

DOKUMENTATIONEN

03/2019

International Cycling Conference 2017

Bridging the gap between research and practice
19-21 September 2017, Mannheim, Germany

Conference Proceedings

DOKUMENTATIONEN 03/2019

Ressortforschungsplan of the Federal Ministry for the
Environment, Nature Conservation and Nuclear Safety

Project No. (FKZ) 3716 58 104 0

Report No. FB000156 ZW

International Cycling Conference 2017

Conference Proceedings

by

Dr. Katherina Grafl
Umweltbundesamt, Section I 3.1 (Environment and
Transport), Dessau-Roßlau

Christoph Schulz
Velokonzept Saade GmbH, Berlin

On behalf of the German Environment Agency

Imprint

Publisher

Umweltbundesamt
Wörlitzer Platz 1
06844 Dessau-Roßlau
Tel: +49 340-2103-0
Fax: +49 340-2103-2285
buergerservice@uba.de
Internet: www.umweltbundesamt.de

 [umweltbundesamt.de](https://www.facebook.com/umweltbundesamt.de)

 [umweltbundesamt](https://twitter.com/umweltbundesamt)

Support in the preparation of this conference volume by:

Velokonzept Saade GmbH
Straßburger Straße 55
10405 Berlin
Germany

Report completed in:

March 2019

Edited by:

Section I 3.1 Environment and Transport
Dr. Katherina Grafl

Publication as pdf:

<http://www.umweltbundesamt.de/publikationen>

ISSN 1862-4804

Dessau-Roßlau, September 2019

The responsibility for the content of this publication lies with the author(s).

Abstract: International Cycling Conference 2017

19.–21. September, Mannheim/Germany

The International Cycling Conference (ICC) is an interdisciplinary and international conference organized by the German Environment Agency (UBA). Together with our partners from PASTA (Physical Activity through Sustainable Transport Approaches) and THE PEP (Transport, Health and Environment Pan-European Programme) as well as the City of Mannheim, ECF, Difu and GIZ, the ICC is a three-day event organized to highlight the role of active mobility from an international perspective. The event will focus on synergies in transport planning, health care, environmental quality, economic and business development, as well as social issues and above all the exchange of knowledge and experience from research to practice and vice versa.

Kurzbeschreibung: International Cycling Conference 2017

Die International Cycling Conference (ICC) ist eine interdisziplinäre und internationale Konferenz des Umweltbundesamtes (UBA). Zusammen mit unseren Partnern von PASTA (Physical Activity through Sustainable Transport Approaches) und THE PEP (Transport, Health and Environment Pan-European Programme) sowie der Stadt Mannheim, ECF, Difu und GIZ ist die ICC eine dreitägige Veranstaltung, die die Rolle der aktiven Mobilität aus internationaler Perspektive herausstellt. Im Mittelpunkt der Veranstaltung stehen Synergien in den Bereichen Verkehrsplanung, Gesundheitsfürsorge, Umweltqualität, wirtschaftliche Entwicklung sowie soziale Fragen und vor allem Wissens- und Erfahrungsaustausch zwischen Forschung und Praxis.

Table of content

Table of content	6
List of abbreviations	7
Summary	8
Zusammenfassung.....	9
1 Acknowledgements	11
2 Organiser and Partners	12
3 Moderators and Key Speakers	13
4 Sessions	17
5 THE PEP Relay Race: Cycling and walking make THE Link –Transport, Health and Environment .	70
6 Poster Presentations	73
7 Pictures of the conference (selection)	111
8 Selected Paper: Promoting children’s cycling through cycling courses in city traffic (practice paper)	112
9 Selected Paper: Can Public Bike Sharing Systems Encourage Migrant Women to Use Bicycles?	122
10 Selected Paper: Promoting active travel for all in European urban regions - A review of evaluated initiatives. (Research Paper).....	137
11 Selected Paper: Transport poverty and Urban Cycling: A Case study Rotterdam (Practice Paper)	156

List of abbreviations

Abbreviation	Explanation
CO ₂	Carbon dioxide
COP	Conference of the Parties
EU-ETS	EU Emissions Trading Scheme
F-gases	Fluorinated greenhouse gases
FTIP	Federal Transport Infrastructure Plan
GHG	Greenhouse gas
HGV	Heavy goods vehicle
ICAO	International Civil Aviation Organization
IMO	International Maritime Organization
KSBV	UBA-study Klimaschutzbeitrag des Verkehrs bis 2050 [UBA, 2016a]
NDC	Nationally Determined Contributions (in Paris-Agreement)
NEDC	New European Driving Cycle
N ₂ O	Nitrous oxide (laughing gas)
PJ	Petajoule (energy measuring unit)
PtG	Power-to-Gas (any power-based gaseous fuels)
PtL	Power-to-Liquid (any power-based liquid fuels)
RDE	Real Driving Emissions
TWh	Terawatt hours (measuring units for energy)
UNFCCC	United Nations Framework Convention on Climate Change
WLTP	Worldwide Harmonized Light-Duty Vehicles Test Procedure

Summary

International Cycling Conference 2017

19.-21. September, Mannheim/Germany

Introduction (inkl. Concept of the conference (PASTA / THE PEP))

The International Cycling Conference (ICC) is an interdisciplinary and international conference organized by the German Environment Agency (UBA). Together with our partners from PASTA (Physical Activity through Sustainable Transport Approaches) and THE PEP (Transport, Health and Environment Pan-European Programme) as well as the City of Mannheim, ECF, Difu and GIZ, the ICC is a three-day event organized to highlight the role of active mobility from an international perspective. The event will focus on synergies in transport planning, health care, environmental quality, economic and business development, as well as social issues and above all the exchange of knowledge and experience from research to practice and vice versa.

Bridging the Gap

The International Cycling Conference is an engaging, innovative and interactive event. International researchers and practitioners will be meeting to discuss the role of active mobility in the modern world, intersecting academic, political and practical thinking strategies. A cutting-edge format will bring together representatives from both research and practice and engage active mobility as a sector of action and research.

200 years of cycling

In 1817, Karl Drais invented the bicycle in Mannheim. Celebrate the 200th anniversary with us in its hometown by joining the International Cycling Conference 2017. Experience numerous bicycle activities as well as projects throughout the city, meet like-minded bike enthusiasts, researchers and practitioners from around the world and contribute to shaping the next 200 years of active mobility.

Target audience

International researchers and practitioners are invited to discuss the role of active mobility in the modern world:

1. Researchers
2. Practitioners
3. Political representatives of all levels (from local politicians and policy makers to trainers)
4. NGOs
5. Planners
6. Public health specialists
7. Designers
8. Architects
9. Engineers

Attractive activities around the conference

The City of Mannheim welcomes the participants with an evening reception on the first day of the conference. On the second day, the participants can take part in several bike excursions in and around Mannheim.

Zusammenfassung

International Cycling Conference 2017

19. – 21. September, Mannheim / Deutschland

Einführung (inkl. Tagungskonzept (PASTA / THE PEP))

Die International Cycling Conference (ICC) ist eine interdisziplinäre und internationale Konferenz des Umweltbundesamtes (UBA). Zusammen mit unseren Partnern aus PASTA (Physical Activity through Sustainable Transport Approaches) und THE PEP (Transport, Health and Environment Pan-European Programme) sowie der Stadt Mannheim, ECF, Difu und der GIZ ist die ICC eine dreitägige Veranstaltung, um die Rolle der aktiven Mobilität aus einer internationalen Perspektive herauszustellen. Im Mittelpunkt der Veranstaltung stehen Synergien in den Bereichen Verkehrsplanung, Gesundheitsversorgung, Umweltqualität, wirtschaftliche und geschäftliche Entwicklung sowie soziale Fragen und vor allem der Wissens- und Erfahrungsaustausch zwischen Forschung und Praxis.

