the changes of driving styles. On the contrary: we tried to observe how the telematics device influences the habits and practices on the road. We tried to observe the effects of such surveillance by adopting a field journal used for describing the impact of telematics solutions on driving. An excerpt from an ethnographic diary shows what happened and how the technology influenced a driver:

I wasn't particularly nervous about getting the telematics device installed. I watched over the technician's shoulder with interest as he took apart the section under the dashboard and installed a device the size of a cigarette box, also known as a black box. The installation took less than twenty minutes. The technician finished and explained that I can now constantly track my vehicle on a computer, a computer tablet, or a mobile phone. I thanked him, sat in the car, and drove off. I paid no heed to the black box that was now watching over my shoulder – I forgot about it by the time I left the parking lot and drove onto the main road. I remembered it was there only the next day when I drove down a road where I had previously been stopped by police for speeding. I was driving too fast again when I suddenly realized that a telematics eye was watching me. I immediately reduced speed and subjugated myself to

the unusual, invisible gaze that was, in my mind, stabbing me in the back of the neck. A few minutes later, however, I again forgot about the gaze of technology and once more hit the gas pedal.

Interestingly, a few weeks later the same researcher found out that the tracking device wasn't switched on at all after installation. That means that the device influenced the drivers' performance, even though it was not operational (Podjed 2014). Such events made us realize that the telematics device, which was supposed to be used for tracking driving habits, had apparently caused the "observer effect" in which individuals modify an aspect of their behavior in response to their awareness of being observed. Not only the vehicle and the driver but also the device should, therefore, be understood as a part of an assemblage, in which the boundaries between different parts are blurred.

### *Seeing more by video recording*

During the DriveGreen studies conducted in different cities, we recorded traffic events and dynamics with the help of photography and video-documentation. We relied on photo and video cameras: mobile phone cameras for taking photos and specialized cameras with high temporal resolution (e.g., GoPro HERO4 Black) for high-resolution, high-speed filming (see Figure 2). We focused on two angles, namely the front view of the traffic in front of the vehicle (through the windshield) and a view of the driver for a better understanding of nonverbal communication and his or her reactions while driving. In our analysis, we compared key footage with the driving style data recorded by the telematics solutions at the time the footage was taken.



Figure 2: GoPro cameras were used to gain a better understanding of nonverbal communication in traffic (image: GoPro).

The cameras were found to be efficient research equipment, since they supplemented researcher's senses, especially hearing and eyesight. While driving through a city, the driver's sight was mainly focused on the road. Recordings, made by the GoPro camera, enabled us to check a traffic situation in detail and watch in slow motion how the interaction between people in different vehicles – or between them and passengers – occurs. In addition, we were able to record voices in the passenger car and around it, which has (Podjed and Babić 2015) proven to be relevant especially for recording swear words and curses in our specific micro-study. These are usually said in critical situations and often remain unrecorded if not unheard.

### *Measuring the heart rate*

We also included heart rate monitoring, measured by Polar H7 monitoring belts, for a more detailed analysis of a driver's physical condition and to supplement our findings with interviews and participant driving. Using this approach, we have tried to measure how driving through city traffic

influences driver's bodily parameters, more specifically the heart rate. In addition to the GoPro camera for recording traffic in front of the vehicle, we used another camera for recording the driver's upper body.

The experiment, described in more detail in another chapter of this volume (see Burger et al.), was significant for showing how it is possible to collect more information about the driver to supplement information collected by interviews, participant driving, and other qualitative methods. We were able to track every moment of how traffic conditions and the situation in the vehicle influenced the driver.

One of our experiments was carried out on a daily route, where the driver – who was also a researcher in the project – regularly took his children to their grandparents' place and a nearby kindergarten. The male driver was wearing a chest strap, with the heart rate and heart rate variability data being recorded on a smartphone. We could observe that the traffic didn't significantly influence the driver's heart rate and heart rate variability; however, both parameters were influenced by the conditions in the vehicle and changed significantly when the driver picked up the children or kept driving only in the presence of another researcher.

In the DriveGreen project, the sensors and devices for measuring bio-parameters – especially the wearable devices – also turned out to be a valuable tool which enabled us to simultaneously collect qualitative and quantitative data. We were able to chat with the drivers, ask them about certain situations on the road, and retrospectively analyze how they felt while driving on particular sections of the road.

## DISCUSSION

In our research, we had many good cases of interdisciplinary collaboration and exchange of methodology, knowledge, and practices. However, we also witnessed several methodological problems, challenges, and questions which influenced our fieldwork and interpretation of results. A relevant and ongoing question was how to make engineers in the research team aware of the value of ethnography and qualitative approaches on the one hand and how to make ethnographers understand and accept the relevance of GPS-based tracking devices, cameras, heart rate monitoring belts, and other technologies on the other. We haven't solved this problem in its entirety throughout the project. However, the mutual collaboration of researchers has made a significant change on both sides – on the social sciences and humanities side and on the side of engineering. The change has been influenced mainly by establishing a common terminology throughout the project about the qualitative and quantitative methods, approaches, and tools. In this way, we were able to understand terms such as *gamification* from a strictly engineering perspective as improvement of digital contents developed in the project, and comprehend the same term from the viewpoint of anthropology as simultaneous cooperation and competition in a certain social group.

Another challenge for the project was connected to the interpretation of results, collected by mixed methods, which had to be twofold. The team had to produce scientific outputs, such as conference proceedings, articles, and book chapters. At the same time, the researchers had to "translate" the findings from the field into relevant development recommendations – after all the research on driving habits was carried out to inform and guide developers of a smartphone app for the promotion of sustainable mobility. This phase had proven to be especially difficult for the anthropologists and the other social scientists involved since they had to make a move from

descriptive to the prescriptive interpretation of results. Instead of only describing how people in researched cities move, they had to help frame a development plan, draw sketches of the smartphone app (so-called “wireframes”), and constantly keep in mind the ethnographic findings from the field and the people involved in the study. The obstacles in the methodology and interpretation of results were overcome by the “learning by doing” approach: the social scientists and engineers jointly analyzed their findings and together prepared a development plan, which was later upgraded by constant feedback from the developers.

## CONCLUSION

In this chapter, we presented how it is possible to use different research approaches, methods, and technologies for studying the habits and practices of drivers. As it was explained, we used telematics vehicle tracking solutions that work with the help of GPS tracking. We used them to monitor how driving styles in various cities differ and how we adapt to traffic in a new town as well as influence the drivers there with the habits and practices that we brought with us. We filmed what was going on outside our field of vision and the relationships between the participants in traffic, for example, between car drivers, cyclists, pedestrians, and motorists, by installing GoPro cameras into our vehicles. We measured how people in cars experienced traffic and which situations were the most stressful for them by measuring their heart rate. In addition to these technological innovations, we kept the “conventional” ethnographic approaches, from interviews to participant observation – and connected them all in a mixed method research, through which we were able to collect, analyze, and intertwine the qualitative and the quantitative data about different ways of driving and moving.

An important achievement of the mixed methods approach was the realization that engineers and anthropologists can work together efficiently and on equal

terms and that ethnography is not simply an addition to interdisciplinary research and development projects. On the contrary, it can present a solid foundation for contemporary studies about how people use technologies for mobility, communication, safety, creativity, etc. When presenting the project, however, it has repeatedly turned out that anthropologists have a lot of reservations about updating their own anthropological approaches and that they cling to "classical" ethnography, which has not changed in any significant way until now. This is quite unusual since engineering solutions and new technologies offer a great opportunity for upgrading the main research tool of anthropology, i.e., the researcher as a person.

Hopefully, we can expect new fruitful collaborations of anthropologists in interdisciplinary teams which will take technology as an addition to anthropological research and help merge Big Data, collected by quantitative approaches, and Thick Data, collected by ethnography and other qualitative methods. We strongly believe that the augmented ethnography can provide a fuller and more complete picture of people living in a technology-based world.

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# RESEARCHING THE CULTURE OF COMFORT

## The Use of Interviews in Ethnographic Studies of Mobility

**Tatiana Bajuk Senčar**

*This chapter is a discussion of the use of interviews as a research method in ethnographic studies of mobility that centers on research conducted within the scope of the interdisciplinary project DriveGreen, which is aimed at fostering mobility awareness and greener mobility practices. The discussion is based on the author's use of interviews to analyze the role of cultural understanding of comfort and convenience in people's everyday choices concerning modes of transportation. With the aid of her interview experiences, the author examines what types of interviews can be useful in mobility studies, how to deal with any problems that might arise when using interviews in mobility studies, and the potential of interviews as a methodological tool for analyzing mobile practices and experiences.*

*Keywords:* *interviews, (auto)mobility, ethnographic mobility studies, comfort and convenience, everyday practice*

## INTRODUCTION

This analytical discussion centers on the use of interviews as a research method in ethnographic studies of mobility and is based on my research experiences within the scope of the DriveGreen research project. As an applied interdisciplinary research project, DriveGreen is focused primarily on developing an application that fosters mobility awareness and greener mobility practices which involve combining different forms of transportation with automobile driving. An important dimension of this project also includes ethnographic research that examines diverse aspects of mobility as an everyday cultural practice. My ongoing research centers on examining the cultural understanding of comfort and convenience and the role that this understanding plays in the daily decisions that people make when choosing between various modes of transportation.

I briefly map out the main features of ethnographic mobility studies as an introduction to a discussion about the role of interviews as an ethnographic research tool that identifies the kinds of questions that can be investigated with the aid of interviews as well as the nature of the information that interviews can provide. Furthermore, I turn to the practice of conducting interviews, where I present my own interview experiences. What types of interview methods can be useful in mobility studies and which one did I employ in my own research? What are the types of problems that arise in employing interviews and what kinds of techniques can researchers use to deal with such problems effectively?

## THE FEATURES OF MOBILE ETHNOGRAPHY

While researchers have long realized the importance of mobility as transportation has played in world history and development, only until recently has travel been addressed as more than a neutral set of practices and technologies (Sheller and Urry 2006). Technological advancements in transportation are often described in terms of being able to facilitate the movement of constantly rising numbers of people and goods from point A to point B on an expanding network of routes covering ever larger expanses of the globe. Ethnographic researchers whose work is associated with the so-called new paradigm of mobility studies are focused on examining the broader implications of unrelenting transport development, which include identifying the range of ways that such developments have shaped the physical landscape and the ways these developments have shaped the way we live (including Clifford 1997; Kaufmann 2002; Sheller 2004; Urry 2003; Verstraete and Creswell 2002). This mutually constitutive relationship between the spatial and social dimensions of travel and transportation are at the heart of mobility studies.

I will not go into existing arenas of mobility research and their theoretical backgrounds, as this far transcends the limits of this discussion. However, I do wish to highlight two key features of ethnographic research on mobility that in turn inform the use of interviews in mobility studies, particularly concerning the ways that researchers understand mobility and the questions they examine with the aid of interviews. The crucial point forwarded by most mobility researchers is that mobility is both a cultural process and an everyday practice.



Figure 1: Volkswagen's new advertising campaign accessible via Facebook (source: Volkswagen's profile on Facebook).

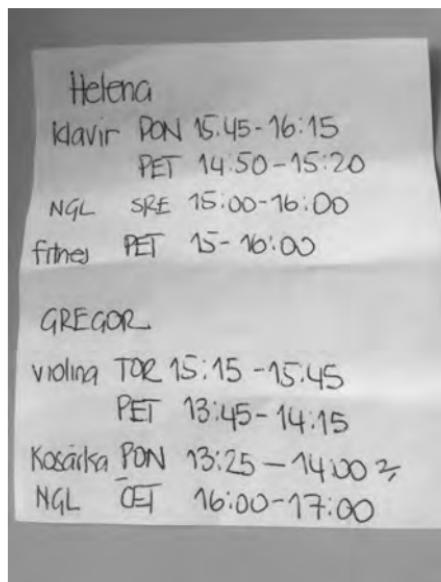
What do ethnographic researchers mean when they argue that mobility is a cultural process? The following advertisement from Volkswagen from its new advertising campaign can help illustrate this. Because they aim to sell cars, advertisements portray numerous ideal images of automobiles. The car is usually at the forefront in such glossy ads: a shiny, powerful machine against the backdrop of an idyllic rural or urban landscape. However, here the car is in the background, and the relationship between the car and the driver is positioned against the backdrop of a sunset. This image and the message it is meant to convey is supported and expanded by the advertisement's written words: "It's more than just a car. It's where it takes you". The image is meant to convey the car's potential: it can take

you to sunsets and beyond. In addition, it makes another important point – a seamless relationship between a driver, in this case, his car, and the road. The car is the machine that will take you wherever you need to go.

This romantic illustration of the relationship between car, driver and road is a powerful image but also a learned one. The idea of a seamless association between the road and the car has been established as a result of a considerable effort and practice over time on the part of numerous social actors, including car companies, who are interested in selling as many cars as possible (Bohm et al. 2006; Featherstone and Urry 2004; Urry 2004). Instead, our relationship to existing modes of transportation and our use of them are the result of numerous factors: they are influenced by our own socialization (social history, education, upbringing, life experience) and by the sorts of habits and conventions that were prevalent in the environments in which we grew up. In addition, they are also a product of the available options in the places where we lived during the different periods of our lives (Flamm and Kaufmann 2006). Finally, they are also informed by actors and institutions that try to shape the social understanding of diverse modes of transport – with images disseminated in the public sphere through advertisements, for example. All these factors form part of the complex, multi-dimensional, cultural system in motion that comprises the process of mobility.

The other important aspect of mobility is that it is an everyday practice. Mobility is primarily something that one does: one may think about how to get to from point A to point B and may deliberate a number of options, but being mobile implies moving. We learn about and experience mobility through the actual practice of travel. Furthermore, while in this day and age one can travel to virtually to any

corner of the globe, the vast majority of our movements are those that we carry out every day, from one to the next. We develop a set of routines that help us get where we need to go through the course of the day, week, or month. These routines seem to be ingrained and automatic. This is not necessarily the case; everyday routines can change, can adapt. The photo below of a list that I had to make for myself this September illustrates this point. In the northern hemisphere, many adults with school age children associate September with the beginning of a new school year and with it the introduction of new schedules both for children and their parents. For children, this means starting out with a new schedule of classes, afternoon activities and homework. For parents, these new schedules imply work at the level of setting up and coordinating schedules to accommodate the activities of every family member, resulting in the creation of a new schedule for them as well: whom to take where and when. In addition, they must learn and internalize this new schedule so that the new will become everyday, routine. This can be done with any number of tools, including, for example, lists such as the one that I carried with me for the first weeks of the new school year. In this manner, parents can internalize a new routine in order to automatically know the timetables and routes for every day of the workweek.



*Figure 2: Photo of a schedule of afternoon activities (source: Tatiana Bajuk Senčar, 17 March 2016, Ljubljana, Slovenia).*

Focusing on mobility both as a cultural process and everyday practice implies placing people at the forefront of research, as social actors are the linchpins of the mobile flows that make their way across the globe. There are numerous methods that can aid researchers in examining what makes people mobile and immobile in various contexts. Researchers that carry out what is often called mobile ethnography employ a number of research tools to examine these mobile practices and the logic behind them, including mobile participant-observation as well as diverse interviewing and recording techniques (Büscher and Urry 2009; Sheller and Urry 2006).

## USING INTERVIEWS IN ETHNOGRAPHIC STUDIES OF MOBILITY

The aim of conducting mobile ethnographies is to place social actors at the center of one's research as a way of grounding mobile flows in concrete practices (MacDonald and Grieco 2007). Ole Jensen, whose work focused on the daily use of a particular transit space, advocated grounding by implementing a shift in perspective, which Jensen illustrated with the metaphors of a river and ballet, and which have been employed extensively in urban studies (Jensen 2010). Seeing mobility practices as a river presumes a bird's eye view based on an aggregation of practices from above; adapting one's approach to examining mobile practices as a ballet means focusing on social actors at their own eye level, at the level of their grounded interaction.

While Jensen's work focused on the observation of the ballet of pedestrians in a public space, researchers can shift from the river to the ballet perspectives with the aid of a number of research tools. These also include interviews, which comprise social actors' narratives concerning their own practices and experiences. As anthropologist Tatiana Argounova-Low argues, "narratives and roads share common characteristics of flow and sequence. These characteristics make roads and narratives kin. Is it not why roads elicit narratives, and why, vice versa, so many narratives are about roads and journeys?" (Argounova-Low 2012: 195).

Eliciting narratives through interviews can provide a great deal of information about the way that people think about travel, the logic that underlies their daily decisions about mobility, the significance that travel practices have for them, and the factors that help shape their understandings of, or relationships with, diverse modes of transportation. In this manner, interviews can provide a useful complement to observation and participation as ethnographic research methods, as interviewees can provide their views on observed practices in their own words and in accordance with their own system of categories.

There are two different kinds of interviews most often employed in mobility studies: biographical interviews and semi-structured interviews. When utilizing biographical interviews, researchers ask interviewees to tell them about their life story or parts of a life story in the form of a narrative. The interviews can be relatively unstructured, meaning that the researcher poses only one or two questions and lets the interviewee tell his or her life story in their own words (Bajuk Senčar 2014; Cuzzocrea and Mandich 2015; Kazmierska 2004; Kent 2015). The life story interviews, on the other hand, are more structured, with the interviewer guiding the interlocutor in his or her telling of his or her life story with the aid of certain questions. This sort of approach is used primarily when an ethnographer's focus is on a particular aspect of a person's experiences and social formation in relation to his or her research question.

Semi-structured interviews are the most common sort of interviews employed in mobile ethnographic research. The questions posed in a semi-structured interview are open-ended in nature, meaning that the interviewee is not limited to a predetermined set of answers to any given question, as is often the case in surveys. In fact, most often interviewers try to elicit responses in the form of narratives, stories, and anecdotes. In this manner, the interviewee is accorded a significant amount of leeway in the way in which he or she wishes to answer a question.

What sorts of questions can one study with the aid of interviews? Interviews may be employed in a broad range of studies: the main question when using interviews for research concerns choosing the interview format most appropriate to the topic to be studied. I now turn to my experiences in researching the understanding of comfort and convenience to illustrate the use of interviews in mobility research. The goal of my research was to understand how notions of comfort and convenience influence drivers' decisions about the modes of transport they choose to employ on a daily basis. When do they decide to drive and why? This question centers on identifying and interpreting

how people themselves thought about and experienced comfort and convenience in relation to car use. These two notions have long been distinguishing features of automobile driving as a mode of transport, and often even defined a central feature of automobiles themselves. In advertisements, the comfort offered by any particular model's design is one of a car's main selling points – whether it be the ergonomic structure of the driving seat, the extent to which a car's main features are positioned at the reach of a driver's arm or hand, the amount of space accorded to a car's driver as well as its passengers, or how smoothly a car drives, and where a car can take you (Stewart 2014). However, research has demonstrated that the images of cars offered in advertisements do not necessarily overlap with the views of drivers themselves, but instead represent only one dimension of automobility as a cultural process (Hagman 2010).

I chose to employ interviews to broaden our understanding of comfort and convenience by asking drivers about the reasons for their automobile use. How do people make their decisions about their daily mobility, and how do Ljubljana's drivers define comfort and convenience in relation to automobile driving? My research involved conducting semi-structured interviews, and my goal was to encourage interviewees to talk about the way they experience their everyday travel routines and how they think through daily decisions about travel and transport.

## CHALLENGES TO RESEARCHING EVERYDAY MOBILITY

There are often certain challenges to researching automobile driving as an everyday practice. Many researchers have pointed out the fact that in the minds of potential interviewees, driving practices become something routine, automatic, and seemingly inconsequential – thus not something that warrants too much reflection or conversation (Flamm and Kaufman 2006). In other cases, conversations about drafting and

coordinating daily mobility routines, while mundane, are an intimate aspect of their everyday routines and not necessarily a subject that one speaks about with strangers.

As a consequence, interviewees often try to answer questions about their driving habits in an abstract, detached manner, with few words and without any explanations. Numerous strategies may be employed to avoid these sorts of responses in interviews. One strategy involves the incorporation of maps in the interview process as an aid to help ground both the interview questions and answers. Researchers pose questions and have their interlocutors use the map as a visual aid to help explain or map out their answers, as it were. The map can be employed as an aid also for the interviewer, who can use the map to illustrate his or her questions (Cuzzocrea and Mandich 2015).

Choosing the most effective strategy to help elicit responses grounded in narratives and anecdotes depends to a great extent on the questions and issues that one is studying. My research focused on the factors that shaped people's driving routines – thus, on the decisions that often either preceded or described their practices. While a map would help ground conversations by offering a starting point for dialogue and aiding interviewees to talk about specific daily practices, I developed a different strategy to facilitate interviews. Instead, I employed questions to encourage interviewees to explain how they go about setting up their travel routines by encouraging them to talk about the particulars of their travel routines, including how they mapped these routines out both temporally and spatially, how and why their routines varied from day to day, and how they adapted their routines to change.

## CONDUCTING INTERVIEWS

Given that the practice of conducting interviews should be adapted to the key questions that are the subject of research, a hard and fast set of interview tactics is not very useful. However, in this last section, I will outline a few tactics

that were helpful in my research, and that can be relevant for interviews in ethnographic mobility research in general.

First, one should strive to have as diverse a sample of interviewees as possible. This is an issue that holds for almost all sorts of interviews and surveys – be they quantitative or qualitative. Sample diversity has various connotations when one is dealing with open-ended interviews as opposed to surveys, in which the range of possible answers is built into the survey itself. In the case of semi-structured interviews, one is encouraging a broad range of answers, and, theoretically speaking, one could potentially get different answers from each and every interlocutor. However, the key is to identify significant overlaps among interviews as well as the significant differences, that is, issues that certain interlocutors may raise that will provide important insights for the researcher. Take, for example, my interview with an older interlocutor. Ivo was over 80 years at the time of our interview, and he answered my questions from his perspective as a lifelong Ljubljana native and a long-time driver, often providing a historical dimension to his answers that younger drivers do not have and thus could not address. At one point during our conversation about driving in Ljubljana, he began to draw a distinction between the past and present practices:

*Ivo: During those times people drove their cars everywhere, even if it really wasn't necessary. We had a family friend who at that time had a job close to her apartment, but she still insisted on driving her car to work. She would say, why should I leave my car parked in front of my apartment building if I can leave it parked in front of work?*

*TBS: Did she have a reserved parking at work?*

*Ivo: No, at that time you could park in the city for free...*

My interview with Ivo was one of my first interviews, and speaking to someone with many years of experience helped identify an issue that until then I had not yet identified as significant: the shifting system of parking infrastructure

that facilitates certain practices over time and hinders others. Parking infrastructure and access are features of automobility in Ljubljana that has changed significantly over the last decades, the result of gradual changes over time. As Ivo explains, parking used to be accessible and free in Ljubljana and not something that one needed to even think about when setting out downtown or traveling from one part of the city to another. The parking situation was (and is) also linked to the level of accessibility of the city center by car, which has also been reduced over the years. Certain areas of the city center under the shadow of the Ljubljana castle were automobile accessible as late as the 1990s. At that time, one could park virtually without restrictions and for free. However, the closing down of certain areas to automobile traffic brought with it the creation of parking zones along the street for city center residents and the creation of paid parking for everyone else. The extension of paid parking zones as well as of the areas not accessible to cars (and parking) has been gradually expanded through to the present day, and these measures form a part of a larger strategy to modify the city's transport infrastructure, in an effort to discourage automobile use and encourage alternative forms of mobility and transport.