Bridging the Gap

Die International Cycling Conference ist eine gewinnende, innovative und interaktive Veranstaltung. Internationale Forscher und Praktiker werden zusammenkommen, um die Rolle der aktiven Mobilität in der modernen Welt zu erörtern, die akademische, politische und praktische Denkstrategien miteinander verbindet. Ein hochmodernes Format bringt Vertreter aus Forschung und Praxis zusammen und engagiert sich für aktive Mobilität als Aktions- und Forschungssektor.

200 Jahre Radfahren

1817 erfand Karl Drais das Fahrrad in Mannheim. Feiern Sie mit uns das 200-jährige Jubiläum in seiner Heimatstadt und nehmen Sie an der Internationalen Fahrradkonferenz 2017 teil. Erleben Sie zahlreiche Fahrradaktivitäten sowie Projekte in der ganzen Stadt, treffen Sie gleichgesinnte Fahrradbegeisterte, Forscher und Praktiker aus aller Welt und gestalten Sie die nächsten 200 Jahre aktiver Mobilität.

Zielgruppe

Internationale Forscher und Praktiker sind eingeladen, die Rolle der aktiven Mobilität in der modernen Welt zu diskutieren:

1. Forscher
2. Praktizierende
3. Politische Vertreter aller Ebenen (von lokalen Politikern und politischen Entscheidungsträgern bis hin zu Trainern)
4. NGOs
5. Planer
6. Fachärzte für öffentliche Gesundheit
7. Designer
8. Architekten
9. Ingenieure

Attraktive Aktivitäten rund um die Konferenz

Die Stadt Mannheim begrüßt die Teilnehmer am ersten Konferenztag mit einem Abendempfang. Am zweiten Tag können die Teilnehmer an mehreren Radtouren in und um Mannheim teilnehmen.

1 Acknowledgements

The Umweltbundesamt UBA, the entire ICC team and its partners want to thank all speakers, poster presenters, supporters and participants for their support and contribution to the ICC International Cycling Conference held in September 2017 in the Baroque Palace of Mannheim, Germany.

A unique mixture of 292 participants from all continents, 90 inspiring speakers in three days, almost 50 poster presentations and finally all participants revitalized the conference motto of bridging the gap between research and practice.

A selection of session and poster presentations is online on the ICC website:

<https://www.umweltbundesamt.de/en/international-cycling-conference-2017-programme>

Please note that due to copyright reasons not all presentations can be published.

Here's a great selection of photos. Copyright: City of Mannheim, Photographer: Thomas Tröster

<https://cloud.velokonzept.de/index.php/apps/gallery/s/G9TLF1aBo1YVBn4>

2 Organiser and Partners

2.1 Organiser

UBA The German Environment Agency (UBA) is Germany's central environmental authority. In addition to 'purely scientific work', the enforcement of environmental law and providing information to the general public about environmental protection issues are key areas of its daily work.

2.2 Partners

Difu The German Institute of Urban Affairs (Difu) is the largest urban research institute in the German- speaking territories and is the research, further training and information institution for cities, municipalities, administrative districts, municipal associations and planning departments.

GIZ The GIZ assists the German Government in the field of international cooperation. On behalf of the Federal Ministry of Economic Cooperation and Development, GIZ's Sustainable Urban Transport Project facilitates knowledge exchange on cycling and mobility worldwide.

City of Mannheim Mannheim, the birthplace of the bicycle, celebrates the anniversary of the bicycle with the motto "Monnem Bike" and an engaging year-round festival programme.

ECF – Scientists for Cycling The Scientists for Cycling network connects research, research plans and scientific-based publications on cycling or cycling- related matters to other scientists, to professionals and to volunteers who work on cycling, contributing to ECF's mission: to improve and to increase cycling.

3 Moderators and Key Speakers

3.1 Opening Ceremony

3.1.1 Moderation

Prof. Dr.-Ing. Regine Gerike, Technische Universität Dresden

The industrial engineer with focus in transportation received a doctor's degree about sustainable traffic development at the Technische Universität Dresden in 2005. After a year in the USA and a junior professorship for mobility at the Technische Universität München, she became a University Professor and Head of the Institute for Transportation at the Universität für Bodenkultur in Vienna. Since 2015 Gerike is a University Professor and Head of Integrated Traffic Planning at Technische Universität Dresden.

3.1.2 Speakers

Rita Schwarzelühr-Sutter, Parliamentary State Secretary of Federal, Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, (BMUB), Germany

The native of South Baden studied business administration in Freiburg and Zürich and gained her first political experiences in the anti-nuclear movement. She worked as the personal assistant to the member of parliament of her district and ran for the seat herself after her predecessor's retirement in 2005. After a four year interval she was appointed Parliamentary State Secretary by the Federal President.

Maria Krautzberger, President of German Environment Agency UBA

Maria Krautzberger studied Sociology and management sciences. Before becoming UBA's president Krautzberger was Permanent Secretary in the Berlin Senate Department for Urban Development and the Environment from 1999 to 2011. Before this she was Senator for Environment in the Free Hanseatic City of Lübeck for six years and also held the function of Deputy Mayor.

Dr. Peter Kurz, Lord Mayor of Mannheim

The Mannheim-born Peter Kurz studied law. After his legal clerkship in both Germany and the USA, he worked for the University of Mannheim while preparing for his doctorate. After five years as a judge in Karlsruhe, Kurz became Mayor for Education, Culture, Leisure and City Marketing before being elected Lord Mayor of Mannheim in 2007.

3.1.3 Keynote: "Bicycle first!" – Can we nudge people into active mobility?

Prof. Dr. Lucia Reisch, Copenhagen Business School

Lucia Reisch is a professor for consumer behaviour and consumer policy at Copenhagen Business School since 2006 and a permanent Guest Professor at the Zeppelin University of Friedrichshafen since 2011. With her main research focus on behavioural economics, sustainable consumption, intercultural consumer behaviour, consumers and new technologies, consumer policy and corporate sustainability Reisch is involved in several EU research projects and engaged in policy consultancy in Germany.

3.2 International Mosaic

3.2.1 Moderation

Manfred Neun, President of European Cyclists' Federation (ECF)

Manfred Neun studied Economy and Psychology and successfully designed, assembled and traded bicycles and bicycle parts. Being called the “father of the Trekking Bike” Neun was the president of the German Two-wheel Wholesalers' Association, the Executive Vice-President of the Chamber of Industry and Commerce in his home region and lecturer at diverse universities for Human Resources (HR) management, economy and ecological psychology before he became the ECF president.

Heike Bunte, (UBA)

Heike Bunte worked as a trained bicycle mechanic before finishing her MA in Economics and Sociological Studies at the University of Hamburg. After working for a Dutch consultancy in mobility, traffic and transport, she worked at the Technische Universität. Currently she works for the Federal Environment Agency, Germany on various cycling (research) programs. She has published and researches on the sociology of cycling and sport, corporate mobility management and spatial mobility behavior.

3.2.2 Speakers

Prof. Dr. Lake Sagaris, Pontifical Catholic University of Chile

Lake Sagaris is an internationally recognized expert on cycle-inclusive urban planning, civil society development and participatory planning theory and practice as they relate to urban-regional governance. An award-winning writer, editor and UN sustainable transport group member, she began her working life in Chile in 1980 as a freelance journalist. She holds a Master's of Science (University of Toronto 2006) and a PhD in Urban Planning and Community Development (University of Toronto 2012). In her current work she focuses on resilience, social justice and inclusion.

Dr. Anvita Arora, Innovative Transport Solutions, India

Dr. Anvita Arora is an architect, transport planner, university teacher and internationally renowned traffic expert with a PhD from the Indian Institute of Technology (IIT), Delhi in 2007. Leading the IIT incubator company Innovative Transport Solutions (iTrans), she has successfully delivered over 40 applied research and planning projects for municipalities and funding agencies like the UNEP, World Bank, Asian Development Bank and DFID to support cities in their sustainable, inclusive and climate resilient development.

Amanda Ngabirano Aziidah, Urban and Regional Planner, Lecturer at Makerere University Kampala, Uganda

Ms Amanda Ngabirano is an urban and regional planner. Being a lecturer at Makerere University-Kampala since 2006, a writer and researcher, the principal physical planner of Goudappel Africa Ltd and consultant in sustainable urban transport and land use planning, the need for linking theory and practice is so vivid to her. The internationally renowned expert speaker and cycling enthusiast initiated diverse collaborations between governments and universities and, among many, the first non-motorized transport pilot project in Kampala.

Alejandra Leal, Co-Director of Cèntrico, Mexico

Co-Director of Céntrico, a group of specialists in planning, design, implementation and evaluation of sustainable urban mobility projects. Alejandra is an economist at CIDE in Mexico City, and holds a Master's degree in Public Policy from the Hertie School of Governance, Berlin. She has advised local governments in Mexico on strategies for street design projects, public bicycle programs and transit regulations. Recently she coordinated the program of the 6th World Bike Forum held in Mexico City.

Prof. Dr. Ana Santos, Lisbon University, Portugal

Ana Santos (Human Kinetics Faculty - Lisbon University) is the Chair of Pedagogical Board, sociologist and anthropologist, assistant professor of Sport Sociology and Sport and Mobility, researcher in the area of Governance, Policies and Livelihoods at the Centre for Research in Anthropology (CRIA). She is the coordinator of the project Dar a Volta ao uso da bicicleta (The new tour of bicycle use).

Prof. Dr. Jason Chang, National Taiwan University

Dr. Chang is a professor of Civil Engineering Department and director of Advanced Public Transport Research Center in National Taiwan University. Dedicated to sustainable transport development for more than 26 years and advisor for the Taipei City Government for 22 years, Prof. Chang has been invited to be advisory board member for Scientists for Cycling of ECF. His research areas include green mobility, transport economics and smart transport. He is also a well known expert on sustainable urban and eco-mobility for the World Bank, GEF, global NGOs, transport ministries and city governments.

3.3 Keynotes

3.3.1 Keynote: Bridging the Gap as a Demand

Manfred Neun, Honorary President ECF

Manfred Neun studied Economy and Psychology and successfully designed, assembled and traded bicycles and bicycle parts. Being called the “father of the Trekking Bike” Neun was the president of the German Two-wheel Wholesalers' Association, the Executive Vice-President of the Chamber of Industry and Commerce in his home region and lecturer at diverse universities for Human Resources (HR) management, economy and ecological psychology before he became the ECF president.

3.3.2 Keynote: Promoting cycling and active mobility in Rome

Linda Meleo, Councilor for Mobility of Rome

3.3.3 Keynote: Bridging the gap between research and practice

Dr Adrian Davis, Visiting Professor University of West of England), United Kingdom

3.3.4 Keynote: EU initiatives for Health and Physical Activity

Saša Jenko, Head of Sector Public Health, DG Research and Innovation, European Commission

3.3.5 Presentation: What PASTA stands for: Physical Activity through Sustainable Transport Approaches

Elisabeth Raser, University of Natural Resources and Life Sciences & PASTA

3.3.6 Bertha-Carl-Benz Award winner

F.K. Day, Founder and CEO of World Bicycle Relief

F.K. Day is the co-founder of the largest US-bicycle components manufacturer SRAM Corporation. Following the tsunami in South-East Asia Day founded and still heads the international non-profit organisation World Bicycle Relief in 2005 providing simple and sustainable bicycle transportation to people to eliminate distance as a barrier to education, healthcare and economic opportunity.

4 Sessions

Most of the presentations can be found online:

<https://www.umweltbundesamt.de/en/international-cycling-conference-2017-programme>

4.1 Session A1: Rethinking Infrastructure

4.1.1 Session Chair

Prof. Dr. John Parkin, University of the West of England

John Parkin worked for consulting engineers before joining academia, and is now Professor of Transport Engineering at the University of the West of England. He has been involved in transport policy formulation, modelling, forecasting, operational analysis, economic appraisal, design and construction. He has experience in all modes and a specialism in cycling. His research interests include infrastructure design, evaluation of transport interventions, and perceptions of risk and effort.

4.1.2 Cycling 4.0 – A new era of urban cycling

Tilman Bracher, German Institute of Urban Affairs (Difu), Germany

Tilman Bracher, 62, is head of mobility at Difu, the German Institute of Urban Affairs in Berlin. He studied Economics and Transport Studies in Freiburg, Germany and London. His recent focus was on urban, public transport and bicycle mobility. Among his references is the European Commission's first ever study on cycling in 1987 ("Policy and Provision for Cyclists in Europe"). He started Germany's "bicycle academy" education program for municipal staff and politicians. At present, he is also an advisor for Germany's DoT and the city of Berlin.

Sebastian Buhrmann, German Institute of Urban Affairs (Difu), Germany

Sebastian Bührmann is head of the German Cycling Academy at the German Institute of Urban Affairs (Difu). The Cycling Academy offers a broad programme of activities to stakeholders involved in improving cycling conditions on the local level. Before joining Difu, Sebastian worked for many years in European projects on sustainable mobility solutions. He has a background in Economic Geography and Urban Studies, including studies and work experience in Germany, Mexico and Canada.

Abstract

200 years after the invention of the bicycle, cycling is about to become an integral part in digital modern mobility concepts. Let's call it "Cycling 4.0". Unlike electric and automated cars and car sharing: Cycling has already proven its ability to provide mass transport, and its environmental record is 100% positive. Worldwide, the bicycle has potential to become part of a new urban mobility system, which provides more livable, healthier and economically successful cities.

Cycling infrastructure is an effective element to re-distribute urban space to serve people not cars. Bicycle highways in conjunction with E-Bikes unlock the potential of longer distances and new target groups of users. Multimodal connections, powered by built infrastructure as safe and quick bicycle parking facilities as well as by apps that make your smartphone your personal mobility advisor, give the bicycle an important role as a feeder and for the egress trips of public transport or car sharing. Digital devices may control the personal, physical or technical status of driver, vehicle and environment. Smartphone apps become powerful tools to deliver more

information about the trips made by the users which contribute to better planning of bicycle infrastructure.

At the same time the bicycle has become more than only a means of transport. It is a lifestyle product and professional marketing and mobility management campaigns contribute to changing the perception of people and decision makers towards a bicycle culture. The bicycle becomes a symbol of a more livable city, a healthier life style and attractive places to invest in.

This practice presentation and paper will provide examples from Germany and other countries that show how the change towards “Cycling 4.0” has begun, what it takes to push this development further and what potential can be unlocked if we follow this path.

“Cycling 4.0” means to look at cycling in a network perspective together with urban planning, development of new technologies and a change of minds. The German Institute of Urban Affairs wants to contribute with this presentation to the discussion on how to develop the practice of cycling promotion further and to point out fields, where research should fill knowledge gaps and develop infrastructures, services and technologies further.

4.1.3 Gaps between the links: Understanding required changes to the fragmented cycling facilities in the developing world context

Jennifer Louisa Baufeldt, University of Cape Town, South Africa

Jennifer Baufeldt completed her MSc Civil Engineering degree at the University of Cape Town. During her time as a Master’s student, she was involved in several projects, including projects for the United Nations Environmental Programme and the National Department of Transportation all focusing on improving the situation for nonmotorised transport. Her main interests are sustainable transport engineering in urban areas, improving equity and social inclusion in developing countries.

Prof. Marianne Vanderschuren, University of Cape Town, South Africa

Associate Professor Marianne Vanderschuren has a Bachelor degree in Transport Planning and Engineering (Tilburg, NL), a Master degree in System Engineering, Policy Analysis and Management (Delft, NL) and a Ph.D. in Modelling of Intelligent Transport Systems (Enschede, NL). Marianne went to South Africa in 2000 and was given the responsibility for developing the teaching of transport studies in the Department of Civil Engineering at the University of Cape Town.