At present, parking presents a challenge as well as a cost that one has to account for in one's driving routines. Ivo's words formed a part of a broader narrative about why he did not often drive to the city center, and he presented the issue of parking as a reason why he refrains from driving in the city. My interview with him aided me in appreciating the ways that the factors that shape notions of convenience can shift over time. For example, parking for Ivo had become an inconvenience, as the shifts in parking infrastructure have over the years diminished an important aspect of automobility: access (via parking). This is a particularly relevant issue for Ivo, who was used to (free) parking and access, and who now accords public transport a level of comfort and convenience that he previously associated with car use.

Another important tactic is focusing questions on routines of mobility, and on encouraging interlocutors to go into as much detail as possible about the concrete practices of their daily travel schedules as opposed to offering broad descriptions. One effective way of doing that is by encouraging a narrative mapping out of a day – both spatially and temporally – in as much detail as possible. This implies asking not only about the routes and places but also about any persons who also help define the course of any given routine as well as the choice of transportation. Posing such questions encourages speakers to map out their routines not only in terms of routes, obligation, and/or errands (professional, family, leisure) but also in terms of social relationships. For example, Tadej, who lives in a rural area of the Gorenjska region but has an hourly commute to Ljubljana, where he works, provides the following depiction of his typical workweek travel routine:

*I get around solely with my own car because we live in a mountainous region /.../ 1000 meters above sea level. Our daily routine is like this: I work in Ljubljana and I drive to Ljubljana with my car. My wife works in Bled and drives to Bled with her car. Our children go to school in Radovljica, and we drive them there because the school for this area is in Bohinjska Bistrica. We cannot make use of available public transportation – I maybe could but it would take too much time. With my car I need three hours to go to work and come back home, with public transportation I would need four or five.*

In the narrative above, Tadej identifies in broad strokes what he considers the basic elements of his travel routine, which he frames in terms of his family and their daily routines mapped out in time and space. These places and persons represent the building blocks of his work week routine that in turn determine his daily route as well as his choice of transportation. His decision to depend primarily on a car is not made in a vacuum but is grounded in the schedules of the members of his family who depend on him

for transportation and thus comprise an important element of his everyday travel routine – his children (Shove 2003; Shove et al. 2012; Thrift 2004). His decision about how to get to work is the result of how that particular route fits into the broader context of his entire workday routine, of which the trip from his home to a place of work is just one step. In addition, Tadej identifies one of the key criteria that defines comfort and convenience in his workday routine and his choice of transportation: time. As he argues, using another form of transportation would add hours to his workweek daily routine.

In addition to encouraging informants to narrate the way they set up their daily routine, it is important to ask about their existing travel routines, not only their typical workweek routine. The reasons for choosing to use a car can change, given the purpose and timing of the travel. In addition, understanding of comfort and convenience linked to automobile use may vary, depending in great part on the ways in which interlocutors define the various modes of mobility that they engage in. Thus the aim of the interviewer is to encourage the interviewee to talk about their routines freely and in as much detail as possible, which hopefully can provide insights into the context, criteria, and categories in terms of which each interviewee defines their everyday mobility routines. Such narrative passages – particularly the ones in which interviewees narrate their reasons for their routines – can help one discern how they define comfort and convenience in the context of their daily decisions.

Encouraging narratives about everyday routines of mobility in all their diversity may also result in learning about certain episodes or transitions in an interviewee's life that also operate in an interlocutor's narrative as moment of reflection about their own habits or even catalysts for change. As was mentioned earlier, daily routines become learned and automatic, but they are always also changing, adapting to the shifting circumstances that social actors experience in their daily lives. Focusing on episodes of

transition or change and encouraging interlocutors to articulate what these transitions mean in terms of setting up new routines can provide important information about the criteria according to which social actors choose to change their mobility habits. For example, Pavla and her family recently moved from Ljubljana's city center, where she and her husband could walk to work and her children to school. Together they moved from an apartment downtown to a house in the suburbs, which, among other things, meant making a great deal of changes in their daily routines. Pavla spent a significant amount of time in our conversation outlining the changes that moving has meant for her and her family on a daily basis as far as transportation is concerned:

*Before the move, we basically never really needed the car during the week... We often went somewhere for the weekend; we basically used the car only on the weekends. On Fridays we would do the shopping, or on Saturdays. Now we use it almost every day. .../ In the morning, we get in the car by 6:15, we drop off Karin, we drop off Domen, we drop off Anže, and we go to work. I have a parking space at work, so we can park close by. This is an important point, because if we did not have this, who knows if we would have moved out of town. So, we all go together in the morning, but normally we all go home separately. Well, the two older ones normally take the bus, and the two of us pick up the youngest and go home. Once or maybe twice a week we all get together and drive home together...*

This excerpt forms part of a longer narrative in which Pavla goes through the numerous options that they are trying out as they settle into their new home and try to coordinate the needs of multiple family members, diverse timetables, and routes. This involved switching from being able to go virtually everywhere on foot and leaving the car parked on the street to setting up a schedule centered on automobile use – at least in the mornings. Commuting into

the city with the car in the morning is presented as the most time-efficient option, given the new location of their family's home and their position on the public transportation grid, which does offer the older children autonomy in terms of their afternoon activities. Focusing on such large sets of changes in interview questions may elicit useful comparisons about place-based travel routines, in which details and practices that otherwise seem self-evident assume a new significance given the change in context.

## CONCLUSION

Ideally, researchers employ interviews in conjunction with other field research methods, which can become a useful means for verifying certain insights in more informal contexts and conversations. Furthermore, interviewing in an ethnographic framework is meant to be a cumulative process, during which researchers incorporate and/or test gained knowledge. The main goal of conducting interviews is learning how to talk to people about their views and everyday habits on their own terms. While one should begin with a common core set of questions, interviews are meant to evolve and change as interviewers receive feedback on their research questions in the form of informants' narrated experiences. With the aid of interviews, one can identify the main concepts and criteria in terms of which interviewees as social actors define, express, and experience their daily mobility routines in the course of their narratives. This sort of knowledge is a stepping stone to starting dialogues aimed at encouraging people to incorporate sustainable mobility practices into their daily lives. More importantly, interviews can provide crucial information to help develop arguments and policies that are grounded in the everyday realities, practices, and experiences of the persons that they wish to address – an important factor for facilitating long-term change.

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# THE POWER OF ETHNOGRAPHIC SENSEMAKING

**Alenka Bezjak Mlakar**

*This chapter, based on the findings of an ethnographic study conducted in Ljubljana, presents the applicability of an ethnographic approach to studying the lives of commercial vehicle drivers. The essential components of an ethnographic approach are the researcher's presence in the field, her ability to become subjectively embedded in the environment and to practice self-censorship, and the power of an analytical approach in observing seemingly banal everyday life. The chapter also gives a detailed presentation of an ethnographic research approach, of its place in the business environment, and of the techniques and tools that the approach utilizes to both improve and facilitate the research process as a whole. It is explained that the process of sensemaking and contextualization is of key importance because it has the potential to bring about crucial observations that could serve as a basis for further applications of newly acquired knowledge.*

*Keywords:* *ethnography, methodology, sensemaking, commercial vehicles, business anthropology*

## INTRODUCTION

Ethnographic research is primarily a practice and a form of active engagement that is conducted within a specific context or “in the field,” which is why epistemology and methodology are far less rigid in ethnography than in most other (mainly social and natural) sciences. This does not mean that the procedures involved in ethnographic work are poorly defined, but rather that no single universal or standardized method could be used anywhere and at any time. For that reason, planning the methodological framework of an ethnographic study is one of the first and foremost tasks a researcher must undertake prior to going out in the field. An important step in solving business problems is determining the type or level of the problem at the outset. The type of the problem decides the way in which it can be addressed, as it allows researchers to choose the most appropriate method of collecting data and the type of data that is to be collected. Researchers can be greatly aided in this process by their experience and by the experiences of other researchers and consultants that face similar problems, regardless of their professional backgrounds. The ethnographic approach is the most appropriate for solving complex problems when the client has little knowledge of either the problem or the solution. Such challenges almost invariably stem from a broader social and business environment, which is why they cannot be overcome without contextualization and a hybrid consulting approach.

## ETHNOGRAPHY IN THE BUSINESS WORLD

The word ethnography has become quite fashionable in the corporate world (Moeran 2005: 11). John Van Maanen wrote as early as 2001 that organizational ethnography is a rapidly growing field in North America and Europe (2001: 233). Following the financial crisis that began in 2008, anthropology and ethnography started to be used even more extensively in companies trying to understand the human factor in business (Ensworth 2013: 73). Business (or organizational) ethnography is the application of ethnography to business (and to studying organizations) and is much more than merely academic ethnography in a business context (Jordan 2013: 7).

Participant observation is the *sine qua non* of ethnography and an important part of anthropology. Nevertheless, it is merely one of several data collection methods used in the latter (DeWalt and DeWalt 1998). There are numerous complementary research methods (interviews, video ethnography, analyses of existing documents and sources, questionnaires) which cannot replace participant observation in the field but can significantly contribute to a broader picture and thus help produce a better final result. Field work is a demanding process and collecting (relevant) data is its most difficult part (Pelto 2013: 103). As a rule, ethnographic research begins with a definition of the concrete problem and of the broader area in which the research is to take place. This preceding or pre-field phase of research, when a problem is more closely examined, mostly involves collecting existing data, reading up on the results of past studies, communicating with people who are connected in different ways with the chosen problem, and searching for an environment that would be suitable for conducting research into it (Hammersley and Atkinson

2007: 29). Understandably, problem identification also ties in with project planning in terms of content, timelines, and finances. In research planning, the main emphasis is on field work, which usually takes from six months to two years or longer<sup>1</sup> (Fetterman 2010: 8).

The next step that is vital for the quality of ethnographic research is gaining access to information or, more precisely, to the field, which is one of the larger challenges in modern ethnographic work. People in organizations where field work is to be conducted (in companies, for example) are often overburdened by their workloads and show little interest in cooperating (Hammersley and Atkinson 2007: 40). Researchers that do not secure access to the field beforehand often report that its inaccessibility, the extent of which usually does not become evident before the data collection phase, caught them completely unawares (Hammersley and Atkinson 2007: 41). This makes obtaining permits from the owners of companies or other people in charge the first, though not a sufficient requisite of conducting ethnographic work. In practice, is it not uncommon for people to view the researcher as a disruptive element, an intruder, a spy. Cases have also been reported where researchers failed to gather relevant data despite spending months in an organization because the people there refused to cooperate (Hammersley and Atkinson

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1 Contemporary authors express different opinions on how long field work should last for ethnographic work to be considered ethnography. Their estimates of the time necessary for the completion of an ethnographic study vary from six months to two years. Slovenian anthropologist Rajko Muršič states that "field work with participation generally takes about a year – more being better than less" (Muršič 2011: 78), but also allows for field work lasting a shorter period, claiming that a few days are enough to carry out applicable participant observation if intense preparatory work is done first. The Dutch Professor of Business Anthropology Alfons H. Van Marrewijk, who merged his academic and consulting careers, believes that an organizational anthropologist needs from one to two years to complete her work (Van Marrewijk 2014: 36), while Brian Moeran, a Professor of Business Anthropology at a Danish business school, says that a year is the ideal length of time for ethnographic work (Moeran 2006: 117). I believe that the time a researcher spends in the field depends on numerous factors in the business world, which is why there is no uniform rule defining any ideal timeframe for field presence. How long research takes is far less important than obtaining relevant data and information that can help us solve our particular business problem.

2007). Being introduced by a member of the “community” is, therefore, every ethnographer’s best ticket for entry into that “community” (Fetterman 2010: 36).

Because access to the field involves more than mere physical presence, it is important for the ethnographer to present her work (its purposes, goals, and potential achievements and consequences) in a clear manner to everyone involved (everyone, irrespective of which rung of the hierarchical ladder they might be on) at the outset, and to observe the highest ethical standards in doing so (Hammersley and Atkinson 2007:42–43). A broad consensus that conducting such research at the company is worthy of approval and the willingness of employees to cooperate are two conditions that must be met for the researcher to collect relevant data and for people to give honest answers instead of altering their behavior to better suit the study.

Once field work is done, ethnography continues. Many different techniques of data analysis can be used, from very simple and statistical analyses to demanding, qualitative analyses, such as triangulation, pattern identification, and crystallization (Fetterman 2010). An analysis of ethnographic data, however, consists primarily of sensemaking and amalgamating the gathered information into a coherent picture. The first step is the selection of data, which tend to be vast in numbers, and their combination into an integrated picture.

Ethnographic work is usually documented in the writings of various genres, depending on the preferences of the researcher and her target audience. However, the “translation” of ethnographic material (notes, diaries, etc.) into an ethnographic text is one of the more demanding aspects of ethnographic research (Neyland 2008: 126).

Participant observation is also the method I chose during my six-month ethnographic research. The choice of the data collection method is a researcher’s professional decision and depends on whether she wishes to study the lives of people and their attitudes towards things or to find solutions for improving a product. In the former example, the

researcher might choose to rely on participant observation and on interviews, whereas in the latter example she might decide to use the method of user interface testing. A method is neither better nor worse than any other, but each is either more or less suitable for solving a specific problem. I believe that different problems in companies call for different approaches or combinations of approaches, since solving concrete problems requires us to produce very specific results and suggestions that can be successfully implemented in business organizations.

Participant observation (regardless of the level of participation) allows us to see the difference between what people claim they do and what they actually do. During my fieldwork, I witnessed many instances where the service center of the company was informed that the device installed in the customer's vehicle was not functioning. In one such case, the caller complained that "we cannot see the truck, we do not know where it is, and we do not know what the driver is doing." The repairman and I set out on the road, expecting to find the usual loss of GSM or GPRS signal or to have to update the modem to the latest version. The problem, however, turned out to be a cut wire. It had been cut by the driver, because he saw the device as an enemy that was being used by his supervisors to watch him constantly. He felt that the monitoring of his vehicle was bad and unwelcome, so he cut the wire, even though he knew that the control center would quickly find out what happened. When asked if he had damaged the wire, the driver denied having done so, but the repairman was able to identify the problem quickly. Naturally, I was interested to know what motivated the driver. In a quiet voice, he reluctantly said: "*Sometimes you have no choice but to do something that you're not supposed to do. /... / The people on top should know that they can't watch us all the time.*" It became clear that cutting the wire only bought the driver some time so he could do what he wanted (like driving through an area he was not supposed to drive through or

pumping some fuel out of the tank).

Another data collection technique that I used at the company were unstructured and semi-structured interviews. I conducted approximately fifty interviews and interviewed some individuals multiple times. To gain a deeper understanding of the employees and the company's operations, I used informal and unstructured interviews, which took the form of a conversation. I relied on the informal type when I wanted to establish contact with the other person and chose the unstructured interview when I wanted participants to share stories about their work, the company, and their products – stories full of subjective experiences. In these individual moments, I often heard all about the business and personal issues that the employees, mainly those that worked in the field (meaning repairmen), were willing to share. I used semi-structured interviews in speaking with people I spent less time with. These were mostly customers of the company and users of telematics solutions. The semi-structured interviews produced partially comparable answers that helped me analyze attitudes towards the products of the company and vehicle tracking in general.

The daily documenting of field notes was another important and occasionally exhausting part of my field work. I collected my notes with a tablet computer, organized them into three parts, and further categorized them in line with the recommendations made by Russell H. Bernard (2006): notes on methodology, in which I noted the methods that I had used; descriptive notes, which made up the bulk of my field notes, since they included everything I had found interesting or important for my research; and analytical field notes, in which I described my ideas and observations, the patterns that I had identified, and intermediate interpretations. Although descriptive notes were the most numerous, I found methodological and analytical notes the most valuable. After all, Brian Moeran claims, the value of anthropology lies in its ability to interpret and contextualize,

and not in endless descriptions of only partially critical studies (Moeran 2014: 79).

It is the individual responsibility of the anthropologist in the business to constantly (at every moment, before she starts her work, as she is conducting research, and during the solution implementation) question whether or not she is performing her work well and whether or not she is doing what is right for the organization. The anthropologist alone bears the responsibility for her work, just as other researchers and business consultants in organizations do for their work. Once she signs a non-disclosure agreement with a company, she takes on a moral responsibility and, furthermore, can be held criminally liable. The latter is yet another reason why an anthropologist must consider her position in the organization and understand that she is also part of the research and of the business world, be it as a buyer, a user, an employee of a company, or a critic. A researcher must understand that we can never be objectively involved in the research process and that we cannot be perfect participants. In my view, being a perfect observer holds no value in the business world. Perfect observation from point zero is neither possible nor necessary in ethnographic research, which is why each researcher or consultant must continually re-examine the issues addressed by a particular project, the boundaries of anthropology, and the researcher's own position. She must not only respect codes of ethics and social moral standards but also – or mostly – her own values and feelings that are based on past experiences. The above can be summed up as a kind of self-censorship (Hammersley and Atkinson 2007: 222). We must remain aware of our own subjectivity, of the fact that we are indelibly part of culture, and that we can only ever see things from our own viewpoint. The most we can do is to be aware of our own position and to reflect on it.

## SENSEMAKING, OR ON THE WAY TO FINDING SENSE

The purpose of an anthropologist's fieldwork is to find sense in the field she is researching. A business anthropologist must connect different findings while also abiding by the viewpoint of the company (meaning the native viewpoint). Sam Ladner also states that an ethnographer should repeatedly pose the question of what a certain phenomenon might mean for those who ordered the research (Ladner 2014: 157). An understanding of the broader environment of the company and of society, in general, is essential for such work. A business anthropologist contextualizes and interprets findings. There is little doubt that some ethnographers are more adept than others at interpreting, but we can all improve this skill and become better and faster in the process of analyzing and interpreting ethnographic findings. Lastly, we must always couch our findings within social theories, lest our work should stay on the level of a good news report or a journalistic piece (Ladner 2014).

Solving business problems is a challenging process that requires numerous analyses, a professional approach, experience, and a successful implementation. Certain business issues demand linear and rational approaches to problem-solving, whereas vague problems that have us stumbling through a fog call for approaches that are, according to Christian Madsbjerg and Mikkel B. Rasmussen (2014), based in the humanities, which include anthropology, and require us to look beyond numbers and tabular data in order to make sense of their position in the company and on the market. For such cases, Madsbjerg and Rasmussen (2014) propose a new method of solving business problems – the method of sensemaking. It is a non-linear process of connecting unrelated dots in a sea of confusion that is comprised of data, and it enables us to reach a point at which things and people begin to make sense, when it becomes clear to us what the problems and their solutions are. Sensemaking is an open-ended method based on pragmatism and abduction.

Madsbjerg and Rasmussen (2014: 109) define five phases of sensemaking in solving business problems: defining the problem as a phenomenon, collecting data, identifying patterns, producing the main findings, and implementing the solutions in the business. The phases identified by Madsbjerg and Rasmussen do not significantly differ from the phases that are typical of traditional ethnographic work. The main difference is the final phase. In traditional ethnography, work concludes with reporting and noting or verifying initial assumptions. I agree with Madsbjerg and Rasmussen, however, in that the final phase, implementation of solutions in the business, is a key part of anthropology and ethnography, and one that represents direct added value for the business.

The phases of business consulting include steps similar to those in both traditional anthropology and the method of sensemaking. Diane McKinney Kellogg (1985), a Professor of Management, identifies five phases of the process of business consulting: meeting and agreeing to cooperate, problem identification, the proposal of a solution, implementation, and conclusion. Gordon Lippitt and Ronald Lippitt (1986: 11), theorists of behavioral science, whose work is known also in organizational sciences, identify similar phases in the process of business consulting: making initial contact and starting the process, formulating a contract and establishing a helping relationship, identifying problems through diagnostic analysis, setting goals and planning for action, taking action and evaluating feedback, and completing the contract. The important differences that I can see between the processes of business consulting and traditional anthropological research are in defining the client-researcher relationship (usually via a contract), implementing the findings, and concluding the cooperation (typically defined in the contract and subject to a successful resolution of the problem addressed).

## DISCUSSION AND CONCLUSION

To find meaning behind business problems and to offer concrete solutions, we must combine our own observations and experiences gathered in the field with the stages of business consulting and traditional ethnography, and thereby create a new, hybrid approach that always includes the native point of view (of the company) as well. This hybrid, called (business) consulting anthropology, includes the following phases, which should be followed by any consulting anthropologist addressing business problems:

*1. The client's identification of the problem:* in the phase of initial contact, the client identifies the business problem and describes her own, native point of view on the existing problem. It is crucial for the consulting anthropologist to actively listen to the client during this phase, as doing so will later prove helpful with identifying and contextualizing the problem. We need to be aware that clients who need help with complex problems often do not know what the exact problem is, which makes it all the more important for the consulting anthropologist to use anthropological methods. Some companies and leaders, however, are very well aware of their problems and simply need someone to solve them. This phase also includes finalizing the formal agreement that establishes cooperation.

*2. Choosing the methodological approach:* based on the client's identification of the problem, choose the most appropriate methodological approach, define work methods, and verify the current situation in the field.

*3. Contextualization of the problem:* the problem is defined as a phenomenon and embedded within broader social and business contexts. We also determine the life-cycle phase that the company is in, which will enable us to understand what the main goal of the company is at that time and which problems are normal for the company. In addressing challenges that can be overcome through humanistic and anthropological approaches, we must contextualize problems, as that is the only way for us to see their causes and the patterns that keep resurfacing.

4. *Data collection*: enter the field and collect relevant data, preferably with mixed research methods. This phase is key for the differentiation of consulting anthropology from other kinds of business consulting.

5. *Connecting seemingly unrelated dots*: the gathered data enable us to see existing patterns that we can connect and make sense of, which in turn serves as the basis for our research findings. This phase is vital for a consulting anthropologist, because it is the phase during which the greatest added value is created for the client, which sets the consulting anthropologist apart from other business consultants. The ability to connect unrelated dots into meaningful patterns is a consulting anthropologist's great competitive advantage.

6. *Identifying useful findings*: on the basis of identified patterns, ascertain which findings are the most appropriate for implementation in the business and for solving a specific problem. Proposed solutions need to be feasible, adapted for the client, and they must solve the relevant problem. General findings can be useful for the client, but their applicability is highly questionable. After all, the client is the one that pays for the consulting service and therefore expects workable solutions. Evaluating findings is necessary during this phase. If it turns out that we have not (yet) managed to deliver findings that are useful for the client, we can repeat certain steps. We can go back to the first step, if it seems that our own understanding differs too much from that of the client, and once again work with the client to identify the problem, before continuing with other activities. If it turns out that the problem lies with sparse or inconsistent data, we return to the phase of data collection. We repeat this process until we obtain findings that can be implemented in the business.