Abstract

While development agencies and the governments of developing countries are making attempts to provide better policies and guidelines for cycling facilities, the improvements in the quality and quantity of cycling facilities remains poor in many cities. However, a few developing cities are generating significant improvements for their cyclists. In this paper, the case study area of Cape Town, South Africa is used to discuss the challenges of building a cycling network in a developing city that has challenges, such as political instability, limited resources, low road safety and high rates of violence.

Despite numerous challenges to both cyclists and pedestrians, there are several grassroots movements demanding better provision of facilities for these sustainable means of travel. However, recent research indicates that the fragmented and ad-hoc approach, with regards to the selection of the location and design of the cycling facilities, are not generating meaningful improvements in safety for the cyclists or an increase in volumes of cycle trips. While the

established practice of implemented fragmented walking and cycling facilities may be showing benefits for pedestrians, a change of practice is needed if improvements in cycling are to be seen.

One way that this challenge may be addressed is by placing a higher priority on establish comprehensive network for cyclists between key origins and destinations for a selected community. In South Africa, this was realised by National Government, proven by the fact that the published updated NMT Facility Guidelines in 2015 (Vanderschuren et al., 2015). However, the local practitioners have not been educated regarding the changed reality yet. Implementation is, therefore, still substandard. Additionally, if practitioners focused on identifying and addressing the needs of cyclists, especially in vulnerable or disadvantaged areas, cycling can become a means to address poverty and inequality that are common in developing cities.

4.1.4 Barriers and facilitators to cycling in European cities: A comparative case study of cycling in London and Amsterdam

Qi Sun, Radboud University Nijmegen, Netherlands

Qi Sun is a PhD researcher from Eindhoven University of Technology (TU/e), The Netherlands. Coming from a cycling kingdom, she is the generation that witnessed the massive decline of cycling and rapid motorisation in China. After having completed undergraduate studies in Beijing, she received the Erasmus Mundus scholarship for a joint master programme at Radboud University Nijmegen and Cardiff University. In 2017, Qi started a PhD project on e-bike and its implications on sustainable mobility

Abstract

The purpose of this comparative case study is to investigate the reasons why levels of cycling are strikingly different in London and Amsterdam by examining natural environment, built environment, competing modes and cultural factors of the two cities. The research is based on a wide range of statistical datasets, secondary reports, as well as interviews among experts and residents. It finds that natural environment is very similar in the two cities and is not decisive for use of bicycle. The main disparity lies in built environment, especially cycle infrastructure provisions; and it is a crucial element explaining the differences in cycling levels. Existence of a good public transport system is one of the reasons Londoners cycle less. Culture barrier in London is also partly shaped by built environment. The fundamental difference is the contrasting planning mentalities in the two countries. British planning has been car-oriented as car traffic is seen to be vital for the economy. On the contrary, Dutch planning has emphasized more on making their cities liveable. In fact, bicycle use is good for the economy because it carries more people in dense urban settings and ultimately it is people who make the economy not the cars. The research challenges prevailing car-oriented planning dogma and calls for a radical change of mentality towards planning cities for people.

4.1.5 Mapping the quality of regions for cycling

Dr. Martin Goossen, Wageningen University & Research, Netherlands

Dr. Martin Goossen is a senior researcher at Wageningen Environmental Research. He is a designer of interactive systems, such as a measuring quality of areas for recreation and landscape preference with www.myclacetobe.eu. The research concentrates on demand of individual variations as correlated with demographic, cultural and economical factors related to spatial characteristics such as demand-oriented qualities, especially to accessibility of locations, experience values and utility of facilities.

Abstract

The Netherlands is a real cycling country. There are 22.7 million bicycles on a population of 17 million people. 49% of the Dutch go out for cycling during their leisure time, spending € 283 million¹. There is 85.000 km of roads and paths to cycle. Cycling is therefore an important policy issue. Policy makers want to have an instrument to measure potential and actual values of regions for cycling. We developed a method to compare preferences and accessibility of region for cycling.

To define cycling potential we developed the website www.daarmoetikzijn.nl that gives the internet-user the opportunity to compile its own preferred landscape, choosing among ten land use types. We save all those preferences in a database. With the use of GIS-data the internet-user preferences are compared with the real existence. The map can be seen as a potential of natural areas for cycling (Goossen et al, 2009).

Cycling infrastructure, the geographical distributions of Dutch citizens and the bicycle use are used to map the potential use of areas for recreational cycling. From the Topographical Map (1:10.000) a network is developed consists of a combination of roads (with permission to cycle) and special cycle paths. The geographical distribution of citizens is mapped with the distribution of number of inhabitants of the postal-code areas. To calculate the cycling use of the network, the participation rate and frequency for recreational cycling is used. The average recreationist cycle 1.5 hours; that is 24 km (Goossen, 2009). An additional step is to sum up the bicycle potential in those regions that can be visited from multiple points of departure. The result is an accessibility pressure map of The Netherlands with areas that can be visited by cyclist, combined with the potential number of cyclist.

The final map of the quality of regions for cycling has been obtained by combining the indicator on preferences and the potential pressure of recreation cycling (both divided into three classes). Regions highly preferred and with low pressure are in the eastern part of the Netherlands. Regions low preferred and with high pressure are in the western part.

4.1.6 Ten years of cycle highways

Rico Andriesse, Goudappel Coffeng, Netherlands

Rico is a leading professional on the subject of bicycle infrastructure. How do you organize your city in a bikefriendly way? Which bike facilities fit in best? What to do if cycling does not seem to fit in at all? Rico was responsible for several Dutch design manuals on cycle highways, cycle paths and roundabouts. Rico is working at Goudappel Coffeng. Rico conducted several ThinkBike workshops (Helsinki, Tampere, Joensuu, Goteborg, Turku, Espoo).

Richard ter Avest, Goudappel Coffeng, Netherlands

Richard ter Avest (1962) studied Urban and Transport Planning. Richard has been working at Goudappel Coffeng since 1992. Richard helps regional and local governments carry out projects in which cooperation between government, business and social organisations is vital to solving transport and traffic problems. He specialises in urban cycling studies, cycle highways, sustainable road safety, and developing attractive and liveable city centres. His international experience is built up in countries like Germany, Scandinavia, United Kingdom, USA.

Abstract

¹ <http://www.fietsplatform.nl/fietsrecreatiemonitor/cijfers#effecten>

On 7,5 to 15 kilometers trips even in the Netherlands by far most of the trips are being made by private car. Public Transport only has a serious share in the cities, traditional bicycles have a range up to 7,5 km. E-bikes in all kinds of forms, bring a serious new player to the field. If we want to take this opportunity, bicycle infrastructure should be redesigned. To cope with more bikes and more speed differences. This why the Netherlands have started to develop cycle-highways. The intense development of cycle-highways in the Netherlands runs almost for almost ten years now. Varrriing from wide non stop cycle highways to upgrade existing cyclepaths.

Based on our experience we can draw some first conclusions on the added value of this new transport concept:

10. 1. The first cost-benefit analyses show a very positive benefit/cost ratio: appr. 2,5.
Especially the health benefits are very positive.
11. 2. There first results are positive. After realizing a cycle highway, the car-mobility of arterials has decreased by 5%. In some projects bicycle use increased up to 25-30% after two years and growing 10% every year after.
12. 3. The users of cycle highways are enthusiastic about the extra quality: a wide red carpet to their destination. Interesting is that design characteristics can influence the time perception:
13. if a route is designed in an attractive way, people state that the route is shorter in time.
14. 4. There is a lot of demand from other countries in Europe and elsewhere to re-develop their cities with cycle-highways

For those who want to start developing cycle highways we developed the next ten steps to take into account:

- ▶ Agenda: set the stage
- ▶ Ambition: aim high
- ▶ Analysis: calculate the effects
- ▶ Anticipate: take every change
- ▶ Compose: use the landscape and citiescape to get a attractive route
- ▶ Communicate: get in touch with your stakeholders as soon as possible
- ▶ Accept: Not every part can be done perfect at once
- ▶ Create: Build a nice pilot and see what happens
- ▶ Campagne: make sure everybody knows about it
- ▶ Champagne: celebrate your successes

4.2 Session B1: Attitudes, Behaviour and Choice

4.2.1 Session Chair

Carlosfeliipe Pardo, Despacio.org, Colombia

Psychologist with a MSc in Contemporary Urbanism from LSE. He focuses on urban development, mobility, and climate change projects in the developing world. He has participated in consultancies in more than 30 cities in Asia, Latin America and Africa, and has delivered more

than 70 training courses on urban development, climate change, bus rapid systems, non-motorized transport, travel demand management and sustainable transport. He is currently the executive director of Despacio.org.