*7. Implementation in the business:* identify workable findings in the business environment to solve current problems. Every consulting anthropologist's work concludes with an evaluation of results. If the client is unhappy with the result because the desired goal was not achieved, certain steps of the consulting process can be repeated. This iterative process of abduction can be repeated multiple times, for as long as it includes an element of surprise (or until we reach a time limit or a financial constraint).

### *Slippers in the cabin of a truck*

It was a lovely spring day not far from Ljubljana. The repairman and I filled our car with the equipment that we would need that day and left the office at eight in the morning. When we met the driver of a truck that was parked on the side of the road, we first had to explain why I was there. The company repairman introduced me as an anthropologist studying how people use tracking devices. I added that I was also interested in people's attitudes to these devices and in learning how people view the usefulness of the devices. *"You know,"* replied the man, who was wearing a comfortable tracksuit with three white stripes down the sleeves, in broken Slovene, *"I don't mind being tracked all the time. This system makes me feel safe, because I know that someone always knows where I am."* I was pleasantly surprised by his reply. In light of what I had heard at the company, I had expected drivers to be far from thrilled to have these devices in their vehicles, especially given how often they intentionally damage the things. The driver and I had thirty minutes to talk while the repairman was busy fixing the device. We sat in the cabin. Next to me hung a wall calendar featuring scantily-clad women, on the floor was a pale rug, and the driver was wearing slippers. As we talked, he offered me coffee. The atmosphere felt like I was in someone's home. Then it dawned on me: drivers spend so much time inside trucks and away from their families that they have no choice but to make their work environment, meaning the cabins, reminiscent of home.

*At the control center with first responders*

The people working at the Control Center of a company that dispatches ambulances throughout Slovenia view the service provided by the company where I was doing my research as a tool that makes their job easier. I did not find a single person at the Center who was not happy with the solutions that enabled them to do their work more quickly, with better oversight, and with fewer mistakes. The employees did not feel that the service was in any way negative or that they were being monitored as they went about their work, which was quite different from the sentiments expressed by truck drivers. They saw a different shortcoming, however. If a driver happens to somehow disable the telematics system in a vehicle, the failure of the system or of the application at the Control Center utterly prevents that driver from doing any work. Although first responders used to operate without the aid of telematics systems in the past, they cannot fathom doing so today. If there was a bug in the application, if they lost internet connection, or if a GPS/GPRS network failure occurred, everything came to a standstill at the the Control Center, and panic ensued. A repairman and I went up to the Control Center after doing some repairs on one of their vehicles that was parked in front of the building the Center was in. The repairman proudly introduced me as an anthropologist studying the usefulness of their system. Of course, he presented me once more as someone conducting research for the benefit of their company and its clients. The workers at the Control Center thus saw me as someone who could help them solve the problems that they had with the system, and they were happy to explain things and tell me about their issues. A man explained that they use the telematics system as support for what they do. It enables the Center to see where their vehicles are located, so they can be dispatched to emergencies or directed to transport patients to non-essential medical appointments, mainly at medical centers in Ljubljana.

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# METHODOLOGY RECOMMENDATIONS FOR SUBJECTIVE AND OBJECTIVE ASSESSMENT OF DRIVING STYLES

**Gregor Burger, Mikhail Sysoev, Emilia Stojmenova Duh,  
Matevž Pogačnik, and Jože Guna**

*In this chapter, we present the methodology recommendations for driving styles assessment, based on subjective and objective measures. The objective measures data input was collected from a variety of sensors, encompassing the heart rate, heart rate variability, GPS location tracking, accelerometer-based data, on-board computer data, and finally video-recording of traffic routes as well as the driver's perspective. In the study, several types of video cameras and GPS-based applications were used, so that their impact could be determined. The proposed methodology was evaluated in two distinct experiments comprising several different scenarios: a complex experiment using a variety of sensors and a long-term experiment with fewer sensors, but more repetitions. Internal and external experiment factors were assessed. Finally, recommendations were provided for designing similar experiments, including which equipment should be used and what risks should be expected in such studies.*

*Keywords:* methodology, user-based study, sensors, driving habits, video-analysis

## INTRODUCTION

Transportation and driving are an important part of our work, family, and leisure lifestyle, since in the 20<sup>th</sup> century a passenger car has become a symbol of freedom. We can read that even though “in Western cultures cars are considered the ultimate vehicle of freedom and individuality, a great deal of social cooperation is required to make this possible” (Redshaw 2008: 22). However, sometimes we tend to forget this social cooperation component and “represent the streets as combat zones where it is a case of everyone for themselves” (Redshaw 2008: 22). For the majority of people traveling means that “the experience of car travel includes the act of driving a car or feeling towards it and implies autonomous, flexible and speedy travel” (Conley and Tigard McLaren 2009: 1). We use our cars on a daily basis for all purposes, even when a bicycle or a walk would suffice. One of modern day health problems is the sedentary lifestyle which has a negative impact on a person’s health and quality of life (Manson et al. 2004). Pollution from transportation adds a negative environmental impact to neighborhoods and affects a person’s health (Künzli et al. 2000).

The transformation to sustainable mobility is neither a fast nor a simple process. Several factors impact the outcome. There is a need for a shift in people’s mindsets to change and adopt more sustainable and healthy mobility options. Transportation and driving in traffic-congested cities and looking for empty parking spaces add an additional level of stress to our daily life, which is under pressure already. Could we influence people to change their view of transport, adopt more sustainable ways of transportation and promote eco-driving? We believe it is possible; however, it is important to understand human needs first and identify the best options to achieve that through a series of tests, questionnaires, and experiments. In such a way we can propose possible solutions and develop new solutions for the promotion of sustainable mobility.

The DriveGreen project interdisciplinary team aims to promote eco-driving and a meaningful use of public transport. The project's goal is to develop an intuitive and user-friendly mobile application for changing driving habits, encourage eco-driving, and subsequently lower CO<sub>2</sub> emissions. In the project, we carried out ethnographic studies in several urban centers, including Ljubljana (Slovenia), Belgrade (Serbia), Budapest (Hungary), and Durham and Newcastle (UK). These studies provided the project team with an understanding of the optimal approaches for encouraging eco-driving, and they support a transition to the low-carbon society.

## STATE-OF-THE-ART

To influence people and change their mobility-related habits, we need to gather as much data as possible about the driving styles in various places. The focus of this paper is to investigate how much and what kind of data different devices, available in our daily lives, actually have to offer? Furthermore, what are the devices that we can use to access and collect data about the driving styles? Collecting the data presents only one side of the problem. The other side is how to interpret it. Is it possible to identify and detect different driving styles with sensor devices, and based on that make a data analysis for predicting a subjective anxiety assessment?

Kristina Stojmenova and Jaka Sodnik (2016) explore the methods for the assessment of drivers' cognitive load, using subjective self-evaluation methods (e.g., standard questionnaires) and objective methods based on psychophysiological measurements. The measurement and evaluation of a cognitive load while driving, using the visual, tactile, and auditory detection response task method is further explored by Stojmenova et al. (2016).

The Spielberger State-Trait Anxiety Inventory (STAI) is a reliable and accurate method for the assessment of anxiety levels, such as anxiety in a given moment (reactive anxiety)

as a state) and personal anxiety (as a stable characteristic of the person or a trait). Most of the known methods of measuring anxiety allow the researcher to estimate only personal or momentary anxiety. The Spielberger method allows the measurement of anxiety differentially as a trait and as a current emotional state of a person and is, therefore, one of the most frequently used questionnaires in this field. The measurement of anxiety as a trait of an individual is particularly important, as it largely determines the behavior of the study participant. Situational or reactive anxiety as a condition is characterized by subjectively experienced emotions: stress, anxiety, concern, and nervousness. This condition occurs as an emotional reaction to a stressful situation and may vary in intensity and dynamism through time.

Another method is DALI (Driving Activity Load Index). This tool has been adapted to the driving task in order to assess the driving workload (Pauzie 2008). The tool is defined for six pre-defined factors with a scale rating procedure. The global score is combined with the weighting procedure of the six individual scales. There are seven workload dimensions of DALI: the effort of attention, visual demand, auditory demand, temporal demand, interference, and situational stress.

Measuring and collecting the data is an invasive process, which causes some disturbance and a feeling of unpleasantness for the participants of the study. Therefore, we must deter and cancel out the influence of the data gathering process as much as possible. It also raises second thoughts about the ethics of gathering the data. During our research and in all experiments we followed the rules and guidelines for data privacy, storage, and anonymization of the data.



Figure 1: Video-recording instruments (source: official manufacturer web pages).<sup>1</sup>

### *Instrumentation*

In order to select the most appropriate video-recording instruments, a researcher can choose from a number of different categories: action cameras, dash cams, smartphones, and body cameras (see Figure 1). An action camera is a versatile device for recording sports activities, daily life, and social activities. They are small, compact and rugged by design; usually, they are water and dust proof. With a vast array of mounting adaptors, they can be attached to almost any surface, vehicle or person. One of the most commonly used action cameras is GoPro Hero 4 Black. The camera is the flagship product of GoPro company cameras, with a maximum video resolution of 4K (3840x2160 screen resolution) at 30 fps (frames per second); however, the video can also be recorded in lower resolution and with higher frames captured per second. The camera can even

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<sup>1</sup> GoPro ([www.gopro.com](http://www.gopro.com)), Blackboxmycar ([www.blackboxmycar.com/products/g1w-english-version](http://www.blackboxmycar.com/products/g1w-english-version)), Apple ([www.apple.com](http://www.apple.com)), Police Body Cameras ([www.policebodycameras.com/Police-body-camera-images/bodywornvideo-camera.jpg](http://www.policebodycameras.com/Police-body-camera-images/bodywornvideo-camera.jpg)), and Wolfcomusa ([http://wolfcomusa.com/wolfcom\\_vision\\_police\\_body\\_worn.html](http://wolfcomusa.com/wolfcom_vision_police_body_worn.html)).

take pictures and time lapse recordings; in addition, it has multiple settings for ISO and brightness adjustments. Recorded material is stored on SD memory card with a maximum size of 32GB. The battery life of the camera varies on the recording settings, but normal use of the camera can be expected to be about 4-5 hours.

Dash cameras are designed for use in passenger cars, vans, trucks, and other cargo or people transport vehicles. Unlike an action camera, they are equipped with all the necessary mounting adapters and power cables out of the box but have only limited artistic recording settings. They are designed for non-stop continuous recording of events in front of the vehicle. More advanced models have proximity sensors for detecting people or other vehicles that come too close to the vehicle in which the camera is mounted. The most common mounting place is behind the rear-view mirror so that they don't obstruct the driver's view. Typically, they come with 1080p and 720p recording format, GPS location sensor, and an option to include geolocation data, vehicle speed, and current time directly into the recording. Recorded material is stored on SD memory card with a typical size between 16 and 32 GB. Because dash cams continuously record while the vehicle is driven, they are connected to an external power supply, usually through a 12V cigarette lighter outlet or a custom power supply. Internal battery typically provides up to 4 hours of operation time.

A smartphone is another convenient device for recording activities on the road, especially since many people use it in their daily life. For a smartphone to work as a recording device, a special holder is needed to provide a stable and safe platform for recording. There is an option for using a front-facing or back-facing camera for recording events

Camera device	Video recording capabilities	Battery life	Mounting capabilities	Quality of video	Price
Action camera	+	o	+	+	-
Dash camera	+	+	+	+	+
Smartphone	+	o	-	o	-
Body camera	+	+	o	+	o

Table 1: Strengths and weaknesses of camera types, assessed by the research team.

in front or inside the vehicle. Recording settings, battery life, and storage space depend on the specification of the smartphone. Most of the contemporary smartphones can record video material in 4K, 1080p and 720p format with several hours' independent battery life. The autonomy of the smartphone can be extended with a power supply cable. The most problematic feature of contemporary smartphones is the limited storage space, as an SD card expansion slot is not often integrated into the smartphone.

Recently, body cameras are on the rise. They are mainly used by law enforcement and security departments. The camera is positioned so that it records the view of the person wearing such a camera. These cameras have a limited number of selected mounting positions; they are either mounted on the glasses, sometimes on the shoulder or on the chest of the person wearing the camera. Typical supported video formats are 1080p and 720p. Battery life and storage space is one area where body cameras differ

the most; it all depends on their design philosophy. They all have a long standby operational time but limited recording time, as some are meant to record constantly for 8 hours or more, while others operate only for 10 minutes.

The table presents a summary of the strengths and weaknesses of all four types of cameras, assessed by our research team. We prepared a table where every characteristic of the camera was evaluated. The “+” plus sign means that the characteristic is better than average. The “0” means that the characteristic is average and the “-” sign means that the characteristic is below average in comparison to the other camera types from our research.

### *Heart rate variability recording*

Chest straps are the best known for measuring heart rate during sports activities (see Figure 2). Usually, they are combined with a sports wrist watch, or they connect directly to a smartphone through Bluetooth low-energy (BLE) protocol for presenting the data. One of the measured parameters is also the heart rate variability (HRV), which presents the difference in milliseconds between consecutive heart beats. A chest strap is commonly made of an elastic material; in the central part, there are two integrated measuring electrodes and a communication and recording pod. Older models used to need weekly recharging but with the new BLE-enabled chest straps the device can run on one CR2025 battery for months or even a year. The data is transmitted, most commonly wirelessly, to an application running on a computer or to a data cloud. Some of the most known and used chest strap brands are Polar, Zephyr, and Wahoo. They all have a similar design and comparable functionalities but differ in styling. The different styling is most noticeable in the protective sensor casing



*Figure 2: Chest straps for measuring heart rate (source: manufacturers' official web pages).<sup>2</sup>*

and elastic mounting strap. The sensor casing varies in size, shape and color features. Elastic mounting straps have different buckles for attaching and the texture of the elastic material varies among the brands. Some straps have signal lights incorporated while others do not. In the case of the Zephyr strap, a person must use BLE-enabled devices as the non-BLE-enabled device does not provide HRV-measuring capability.

### *Smartphones*

In addition to video-recording, smartphones can also be used as sensor devices, since they commonly contain an accelerometer, GPS, Glonass, the BeiDou or Galileo navigation satellite system, a gyroscope, a light and sound detection sensor, and several other sensors. These sensors provide data about speed, acceleration, braking, the direction of driving, environmental sounds, etc. Sensors only work with specific mobile applications. One of the frameworks that utilize mobile phone sensors is Funf Open Sensing Framework,<sup>3</sup> part of which is the Funf mobile application. This mobile framework was designed for sensing and data processing by Massachusetts Institute of Technology (MIT). Another application is the Sensor

<sup>2</sup> Polar ([www.polar.com/us-en/products/accessories/H7\\_heart\\_rate\\_sensor](http://www.polar.com/us-en/products/accessories/H7_heart_rate_sensor)), Zephyr MXM ([www.zephyranywhere.com/resources/hxm](http://www.zephyranywhere.com/resources/hxm)), and Wahoo (<http://eu.wahoofitness.com/devices/heart-rate-monitors>).

<sup>3</sup> Funf web page: <http://funf.org>.

Tool Box.<sup>4</sup> This application supports a built-in compass, speedometer, position determiner, and other functionalities. The third mobile application is SenseView,<sup>5</sup> which also uses internal sensors like accelerometer readings, GPS location, and light conditions.

### *On-board diagnostic devices*

On-board diagnostics (OBD) refers to a vehicle's self-diagnostic and reporting capabilities (see Figure 3). These are typically aftermarket devices that connect to a car. An OBD system provides access to the status of various vehicle subsystems. An OBD device is connected to the controller area network (CAN) bus that is an integral part of contemporary cars. As part of the on-board diagnostics EOBD vehicle standard, it has been mandatory for all petrol vehicles sold in the European Union since 2001 and all diesel vehicles since 2004.<sup>6</sup> The device operates as a gateway for mobile devices or computers to collect car related data such as the information about speed, braking, engine power, torque, temperatures and pressures, fault codes accelerating and gravitational forces, etc. (Erman and Friedman 1973). When analyzing the driving behavior, the most valuable data are information about acceleration and g-forces, braking, and speed. The collected data can later be presented in supporting computer- or smartphone-based applications.

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4 Sensor Tool box web page: <https://play.google.com/store/apps/>

5 Senseview web page: [www.senseview.mobi](http://www.senseview.mobi).

6 Obddiag web page: [www.obddiag.net/adapter.html](http://www.obddiag.net/adapter.html).



Figure 3: On-board diagnostics (OBD) module (source: Vgate materials).<sup>7</sup>

### *GPS-based trackers*

There are several smartphone applications available which enable collecting GPS NMEA data. These applications are, for example, Androsensor, GPS NMEA Tool, and NMEA Tools. From such apps we can obtain the GPS coordinates, the speed and number of satellites and, if necessary, we can calculate acceleration and deceleration during driving. It is important to note that using a smartphone as a GPS sensor has its drawbacks (Sysoev 2016). Firstly, a GPS sensor inside a car has a smaller view angle compared to a GPS receiver on the car roof. This can result in losing GPS signals faster in places with poor coverage area (among urban buildings, under the bridges, in tunnels, etc.). Secondly, most smartphones update GPS data once per second (1Hz) – this is a hardware limitation which makes it less accurate than the usual GPS receivers (like Microblocks, U-blox, etc.). For example, for the U-blox GPS receiver, the official update rate of collecting GPS NMEA data is 18 Hz, but it is important to note that in a practical experiment this receiver was able to provide only 10 Hz data rate (Sysoev 2016).

<sup>7</sup> Vgate-scan OBD web page: [http://vgate-scan.com/index.php?route=product/product&path=59&product\\_id=50](http://vgate-scan.com/index.php?route=product/product&path=59&product_id=50).

### *Smartphone applications for measuring driving styles*

Driving style applications have become very popular as they are designed to help people become more economic and environment-friendly drivers. They provide drivers with basic driving parameters data such as speed, braking intensity, turning intensity, acceleration, and in some cases driving directions. They can either be built in the car multimedia system or standalone applications on smartphones.

Flo – Driving Insights (see Figure 4) is one of the most useful smartphone applications for tracking real-time driving insights, according to the Google Play store score and comments from the users at the time of the mobile applications testing. It has been installed on more than 100,000 smartphones. The application is recording the driving parameters and shows the user how well he or she is executing braking, acceleration, cornering, and the level of even driving. These activities are displayed on a mobile phone by flashing and sounds. If the screen flashes green, the driver is driving well; if the screen goes red, the driver is driving poorly in terms of sustainability. Every journey, detected by Flo, is divided into smaller sections that are ranked according to the driver's performance. When the driving ends, the application shows the driver's dashboard with a map of the driven route, a score, the average and maximum speed. The map provides indicators for rating the individual route segments. All the past journeys taken by the driver can be viewed as well. The application provides the leader board of best drivers and social media functionalities, which attempt to support the drivers' motivation for a transition to more sustainable and environmentally responsible driving through an informal competition with other users. The application recognizes different driving styles relatively well but is not perfect. One of the biggest

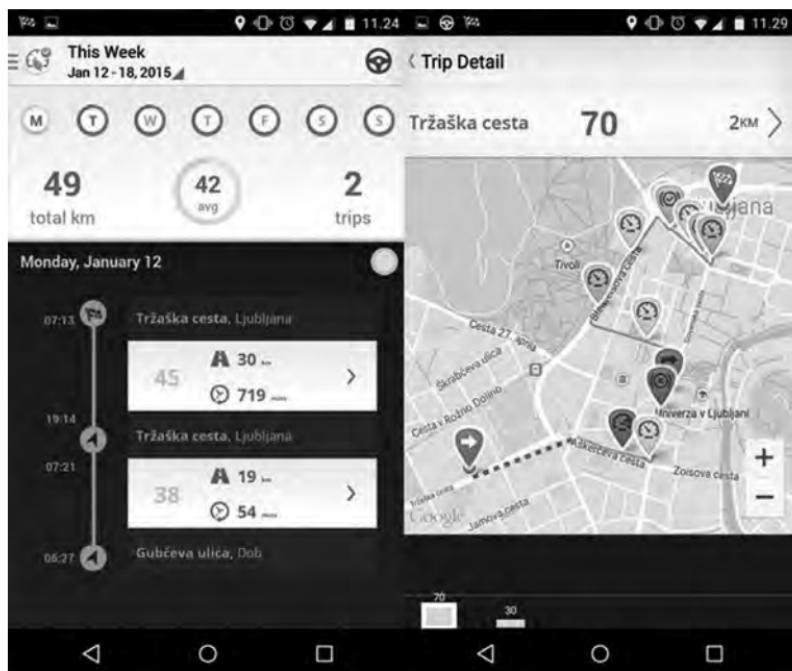


Figure 4: Flo application screenshot (source: Flo application with user data).

problems that we detected and that is reported by the users on Google Play store is a false positive recognition of corners on the road, especially at a higher speed on the highway. It is not possible to drive as the application suggests, as the driving circumstances might not allow that particular style of driving. When there is a problem with the GPS reception, we have observed problems with accurate tracking of acceleration and car speed. An incoming phone call or short message cause the mobile application to stop getting the data. One of the biggest user complaints about the application are the visual and audible notifications. They become disturbing over a longer time and may distract the driver. Our research team tested the application with



Figure 5: Hudway application (source: Motorburn web page).<sup>6</sup>

three different cars and three drivers for a month between December 2014 and March 2015.

Hudway (see Figure 5) is a heads-up display (HUD) application which provides the driver with road navigation and speed information. The driving destination must be entered before the driving starts. The user positions the smartphone directly in front of himself on the dashboard of the car. Then the application projects directions and current speed information on the windshield of the car. The picture on the screen is mirrored as a reflection on the windshield. The largest drawback of the application is that the heads-up display functionality is usable only at night.

Navier HUD Free (see Figure 6) is a heads-up display smartphone application designed to help drivers improve their driving style. The application has two views. The first is the navigation view and the other is a digital dashboard view. The digital dashboard provides current and average speed data, distance, and journey time. The application

<sup>6</sup> Motorburn web page: <http://motorburn.com/2014/02/4-ways-to-get-the-hud-experience-without-shelling-out-for-a-luxury-car/>.



Figure 6: Navier HUD Free application (source: Navier HUD Free application presenting the user data).

supports the HUD functionality for projecting the screen's image on the car's windshield, which makes it safer to use in comparison to the non-heads-up display smartphone applications. The current version does not support the sustainability and fuel-saving aspects of driving.

Drajv (see Figure 7) is a smartphone application, developed in collaboration with the Slovenia-based insurance company Triglav; it was designed for promoting safe and responsible driving. Its users have the possibility to win special car insurance discounts if they score high marks for driving, as recorded by the application. The application records their driving and compares it to preset values for safe driving; this also includes a maximum allowed speed and the points achieved while driving are assigned based on that. At the end of the journey, the driver sees a dashboard showing the aggregated driving data with an assessment of the quality of his or her driving. Our research team tested the first version of this application, using three different cars and three drivers during the month of January through the middle of March of 2015. A mobile phone with a working



Figure 7: Drajv smartphone application (source: Drajv application with user data).

application was installed in each car. After each drive, the drivers compared their observations and expectations about the completed trip, using the application. The drivers noted and compared the inconsistencies at the end of the testing period. We detected that the application had problems with the calibration and was too sensitive when recording accelerations and decelerations. It even occasionally missed when the driver was speeding and didn't assign negative points.

## THE EXPERIMENT

The experiment was designed to include the least amount of unpredictable factors that can influence its execution. All the variables, in the following text we define them as the independent variables, could not be excluded, but we tried to eliminate their significance. We attempted to define the context of the experiment which should not change during the testing. There should be the least possible amount of potential unpredictable factors that change over time. The car, route, and time should remain the same and should not change, which is a big challenge to achieve when considering the busy daily life of the test study participants. Variables can be divided into dependent and independent aspects.

Dependent variables are the variables that we were able to influence. These included the selected car for the test, number of the passengers during the test driving, demographic information of the passengers, etc. We collect data on anxiety level and mood of the driver and passengers, the time of driving, and the selected routes. Independent variables are the variables on which we do not have any influence. These are foremost the driving conditions and weather, and the time and driving route to some extent, because sometimes certain circumstances cause the deviation from the predetermined route and time.

The procedure and setup consist of two parts. The first part is instrumentation and the second is context. We aimed to make these two parts replicable and unchanged in every repetition of the test as much as possible.

### *Instrumentation*

The smartphone should have a constant place in the car, preferably on the dashboard. If the phone is there for the purpose of gathering sensor data, its placement is more simple. Most commonly people position it in the middle of the dashboard on a non-slippery surface. If it is required to record a video with the back camera, its placement becomes more complicated, since the smartphone must be placed in the upright position. Both placements can be done using a special phone holder, but neither of the solutions is perfect, as it takes some improvisation to set up the device.

Setting the HRV chest belt is more straightforward. The test subject secures the belt on his or her chest. It is important that the surface with electrodes is moist enough to provide optimal signal detection. The second smartphone or tablet was used for HRV data collection, but we were able to use the same phone for both video and GPS data recording.

The dash cam was set up behind the rear-view mirror. Its placement and setup are relatively simple; the Go Pro camera that served as a dashcam has all the needed mounting adaptors, such as a suction cup, curved and flat adhesive mount, 3-way pivot arm, thumb screw, etc. The supported SD memory card and battery are adequate for several hours of driving time. Since the memory card is easy to change, the best way to get the maximum time out of the camera is using an internal power supply.

## *Context*

The context should not change or should change as little as possible. The test study participant must be informed of this fact in advance. Some variables can be influenced, for example, the car, route, and number of passengers, while other variables cannot be influenced. Examples of these variables are the weather and traffic conditions. Driver's anxiety or mood represents an exception. It can be influenced by the other people in the car, either in a positive or a negative way, but if a person has had a bad day, there is little improvement to be made.

## CASE STUDY: DRIVING IN LJUBLJANA

In the context of the DriveGreen project, we have designed and carried out two experiments. The first was a basic test of data collection of the driving parameters on a drive through Ljubljana. The other was a long-term test, lasting more than one month, where traffic was recorded on video on commuting routes from home to work and back. During this test, we also conducted an assessment of smartphone applications, mentioned in the section above.

During the collection of driving parameters on the drive through Ljubljana, we simulated the daily commute of a parent taking his children to kindergarten on his way to work. The male driver was wearing the Polar H7 chest strap, with the heart rate and HRV data recorded on a smartphone. There was a GoPro Hero 4 action camera for recording traffic conditions in front of the car mounted behind the rear view mirror. The back camera on the smartphone was used to record the driver during the trip. All data was later synchronized and presented in a one-view video (see Figure 8).



Figure 8: Video of the case study of driving in Ljubljana (source: a composition of video recording and recorded sensors data).

The long-term test was designed for a video analysis of traffic, as well as for testing the smartphone applications for tracking and influencing driving habits. The selected test route ran between the University of Ljubljana's Faculty of Electrical Engineering and the village of Dob on the outskirts of Ljubljana. This was the daily commute to work of one the project members. It included local roads, city roads, one regional road, and two-lane roads. From mid-January 2015 to mid-March 2015, 45 route trips were recorded in total. The majority of the recorded routes were from Dob to the Fire Brigade Ljubljana bus station on Vojkova road. Other routes were between Dob and the Faculty of Electrical Engineering (FE), in both directions. Three recorded routes were different and cannot be placed in the other three



Figure 9: GoPro recording video (source: video recording).

categories. The distances of the routes vary between 19.5 and 14.7 kilometers. Detailed information about routes, distances, and the frequency is presented in the table below. GoPro Hero camera was used for making the recordings. The camera was attached to the front windshield, behind the rear view mirror, with a special suction cup adapter. During the test, two cars were used, Dacia Logan and Škoda Octavia. The trips from Dob to Vojkova road were recorded while driving Dacia and the rest of them were made while driving Škoda. All recordings were done in 1920X1080 video resolution at 30 frames per second with 9 161 kb/s of combined bit rate, which assured high-quality recordings (see Figure 9).

Route	Dob - Vojkova road (Fire brigade Ljubljana)	Dob - FE	FE - Dob	Other drivers
Distance	14.7 km	19.5 km	19.5 km	/
Number of drivers	25	9	8	3

*Table 2: Distance and number of drives during the test.*

### *Risk management and safety issues*

The experiment confirmed that the installed devices, cables, and mounting adaptors should be considered with some safety aspects in mind. Mounting adapters for cameras and smartphones can get detached from the surface or unplugged from the connectors. They can and did fall under the drivers' feet and operating pedals. Power supply cables have similar safety aspects. Cameras or mobile phones should not be operated by the driver while driving. That should be done by the co-driver or before the start of testing.

Some external influences cannot be controlled during the tests. The weather, for example, has a significant impact on how a driver is driving and how traffic is recorded. It may change from the bright sun, heat, cold, or rain to snow and icy roads. Similarly, the time of day can influence the driving style and outcome of recorded driving habits. Traffic conditions are another influence that must be taken into consideration. Traffic varies during the day and on different days of the week. We can determine some of the general similarities from one week to another, but they may still change during the year, especially with weather, major

traffic events like accidents, road works, etc.

Subjective influences are more common and differ from one person to another. They are highly dependent on the person's mood, stress level, daily activity, etc. (Sysoev 2015). Gender selection, demographics, and driving experience are important factors as well. An additional factor is one's attitude towards technology. Some people prefer to use cameras and sensors in their private life, others do not like to, and may even get anxious and irritated due to being under surveillance.

Data precision and reliability are also topics that need to be addressed. The heart rate chest strap is not medical-grade equipment and has limited data precision and reliability. All the measured data have some degree of error. Usually, devices don't offer timestamp functionality and therefore it can be a difficult task to synchronize data sources with videos. Instrumentation influences the driving, too. The test drivers are aware of the fact that there is at least one device that is monitoring their driving or even recording it. This influence can take a positive or negative direction but it will always influence the experiment in some way. Examples of a positive direction would be people stopping driving through red lights at traffic lights, not driving over the speed limit, or not committing motoring offenses. An example of a negative direction would be an overwhelming distraction from all the installed instrumentation which occupies the drivers' attention and hinders driving.

## DISCUSSION

For many drivers, the task of driving is not a complex operation after the initial learning stage (Healy and Picard 2005). The question is what do drivers do while driving and how do internal and external aspects influence their

driving? Therefore, a test was designed to study these types of influences, as described above. The result of the experiment was a production of a driving video with heart rate variability data. It shows where the driver was more stressed or excited (Lanata et al. 2015).

The second test was more time consuming and lasted for one and a half month. During this test, the durability, usability and image quality of an action camera for the long-term recording of driving was assessed. The second part of this test was the assessment of several driving style applications. The result was a series of recordings of driving on predetermined routes.

The videos were recorded in all-weather types (from sunny and cloudy weather, fog, rain, and snow) and different parts of the day (morning, midday, afternoon, and evening). The recorded video quality was satisfactory in all weather conditions, but most of the time it was beyond expectations. Even during a very bright sunny day with the sun pointing directly to the camera objective, the video recording was usable and all the driving events were recorded. During the night, the video recording was grainier as ISO setting in the camera had to be increased. Snow and rain had less of an effect on the video quality than expected as the video was still usable and all details were clearly visible. Different parts of the day had no significant effects on the video recording. The camera was able to adjust to the changing lighting conditions without any problems.

Not all cameras are appropriate for such experiments. One of the cameras that we tested was a low-budget no-name camera purchased on eBay. The official product specification indicated a great ratio of price and performance for the device. The car test has shown that the product specification was misleading, and the camera was in fact not useful for recording. The image quality of the recording during daytime conditions was low. The picture was very grainy with inaccurate and unnatural colors and poor image focus. During the night time, the recording

image quality was not usable at all. It was not possible to recognize anything in the video as there were only dark and bright colored blocks visible.

The process of testing mobile applications is time-consuming and long-term work. The drivers must have the discipline to follow the test procedure, the predetermined routes that they will be using, and to write down their notes. As each mobile application is different, there is some adjustment time for the drivers to get to know the application's work process. We recorded the events where some unexpected notifications from the applications distracted the driver in critical situations on the road, as in crowded crossroads, when changing lines in dual line roads, etc. During the tests, the smartphone is usually positioned on the dashboard of the car and out of hand reach of the driver. Despite securing the phone on the dashboard, on some occasions the phone fell off the dashboard. At other times, the test members got phone calls and text messages which disrupted the mobile applications' data gathering. The details of the tests of the mobile applications are provided in the following paragraphs.

Flo driving insights and Draiv mobile applications are applications very similar in their design ideas. Both applications are designed to assist people to change and improve their driving habits; however, they also have some significant differences. Flo works in real-time as it gives direct insight into driving, scoring, etc. The information is presented with colored flashes and sound. This can, as we noticed during our tests, become irritating over time as it distracts the driver from staying focused the road. As driving conditions change and unexpected events happen, the driver cannot always drive according to the application's suggestions. Therefore, the negative scores are not accepted well by the drivers as they felt that they were penalized unfairly while saving a critical traffic situation. The Draiv application provides a report at the end of each completed route but does not disturb the driver during

the driving. The application has a significant tolerance for speeding violations and is not aware of the events on the road. Some drivers report that a perfect score is very difficult to obtain but scores can improve over time.

Hudway and Navier HUD Free are addressing the same functionality as heads-up displays for driving. They provide the speed information directly to a space in front of the driver's eyes. Hudway has the more minimalistic user interface and shows only navigation instructions and the current speed. The application includes very little interaction with the driver, although the instructions for when to turn last too long. Navier HUD offers a more informative dashboard as well as navigational directions and the current speed information. Unfortunately, the application doesn't use updated charts, which can sometimes lead to inaccurate driving route suggestions.

We noticed that the presence of a camera has some effect on the driver as they are aware that their driving is being recorded. This causes a change in their driving style, as the driver is more aware of the possible driving violations. The second observation was that the camera can bother the drivers and raises their anxiety level. A research team member reported that he was more conscious of driving through a red light as he knew that his action would be recorded. The other research team test member reported that he respected the speed limits more while being recorded.

Our method provides basic data gathering from sensors and recording devices. It is simple to conduct and involves a lot of improvised solutions that were developed over the period of testing. For most of the tasks, there was no off the shelf solution. Some high tech and high price solutions do exist but are too expensive for non-professional use. These solutions are also often invasive and cause anxiety (Wang et. al. 2013). We used most of the devices that people carry with them and are often their daily companions. In this way we lowered the level of anxiety during tests.

There is some risk management necessary in these tests as there are a lot of factors that influence the relevance of the results. Test users do not always use the same car or route, and the time of travel is even more difficult to manage. Traffic conditions in combination with the weather are factors that we cannot influence, and so the daily anxiety levels of test study participants change from day to day or even during the day. Sensory devices are not without their share of problems either. Their battery can get depleted, memory cards or modules get full, the wireless Bluetooth BT connection can disconnect, etc.

## CONCLUSION

In this chapter we have presented an overview of the methodology recommendations for subjective and objective assessment of driving styles. We presented the methodology and the experimental approach as well as typical equipment that can be used for the research of driving styles. While conducting this research, we have identified particular issues and parameters that may have significant effects on the outcome of the test. As we have shown, it is possible to conduct a subjective and objective assessment of a driving style, taking into account all of the above mentioned facts and limitations. Based on these, we will be conducting further experiments with a larger group of drivers, which will help us optimize the smartphone application developed in various applied projects, in terms of sensor data processing for the detection of a driving style as well as improve the user experience and notification optimization. The final goal of the study is a tool for developing a driver-friendly and motivational application, which will improve safety on road and support sustainable mobility in passenger cars.

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# ACCESSIBILITY TO PUBLIC TRANSPORT IN LJUBLJANA

## Review, Development, and Challenges

**Jernej Tiran, Simon Koblar, and Luka Mladenovič**

*The chapter describes the development of public transport in Ljubljana through time, highlights some important aspects of its accessibility and use, and states the key challenges and recommendations for improving the system in the future. Despite the stated measures and improvements to the service, the number of passengers has been surprisingly steadily decreasing in the past years, although the spatial distribution of the bus stops in Ljubljana is relatively appropriate according to the settlement pattern. An integral consideration of the usefulness of the routes is required during their planning stages, and convenient transfer points must be provided.*

*Keywords:* public transport, accessibility, traveling habits, PTAL, Ljubljana

## INTRODUCTION

Public transport (hereinafter PT) is one of the most important traffic pillars in sustainable urban development. PT has less negative effects on the urban environment than automobile traffic and enables the citizens to make daily trips regardless of transport vehicle ownership. PT also contributes to controlling the flow of people within the city and between the city and its surroundings. It is an important connective element of public life, as it allows the mobility of its citizens and accelerates the development of the city and its activities (Uršič 2006). So it is not surprising that cities with well-developed PT systems have a better quality of life (Litman 2015).

Ljubljana is the political, administrative, economic, employment, educational, and population center of Slovenia with 287,347 inhabitants, 206,313 employment positions, and more than 112,691 daily migrants who commute to work from other municipalities (Statistical Office RS 2015). A competitive, effective, and accessible public transport is therefore very important for uninterrupted city functioning and the citizens' quality of life. The chapter describes the development of PT in Ljubljana through time, highlights some important aspects of its accessibility and use, and states the key challenges and recommendations for improving the system in the future.

## DEVELOPMENT OF PUBLIC TRANSPORT

The development of PT in Ljubljana has always been more or less closely connected to the development of the city and has undergone a number of crucial development points in the last century. The tram started operating in 1901. At first, twelve tram lines were planned, however, in 1901, the tram was running on only three lines on about 5 kilometers of tracks that converged in front of the Ljubljana Town Hall. The track network then spread to the suburbs after 1931 and consisted of about 21 kilometers of tracks in 1940 (Brate 1997). After World War II, the population of Ljubljana

increased rapidly, and the tram could no longer service the greater number of passengers. In 1951, the renovation of the vehicle fleet and track network was abandoned, and the cheaper option of trolleybuses was selected instead; these subtracted less driving surface from the cars, and the tram lines were finally eliminated in 1958. At the time, trolleybuses operated on four routes. The trolleybus period lasted only until 1971, predominantly due to numerous problems and inconveniences, especially with the electrical grid; the trolleybuses were then swapped out for buses (Brate 1990). Since then, the bus route network has been more or less developing and expanding together with the growth of the city; in 1972, it ran on 16 lines, and in 2015 on 26 lines with a total distance of 372.8 kilometers (Letno poročilo 2015, 2016). Buses still run through the city (and some suburban settlements) today. The last ten years have seen numerous measures to make the city public transport service more attractive, reliable, and competitive with personal vehicles. These measures include updating the payment system with the Urbana card, introducing bus-only yellow lanes, increasing the number of low-floor and environmentally friendly vehicles, expanding the P+R (park-and-ride) facilities, extending the routes into the suburbs, and electronic displays of arrival times at the bus stops.

## SELECTED ASPECTS OF PUBLIC TRANSPORT USE

The introduction of the Urbana card in 2009 and its electronic noting of the number of rides has also enabled a precise overview of the number of passengers (up to 2009, the number of passengers could only be estimated). Despite the stated measures and improvements to the service, the number of passengers has been surprisingly steadily decreasing in the past years (an increase occurred only between 2012 and 2013). Besides that, considerable differences between 2009 and 2010 clearly indicate that the estimates on the number of passengers were exaggerated (Table 1: Letno poročilo 2011, 2012; Letno poročilo 2015, 2016).

Year	Number of passengers
2009	65,963,700
2010	42,814,184
2011	41,614,656
2012	39,437,496
2013	40,631,336
2014	39,838,115
2015	37,928,067

Table 1: Annual number of passengers on city PT routes between 2009 and 2015 (source: Letno poročilo 2011, 2012; Letno poročilo 2015, 2016).

The introduction of the Urbana card also enabled precise studies of the number of passengers at specific bus stops. The data on bus entries were acquired at the Ljubljanski potniški promet company (Urbana card entries 2015). The chosen date for analysis was Thursday, 19 November 2015, a day with no precipitation, school or study holiday or any larger events, so it can be assumed that this was an ordinary day in the calendar year. Only the city bus and integrated city bus lines were included in the analysis. The total number of passengers was 165,000, which is a bit more than the average during the school year. Figure 1 clearly illustrates the main PT corridors in Ljubljana, running on the main arterial roads (Celovška, Dunajska, Tržaška, and Zaloška Road), while the greatest number of entries occurred at the stops along Slovenska Road; the two stops at Bavarski dvor saw over 8,000 entries and the Pošta and Konzorcij bus stops also saw over 7,000 entries.<sup>1</sup>

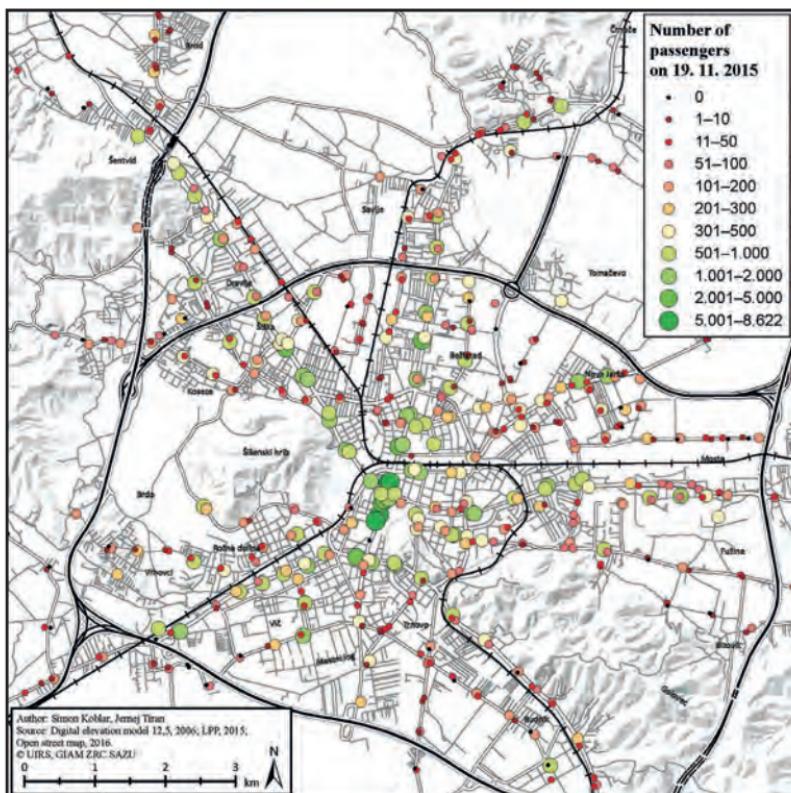


Figure 1: Number of entries at city bus stops on 19 November 2015.

The passenger analysis according to the days of the week was carried out based on a year's worth of entry data from January to December 2015 (Table 1). The analyses were made over two time periods. The first representative period for the school and study year ran from 1 October to

1 It should be mentioned that there was ongoing construction in the southern part of Slovenska Road, causing the buses to detour to Bleiweisova and Prešernova Road. This explains the greater number of passengers at the Cankarjev dom and Bleiweisova bus stops and no passengers at the Drama bus stop. Since the bus stops were analysed separately for each direction, some bus stops near the end of the lines note very few or no entries.

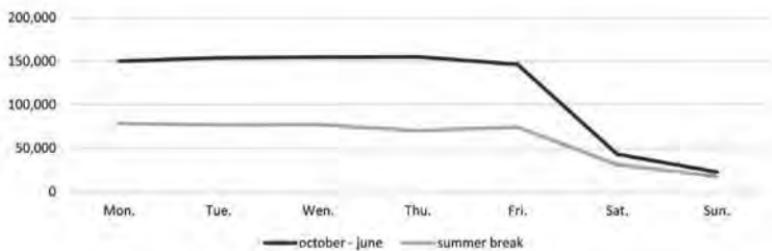


Chart 1: Average number of city bus passengers in one day between January and December 2015 (source: Urbana card entries 2015).

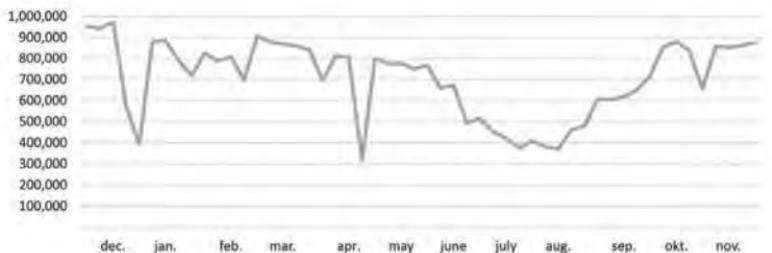


Chart 2: The average number of passengers per week between January and December 2015 (source: Urbana card entries 2015).

24 June. Any national and school holidays were eliminated from this period, as the number of passengers is significantly lower during those times. The data for this period show an average number of passengers on school days. The period for the summer break ran from 25 June to 31 August.

Chart 1 also shows that the number of passengers is almost halved during the school holidays than during school periods. This is to be expected considering the structure of the passengers since around 50% of the bus journeys in the City Municipality of Ljubljana are done by people younger than 30 years and who are mostly school-aged children,

high school children, and students (Klemenčič et al. 2014). The lower number of passengers in the summer is also influenced by the summer holidays and a greater share of people cycling. It is interesting to note that the number of passengers does not vary significantly during the workweek, while it decreases drastically during Saturdays and Sundays.

The analysis of passengers of the number of passengers using PT per week also shows a steep decrease in the number of passengers during New Year and spring break, when the number of passengers is halved, similar to the numbers during school holidays. The number of passengers starts to increase again in September when the school year begins (Chart 2).

## ACCESSIBILITY TO PUBLIC TRANSPORT

One of the more important aspects of PT quality is also the systematic measuring of its accessibility. This is important for estimating the quality of the existing system and its upgrading and for a more effective spatial planning. One of the most elementary indicators for this is the spatial (walking) accessibility of the bus stops. The calculations indicate that the spatial distribution of the bus stops in Ljubljana is relatively appropriate according to the settlement pattern: 93.1% inhabitants have their permanent residence within a 640-meter radius, which corresponds to eight minutes of walking distance; 78.6% inhabitants live within a 400-meter radius, which is a five minute walk (Figure 2). The result was calculated based on the actual distance to the bus stops in the street network, which provides significantly more reliable results than the calculation based on the Euclidian distance (Kozina 2010).