4.2.2 Socio-spatial determinants of preference for the active transport modes – Evidence from the Croatian travel behaviour survey

Antun Plenković, Ivo Pilar Institute of Social Sciences, Croatia

Antun Plenković (1987) works as a research administrator at the Ivo Pilar Institute of Social Sciences in Zagreb, Croatia. He has M.A. (University of Zagreb). His research interests include sustainable mobility, travel behaviour, and the impact of social sciences and humanities. He is a member of the national project regarding bicycle use in daily migration and a member of two COST actions (one regarding research administration and the other regarding the impact of social sciences and humanities).

Dr. Geran-Marko Miletić, Ivo Pilar Institute of Social Sciences, Croatia

Geran-Marko Miletić (Ph.D) is a senior research associate at the Institute of Social Sciences Ivo Pilar in Zagreb (Croatia). He is a sociologist and his research interests are broadly concerned with social aspects of spatial transformation. Concerning the topic of travel study, he is primarily focused on social dimensions of both general travel demands and travel mode choice. He was principal investigator on the national travel behaviour study used for the development of a traffic model for Croatia.

Abstract

Greater mobility of goods and people is one of the key challenges that faces the modern world. Traffic is major source of environmental pollution, furthermore the limitations of transport systems have an impact on economic development, and also on various aspects of everyday life, such as health or social interaction. Increasing the volume of traffic becomes an obstacle to development not only cities but also the entire region. Aiming to tackle these issues, the concept of sustainable mobility, among other measures, promotes the use of active transport modes. New research projects are being conducted and new public policies have emerged regarding transportation that is based on those active modes: cycling and walking. Accordingly, this analysis is oriented on active modes of transport.

Our analysis has two objectives, the first is to find out which categories of population are more likely to use modes of active transport, and the second objective is to determine how does the availability of public transportation or car travel affect on the people's preference of using active modes of transport. For this analysis we shall use the data collected through the national research that was conducted in 2014 (Croatian travel behavior survey). This is an important insight regarding the travel behavior of Croatian society, and also it is a valuable observation point for future analysis and research about active modes of transport.

4.2.3 A survey proposal to analyze cycling routes

Juan Pablo Ospina Zapata, Universidad Nacional de Colombia, Colombia

Juan Pablo Ospina received a master's degree in Urban Planning at the Institut Français d'Urbanisme in Paris. Focusing on his dissertation on "Measuring accessibility by cycling taking into account the spatial effects" at the Universidad Nacional de Colombia, he is also an active member of RiSE (Research in Spatial Economics). His teaching experience and work on consulting projects is mainly focused on urban transport and urban planning while his research interest is specialized in non-motorized modes, accessibility, spatial analysis, and sustainability.

Verónica Botero Fernández, Universidad Nacional de Colombia, Colombia

Verónica is a Professor of GIS, Remote Sensing, and Geospatial Analysis in Undergraduate and Graduate Engineering Programs at the Department of Geosciences and Environment of the Faculty of Mines of the National University of Colombia, Medellin campus. She is an active member of several research groups where she has served as principal investigator or co-PI in more than 50 research and extension projects that have involved the use of geoinformation for urban and rural planning, and disaster management.

Juan Carlos Duque Cardona, RiSE (Research in Spatial Economics)

Juan C. Duque has been a full Professor in the School of Economics and Finance at EAFIT University (Colombia) since 2007. He is founder-director of RiSE (Research in Spatial Economics), a research group devoted to the development of quantitative methods for space-time data analysis. Having studied on executed research for his Ph.D. and as a post-doctoral researcher in Spain and the USA, Duque has published about 35 international papers and participated in consulting projects for various international funding institutions.

Víctor López-Ríos, Universidad Nacional de Colombia, Colombia

Having studied mathematics and statistics in Colombia V. I., López-Ríos received a doctoral degree in Statistics in Mexico in 2008. He is currently Associate Professor in the School of Statistics at the Universidad Nacional de Colombia, sede Medellín, Colombia. His areas of interest are sampling studies, design and optimal design of experiments and his assignment as editor in chief of the journal Revista de la Facultad de Ciencias.

Abstract

The global urbanization process involves challenges for urban planning that are particularly important in developing countries for two reasons: (1) the rapid urban growth and (2) the scarcity of resources to provide services in the cities. In addition, current urban transport trends have significant impacts on the environment, society and economy such as a high energy consumption based on fossil fuels, greenhouse gasses emissions, land waste, high infrastructure costs, inequities in location, inequities in the capability of enjoying the city. These are the reasons why current sustainability agendas for cities suggest to develop a set of integrated measures involving car use reduction, integrated land use, and transport planning actions, but also the promotion of public transport, cycling, and walking. These actions imply the design of different strategies based on the comprehension of travel behavior for the different users of transport systems. In particular for cycling, it is important to know about the origin and the destination, but also about the route that cyclists take. In consequence, there are different methodologies that have been applied according to the context going from the most sophisticated ones (GPS or smartphone apps), where it is feasible to track the cyclist, to some Internet-based or household surveys. However, in developing countries, resources are limited, not everyone has access to the Internet or email. As a result, it is difficult to capture cyclists' related information. In this sense, it is important to propose some methodologies trying to get the information about the travel behavior and particularly related to the cyclist routes, involving representativeness of cycling population and at a limited cost. This research aims to propose a methodology to collect cyclists' routes through telephone and field surveys. A tool for surveying bicycling routes will allow accounting for the gaps in methodologies and tools to evaluate strategies concerning bicycle promotion. Besides, it will provide new maps as a support for decision-makers in order to prioritize actions to promote cycling by letting them have a better understanding of cyclists' spatial interaction.

4.2.4 Attitudes of multimodal citizens towards policy measures to restrict car-traffic in favor of sustainable modes of transport

Lisa Ruhrort, InnoZ, Germany

Since 2006 Lisa Ruhrort has been doing research at the Science Centre for Social Research Berlin (WZB) as well as at the Technische Universität Berlin on questions regarding the transition of the mobility system towards sustainability. Since 2011 she has been working at the Innovation Centre for Mobility and Societal Change (InnoZ GmbH), where she focuses on the user perspective on mobility innovations such as car-sharing and electric mobility. She is currently working on a dissertation project on the user acceptance of sustainable transport policies.

Andreas Graff, InnoZ, Germany

Andreas Graff has been working for the Innovation Centre for Mobility and Societal Change (InnoZ GmbH) since 2012. His areas of expertise are quantitative methods of social research, computer-assisted web interviewing, statistical data analysis (regressions, factor analysis, cluster analysis, hierarchical linear modeling, structural equation modeling). He conducts research in the field of mobility attitude groups, user integration, user experience and user needs.

Sina Nordhoff, Delft University of Technology

Sina Nordhoff is currently a PhD student at the Delft University of Technology in cooperation with the Innovation Centre for Mobility & Societal Change, Berlin, where she is working on the user acceptance of automated vehicles in public transport. Before that, she was a working student in the research group „Society & Technology“ at Daimler AG, Berlin.

Abstract

There is evidence of a growing “multimodal” mobility culture in cities. As recent studies show, levels of bike and public transport use have been on the rise in many European cities, while car use has been declining – slightly but persistently. Mobility services such as car- and bike-sharing are growing. There is evidence that in the large cities multimodal mobility behavior is already the dominant mobility model. In a multimodal mobility culture the car is no longer the dominant means of transport but only one option among others. The question of this paper is if it can be expected that “multimodal” citizens will support or even demand transport policy measures to restrict car traffic in favor of better conditions for other modes of transport – such as cycling, walking and use of public transport.