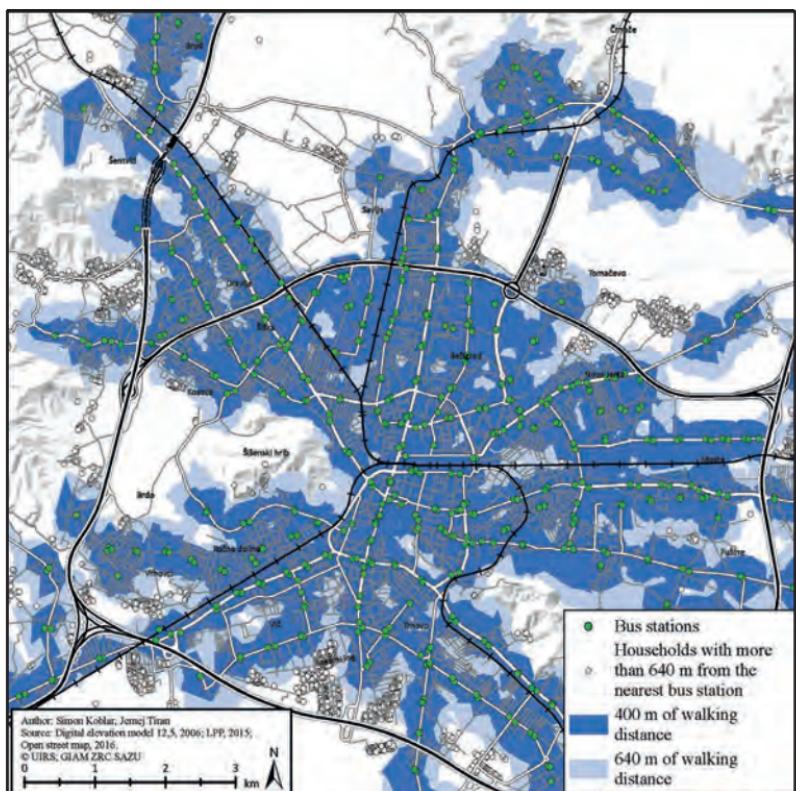


Figure 2: Ljubljana is relatively well covered with bus stops according to the settlement pattern.

One of the more established and integral methods for measuring access to PT is the PTAL method (*Public Transport Accessibility Levels*), which has been used as the basis for spatial planning in the London spatial plan since 2004 (Measuring Public Transport Accessibility Levels 2010; The London Plan 2015). The most important characteristic of the method is that it takes into account the number of the lines and the frequency of departures at individual bus stops in addition to the walking accessibility of the stops. A somewhat adapted PTAL method was also applied to the case of Ljubljana. The coefficient calculation for a selected location runs in several stages, and the final result is the PTAL accessibility index (PTAI) arranged on a 9-level scale (PTAL). A more detailed description of the method and calculation process can be found in Tiran et al. (2014).

The final PTALs coincide well with the number of entries at bus stops, which points to a strong correlation between the supply and demand for PT. The differences in accessibility are quite big between individual city areas. 9% of inhabitants live in areas with excellent accessibility (PTALs 6a and 6b): this consists of the central part of the "Dragon Tail" corridor (Barjanska–Slovenska–Dunajska Road), with Bavarski dvor dominating with PTAI of over 70. Areas along most of the rest of the main traffic veins and the wider city center have medium to excellent accessibility (PTALs 3 to 5): these are areas in the vicinity of bus stops with at least two reasonably frequent routes. The majority of people, 23%, lives in areas with poor accessibility (PTAL 2), where only one PT route usually operates with a medium frequency of arrivals (every 10 or 15 minutes). These areas are also spatially the greatest. A similar share of people also live in areas with very poor accessibility (PTALs 0, 1a, and 1b), and 7% of people live in areas without a bus stop within a 640-meter radius (PTAL 0).

Public Transport Accessibility (PTAL)	Public Transport Accessibility Index (PTAL)	Description	Number and share of inhabitants (640 meter distance from the bus stops)
0	0	very poor	18,555 (7,0%)
1a	0 - 2.5	very poor	8,572 (3,3%)
1b	2.5 - 5	very poor	32,720 (12,4%)
2	5 - 10	poor	60,724 (23,0%)
3	10-15	medium	52,272 (19,8%)
4	15 - 20	poor	42,872 (16,3%)
5	20 - 25	very good	24,346 (9,2%)
6a	25 - 40	excellent	17,428 (6,6%)
6b	40 and more	excellent	6,238 (2,4%)

Table 2: Number and share of inhabitants in Public Transport Accessibility Levels in Ljubljana (source: Tiran et al. 2015).

These areas are located on the outskirts of Ljubljana and are mostly urbanized rural settlements and areas of dispersed individual buildings. Newer buildings, built after 1991, are also among the less accessible areas, such as some newer residential areas, new faculty center under Rožnik, and shopping centers, especially Rudnik (Table 2; Figure 3; Tiran et al. 2015).

## SELECTED ASPECTS OF TRAVELING HABITS

Data on the travel habits of inhabitants have not been observed systematically at the level of the city. Two surveys were conducted in 2003 and 2013 (Dalla et al. 2003; Klemenčič et al. 2014) but they are not methodologically comparable. Both surveys indicate that the state of the

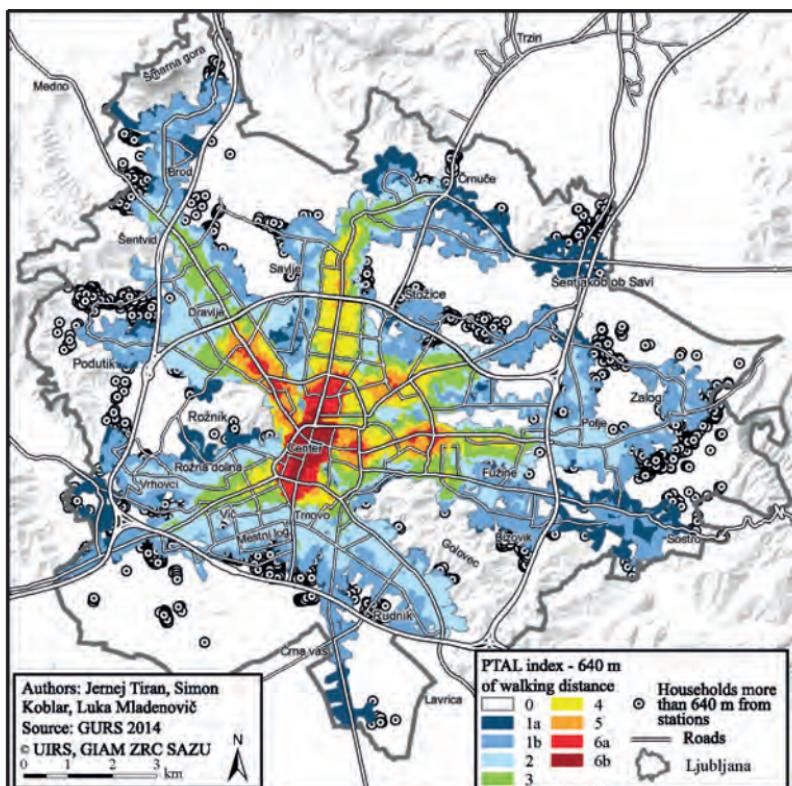


Figure 3: Spatial depiction of accessibility to public transport in Ljubljana (source: Tiran et al. 2015).

traffic system in Ljubljana is largely influenced by the routes stemming from the Ljubljana urban region. At the same time, considerable differences exist in the use of the different modes of transport between individual city areas, as a consequence of limiting automobile access to the city center, the differences in the accessibility to PT and the quality of the cycling infrastructure. The comparison of both surveys points to differences in the share of walking and automobile use, while the share of PT use has remained almost identical. In 2003, 12.6% of all journeys in the City

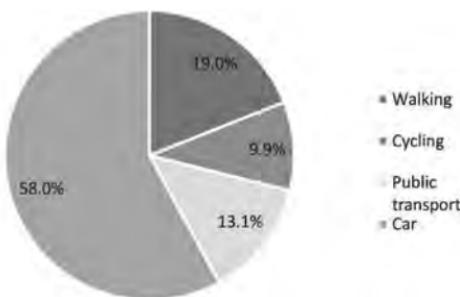


Chart 3: Relations between the modes of travel in the City Municipality of Ljubljana in 2003 (source: Dalla et al. 2003).

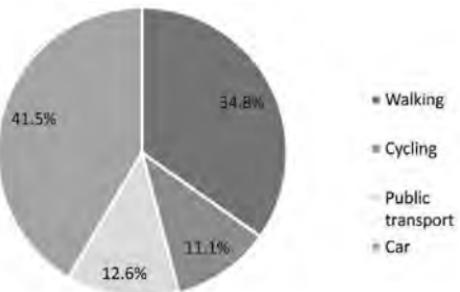


Chart 4: Relations between the modes of travel in the City Municipality of Ljubljana in 2013 (source: Klemenčič et al. 2014).

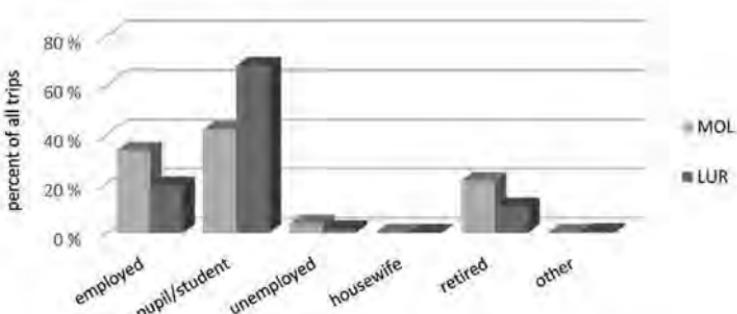


Chart 5: Share of trips in the City Municipality of Ljubljana and Ljubljana urban region according to status for 2013 (source: Klemenčič et al. 2014).

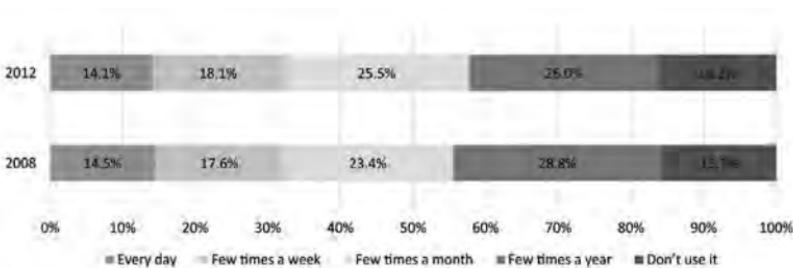
Municipality of Ljubljana were done by bus and 13.1% in 2013 (Dalla et al. 2003; Klemenčič et al. 2014). This slight change matches the data on the number of passengers, which also does not point to a significant increase (Letno poročilo 2015, 2016). The share of PT use places Ljubljana somewhere in the middle of the list of European cities that are comparable in the number of inhabitants (EMS – The EPOMM Modal Split Tool 2016).

The results show that the most numerous group of PT users are citizens without a car: elementary school children, secondary school children, and students. PT among employed people is becoming more represented due to the increased use of P+R parking lots (Jesenšek 2016), gradual limitation of access to the city using a car, and abolishing free parking.

The surveys from the CIVITAS project (Uršič et al. 2009; Uršič et al. 2012) also show that despite some improvements to the PT, no clear shift to a more increased use of PT can be detected as the frequency of use remains on approximately the same level.

The answers from both surveys indicate a high support for PT with regards to the priorities in the traffic arrangement as well as with regards to the allocation or siphoning and restructuring funds for the development of the traffic infrastructure. The study concludes that PT is poorly utilized in general, as the poor increase in use (and even a decline in some activities) points to a relatively poor efficacy of PT and points to a need for change and improvement the PT service in the city.

We would also like to point to a psychological aspect of PT use, which is gaining in importance due to greater competition between different modes of transport – that is, what is the appropriate walking distance to bus stops that



*Chart 6: Frequency of use of the city bus in the "Dragon Tail" corridor (source: Uršič et al. 2009; Uršič et al. 2012).*

will not deter the passengers from using PT. Various research indicate different distances, which are used for the desired, recommended, or minimal spatial accessibility to PT stops (Gabrovec and Razpotnik Visković 2012). The most common distance in Ljubljana is 400 or 800 m, which corresponds to five or ten minutes walking. However, an online survey based on non-random, but relatively representative sample of 485 adult citizens of Ljubljana (Tiran 2014) indicates that both distances are too great in terms of distance perception and the wishes of the inhabitants. Only 67% of the survey respondents are willing to walk five minutes to a bus stop and, surprisingly, only 18.6% are willing to walk ten minutes. Compared to other objects (stores, services, green surfaces, etc.), the willingness to walk to a bus stop based on the distance is the smallest. The outskirt inhabitants are willing to walk a bit further compared to the city center inhabitants, but the differences are not large. This is undoubtedly an interesting finding that may also explain the relatively small share of PT use compared to other modes of transport and should be taken into consideration when planning possible upgrades to the route network in the future.

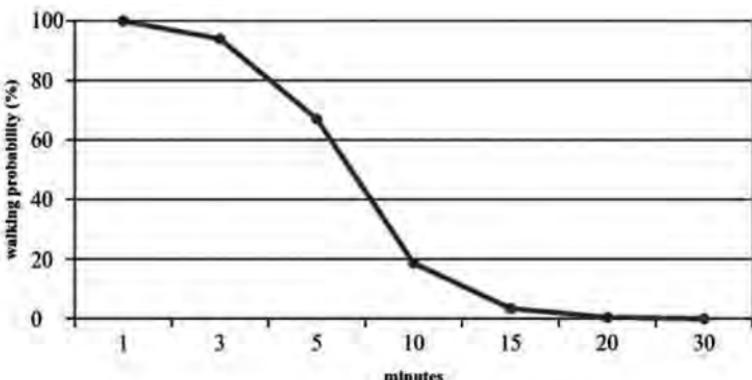


Chart 7: Level of willingness to walk to the bus stop according to walking distances among the survey participants in Ljubljana (source: Tiran 2014).

## CONCLUSION

The PT system in Ljubljana has undergone noticeable changes in recent years towards greater quality, attractiveness, and reliability. It seems that as the profile of the passengers is changing, PT is also becoming more acceptable for employed people. However, data show that the use is stagnant or even decreasing. In our opinion, decisive steps must be made to increase the use, especially in integrating the traffic and spatial planning. The system is currently developing only with smaller adjustments and changes, more curatively or as a response to developments in space. The development of newer parts of the city, like shopping centers and newer residential areas, is almost exclusively based on automobile access. The bus route network only responds to these changes, but is not their generator and does not co-create the development of the city. The situation was different in the period after World War II, as the development of the city was mostly planned by building neighborhoods along the arteries. All the

larger neighborhoods were placed along an important traffic route and the design of the inner roads was directed toward the center of the neighborhood and equipped with a bus stop (Tepina et al. 1957). The concept of this kind of development and city dispersal had a strong influence on the numerosity of public transport use. According to the data of the research by the Urban Planning Institute from 1962, the inhabitants of Savsko naselje, which was built according to this principle, did as many as 51.8% of journeys in the winter by bus and an enviable 30.9% of journeys in the rest of the seasons (Človek – stanovanje – naselje 1962).

One of the possible “recipes” for an increased PT use is a methodologically supported placement of bus stops based on the vicinity of key services and apartments, which is based on findings of the acceptable distance to bus stops according to the opinion of the inhabitants. An integral consideration is required on the usefulness of the routes during their planning stages, especially in connecting densely populated areas with employment centers. The PT system has not changed significantly despite the routes being extended into the outskirts and is still based on direct connections of the center to the outskirts. Some routes have been extended, making them quite long and with a great number of stops, which makes the journeys very long. This kind of system has been designed for a token payment system, where people paid for each ride. The Urbana card enables free transfers, so it makes sense to simplify the route system and rearrange it so that people can transfer from the auxiliary lines to the main ones. Here, convenient transfer points must also be provided. In addition, the prices, times, and locations between different transport providers must be integrated; this is projected to be achieved with the integrated PT system on the state level, which is said to commence in September 2016. The system has been in the testing process since September 2016, only applicable for pupils and students for now.

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# DISCOVERING TRAFFIC PHENOMENA THROUGH LANGUAGE ANALYSIS

**Saša Babič**

*Language is an essential component of culture – it reflects the culture specifics, defining the boundaries between cultural groups and the links between them. Transport and vehicles are part of our everyday lives; an autonomous system with its own socio-cultural characteristics and dynamics was set up and is closely intertwined with other segments of daily life and its conceptualization; this is reflected in language. The chapter discusses how cultural characteristics of traffic can be accessed through language. Among other things, it explains which vocabulary is used for the interpretation of traffic, cars, and events on the road and which vocabulary of the motorized world passed into the metaphorical meanings and is used for the interpretation of other everyday phenomena. The author is interested in how we speak of traffic and what it reveals about our relationship with it. Based on practical examples, such as from the media and roadside ads, this contribution shows how we can research the discourse with the methods of conceptual linguistics, ethnolinguistic, linguistic anthropology, and paremiology.*

*Keywords:* traffic, linguistic anthropology, ethnolinguistics

## INTRODUCTION

The relationship between language and culture with a focus on the reflection of the culture in language is researched within many linguistic fields. They mostly aim to get into the culture through its media, i.e. language. For this research, we have used the methods of linguistic anthropology, ethnolinguistics, and conceptual linguistics. These all have one important common ground: their research stems from "living texts." These methods research language in actual use: in speech and daily writings (newspapers, commercials, etc.); they are suitable for studying the language which is used daily in communication (spoken or written). Although we often hear Wittgenstein's citation "the limits of my language mean the limits of my world," which are supposed to draw limit to thought, it becomes apparent that language adapts to the surrounding world and thoughts with conceptual metaphors, transformations of meanings, and crosses the so-called thought-limits which are supposed to be set by language.

## THEORETICAL FRAMEWORK

Linguistic anthropology is researching culture using the "meaning as culture" approach: linguistic meaning is determined by the cultural context in which language occurs; one cannot be separated from the other (Forrester 1996: 48). This approach is supposed to be the foundation framework of a "world view". As Frawley (1992: 46) stated: "Language, culture, and thought are all mirrors of each other ... so it is possible to read through language and language of culture because linguistic distinctions reflect cultural differences, which in turn generate distinctions in thought". Duranti (1997: 14–21) describes three theoretical fields in using language, which have developed within linguistic anthropology: indexicality (words are indexically connected to an "object" or worldview), performance (the actual use of language, attention, perception and memory, that have to be in use, so that speaker can use

effectively and independently the abstract knowledge), and participation (the speaker is a social participant). Speech is defined as a social activity, which always contains more than just linguistic expressions. To be a speaker of a particular language means that person has to be part of society. A competent speaker can be part of wider social activities, which are organized and interpreted within the framework of culture, which is broader than the things we see and touch at any moment. A link to this wide world – real or imaginary – is created through a performative power which comes through its indexicality.

Language use can only be understood when it is integrated with the patterns of everyday actions (Forrester 1996: 45): "Meaning is located in the function that words have "signals" passed back and forth between people in the course of purposeful and shared activity" (Wittgenstein 1953: 180). Words only obtain their meaning in the context of thought and life: "Context and use determine the meaning, and the meaning of an expression is a function of its use in a particular context" (Forrester 1996: 45). Therefore, language meaning and language use are irretrievably bound within the theory of secondary meaning.

In the theory of "meaning as a conceptual structure" the orientation moves from use to conceptual structure: the position here is that all human minds are the same and that the semantic properties that underlie the meaning of sentences are conceptual (Forrester 1996: 47). Lakoff and Johnson (1980) introduced a way of researching culture through concepts that are expressed through metaphors. Our concepts provide the structure for how we understand and relate to the outer world (Lakoff and Johnson 1980: 3). It could be claimed that our everyday realities are defined within our conceptual system, that is why in everyday life metaphors are so pervasive – both in thought and action and consequently in language. Our conventional conceptual system, in terms of which we think and act, is fundamentally metaphorical. Linguistic meaning precedes and enters the context as speakers bring this meaning with them into the

context of communication. The context and use are thus relevant to the meaning because speakers have a prior conceptual structure (Frawley 1992: 54). These metaphorical concepts that “govern our everyday functioning to the most mundane details” (Lakoff and Johnson 1980: 3) therefore tell us a lot about our perceptions, way of life and culture we live in. Metaphors are linked to the understanding and experiencing of one kind of a phenomenon in the sense of another kind (Lakoff and Johnson 1988: 27), where we usually talk about (mirror) transformation between different areas, where X lies in the domain of the target and Y lies in the domain of the source (Wiertlewski 2009: 50). Using the theory of conceptual metaphors Stefan Wiertlewski (2009) takes a closer look at one type of transport, in his case cycling, using both methods – looking for conceptual metaphors as well as ethnolinguistic ones: he looks at the conceptual metaphors of “cyclist as a pilot,” “bike as a plane,” and “cycling as eating.”

To obtain an insight into the language perception of the traffic world, we can also use ethnolinguistic approaches. In a wider definition, ethnolinguistics (Lublin school) occupies all aspects of the exploration of language as a social phenomenon (Bartmiński 2005: 159–161). Ethnolinguistic methods are at a certain point similar to linguistic anthropology and can be used to explain how the collective consciousness and history are reflected in language and how the concept of reality is manifested in cultural texts. It introduces a “world map” with concepts and stereotypes that are created around various objects, which have an important role in the modern worldview: presentations of the world and human, basic understanding which show the specifics of human existence, relation towards the world, the more important conditions of their existence; the language world map shows all views of their worldview and imaginings (Balašova 2003: 3). We can look into the concepts and stereotypes (as an image and obtained opinion) of roads, crossroads, cars, bicycles, buses, pedestrians, etc.,

which cannot be separated from language and the word (Bartmiński 2005: 159–161).

When researching the world of traffic, we observed the Slovenian language in two directions, 1. how we talk about traffic and what kind of metaphors are used in language when we speak of traffic; 2. how is it possible to study which vehicle- and traffic-related expressions have passed into the metaphorical language. For example, *Tale se mi je prišel na rit* [That driver's stuck to my arse], *Zamujamo – daj v višjo prestavo* [We're running late – kick it into a higher gear!] and *Uptown girl* are just some of many metaphorical expressions that have appeared in Slovenian newspapers and everyday language and can be researched from both perspectives.