To answer this question, the paper investigates the correlation between multimodal mobility behavior and attitudes towards a specific type of transport policy measures: namely measures which reduce access to public spaces for private cars to improve conditions for other transport modes: e.g. “car-free” neighborhoods, protected bike lanes replacing car lanes, reducing parking space in favor of other uses. The central hypothesis is that multimodal mobility culture could have a catalyzing effect on the transformation towards sustainable urban spaces: The more people experience other modes of transport beyond the car, the more they might question the dominant role of the car in public spaces.

In a first step, the paper outlines the potential interrelation between multimodal mobility and attitudes towards urban transport policies on the individual and the cultural level, recurring on theories from mobility studies and the sociology of technology. In a second step, it presents and compares the results of two exploratory studies using different samples. The first sample consists of more than 1.500 respondents from 39 countries worldwide that were recruited by means of the online survey platform “Crowdfunder”. The second sample consists of more than

500 respondents with an above average interest in mobility innovations (“Lead Users”), recruited on the basis of social media platforms Facebook, Twitter and Reddit.

4.2.5 Cyclists’ perceived aggression from car drivers on road interactions: Paris and Berlin comparison

Carolina Martinez Tabares, French Institute of Science and Technology for Transport, Development and Networks, France

Carolina Martinez Tabares received her doctoral degree in Psychology in 2017 from the Paris VIII Vincennes-Saint-Denis University, France. Her PhD thesis focused on identifying individual factors related to utilitarian urban cycling. She is currently a postdoctoral researcher in Social Psychology at IFSTTAR in the project “Urban New Cyclists”. The aim of the project is to develop measures to help new urban cyclists overcome their difficulties and to use the bicycle on their journeys.

Nadine Chaurand, French Institute of Science and Technology for Transport, Development and Networks, France

Nadine Chaurand obtained her PhD in social psychology in 2008 from University Blaise Pascal. She is a researcher at Ifsttar. She is interested in psychological factors related to cycling as a mode of transportation, such as subjective risk perceived by cyclists and other road users interacting with cyclists, psychological motivations and barriers to cycling as a mode of transportation, and designing interventions to promote urban cycling, based on theories of behavioral change.

Prof. Patricia Delhomme, French Institute of Science and Technology for, Transport, Development and Networks, France

Prof. Patricia Delhomme is a senior researcher of the Mobility and Behavior Psychology Lab at IFSTTAR. She participates in numerous projects to increase road safety, research strategies to encourage individuals to use their cars less and to increase the use of public transport or active modes of transport. She has supervised over 40 PhD students and post-docs, and has authored over 90 publications. The impact of her research is significant as evidenced by several of her papers being cited 300 times.

Abstract

One of the most important concerns about utilitarian urban cycling is related to road safety. For cyclists, risk can come from different sources, in particular from interactions between cyclists and car drivers. We conducted a study with the main aim of better understanding the interactions between cyclists and car drivers in urban situations, focusing on the perception of car drivers' behavior as aggressive. Using specific interaction situations between cyclists and car drivers based on three pilot studies, we carried out an online survey, among 174 cyclists, where we compared cyclists' perception of car drivers' behavior as aggressive, in two cities with different cycling modal shares: Paris (3%) and Berlin (13%). Results show that there was no significant difference in terms of perceived aggression between Paris and Berlin students. Cyclist students from Paris had a higher cyclist identity and perceived that car drivers granted more legitimacy to cyclists than cyclist students from Berlin. About our main aim, the higher the perceived intention to harm, and the higher the perceived danger, the higher the perceived aggression. Moreover, the lower the drivers' knowledge about adapted behaviors when interacting with cyclists (as perceived by cyclists), or the lower the legitimacy given by car drivers to cyclists on the road (as perceived by cyclists), the higher the perceived aggression. Finally, perceived aggression also increased with trait aggressiveness and "cyclist" social

identity. These results allow us to better understand interactions between cyclists and car drivers, in particular in terms of perceived aggression; They will enable stakeholders to design actions in order to improve the relationship between cyclists and car drivers, which will contribute to a better share of the road, prevent accidents and promote utilitarian urban cycling. The theoretical, methodological and applied implications of these results are discussed.

4.2.6 Revealed preference route choice model for cyclists in Kharkiv, Ukraine

Olena Chernyshova, Kharkiv National Automobile and Highway University, Ukraine

Olena Chernyshova holds Master of Science in Transport Systems from Kharkiv National Automobile and Highway University (Ukraine) and a Master of City and Regional Planning from Clemson University (USA). She is a PhD student at Kharkiv National Automobile and Highway University. Her research interests are focused on sustainable urban planning, alternative transportation, cycling infrastructure planning, urban development and active mobility.

Petro Horbachov, Kharkiv National Automobile and Highway University, Ukraine

Petro Horbachov graduated from Kharkiv National Automobile and Highway University (Ukraine) in 1986 and received his PhD in Transportation Systems in 1993 and Dr. of Science Degree in 2009. He is currently holding a position as professor and chair of the Department of Transportation Systems and Logistics at Kharkiv National Automobile and Highway University. His research interests are focused on the theory of transport processes and systems, the urban public transportation and traffic management, the analytical modeling of transport processes and system, etc.

Abstract

Recently bicycling has been rapidly developing in Ukraine. Since 2012 more than 30 small, medium and large cities have adopted cycling policy and started developing infrastructure. However, there is very little known about travel patterns of cyclists in Ukraine. The purpose of this research was to develop a route choice model that will allow capturing preferences of Ukrainian cyclists and to develop recommendations for local authorities on how to plan and design cycling infrastructure.

The second biggest city in Ukraine, Kharkiv, with population 1.5 million, was selected for the analysis. The data was collected through two main sources: mental maps of home-work cycling trips collected by local NGO and GPS tracks from mobile application of 30 Days of Biking local community. The Multinomial logit model was selected to estimate model parameters. The initial model had six parameters: route length, on-road parking density, speed of motorized traffic, number of traffic lights along the route, number of left turns, and physical effort required from cyclist. To calculate physical effort a model based on topography and riding speed relationship was developed. Even though, number of researches show that cycling infrastructure has a significant effect on route choice, at the time being city of Kharkiv did not have sufficient infrastructure to consider. Free software BIOGEME was used to estimate model coefficients.

As expected length of selected route was shorter than alternatives average, however, most of the time is longer than the absolute shortest route. It was expected that the number of traffic lights will discourage cyclists, conversely, number of traffic lights has shown to be the most significant factor with positive coefficient. After detailed review it was assumed that cyclist are attracted by major roads that tend to have more signalized intersections, number of traffic lights parameter was replaced by class of the road that proved the hypothesis. Speed of motorized traffic served as congestion level with speed drop during peak hour. The model has shown that cyclists are

likely to selected congested areas. Parking density has shown to be insignificant. The model is currently being implemented into bicycle traffic assignment model.

4.2.7 The state of the art in assessing bicycle travel demand in relation to the surrounding route environment

Ilil Beyer Bartana, German Aerospace Center, Germany

Ilil Beyer Bartana studied philosophy, geography and transportation systems in Tel Aviv and in Munich. She has gathered practical experience in planning for cycling at PGV, Hannover, and in researching different aspects of travel behaviour at the University of Natural Resources and Life Sciences, Vienna. Today she is a doctoral candidate working at the German Aerospace Center, Department of Mobility and Urban Development, focusing on the influence of the route environment on choices people make regarding cycling.

Abstract

The surrounding route environment and its evaluation by cyclists and non-cyclists plays an essential role in both mode and route choices. Previous studies have analysed the surrounding route environment according to factors that vary according to the applied research approach and the data availability. These factors can generally be arranged in three categories: the surrounding natural environment, the surrounding built environment and the surrounding human environment.