## METHODOLOGY

I conducted an overview of media presentations of traffic and vehicles in Slovenian newspapers. I included publications such as the weekly supplement *Svet vozil* (World of Vehicles), published by the national daily newspaper *Dnevnik* (May 2013 and May to September 2014), and specialized magazines (2014, summer issues, and March 2016) on cars and other vehicles (*Avtofokus*, *Avto magazin*, *Avto*, *Auto Bild* and *Evo*) – all of them in printed version, because it is fixed and not updated hourly/daily, which allows for better control of the analyzed texts. I analyzed the articles, columns and professional opinions on traffic as well as the descriptions of road conflicts and traffic accidents in the newspapers' news sections. I tried to estimate the subconscious position of the traffic world in national and local perceptions and concepts by analyzing the metaphors and other rhetorical figures. The analysis helped me shed light on the conceptual map of the cultural surroundings in which traffic operates. I also used semi-structured interviews, which were carried out to obtain information on driving habits. I carried out 15 interviews with drivers, both female and male, from different parts of Slovenia (aged between 20 and 65, from urban as well as rural areas). In the interviews,

the interviewees were allowed to talk as freely about cars and traffic as they desired. The interview started with general personal data questions (age, place of residence, type of car owned, etc.), followed by questions linked to their attitude towards their car, their driving habits, their perception of road rage, driver stereotypes, etc. This represented the only way to obtain their own metaphors on traffic elements and language use. Since I am aware of the importance of privacy protection, privacy was ensured throughout my research. All information about the drivers and their behavior on the road was made anonymous, and no personal information was disclosed without their knowledge and consent. As the material in the media had been previously published and was, therefore, public, privacy protection was not an issue with the media texts.

## SLOVENIAN TRAFFIC LANGUAGE AND ITS METAPHORICAL FUNCTION

The most obvious traffic elements to be noticed were the road as an area in which traffic “lives”: vehicles and drivers, bicycles and cyclists, pedestrians – all are a part of the living road. All of these elements are intertwined; however, the most metaphorical language can be found in the language of motorized vehicles. Although traffic is deeply rooted in our everyday life, there are no (new) true proverbs in Slovenian language that would use the language from the modern world or traffic. All I could find were proverbial instructions: one involving a motorized vehicle, i.e., a bus:

*Za avtobusi in fanti se ne teče (ker čez 10 minut vedno pride nov).* [A girl should never run to catch a bus or a boyfriend (another one is always round the corner)],

and one involving a bicycle:

*Na kolo za zdravo telo.* [On the bike for a healthy body.]

I have detected more phrases than proverbs that have crossed over to the metaphorical language of everyday functioning, e.g.:

*Pritisni na plin/gas!* [Step on the gas!] = "Hurry up!";  
*Daj v višjo prestavo!* [Kick it into a higher gear!] = "Hurry up!";  
*Zmanjkalo mi je bencina.* [I ran out of gas.] = "I didn't have the energy to finish something.";  
*Spelji se!* [Drive off!] = "Go away! / Get a life!";  
*Odpeljal je zadnji vlak.* [The last train has departed.] = "That was your last chance."

On the other hand, the road/street is commonly used in metaphorical language:

*Biti na cesti* [to be on the street] = "To be out of work or homeless";  
*Vreči koga na cesto* [to throw somebody out onto the street] = "to send somebody packing";  
*Zmeraj je na cesti* [somebody is always on the street] = "somebody is always out, i.e., being never at home."

There are also many proverbs in which the road assumes a metaphorical meaning:

*Cesta ni dom* [The road is not a home];  
*Cilj je eden – cest tisočero* [There is one goal, but a thousand roads];  
*Dobra mera in vaga na cesto pomaga* [Good measure and scales lead to the road] = "if one is too wasteful, one might quickly find oneself without possessions."

In most proverbs, the “road” implies poverty or homelessness:

*V vsako vas pelje cesta* [There is a road leading to every village].

The world of vehicles created two specific phrases:

*pritisni do konca!* [push it to the end!] and  
*imeti težko nogo* [to have a heavy foot],

which both originally pertained to stepping on the accelerator. The first phrase is metaphorical also in everyday life, when it is used to express that “somebody has persisted with his/her will for as long as it took to get what he/she wanted to get,” while the second phrase is used only to mean “to enjoy driving too fast.”

## CONCEPTUALISATIONS OF SPECIALIST TRAFFIC LANGUAGE

Words about traffic, such as road, car, and bicycle, are described in various ways which can demonstrate the perception and conceptualization of the traffic phenomenon. Next, we will describe some of the conceptual metaphors that present the conceptual map of the world of traffic.

### Roads

Roads are often conceptualized as organisms with their own digestion system: *Avtoceste pa tega velikokrat ne morejo več „prebaviti“* [Motorways can often no longer “digest” it all] (Zupančič 2014: 15), i.e., there might be so many vehicles on the motorway during rush hour that the traffic stops. The road also has its own driving force, which can collapse: the roads can experience a *prometni infarkt* [traffic coronary], i.e., the collapse of the traffic system.

The expression *cestni zamašek* [street cork] in Slovenian language also implies that traffic is like a flowing liquid

in a bottle, i.e., road; if there is some congestion, it is conceptualized as a cork which prevents the liquid, i.e., traffic from running fluently.

Roads present a battlefield: *komaj smo se prebili do Stožic* [We could barely get through to Stožice], where we have to fight for our existence, not to get pushed out of the road and to get to our destination. As a consequence of being on the battlefield of the road, we can also get trapped: *Ujeti smo bili v koloni* [We got caught in a line], thus having our mobility restricted. This metaphor is used when the traffic system collapses and long lines of cars come to a halt on the motorway (usually during summer months).

When conceptualizing a road as a battlefield, there are also *žrtve cest* [road victims], which are people who die in car accidents, in battles that happen on the road every day.

Accidents in Slovenian language are talked about in the passive form as if they happened by themselves:

*Nesreča se je zgodila* [an accident was happened];

*Ob 17.42 se je v Orli vasi, občina Braslovče, pripetila prometna nesreča, v kateri sta bili udeleženi dve osebni vozili.* [At 5.42 pm there was a car accident in Orla vas, in municipality of Braslovče, in which two vehicles were involved].<sup>1</sup>

*Ob 18.39 je na Polici v občini Naklo vozilo nasedlo na brežini.* [In Polica, in municipality of Naklo, a vehicle ran aground on the shore].<sup>2</sup>

The active form (*nesrečo je povzročil nekdo* [somebody caused the accident]) is used only when the report is about a specific person and his/her guilt is discussed. The lack of an actor, when talking about accidents, shows us the distance which we want to make between the actual act of a human being and the consequences. At the same time, we already see the implication to the driver-vehicle assemblage.

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1 <https://spin.sos112.si/SPIN2/Javno/Dogodki>

2 <https://spin.sos112.si/SPIN2/Javno/Dogodki>

### *The driver–vehicle assemblage*

As vehicles have become a common part of our lives, it seems natural that they have assumed an important role in our concepts and that different (conceptual) metaphors have been created. Concepts which explain how a subject (driver) and an object (vehicle) create a new social entity are also expressed through language, especially metaphors. When talking about cars and drivers as participants in traffic, the conceptual “driver-car” metaphor is created (Dant 2004), and this shows that a vehicle is not merely a mode of transport: it is understood and perceived as a belonging and even as a part of the individual’s “self.” Interviewees told us that their cars operate as their “shells” or “shields.” Drivers often use the expression that *nekdo se mi je priposal na rit* [somebody has stuck to my arse], with which they want to say that vehicle is driving too close to the back of their car. It is obvious that the phrase does not describe the actual human body part and that it is never used in its literal form; the perception of the human behind is in fact transferred to the car’s rear part. Similar is the case in the common phrase *nekdo se je zabil vame* [someone has bumped/crashed into me]. Of course, this does not describe actual collision with the human body but rather implies that someone has crashed into the car. The car might even be considered an extension of one’s body, which is why some people feel hurt when their car is scratched or bumped. We also often use and hear that *stojimo v kolonah* [we stand in queues] and that *naši izpusti toplogrednih plinov so zaskrbljujoči* [our greenhouse gases are alarming] – our bodies don’t produce greenhouse gasses, cars do.

This assemblage is obvious also in texts: */.../ ne glede na to, ali premagujemo kombinacije ovinkov ali v mestu poskakujemo od semaforja do semaforja [/.../ whether we are defeating combinations of turns or we are jumping from one traffic light to another]* (Kapetanovič 2016a: 54).

### *Vehicles and cars*

The car is the most common vehicle to appear in traffic discussions in Slovenian, as it is also the most common motorized vehicle found on the Slovenian roads. Cars have a great impact on our lives: from the financial aspect to the spent energy and the practical travel point of view. Cars are encountered at almost every step and they appear to be one of the most normal and common objects in our surroundings; thus examples of motorized vehicles found in this article are mostly cars, however, their meanings in conceptual metaphors can often be expanded to vans and trucks. The great impact cars have on our lives is reflected in the following statement: "*Even though life with this car can be a bit more complicated than it should be, it is also more exciting and unpredictable*" (Stamač 2014: 35). Cars are so intertwined with our everyday lives that they are given metaphorical names: *jekleni konjički* [little steel horses], *štirikolesnik* [four-wheeler] and *pločevina* [sheet metal], while a motorcycle can also be called a *dvokolesnik* [a two-wheeler]. Not all of these expressions are affectionate: while the first two expressions for the car and the expression for the motorcycle carry a positive or neutral connotation, the third expression for the car carries a negative connotation.

The car can be presented through different conceptual metaphors: it can be thought of as a home, a person, or an animal.

### *Car as a home*

When describing vehicles, writers, as well as interviewees, talk about a car as a space in which they spend a certain amount of time, similar to an apartment. Therefore, it needs to be comfortable, likable, have a pleasant design and colors, be practical, and come with all accessories:

*V kabini, ki lahko sprejme pet ali sedem potnikov, je prav tako nekaj barvnih kombinacij oblazinjenja, malenkost prijetnejša pa je tudi plastika na armaturni plošči* [There are a number of color combinations for the cabin, which can hold five or seven passengers, and the plastic used on the dashboard has also been slightly improved] (Stamač 2014b: 53);

*zato lahko zadaj dobro sedi tudi odrasel* [thus an adult can sit comfortably also in the back] (Marušič 2014: 57); *avtomobil, ki ponuja vrhunsko udobje* [this car offers the utmost comfort] (Fakin 2014a: 66);

*/.../ navdušila lepa rdeča barva v kombinaciji s črno streho /.../ zamenjale barvne kombinacije /.../ v izdatni meri vizualno individualizira* [/.../ a beautiful red color combined with a black roof will impress /.../ color combinations have changed /.../ abundantly visually individualizes /.../] (Auto Bild 116: 33);

*/.../ je več kot spodobno urejeno tudi bivalno okolje. /.../ Zato pa brez stika z modnimi smernicami* [/.../ the living environment is more than appropriately made /.../ But without the touch of fashion trends] (Gomolj 2016: 46, 47).

Writers emphasize different characteristics of the cabin, depending on the car: when writing about family-sized cars they will emphasize the spaciousness, colors, and accessories; when writing about a sports car, they will highlight the leather seats, discuss the shape of the steering wheel, etc. Some drivers arrange and “decorate” their car’s interior and thus make it more comfortable and better suited to their taste: a 27-year-old driver from Ljubljana, who claimed that her car was merely a “means of transport,” decorated it with a pendant, a small plastic dog, that hung from the rearview mirror, and a soft toy, also a dog, on the back shelf. This obviously reflects the broader meaning of the car in her personal life: not only is it decorated as a place in which she spends time, but it is also decorated in

a personal way that does not necessarily follow the current fashions.

Even the exterior of a car can be decorated, not only with stickers which reveal interests or even lifestyle of the owner (e.g., surfer-stickers or sticker for children being in the car, which have the names of the children written on them) but also with some decorating extras, like plastic eyelashes for the front lights. This kind of car accessories attribute human characteristics to the vehicle and transform it into a "living being."

### *Vehicle as a person*

When people talk about their cars, they commonly address them as "my car," where "my" does not merely reflect the material belonging, but also indicates pride and emotional attachment. The relationship with the car can also be noticed in the perceptions that emphasize the autonomy of vehicles, which is something the drivers also like to express. A 55-year-old male from rural environment responded to our question as to whether he feels safe on the road with the following words: "*I trust the car and the car trusts me.*" This statement clearly indicates that the vehicle is perceived as a "person" with whom he is in a relationship. Therefore, there are also to indicate the type of article, i.e., which car characteristics will be discussed in the article. The titles often present vehicles as humans with human characteristics, abilities, and achievements, for example:

*Ima diploma iz elegancije* [He has a degree in elegance];  
*Ko si Clio obuje škornje* [When Clio puts on its boots] (Avtofokus 5/2014);  
*Uptown girl* (Avtofokus 6/2014);  
*Arogantni nastopac* [Arrogant show-off];  
*Električni pametnjakovič* [Electric smart aleck];  
*Okroglolični atlet* [Round-cheeked athlete] (Avtofokus 8/9 2014), etc.

These titles suggest what kind of an impression one would make with a certain car. Expensive sports cars are usually show-offs, while family cars are characterized as *guardian angels* or *robust with a soft soul*. In these texts cars obtain the autonomy of individual objects with their own characteristics. In some texts cars even obtain a character:

*/... / še najraje peljali po avtocesti, a tudi na terenu se dobro znajde [...] / it is best suited for the motorway, but it also manages to find its way on rough terrain] (Auto Bild 98: 22);*

*Težava je v tem, da takrat postane požrešen [The problem is that in this situation [the car] becomes greedy] (Fakin 2014: 60).*

The car often appears as “a speaking person”: Citroën addresses different feelings and steel horses say a lot about their owner (Vrabec 2014: 18). M. Štakul (2014: 16) wrote a road report on two new cars in the form of a dialogue that took place between the journalist and the car, in which the cars “replied to” the questions:

“It’s pouring outside. Would you dare go on the wet road?” we asked [the cars].

*Opel replied: “I have a four-wheel drive, high-quality tires and ESP stability system.” Citroën added: “Even when the road is slippery, driving me is comfortable and safe due to my hydro active suspension – if necessary, the chassis can be lifted by 15 centimeters.”*

We often hear that “*the car tells everything about the owner*,” in the sense that “*by looking at the car one can immediately see what kind of person the owner is*.”

The car is often described as an organism with its own body:

*Rodil se je 4. julija 1957 /.../ [it was born on July 4<sup>th</sup>, 1957 /.../] (Avtofokus 3/2016: 60);*

*/.../ ne glede na hibridne komponente pod svojo kožo, pelje zelo dobro /.../ regardless of the hybrid components under his skin, he drives very well] (Avtofokus 3/2016: 55); Prvi z novim obrazom [The first with a new face] (Avtofokus 3/2016: 56);<sup>3</sup>*

*/.../ z višanjem vrtljajev pa začne še dodatno napenjati mišice – kot mlad žrebec, preden se požene v galop /.../ by increasing the speed he starts to further strain his muscles – like a young stallion before it gallops] (Avtofokus 166, marec 2016: 48);*

*/.../ a s turkizno obarvanimi seksi oblinami ravno prav predrzen /.../ it is just daring enough with its turquoise sexy luxuriant curves] (Stamač 2014c: 62);*

*Če se po žilah poleg športne pretaka tudi kaj gorenjske krvi, pa še toliko bolj! [Even better, if there is some Upper Corinthian as well as sports blood running through his veins!] (Avtofokus 166, marec 2016, 62);*

*Večno mlad [Forever young] (Avtofokus 166, marec 2016, 60);*

*Z zadnjo prenovo je tudi X1 prebolel otroške bolezni [With the last renovation, X1 also got over childhood illnesses] (Auto Bild 116: 40);*

And digestive system and “body dynamics”:

*/.../ in močno posegli v drobovje /.../ and ventured deeply into the intestines] (Marušič 2014: 55);*

*Mini se je zredil za deset do 15 kilogramov [The Mini has put on 10 to 15 kg] (Marušič 2014: 56).*

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<sup>3</sup> Nos [nose] is how the front part of the car is named.

Going from object to personalization is also seen when choosing names for different types of cars: instead of model 240 or S90, XC90, it often happens that a model is named with a personal name. The personification of a car can partly be started in the factory: the models get a human name, like *giulia* (Alfa), *romeo* (Alfa), *adam* (Opel), *zoë* (Renault). Naming the car is also common among owners, like *Polde*, *Mojči*, or *Simon*.

### *Vehicle as a pet or an animal*

Making your car look good and keeping it clean is linked to effort and attention, which could be described as "care." Taking "care of" cars places these objects into the role of living beings, comparable to pets: they have to be washed and "vetted" on a regular basis; we have to be careful that they do not experience any harm and it's best for the vehicle if it has its own "spot" in the garage. Interviewees often testified that they talk to cars, especially when there's something wrong with them, e.g., when they fail to start.

Animal metaphors applied to cars or their parts are based on a rough resemblance: thus the Smart is called *mestna bolha* [a city flea] (Auto Bild, No. 98: 40) because of its small size, while a sports car with a powerful engine *kradljivec pogledov in vročekrvna zverina hkrati* [a gaze stealer and a hot blooded beast at the same time] (Auto Bild, No. 98: 61). Horses are a common analogy to cars. Firstly, for the measure of the engine power: kW (100 kW = 137 horsepower), and secondly as a symbol of vitality and power:

/... / z višanjem vrtljajev pa začne dodatno napenjati mišice – kot mlad žrebec, preden se požene v galop [...] / by increasing the speed it starts to additionally strain the muscles – like a young stud before it starts to gallop] (Avtofokus 166: 48).

The rear of a car is described as its *zadek* [derrière], which is the word used for the rear ends of insects:

*/... / majhni in veliki, 4-vatni avti z značilnim zadkom, tj. prtljažnik s pokrovom [/... / big and small, 4-watt cars with a typical derrière, i.e., a trunk with a lid] (Terzić 2014: 20);*  
*/... / prisekan zadek bolj priročen [/... / the truncated derrière is more convenient] (Stamač 2014a: 38).*

Insects and their derrière is implied also in the title *Piči kot škorpijon* [It stings like a scorpion] (Avtofokus 166: 46); the scorpion was also a symbol of a sports style and poisonous character in 20th century – nowadays this symbol is blurred.

### *Car make as a family*

As a part of personifications in traffic, a wider concept of generations and families among vehicles can be detected. This is constructed as a hierarchy: "car make as a family," with different "generations of cars":

*Heroj reljev v novi generaciji bo navdušil predvsem dinamične voznike* [The new generation of the rally hero will mainly enthuse dynamic drivers] (Auto Bild 98: 21).

Older generations are referred to as "grandfathers":

*Vojaški willys, dedek tokratnega testnega avtomobila ...* [The army SUV Willy, the grandfather of this test car...] (Stamač 2014: 32);

Younger generations are "brothers and sisters":

*Veliki brat tudi ob vklopljeni varnostni elektroniki dopušča nekaj tovrstne svobode* [The big brother allows some freedom even when the safety electronics are turned on] (Jamnik 2014: 36).

Smaller cars are considered to be the “toddlers” of the family:

*Čudežni malček* [Prodigy toddler] (Avtofokus 166: 59);  
*Novi mestni malček končno tukaj* [The new city toddler has finally arrived] (Auto Bild, No. 98: 40);

*Renaultov malček je v tretji generaciji zopet posebnež* [The Renault toddler is again a special character in its third generation] (Avtofokus 176: 49);

*Novi Toyotin malček ohranja kompaktne zunanje mere* [The new Toyota toddler has preserved its compact outer dimensions] (Avtofokus 176: 50);

*Ta malček vas lahko z lahkoto naheca* [This toddler can easily change your mind] (Kapetanovič 2016: 48).

The car make is presented as a person, clearly intending connecting it with success:

*Z novim NX želi Lexus veliki povratek na evropski trg* [With the new NX, Lexus wants to mark its comeback to the European market] (Auto Bild: 22);

*Nova generacija Mustanga je drugačna* [The new generation of Mustang is different] (Bovingdon 2016: 87);

*/.../Golfa skoraj spremenila v ostarelega in zamegljenega tekmeca* [/.../Golf was almost changed into an old and blurred competitor] (Simister 2016: 102).

## CONCLUSION

This chapter has presented how we can research the perception of traffic and vehicles through language and metaphors in everyday life and media. Additionally, our daily conversations are connected to these themes – similarly to the weather – and newspapers and other media regularly follow themes pertaining to traffic. Conceptual metaphors used in traffic themes and the way we talk about vehicles and traffic can reveal much more than what is obvious at first sight. If we combine these results from language analysis with analysis of behavior patterns, we can access

deeper levels of human relationships. We can claim that language serves as the material of culture and at the same time appears as the meta-language of culture with constant verbal forms of meanings, motives, grading, and cognitive models of conceptualizing the world.

We have identified phrases and proverbs connected with the language of traffic which show that the language from the motorized world is common in these word constructions. The road is constantly present in our lives; thus it appears very often. It has two meanings: the first is linked to the connecting function of the road, while the second is linked to poverty and homelessness – anybody living on the road is considered to be financially destitute and homeless. Vehicles and vehicle parts have different denominations, and metaphors shape different concepts. Given the ubiquity of traffic and vehicles, it comes as no surprise that commonly used metaphors for vehicles include personification of an independent object or that the vehicle is even seen as a constituent part of the driver. The metaphorical language also presents the vehicle as a pet that needs to be looked after, petted, and given a personal name. When the car's interior is discussed, it is compared to living spaces such as apartments. In our research we experienced several limitations that could be avoided in further investigations on this topic. As language is a living entity within society, it is more important to listen to the expressions that are used in conversations rather than to analyze written texts. Relaxed conversations provide a different picture of how a car is perceived to the articles found in written media: a common feature of the interviews that we carried out was that a vehicle is seen as a valuable object, not only from a financial point of view, but also as a precious object, assistant, and friend.

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# TRAFFIC AND QUALITY OF LIFE

## Between Necessity, Wishes, and Possibilities

**Marko Polič**

*Harmful environmental impacts are not a necessary consequence of technological development, but more probably caused by the use of technologies that are immature, lavish, and inefficient. It is not necessary that they remain such. The image offered by the sustainable development is not a kind of Rousseau's return to nature, it is not primitivization of societal and economic structures and is not utopia frozen in time, but a new possibility of research and activity in all scientific fields and a search for better and better possible versions of our world, especially such that can be accomplished. Traffic represents one of the most characteristic parts of the current catastrophic image. Because it is an important part of everyday life – eventually traffic in its various forms has contributed to the development of civilization and is a crucial part of this development – it is so much harder to change, or even give up its particular forms.*

*Keywords:* *image, reinforcement, sustainability, symbolism, traffic, values*

## INTRODUCTION

Many risks endangering people in the world today are directly or indirectly caused by people themselves and their activities. These are not only technological accidents, where the names Three Mile Island, Bhopal, Seveso, Chernobyl, or Fukushima are widely known, even though their consequences are not completely known yet but also many other phenomena, showing that the Earth might soon become an unpleasant place for life. Kenneth Boulding in his book *The Image* (1956) believes that human activity is based more on the image of the outer world than on its objective reality. If this is so, it is important to consider what this image looks like, and how much people are aware of risks and threats. He is also warning that while our experiences are about the past, all decisions are about the future. That is why images of the future are crucial for making behavioral choices, while images' character and quality in society are the most important guide of its general dynamics. Harmful environmental influences are not inevitable consequences of technological development but are more probably caused by the use of technologies that are immature, lavish and inefficient. It is not necessary that they remain such.

Traditional images are becoming less plausible and stimulating; therefore, new ones are necessary. Robert L. Olson (1995) believes that images, being influencing enough to stimulate comprehensive behavioral changes, should be: *possible* (and although accessible with difficulty, not improbable fantasies), *highly positive* (attractive and motivating), *open* (showing a new direction and inviting to elaboration), *responsive* (dealing with societal challenges and correcting the most outdated prevailing images of the future), and *integrating* (helping in reviving the sense of



Figure 1: Pollution connected with car use (source: AA1Car).<sup>1</sup>

meaning and purpose in society). Such a promising image is a concept of a sustainable society.

The image offered by the sustainable development is not a kind of Rousseau's return to nature, it is not primitivization of societal and economic structures and is not utopia frozen in time, but a new possibility of research and activity in all fields and a search for better and better possible images of our world, especially such that can be accomplished. But contemporary societies are not like that.

A number of possible scenarios of environmentally sustainable traffic have been developed (Gifford and Steg 2007): a *high-technology scenario* (only technological changes), a *mobility changes scenario* (only behavior changes reducing car dependency), and a *combination scenario* (technological and behavioral changes). The authors

<sup>1</sup> AA1Car web page: [http://www.aa1car.com/library/automotive\\_environmental\\_issues.htm](http://www.aa1car.com/library/automotive_environmental_issues.htm)

believe that the social consequences of environmentally sustainable transport scenarios appear to be less drastic than assumed. It should only be considered that any sustainable traffic scenario should be a part of a wider image of the societal system changes. Different systems are too closely connected to be dealt with in isolation.

The majority of people are more or less aware of environmental problems, many are experiencing the problems in full degree, but are unaware how to solve them, because environmentally friendly thought critically differs from the prevailing way of thinking about the contemporary industrial society (Milbrath 1995). This thinking is linear and causal while solving environmental problems demands systemic thinking directed toward wholeness, focused on the relationships within it and not being lost in partial solutions. Thinking about environmental problems as global could perhaps offer the impression that problems are not here but somewhere else and somebody else's problem. However, Slovenia's contribution toward worsening life conditions is also great. The rivers are polluted, the earth is poisoned with insecticides and pesticides, vehicles are passing across the country, and it is yet to be seen if the situation is improving. The only way to repair the consequences of emerging catastrophes is, therefore, their prevention.

Traffic represents a characteristic part of this catastrophic image. Because it represents an important part of everyday life – after all, traffic in its various forms contributed significantly to the development of civilization and is a crucial part of its development – it is even harder to change it, or even give up its particular forms. Roads are more and more eroding the landscape and traffic is one of the greatest consumers of energy (28% in 2004). That is why it is one of the greatest direct polluters – according to Joseph Reser (1980) in the U.S. cars are causing 60% of air pollution – while damage is caused indirectly by the increasing production of cars, not to mention the senselessness of devoting large land areas to the production of biofuel in time when humanity

is still facing hunger, perhaps more now than ever before. Traffic, once the driving force of development, is becoming more and more – especially in its current form – its obstacle. Large changes are therefore necessary on the systemic level, because the greater the polluter, the more changes to it could contribute to sustainable development. One part of these measures lies without a doubt in the domain of technical and technological changes (e.g., the use of cleaner energy sources, more fuel efficient vehicles), while the other lies in the changing patterns of habits and customs (e.g., transition from private cars to public transport, more economical use of cars, use of other means of transport, etc.). Undoubtedly, for nature and the benefit of people, it would be more sensible to transition from private transport to the greater use of public one. But in such a way, a crucial advantage of private car use – control over one's travel – is lost. The basic question of freedom and control over the travel offered by a private car in comparison to public transport has been an issue from the very beginning, as a lack of control over and determination of the public transport is not appealing. But at the same time, the more cars there are in the world, less joy there is in driving. Car development brings in itself the seed of its own negation. Crowded roads, traffic jams, oil shocks, pollution, etc. bear evidence of this. Car owners are using their vehicles less because of their enjoyment, but more and more out of necessity (Wolfgang Sachs 1983). While in 1960, 63% of car owners reported that they enjoyed driving very much, in 1981 only 41% said that they appreciate it a lot. Regarding the necessity of driving in 1960, only 21% of owners reported that they are driving because they must, while in 1981 this percent increased to 36%. The decisive transition happened in 1972 and 1973, i.e. during the first oil shock. From that time, the situation is rather controversial, but unfortunately, more recent data could not be found. Anyway, Jorrit Nijhuis (2013) is right in believing that consumers play a crucial role in the transition to sustainable mobility.

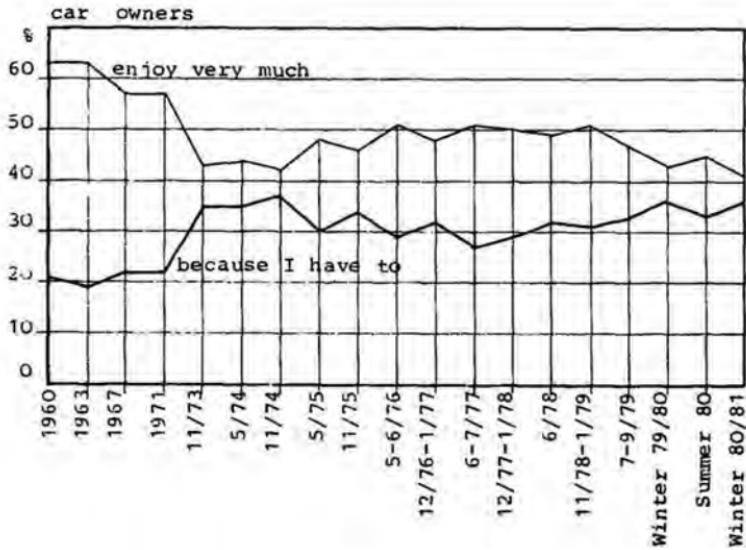


Figure 2: Attitudes of car owners to driving (source: Sachs 1983).

In short, the greater the number of cars, the less someone can enjoy driving his car. In addition, driving a car increases air pollution. Even though car engines are improving and pollute less, their number is growing. Also, other resources used by the car industry should not be neglected.

As Bert Van Wee (2007) believes, transport volumes and travel patterns result from (1) the wants, needs, preferences and choice options of people and companies; (2) the locations of activities such as living, working, and shopping and (3) transport resistance, expressed in time, cost, and other factors like risks, reliability of the transport system, and effort. They are also influenced by socio-economic factors.

The paradigm of *behavioral traps* represents a useful model for understanding and solving transport behavior. The

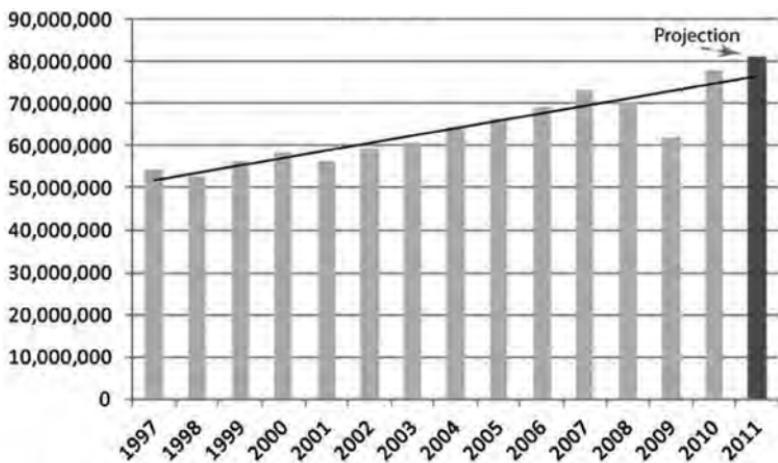


Figure 3: Global automobile production between 1997 and 2011 (source: *The Truth about Cars*).<sup>2</sup>

concept of behavioral trap or dilemma is about situations in which individuals or groups start a promising activity, which later becomes undesirable but it is not easy to cease. These traps could be social as well as individual. John Platt (1973) believes that the social trap appears in the conditions of conflict between highly motivated short-term reward or punishment and long-term consequences. It appears when following individual benefit leads to harmful consequences for all. An individual does something to acquire immediate and short-term benefit, but the activities of all individuals in such situations lead to long-term negative result.

An obstacle for environmentally friendly behavior is given by the fact that such motives must compete with much

<sup>2</sup> The Truth about Cars web page: <http://images.thetruthaboutcars.com/2011/10/Production2011.jpg>

stronger needs and wishes. Are people willing to decrease their use of private cars? "Your money and your convenience," write Philip Zimbardo and Michael Leippe (1991) "are often tangible, salient, and immediate outcomes compared with your small, delayed contribution to preventing or cleaning up a large-scale environmental problem you can't even see." Because people rarely see the consequences of their environmentally destructive behavior or realize that some of their current behaviors have destructive delayed effects, some factors which would connect environmental attitudes and behavior more strongly are missing, especially knowledge, clarity and direct experience.

## ATTITUDES TOWARD THE CAR

Why are people so attracted to cars? Studies (e.g., Steg 2005) show that it is not only because of a *satisfying* instrumental function (enables activities), but that it also has a *symbolic* (e.g., self-expression, symbol of attractive way of life, freedom, power, status, elegance, taste, etc.) and an *emotional* (e.g., excitement, control) function. The use of a private car is not only a matter of rational calculations of costs and benefits but is also connected with status, perception of self, gender, etc. Frequently it is even possible to trace *car dependency*, which is similar to drug dependency. Drivers are reporting a subjective experience of satisfaction, perhaps dependent on emotional excitement while accelerating or turning a car. The physiological basis for this is the excretion of some stress hormones (e.g., adrenaline, noradrenaline). The relationship with the car starts as a connection and as a dependency (contrary to relationship child-parent). The car is undoubtedly a bearer of culturally forming meanings exceeding its benefit. It is offering an image of

## Average Annual Cost of Owning a Car: \$10,452

*Based on 18,000km of driving per year*

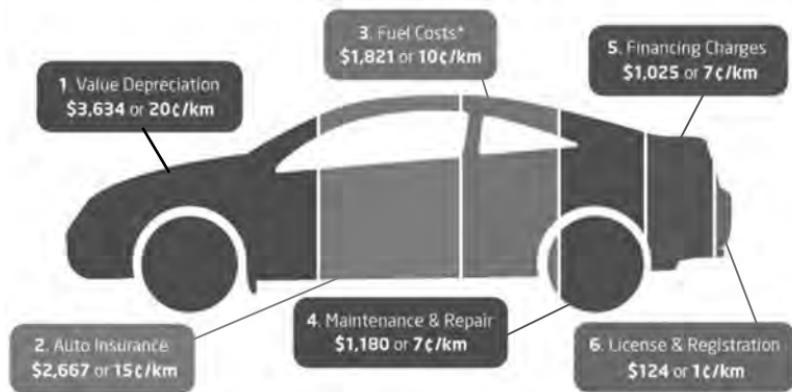


Figure 4: "Invisible" costs of owning a car (source: Price Tags).<sup>3</sup>

speed, excitement, and vitality. Because of the diversity of these messages, the car is attracting attention and is psychologically a very expressive object. At the same time, the costs of car use are delayed, while the costs of other forms of transport are immediate. The ticket should be paid immediately, while the cost of fuel, insurance, and maintenance are paid occasionally, unconnected with the actual driving. All this is also expressed in findings that drivers (Goodwin 1997):

- are systematically wrongly perceiving and not understanding the real costs of car use;

<sup>3</sup> Price Tags web page: <https://pricetags.wordpress.com/2013/01/23/2012-car-ownership-busts-the-10000-bar/>.

- are mentally decreasing the fixed costs of a drive, when they are deciding about using the car for a trip, as if these are different categories of costs;
- know little about the existence and characteristics of alternative ways of transport, and even if they know them, they perceive them as more expensive, slower, and generally less attractive;
- have distorted perception causing disregard for alternatives.

Car use can become such an important part of daily habits that even trips which could easily be accomplished by other transport means or on foot are automatically made by car, disregarding other options. Owning a car changes the behavior pattern. The wrong perception of other means of transport appeared in some drivers as an attempt to justify decisions for the car use.

Nevertheless, there are differences in car use between people. A car actually offers a greater possibility of control and independence, but some people are opposing excessive car use because they do not want to become too dependent on it; they are car-independent. From 20 to 80% of people are reporting a great degree of relying on their car, especially when other alternatives are worse or the pressures stronger. Otherwise, the share is smaller. There are also journeys possible only by cars. It is therefore necessary to distinguish *car-dependent people* from *car-dependent journeys*. Car ownership and mileage are greater with poorer people from rural areas than urban ones (because of location limitation, the use of cars is a necessity). With richer people there were no differences, they use cars regardless of their location. In principle, people purchase a car not when this is necessary, but when they could afford it.



Figure 5: SARTRE 4 project car drivers' average willingness to accept changes in travel behavior because of environmental considerations, based on 11,867 car drivers (1 = not at all, 4 = very). Bars denote 95% confidence intervals for the mean (source: Dogan et al. 2012).

## MANAGING TRAVELING NEEDS

The project Social Attitudes to Road Traffic Risk in Europe (SARTRE 4) discussed different ways of car use in the context of sustainable transport, and some results are presented here (Figure 5).

Data clearly show that car drivers are not very willing to accept more environmentally friendly solutions. The prevailing answers were more or less neutral. They are not rejecting the change, but are not accepting it either.

Transport costs are increasing on individual as well as on the national level. Only in the U.S., transport costs in 1981 amounted to one fifth of BDP and 52 percent of all oil, of which personal cars took up 43% of the total. The use of personal cars is becoming one of the greatest consumers of "the black gold", i.e. oil, and increasing pollution. The situation is worsening because of increasing traffic jams,

TDM Measure	EXAMPLES
Physical change measures	<ul style="list-style-type: none"> <li>- improving public transport</li> <li>- improving infrastructure for walking and cycling</li> <li>- park and ride schemes</li> <li>- land use planning to encourage shorter travel times</li> <li>- technical changes to make cars more energy-efficient</li> </ul>
Legal policies	<ul style="list-style-type: none"> <li>- prohibiting car traffic in city centers</li> <li>- parking control</li> <li>- decreasing speed limits</li> </ul>
Economic policies	<ul style="list-style-type: none"> <li>- taxation of cars and fuel</li> <li>- road and congestion pricing</li> <li>- kilometer charging</li> <li>- decreasing costs of public transport</li> <li>- individualized marketing</li> </ul>
Information and education measures	<ul style="list-style-type: none"> <li>- public information campaigns</li> <li>- giving feedback about consequences of behavior</li> <li>- social modelling</li> </ul>

Table 1: Travel Demand Management Measures (source: Steg, cited in Gärling and Schuitema 2007).

land use for highways, etc. That is why intentions to transfer passengers from private cars to public transport appeared. Behavioral studies with behavior modeling offered only temporary solutions at best, or shifted former pedestrians to public transport. Linda Steg (in Gärling and Schuitema 2007) presents a number of possible measures for managing traveling needs (Table 1). Physical changes should increase relative attraction of alternative ways of transport, legal policies should encourage their use, economic measures should raise the price of private car use, and education and informing should change perception, attitudes, beliefs,

Consequences of Behavior			
		Pleasant	Unpleasant
Behavior	Car-Driving	short travel time, high prestige, choice of route, choice of departure/arrival time, deferred costs, privacy, large cargo capacity	traffic congestion, high gas and maintenance costs
	Not-Car-Driving	freedom from driving responsibilities, healthful exercise from walking and biking	long travel time, low prestige, minimal choice of travel route, inflexible travel schedule, immediate costs, crowding, inconvenient cargo transport, dangerous (walking, biking)

Table 2: Consequences of car driving/not driving (source: Reichel and Geller 1981).

values, and personal norms regarding car use. Studies have shown that coercive measures are more efficient than non-coercive, but it is harder to enforce coercive ones.

The saving measures based on the reinforcement of desired behavior were directed mainly toward changing the drivers' habits, stimulating shared drives (e.g., when neighbors drive in the same car to work), and use of public transport. It appeared that feedback information did not influence attitudes toward the use of private cars, although in many other cases (e.g., the consumption of

INDIVIDUAL	SOCIAL
Lack of knowledge	Lack of political action
Uncertainty and skepticism	Lack of action by business and industry
Distrust in information sources	Worry about free rider effect (because others are not acting)
Externalizing responsibility and blame	Social norms and expectations
Pollution is a distant threat	Lack of enabling initiatives (the facilities are costly, inconvenient, sparse, not viable; existing infrastructure and economy are determining behavioral patterns)
Other things are more important	
Reluctance to change lifestyles	
Fatalism	
'Drop in the ocean' feeling (helplessness due to the scale of the problem)	

Table 3: Perceived barriers to engagement in behavioral change (source: Lorenzoni et al. 2007).

electric energy) it was efficient. Evidently driving habits are too strong and feedback information less adequate. Also some rewarding measures, e.g., priority lanes for shared driving, parking possibilities, etc. were only partially efficient. Rewarding passengers for the public transport use did increase the number of passengers, but mainly because former pedestrians changed to bus use.



*Figure 6: An example of token used for rewarding public transport users (e.g., discount in local shop, free ice-cream, entrance ticket for ZOO, etc.). The effect was ambiguous (source: Everett 1981).*

A lot could be added to the list in Table 2, although it shows many perceived priorities of private transport. As long as these will prevail, as long as congestions will not prevent normal driving and people can afford their own car, as long as they will not change their value system, they would prefer using private cars. Reinforcement models of behavior change are too static in time and space. Often the planners give priority to punishment because it is easier to administer it. But punishments have unwanted consequences because they stimulate mainly avoiding behavior, cause resistance, etc. Any measure should diminish the pleasant and increase unpleasant consequences of private car use, and the other way around for public transport.

It has been evident till now that there are a lot of obstacles to fostering environmentally friendly transport behavior. In their paper, Irene Lorenzoni, Sophie Nicholson-Cole, and Lorraine Whitmarsh (2007) summarize some individual and social obstacles to engagement regarding the climate change, but they are equally suitable regarding transport changes (Table 3).

Nevertheless, to act, to change their environmentally damaging behavior, people have to perceive the change (e.g., air pollution, global warming), recognize it, and be concerned – then and only then will they change their behavior, of course if they know how to and can do so.

## CONCLUSION

What can we do? Old habits cannot be changed overnight, while drastic measures are not popular. However, some of them should be implemented, at least those which would increase the price of irrational personal use of the cars. It is necessary to construct infrastructure for public transport (e.g., railways, cycling lanes, etc.) and give it priority everywhere. Unfortunately, not all of these measures are popular, and resistance, mainly in developed countries, is seen in every direction. One of the most developed countries, the U.S.A., did not sign the Kyoto treaty. Although it is already late, only the long-term measures are appropriate. The main solution to the global environmental crisis lies above all in nurturing pro-environmental attitudes and beliefs throughout the cultures (Zimbardo and Leippe 1991). Early ecological educational programs can be effective, of course not only a few lectures, but direct experience of nature with a teacher's guidance, showing children the beauty of nature as well as the threatening consequences of certain human activities. Mass media should focus on the maintain environmental problems and not keep them hidden. People should learn *concrete* ways of solving environmental problems. What is necessary is not a paranoid catastrophic vision of the current situation but a consciousness about the real circumstances of our world and the necessary activity to change them.

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# GREENING SOCIETY

## Social Science Approaches for Encouraging Pro-Environmental Behaviors and Lifestyles

**Simona Bezjak**

*The chapter maps recent developments in social science approaches for encouraging pro-environmental behaviors and lifestyles. By reviewing four different approaches from across the social sciences (psychological individual behavior change, social practice theory, economic policy incentives, and environmental citizenship approach), the chapter seeks to explain what encourages people to change their behaviors and adopt more environmentally friendly practices and lifestyles. We argue that interlinks between various approaches, including those beyond the social sciences, may be useful to underpin sustainable lifestyle changes. Since people could develop comprehensive green lifestyles only when the wider context of their everyday life is green too, the chapter concludes with the suggestion that green mobile applications may be an important tool for supporting green lifestyles and possibly long-lasting changes in the current unsustainable ways of living on this planet.*

*Keywords:* environmental behavior, green lifestyle, mobile apps, environmental sustainability

## INTRODUCTION

When we speak of global environmental crisis today, we usually agree that our current way of living on this planet is unsustainable and something needs to be done to change our existing attitudes and behaviors towards nature. The contemporary environmental literature is increasingly recognizing that environmental problems are primarily social issues, which have their origins also in human actions. Consequently, the idea that any solution to the environmental crisis will require changes in human behaviors and lifestyles has come to dominate the environmental social science literature (Abrahamse and de Groot 2013; Dobson 2007; Jagers et al. 2014; Schultz 2015; Steg and Vlek 2009).

This chapter broaches an important question that arises when we talk about adopting more environmentally friendly behaviors: what encourages people to change their habits and adopt more ecologically responsible and sustainable lifestyles? Over the past two decades, scholars and practitioners across the social sciences and beyond have developed a wide range of theoretical and practical approaches designed to bring about changes in behaviors and lifestyles that contribute to environmental pollution (Capstick et al. 2014). It is now generally understood among most of these approaches that behavior and lifestyle changes need to become a more central aspect of the move towards a low carbon society. But in practice, with the exception of a small number of iconic behaviors such as recycling, it has proved extremely difficult to bring about meaningful changes in personal greenhouse gas emissions at the individual or societal level (Capstick et al. 2014). Environmental awareness and concerns have increased over the last years. But, when people were asked what actions they would be willing to undertake to address climate change, recycling and energy conservation in the home are the most frequently mentioned, while there is considerable resistance to changing travel habits (Whitmarsh et al. 2011).

The chapter seeks to address four different approaches from across the social sciences for understanding and encouraging environmentally significant behaviors, practices, and lifestyles at the individual and societal level. In order to map this vast field, we review the psychological aspects of individual behavior change, sociological social practice theories, economic policy instruments, and the political-theoretical notion of environmental citizenship. While each of these approaches differs significantly, they share the common premise that positive environmental changes (such as emissions reduction) can be brought about through individual or collective behavior/lifestyle changes in daily routines and practices. Finally, the last part of the chapter offers some tentative conclusions about how and why new technologies and, in particular, green mobile applications could support the transition to a low-carbon society.

## ENVIRONMENTAL BEHAVIOR AND HOW TO CHANGE IT

Since the early days of the environmental movement in the late 1960s, the negative consequences of human behavior on the environment emerged as a central issue in environmental research. The message of the iconic book entitled *The Limits to Growth* (Meadows et al. 1972), which sold millions of copies around the world in the 1970s, was that if the actual trends of pollution, population growth, industry growth, food production, and resource exhaustion continued to be unchanged, the environmental collapse in the next hundred years would be inevitable. The idea seemed to be that once people knew how bad everything was, they would change their attitudes and behavior accordingly (Dobson 2007). But, it is clear today that this approach has not worked, and we continue to be assailed by environmental problems (Dobson 2007). However, this book has opened a whole new chapter in the environmental thought and contributed to increasing awareness of environmental issues. On the other hand,

current global trends indicate that our impact on the environment is still considerable. Moreover, carbon dioxide emissions that result from the combustion of fossil fuels and are considered to be the main cause of global warming have steadily increased over the past decade (Abrahamse and de Groot 2013).