This study aims to review previous and current research efforts to assess how the mode choice 'bicycle' and route choices in bicycle trips are related to the personal evaluation of the surrounding route environment. It presents existing research achievements in investigating which factors of the route environment are crucial for bicycle travel demand and the use of certain routes. Moreover, the work tries to identify the frontiers of existent knowledge and its possible contribution to transportation planning and bicycle travel demand modelling.

Methodologically, the study applies a qualitative content analysis to investigate the state of the art in studying the route environment as it is evaluated by cyclists and non-cyclists. This content analysis of relevant selected literature is conducted with the assistance of the qualitative data analysis software Atlas.ti. The sampling of the literature is done according to the purposeful sampling principle in qualitative research.

The results will summarize how cyclists' and non-cyclists' evaluation of route environments can be valuable when modelling and planning for cycling.

4.2.8 Cycling behavior and the role of bicycles for daily travel in Germany

Dr. Clotilde Minster, Karlsruhe Institute of Technology (KIT), Germany

Dr. Clotilde Minster is senior researcher and lecturer at the Institute for Transport Studies (IfV) at the Karlsruhe Institute of Technology (KIT). Her research interests focus on the relationship between urban and transport planning, which include quantitative analysis of mobility behavior, transport policy, and transport planning. Her current research projects are related to mobility behavior and transport policies towards sustainability goals.

Dr. Bastian Chlond, Karlsruhe Institute of Technology (KIT), Germany

Dr. Bastian Chlond is senior researcher, lecturer and deputy head of the Institute for Transport Studies (IfV) at the Karlsruhe Institute of Technology (KIT), with experience in traffic engineering and as a specialist for travel behavior. He is responsible for the design and scientific supervision of the German Mobility Panel (on behalf of the German DoT), and application of

these data for research at the IfV. He teaches traffic engineering, freight and longdistance-transport and assessment and evaluation methods.

Abstract

Cycling is worldwide a key element of sustainable urban mobility plans, which has been recognized as positively affecting health, supporting sustainable development, and improving the liveability of cities. If transport policies aim to encourage cycling, researchers need to understand who the cyclists are, under which circumstances do they cycle, in which situations and why other modes are preferred.

Within the last 15 years, an intensification in the use of bicycles (i.e. an increased modal split of the bicycle) can be observed in Germany. However, it is not clear if the same person groups are using their bikes more intensively, or if the share of people using bikes for every day's travel has increased during the last decade. These two questions are key issues in order to identify cycling potentials for transport policies, as well as to identify person groups with a potential for (more) cycling. The identification of person groups and "trip situations" with a potential for an intensification of cycling would support decision making and help finding political measures by which cycling potentials could be activated.

These questions can be answered based on the data of the German Mobility Panel (MOP), which is a longitudinal national travel survey conducted since 1994. Each year participants have to fill a seven-day trip diary. Therefore mobility behavior may be observed across the time but also across a given week. The longitudinal approach allows for an identification of persons who cycle (during one week) but also for the distinction of different intensity levels. Furthermore changes in demand volumes can be identified.

Our results highlight how bicycle use differs among several population groups, and which individual characteristics have a positive or negative influence on cycling habits. By considering mobility behaviors in a longitudinal section for the period of one week, the competition but also the synergies between travel modes on an individual level can be analyzed, i.e. by looking if a person uses the bicycle at all and how intense their bicycle-use is. Then, we analyze in which way bicycle use has changed during the past 15 years in Germany. An increase of bicycle use for all population groups can be identified. Both modal shares as well as the changes in the cyclists' part of the population are considered. Demographic and structural processes explain part of these changes.

From the perspective of transport policy experts, the question is then how far cycling can be regarded as an element of multimodal mobility: can the bicycle be considered as synergetic to public transport (as well as car-sharing)? Environment-friendly modes such as cycling and public transport are in most cases not able to satisfy all mobility requirements. Therefore most cyclists combine several transport modes in their daily mobility. Our results highlight in which situations bicycles are used, and in which situations other modes are utilized. The results also show that more than two thirds of cyclists are car drivers as well and are therefore potentially sensitive for any changes in the supply frameworks. Our results can be used for a purposeful development of measures aiming an intensification of the use of bicycles.

4.3 Session C1: Health and Active Mobility

4.3.1 Session Chair

Dr. Audrey de Nazelle, Imperial College London, United Kingdom

Audrey de Nazelle is a lecturer in air pollution at the Centre for Environmental Policy, Imperial College London. Audrey is an expert in health impact assessment and exposure science. Her research is at the intersection of environmental sciences, health behaviour, transportation, and urban planning. Her work aims at guiding decision makers towards health-promoting built environments and policies. It involves novel and holistic approaches to assessing behavioural, environmental and health impacts of urban plans and policies.

4.3.2 Walkability in Essen – Testing measurement and assessment methods on macro and micro scale

Dr .Minh-Chau Tran, Universität Duisburg-Essen, Germany

Minh-Chau Tran has been post-doctoral research associate at the Institute of City Planning and Urban Design at the Universität Duisburg-Essen since 2009. She is working in the fields of health-oriented mobility behavior, walkability, public spaces, and digital analysis and participation tools. She studied architecture at the Universität Karlsruhe and worked as a freelancer in several planning offices. She also was scholarship holder of the State Graduate Funding of Baden Wuerttemberg.

Sonja Hellali-Milani, Universität Duisburg-Essen, Germany

Sonja Hellali-Milani studied Architecture at the Leibniz Universität Hannover and worked in several planning offices. She has been working as a research assistant at the Institute of City Planning and Urban Design at the Universität Duisburg-Essen since 2013. Her research focuses are on sustainable concepts for urban mobility, public spaces in transition and walkability. She is also a member of the PhD-Project “Energy Efficiency in Neighborhoods”.

Abstract

Urban form influences active behavior such as walking. Measuring walkability serves as a component to inform policy and planning and to assess their impacts. Decisions are based on reliable information which in turn is collected with adequate measuring tools. Yet, it is still difficult to measure walkability on street level: Related data is often not collected, measurements are very complex or are carried out arbitrarily. At the same time, there is a promising level of research interest and awareness which is also reinforced by new assessment methods and technologies.

In the walkability study currently carried out by the Institute of City Planning and Urban Design (ISS) quantitative methods for objective measurements on macro scale (GIS-derived) are linked with micro scale assessments of streets (audit-derived) and subjective individual perception (survey-derived). The goal is a) to identify which criteria are relevant for the specific context of Essen, Germany, b) to test how the different methods can be linked and 3) to find out whether the results on micro level relativize, validate or disprove the objective measurements on macro level.

Using a walk audit tool, physical features and urban design qualities of selected mixed-use street segments in seven study areas in Essen were assessed. Trained experts from the fields of architecture, urban design and social science collected the data on site using the digital app ArcGIS Collector. This audit tool contains context relevant features and is adapted to local conditions. The tool was linked with the GIS-based walkability index which measures the objective features of the built environment such as household density or street connectivity. Thus, the data collected on micro level is automatically included in the calculation of the walkability scores on macro level, so that error rates were limited when transferring data. In the last step objective walkability scores will be connected with results of pedestrian surveys in

order to include the subjective perception of streetscapes into the findings to additionally capture the social dimension of walkability. These findings are intended to provide a basis for developing an app for community street audits in Essen addressed to different target groups.

4.3.3 Austrian master plan for walking Nikolaus Ibesich, Environment Agency Austria, Austria

Nikolaus Ibesich, Environment Agency Austria, Austria

Nikolaus Ibesich is an expert on the subject of environmental aspects of transport with the focus on cause-effect relations in the field of transport systems, land use and settlement planning. He is an expert on assessment and appraisal of transport measures and policy instruments, on bicycle traffic and walking as well as on the subject of soft mobility and tourism with activities in national and international working groups. Since 2006 he has been working at the Environment Agency Austria, in the Department of Mobility and Noise.