During the past four decades, social scientists, particularly environmental psychologists and sociologists, have progressively examined different ways to encourage people to adopt pro-environmental behaviors. Pro-environmental behavior is usually understood as any individual or collective behavior that harms the environment as little as possible or even benefits the environment (Steg and Vlek 2009: 309). It is, therefore, a deliberative practice (for example, switching off lights, recycling, and using sustainable modes of travel) that seeks to minimize the negative impact on the environment (Kollmuss and Agyeman 2002; Reid et al. 2009). While pro-environmental behavior may take various forms and different intensity levels, many social scientists agree that it is more likely to emerge when people have positive attitude towards such behavior, when they have the knowledge about how to act to lower their environmental impact, when they believe that others already do it, and when they feel that their contribution could make a difference (Gatersleben et al. 2014; Kollmuss and Agyeman 2002).

Especially psychological research in this field is dominated by an assumption that changes in individuals' attitudes, beliefs, and values will result in behavior changes (Abrahamse and de Groot 2013; Hargreaves 2011). This assumption is also the main idea behind various environmental information and communication campaigns that are aimed at increasing people's knowledge and awareness of environmental issues (Abrahamse and de Groot 2013; Kollmuss and Agyeman 2002). Similarly, many various environmental policies, measures, and initiatives that can be found in contemporary societies, such as labelling products on the basis of their environmental impact or

including environmental education in school curricula, are based on the same assumption that increased knowledge or awareness will impact people's decisions and encourage or convince them, rationally, to adopt pro-environmental behaviors. This rationalist approach, which assumes that informing and educating people about environmental issues or risks would linearly or automatically result in more pro-environmental behavior, is something to which many studies are strongly opposed (Kollmuss and Agyeman 2002). Namely, in contrast to attitudes, which are relatively easy to change and can alter with new information or circumstances (Gatersleben et al. 2014), changing behavior is very challenging, and the information is simply not enough to spur the change itself even if the new behavior has distinct advantages over the old one (Kollmuss and Agyeman 2002).

Despite the fact that today the level of people's awareness of environmental issues is relatively high, there is still a discrepancy between people's attitudes and their behaviors. Results based on the data from the Eurobarometer (2008) survey show that almost all Europeans (96%) consider the protection of the environment to be highly relevant. Although Europeans strongly believe that they can help to protect the environment, their concerns and attitudes do not always transform into practice or actual engagement. As Eurobarometer (2008: 21) survey shows, Europeans are highly worried about global environmental problems such as climate change and pollutions, but only mildly concerned about issues that are directly linked to their own behavior such as their consumption habits or the impact of current transport modes, particularly the use of private cars. To put it in detail, while 75% of respondents say they are ready to buy environmentally friendly products even if they are more expensive, only 17% have done so in the month before the survey. Moreover, only 28% of respondents have chosen an environmentally friendly way of traveling (by foot, bicycle, or public transport) during the past month.

for an environmental reason. Here, it is very interesting that more Europeans (38%) expect their fellow citizens to use public transport more than they do themselves (28%) (Eurobarometer 2008: 24).

## PRO-ENVIRONMENTAL BEHAVIOR AS SOCIAL PRACTICE

The question on how to fill such gaps between public awareness or expressed levels of environmental concerns on the one hand, and the limited behavioral response on the other, is gaining more and more attention in social sciences. For some sociologists, the problem relates to the complexity of human behavior, which cannot be understood in isolation from social, economic, and cultural factors. Most of the early work in environmental sociology focused on the social and political dynamics of the environmental movements, discovering how people organized themselves, and how they responded to environmental problems or risks. More recently, environmental sociology expanded its field of study to include, among others, aspects of human behavior in everyday situations and dimensions of environmental protection, which are essential to the quality of life, health, well-being, and enjoyment of fundamental human rights (Hannigan 2006; Reid et al. 2009; Spaargaren 2003; Tindall 1995).

In contrast to environmental psychology with its emphasis on individual behavior change, environmental sociology looks at people in their social context, arguing that their attitudes and behaviors are shaped by a number of different factors, including social norms, cultural traditions, family customs, institutional support, and socioeconomic status (Hannigan 2006; Reid et al. 2009; Tindall 1995). In particular, the sociologically grounded critiques argue that the psychologically oriented approach, which seeks to provide additional information among the population or educate them to hold more (eco) rational attitudes, beliefs and values, is excessively individualistic and fails to appreciate the ways in which, variously, social relations,

material infrastructures, and context are intrinsic to the performance of social practices (Hargreaves 2011). These critiques call for a more sophisticated understanding of pro-environmental behavior by studying individuals' lifestyles and everyday practices as they are performed in specific social settings (Hargreaves 2011).

The social practice theory is widely used to examine the constitution and dynamics of routines in everyday lives and their implications for the environment and sustainability (Capstick et al. 2014). In social practice theory, the practice is a way of doing everyday things (such as cooking, bathing, or commuting) by individuals within communities (Capstick et al. 2014). The practice itself, rather than the individuals who perform them or the social structures that surround them, is the core unit of analysis (Hargreaves 2011). In particular, pro-environmental actions are not seen as the result of individuals' attitudes, values, and beliefs constrained by various contextual 'barriers,' but as embedded within and occurring as part of social practices (Hargreaves 2011). In turn, through these engagements with practices, people understand the world around them and develop a more or less coherent sense of self (Hargreaves 2011). Social practice approach is, therefore, different from the social-psychological attitude-behavior theories in two crucial respects. First, at the center of this approach is not the individual attitude or norm but rather the actual behavioral practices (situated in time and space), which an individual shares with other people (Spaargaren 2003). Second, the analysis does not focus on a single pro-environmental behavior but rather looks into the possibilities for designated groups of actors to reduce the overall environmental impacts of their normal daily routines involving clothing, food, shelter, travel, sport, and leisure (Spaargaren 2003:688).

Therefore, from the sociological point of view, pro-environmental behavior is more likely to occur in social settings where, for example, the dominant culture propagates a sustainable lifestyle and the necessary

infrastructure (e.g., cycle paths, public transport, separate trash containers) is available (Kollmuss and Agyeman 2002). However, this does not mean that pro-environmental behavior in one domain will automatically lead to pro-environmental behavior in another. Likewise, in societies where cycling infrastructure is well developed and social norms encourage people to cycle and walk more, people do not necessarily develop a sustainable lifestyle. For instance, people who have a positive attitude towards recycling are more likely to recycle, but this does not mean they also cycle to work or use ecological washing powder (Gatersleben et al. 2014). In social practice theory, lifestyle is defined as a set of social practices. When interpreted in this way, the concept of a green or sustainable lifestyle differs from the concept of pro-environmental behavior since it cannot be measured using only one dimension or scale. Green lifestyles are composed of lifestyle segments or elements that make variable contributions to the net environmental impact of the lifestyle of an individual (Spaargaren 2003). In lifestyles, therefore, people attempt to connect an array of social practices into a reasonably coherent whole – a holistic lifestyle narrative (Lorenzen 2012: 99). That is to say, to change a lifestyle, people not only have to change their practices but also the story they tell about these practices. A green lifestyle is not only a pattern of living that involves deliberation over the uncertain environmental impacts of everyday practices, but also a guiding narrative that makes that process personally meaningful (Lorenzen 2012: 95). Although the overall process of lifestyle change is far from fast and simple, it is one of the most successful ways to make environmentally significant behaviors sustainable in the long term.

## ENVIRONMENTAL POLICY AND ECONOMIC INSTRUMENTS FOR BEHAVIOR CHANGE

The idea that, through prolonged repetition, any pro-environmental behavior may become sustained and habitual is often the basis for various policy initiatives. Today, fiscal or economic incentives are the most common policy instruments used to influence people's environmental attitudes and behavior (Dobson 2007). These incentives take many forms, from financial advantages to penalties, including so-called green taxes, which are some sort of a combination of direct pollution taxes and less direct taxes that aim to provide incentives for environmental protection (Dobson 2007; Driesen 2006). For example, Singapore charges high taxes on automobiles, fees for entry into the city, and charges for driving during rush hour to discourage both congestion and the associated air pollution from cars (Driesen 2006: 284). As explained by David Driesen (2006), none of these taxes constitutes a pollution tax, because they do not vary directly with the amount of pollution. But, all of them encourage pollution reductions because they discourage driving, which produces emissions. Almost all OECD countries levy some tax on the purchase or use of vehicles (for example, many European countries prefer rather high gasoline taxes, which may induce motorists to forego trips or use mass transit), although none is as environmentally effective as Singapore's (Driesen 2006).

A similar attempt to dissuading people from driving their cars into old city center comes from the British city of Durham where city planners decided to adopt a road-pricing scheme (Dobson 2007). Where once it was free to drive a car, it now costs a relatively modest amount to drive to the center. As reported by Andrew Dobson (2007), the planners had no real idea whether this would work, but they hoped that traffic would be cut by 50% within a year. In fact, it was cut by 90% in just a few months and it seems to suggest that the fiscal route to changing people's environmental behavior actually works (Dobson 2007). But the question

here is, as asked by Dobson, what would happen if city authorities abandoned the road-pricing scheme? Would people keep out of the city center or would they go back to their original and unsustainable behavior? (Dobson 2007: 278).

Yet another instructive example of using economic instruments, in this case a regulatory measure, to reduce traffic congestion and vehicular emissions comes from Mexico City. Govinda Timilisina and Hari Dusal report that in 1989, the authorities introduced a policy of 'No Driving Day', which mandates not driving one day during the week (except the weekends when odd and even license plate numbers were used) and two days during severe pollution episodes. While removing 20% of the vehicles from the streets in its first few months of operation contributed to the improvement of air quality, this successful policy effect was only temporary (Timilisina and Dusal 2009). One reason for this was that the city lacked sufficient public transport systems to meet the increased travel demand. The other reason was that the driving public found ways to subvert this regulation. For example, many drivers bought additional cars in order to have at least one vehicle available on any day. Because many of these extra cars were older and released more emissions, some studies even suggest that the measure actually might have led to an increase in the number of vehicles and total emissions from road transport (Timilisina and Dusal 2009: 37).

In the 1980s, a similar restrictive policy measure of regulating the flow of traffic by discriminating between odd and even registration number plates, which banned half of all vehicles from the streets on alternate days, was also adopted in Slovenia. In this case too, the infrastructure for alternative transport modes, such as public transport, was faced with many deficiencies (Pirjevec 1979). In addition, the creativity and ingenuity of drivers who managed to keep their vehicles on the road were boundless and comparable to those in other countries or cities that implemented

similar policy measures.

As the examples above illustrate, economic incentives do not work as well as commonly assumed (Driesen 2006). The first problem with the economic incentive approaches is that financial penalties invite attempts to get around them (Dobson 2007). This problem exists in other environmental policy contexts as well. For instance, a whole industry has been built up around the means of making number plates illegible to cameras as cars enter the Pay Zone in the center of London (Dobson 2007: 278). The second problem is that, very often, the change in behavior lasts only as long as the incentives (or disincentives) are in place (Dobson 2007).

Of course, economic-policy approaches have the power to change behavior. But the question is, can they change attitudes too? Have people's attitudes to air pollution changed because of the incentives mentioned above for reducing emissions? This is important because, as demonstrated by the above examples, we can change our behavior to drive less without changing attitudes towards pollution or any other environmental problem (Dobson 2007). But, on the other hand, it makes sense to think that only when our underlying attitudes to pollution change, long-lasting changes in our behavior will follow (Dobson 2007). Hence, it could be said that economic-policy approaches could be a viable solution for some individual or particular environmental practices, but can probably not be used for more comprehensive lifestyle changes.

## ENVIRONMENTAL CITIZENSHIP APPROACH

The idea that people often choose to act environmentally responsibly not because of economic incentives, their self-interest (for example, saving money or improving health), or because social norms call for such behavior, but rather because they are committed to a common good and want to make something positive for other people and society, was the basis for developing the theoretical notion of environmental citizenship that promises a more stable

foundation for lifestyle changes than, for instance, economic incentives. Ecological or environmental citizenship – which is not necessarily the same thing (cf. Dobson 2007) – is an evolving concept in green political thought that extends the civic entitlements and obligation to the environmental context and into the private sphere of everyday life.

The process of greening of citizenship starts in the early 1990s. Perhaps more than any other social movement in the history of political thought, environmentalism has succeeded in changing the way citizenship is theorized (MacGregor 2014). The most obvious reason for this is that environmental citizenship was part of a wider revival of citizenship as a concept in political theory in the latter years of the twentieth century when many new forms of adjectival citizenship emerged (MacGregor 2014). Further development of the concept was supported when it became increasingly evident that for a serious change to happen, environmentalism had to move from the margins to the mainstream and, what is more, that moving towards a sustainable society will require answers to fundamentally political question on how should people live together and distribute finite resources fairly to meet needs (MacGregor 2014). In general, green thinking has influenced debates about citizenship in at least three various ways (Dean 2001). First, environmental concerns have entered our understanding of the rights we enjoy as citizens. Secondly, the enhanced level of environmental awareness has helped to broaden our understanding of the potential scope of citizenship. And thirdly, emergent environmental concerns have added fuel to a complex debate about the responsibilities that attach to citizenship (Dean 2001: 491).

Following Andrew Dobson, one of the pioneers of the concept of environmental citizenship, there is one point where environmental citizenship differs from all other types of citizenship. Historically, citizenship is associated with participation in public sphere activities. In contrast, from an environmental point of view, all actions are public actions,

even those that originate in the private sphere such as, for example, heating homes or buying food products. Because each of these apparently private actions or decisions has public environmental implications, the environmental citizenship embraces both the private and public spheres (Dobson 2007).

At the core of the concept of environmental citizenship, we find the idea of social justice and the metaphor of the ecological footprint, a simple comprehensible indicator that measures and visualizes the environmental impact of human activities. The ecological footprint is the environmental space we occupy, and because we go about our daily lives in very different ways, our ecological footprints are of different sizes (Dobson 2007). The planet on which we live is of finite size, and, therefore, there is a limited amount of environmental space to share out. Fairness demands that we all have roughly the same amount of space, but ecological footprint analyses suggest that some of us have too much. From this, it follows that the specific responsibility of the ecological citizens is to try to occupy an appropriate amount of environmental space (Dobson 2007: 281). Failing to shoulder this responsibility means they have used an unequal proportion of the available resources and exceeded the fair share of the ecological space (Jagers 2009).

Since citizenship is traditionally a matter of balancing rights and responsibilities, the responsibility to do justice is more a political than charitable obligation for the ecological citizens who are aware that their environmental responsibilities follow from their environmental rights (Dobson 2007). The only motivation for taking on environmental obligations is, thereby, grounded in the sense of social justice. In other words, people are not asked to change their pro-environmental behavior with the motivation that they will personally gain something from doing so (Jagers et al. 2014). Rather, the duties of the ecological citizen are to live sustainably so that others may live well (Dobson 2007: 282).

At this point, the theory of ecological citizenship is closer to the sociological way of thinking than to the economic incentive approach. In fact, it targets lifestyles rather than single activities; and it motivates behavioral change by moral or ethical considerations rather than by external incentives such as policy instruments (Jagers et al. 2014). As demonstrated above, under the fiscal incentive policy, people stop driving into the city center because of fear of a fine. From an ecological citizenship point of view, people drive less because they know that driving contributes to global warming and leaves a large ecological footprint (Dobson 2007). Consequently, the behavior driven by the environmental citizenship consideration is more likely to last or even become habitual than behavior driven by economic incentives (Dobson 2007). But, it is also true that economic incentives can change behavior almost overnight, while this is not the case in environmental citizenship initiatives (Dobson 2007). It could be said that this is because the environmental citizenship approach aims at attitudinal change, while economic incentives target behavioral change. Paradoxically, as we have already seen above, Dobson's core assumption that pro-environmental attitudes lead to pro-environmental behavior has been extensively criticized in literature (e.g. Kollmuss and Agyeman 2002).

Although a change in behavior driven by economic and regulative instruments may be crucial for combating the environmental problems or reducing the ecological footprint of our society, this change does not necessarily turn people into ecological citizens (Jagers et al. 2014). For example, sustainable consumers or eco-drivers are not by necessity also ecological citizens, neither judging by the full range of their actions nor by the values or motivations underpinning these actions (Jagers et al. 2014). Indeed, ecological citizenship is not just a matter of doing green things; it is a matter of being green when doing them, too (Jagers et al. 2014). In other words, it is a matter of a green lifestyle.

## CONCLUSION

As we have seen, lifestyle changes are one of the most ambitious, comprehensive and far-reaching, although not always the easiest, ways for greening society. However, all of the analyzed approaches have specific advantages and limitations. Whereas the economic incentive approach can be quick in encouraging people to act differently, it does not necessarily affect people's mindsets. The environmental citizenship approach, in turn, might be slow, but can make shifts in deep-seated attitudes (Capstick et al. 2014). As we have outlined above, most psychological approaches, which tend to dominate both the research and policy literature, limit their scope to the individual behavior. In contrast, the social practice theory addresses the widespread but ordinary or inconspicuous practices that make up everyday life (Capstick et al. 2014).

However, it is important to note that none of these approaches has proven entirely satisfactory in practice. It is clear that current theoretical understanding of the attitude-behavior relation is far from conclusive. The paradox that we outlined in this chapter is apparent: pro-environmental attitudes do not necessarily lead to pro-environmental behaviors (as is the case in the environmental citizenship theory and information-educational approach), and changes in pro-environmental behaviors do not necessarily lead to pro-environmental attitudes (as is the case in economic-policy approach). Two conclusions can be drawn from this. One is that, to some extent, interlinks and intersections between various approaches or scientific disciplines, including those beyond the social sciences, may be useful to improve not only their inherent limitations but also our understanding of pro-environmental behavior and lifestyle changes (Capstick et al. 2014). At this point, it should be noted that neither knowledge nor attitudes are a precondition for behavior. In some cases, pro-environmental behavior results from hands-on-participation, that is, from the contextual experience of getting involved, through

both activities and interaction with others engaged in similar practices (Melo-Escrihuella 2015).

The other point is that there is no doubt that 'internal' factors of pro-environmental change (such as an individual's knowledge and attitudes) are important, but they are not sufficient alone to stimulate lasting change in behavior. This means that in those societies where there is limited 'external' or structural support, including infrastructure development, it can be extremely hard to adopt pro-environmental behavior and to integrate it into daily life practices and habits. Carme Melo-Escrihuella (2015) likewise remarks that today, because green infrastructures are insufficiently developed, the notion of ecological citizenship demands alternative systems of provision of goods that make sustainable forms of living possible and give cohesion to individual ecological citizenship behaviors.

Environmental lifestyles, therefore, need supporting structures and mechanisms that address the full range of people's everyday activities, needs and desires. Here, supporting is a broad term that encompasses not only infrastructure provision (for example, bicycle facilities), but also educational programs, information campaigns, policy incentives, availability of sustainable products and services, etc. In other words, people could develop a green lifestyle in its full material and cultural sense only when the wider context of their everyday lives is green too. As emphasized by Janet Lorenzen (2012), changing a lifestyle is not the same as replacing an old habit with a new habit. Rather, resources are drawn from many different areas and cobbled together in a bricolage style. Following Murray Bookchin (1990), a thinker who has been a major influence on social ecology, green movements and ecological thought around the world, we can say that environmental issues cannot be understood without a careful understanding of our current society. In turning to the modern world and by exploring the day-to-day activities of people we can begin to search for those resources that may facilitate and support such a lifestyle change.

Proceeding in this way, we can see that often the reason why any pro-environmental behavior is so difficult to engage and, especially, to sustain, is the fact that the full impact of pro-environmental changes may not become apparent until some time in the future. In other words, the time lag between behavior change (e.g., use of environmentally friendly modes of transportation) and environmental response (e.g., reduction of atmospheric carbon emissions) may be long and invisible to the naked eye. As we have seen above, a growing awareness of environmental problems at an abstract or general level tends not to be translated into pro-environmental actions. The recognition that people want to have information or feedback regarding their environmental behavior has given rise to a number of various carbon calculators, which can be used to determine an individual's carbon footprint. Carbon calculators, as outlined by Paul Padgett et al. (2008), play an important role in promoting carbon reductions through individual behavior change. They can help make environmental issues more personally relevant, especially if they provide comparative information, so that individuals understand the relative contribution of different activities and how their lifestyle compare to others (Whitmarsh et al. 2011). Indeed, lifestyles are relational by definition – in a way they are our identity in context (our standpoint or social position in relation to others) – and can be meaningfully understood only in context (Lorenzen 2012).

As Benjamin Brauer et al. (2016) recently pointed out, information and communication technologies are a viable option to influence people's behavior. Examples from the health and education domain show that the utilization of mobile devices and mobile applications can serve as successful interventions. Pervasive technologies such as smartphones or wearables support the provision of micro-learning apps allowing the user to study everywhere, and systems concerned with the user's health can monitor user behavior and provide feedback for a healthier lifestyle (Brauer et al. 2016). According to Brauer et al. (2016), the advantage

of utilizing mobile apps as enablers for sustainable actions lies in their immense potential for scalability. Further, they claim that considering the sheer number of people owning a smartphone, mobile applications that have even a tiny effect on resource efficiency or the reduction of greenhouse gas emissions could result in a greater impact than any organizational sustainability campaign might offer (Brauer et al. 2016).

The supportive environmental potential of mobile applications that are designed as feedback systems is still poorly investigated. However, there are some studies that reveal, for example, that drivers using the mobile apps reduced their fuel consumption or that visual feedback regarding users' mobility behavior influenced the use of more sustainable transportation modes (Brauer et al. 2016). A recent analysis by Brauer et al. (2016) of existing mobile applications that aim to foster environmental sustainability (i.e., green apps) and are available in Google Play store with a German or English description text, shows some interesting results. First, there are already many green applications available (in total 262), but they are rarely used, although the user ratings are predominantly positive. This indicates that the awareness and diffusion of these applications are rather low. Secondly, a green app is an information system that supports the user in performing sustainable actions. Green apps assist users in their everyday lives with the goal of reducing their carbon footprints by monitoring their behavior (e.g., regarding resource consumption, pollution, recycling, modes of mobility, etc.). And thirdly, the majority of the existing green apps are generally concerned with altering an individual's behavior (Brauer et al. 2016).

There is still much potential for improvements and further research, particularly about the social aspects of such green applications, for example, studies that focus on users (Brauer et al. 2016). This is in line with our argument that green apps may be an important tool for supporting a green lifestyle when approached interdisciplinarily. Smartphones seem to

be a good solution to support the societal change process of greening society because today mobile applications can easily become an integral part of people's everyday life habits, not only for informational and entertainment purposes, but also as a personal environmental management system. In this view, green apps may be considered especially useful tools for those people who are already engaged in some pro-environmental behavior and are willing to make a greater effort to reduce their overall environmental impact and develop more sustainable practices and integrate them into a holistic lifestyle narrative.

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