Abstract

Walking is by far the most sustainable and most environmentally friendly form of mobility. Support measures in favor of pedestrians have - compared to other environmental modes of transport (bus, train, bicycle) - lower financial expenditure and promise high effectiveness. Walking is also essential for other means of transport to fulfil their function, because foot traffic is the universal feeder and the universal interface to all other modes of transportation.

Therefore the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) and the Austrian Ministry for Transport, Innovation and Technology (BMVIT) launched the initiative to formulate a "Austrian Master Plan for Walking", the new walking strategy for Austria, where a variety of efforts in Austria are summarized and bundled. The main objective of the Master Plan for Walking is to enhance and to strengthen the situation for pedestrians.

Rising shares of pedestrians are an important step towards fulfilling health, environmental and transport policy goals and commitments. To strengthen the traffic on foot stimuli are set and synergies are created throughout Austria.

The Master Plan for Walking ensures an attractive overall transport system, a high-quality living environment, a healthy population, an inclusive society, a strong economy and a high (traffic) safety.

In addition to an analysis of the current situation and a representation of the potentials and barriers for pedestrians, fields of action are defined and a catalogue of concrete measures at federal, state and local level is assigned. The master plan concludes with a list of good practices.

The Walking Master Plan shall lead to a joint action plan between the Austrian authorities federation, state and municipalities including a compilation of concrete measures, with the aim to promote walking effectively. The main emphasis of measures is put on infrastructure for walking as well as on necessary information, data, funding and the creation of pedestrian-friendly legal framework.

This 1st Austrian Master Plan for Walking was prepared with support of the Environment Agency Austria in consultation with numerous experts of the Federal ministries, Federal states and cities as well as experts for transport, environment, economy and academia.

4.3.4 Developing a score to assess the policy environment for cycling and walking promotion in cities – Results of a feasibility study

Dr. Sonja Kahlmeier, University of Zurich, Switzerland

Sonja Kahlmeier is leading the Unit on Physical Activity and Health at the University of Zurich, Switzerland. Her work focuses on physical activity promotion policy and networking as well as transport and economic approaches. Before that, she was with the WHO Regional Office for Europe in the Non-communicable Disease and Environment Unit, where she addressed similar topics. She has also done work with a focus on policy evaluation and indicators on environment and health.

Dr. Audrey de Nazelle, Imperial College London, United Kingdom

Audrey de Nazelle is a lecturer in air pollution at the Centre for Environmental Policy, Imperial College London. Audrey is an expert in health impact assessment and exposure science. Her research is at the intersection of environmental sciences, health behaviour, transportation, and urban planning. Her work aims at guiding decision makers towards health-promoting built environments and policies. It involves novel and holistic approaches to assessing behavioural, environmental and health impacts of urban plans and policies.

Abstract

Background: The suitability of transport environments for active mobility (i.e. cycling, walking) depends on its recognition in policy and transport planning processes. While a range of quantitative scores exist to assess cycling and walking environments, to date hardly any scores focus on the qualitative aspects of the policy and social environment.

Methods: As part of the PASTA (Physical Activity through Sustainable Transport Approaches) study, information on the social, policy and planning contexts was collected in 7 cities through standardized workshops and semi-structured interviews with key stakeholders in health and transport sectors. Information was collected on main policies and projects in place, challenges in supporting active mobility and a qualitative rating of local pedestrians' and cyclists' environments.

A purposive literature search in literature databases (ScienceDirect, PubMed, JSTOR) did not return any qualitative score to assess the policy/social environment for active mobility. Grey literature searches and expert input revealed the Copenhagenize Index as most suitable guidance.

Results: A subset of the Copenhagenize Index categories' was adapted and used to analyse the qualitative information from the workshops and stakeholder interviews on the social (bicycle/walking culture, social acceptance) and the policy environment (advocacy, politics, urban planning), respectively. Perception of safety was assessed using respondent's data from the PASTA survey. Feasibility to derive scores was tested using data from two cities (Zurich, London). Sequential text interpretation was used to derive a scoring for walking/cycling, i.e. two experts independently derived a score from 0-4 for each of the categories, one from the local PASTA team and one rating each of the cities. Sections to be used from the coded interview and workshop reports were pre-determined. Explanations on why a particular score was given were recorded. Disagreements were resolved through discussion and arguments for the agreed score were documented.

Conclusions: The approach was found to be feasible to derive initial scores to capture the policy and social context for walking/cycling, respectively, which can be included into quantitative

analysis of active transport data. Further work will be done to test and refine the approach with the data from the other five PASTA cities.

4.3.5 The go-active randomized controlled trial – An interdisciplinary study designed to investigate the health effects of active commuting and leisure time physical activity

Prof. Bente Stallknecht, University of Copenhagen, Denmark

Abstract

Regular physical activity is efficacious for improving metabolic health in overweight and obese individuals, yet, many adults lead sedentary lives. Most exercise interventions have targeted leisure time, but physical activity also takes place in other domains of everyday life. Active commuting represents a promising alternative to increase physical activity, but it has yet to be established whether active commuting conveys health benefits on par with leisure time physical activity (LTPA). A 6-month randomized controlled trial was designed to investigate the effects of increased physical activity in transport (bicycling) or leisure time domains (moderate or vigorous intensity endurance exercise). We included 188 overweight and class 1 obese sedentary women and men (20-45 years) of which 130 were randomized to either sedentary controls (n=18), active commuting (n=35) or moderate (n=39) or vigorous (n=38) intensity LTPA. At baseline and after 3 and 6 months, participants underwent a rigorous 3-day biomedical test regimen followed by free-living measurements. In a sub-sample, physical activity level and energy expenditure were monitored by means of personal assistive technology and the doubly labeled water technique. Additionally, the delivery, reception and routinization of the exercise regimens were investigated by ethnological fieldwork. One year after termination of the intervention, participants will be invited for a follow-up visit to investigate sustained health effects and continuous physical activity adherence. By combining biomedical, technological and humanistic approaches, we aim to understand the health benefits of physical activity in different domains of everyday life, as well as how to improve adherence to physical activity. The study has been finished and currently data analysis is ongoing. We will present the full data on metabolic health from the GO-ACTIWE study at the International Cycling Conference.

4.3.6 Overall health impacts of a potential increase in active commuting in Stockholm, Sweden

Johan Sommar, Umeå University, Sweden

Mr Sommar has a PhD in Occupational and Environmental Medicine, with a background in mathematical statistics (M.Sc.). He has a specific interest in air pollution epidemiology and is currently conducting research on air pollution effects among active commuters.

Abstract

There is overwhelming evidence that regular physical activity has important health benefits including reduced risk of chronic disease. At the same time, air pollution driven climate change is a global health threat, and the direct effects of emissions from traffic is a major health problem. Moving urban trips from cars to active transportation, mainly biking, could be a real win-win solution. Attempts to develop estimates of the overall impact of transferring journeys from car to bicycle have estimated very large potential benefits for commuters who shift mode of commuting. However, most studies use very hypothetical scenarios.

In this study register information on home and work addresses for the population of Stockholm County was used to obtain the shortest travel route on a network of bicycle paths and possible

roads. Current modes of travel to work was based on travel survey data. The relation between duration of cycling and distance cycled within the normal adult Swedish population in 2015 was established as a basis for selecting the number of individuals that normally would drive to their work place, but have a distance to work that they could cycle within 30 minutes. The change in traffic flows was estimated by a transport model (LUTRANS). Effects on air pollution levels was modelled using a dispersion model.

In the main scenario 111 000 commuters would shift from car to bicycle. The average cycle distance among the new bicyclists was 3.4 kilometers. On average, this reduced the one-year mortality risk by 12%, corresponding to 16.2 fewer preterm deaths in Stockholm County per year, or 469 fewer life years lost. Including the number of years lost due to disability (YLD), the total number of disability adjusted life years (DALY's) gained was 608. The amount of DALY's in the population was reduced by 368 due to reduced air pollution levels at home. Among individuals that shifted mode of transport from car to bicycle, DALY's increased by 261. Reduced exposure to air pollution among existing bicyclists however decreased the amount of DALYs by 8. The total amount of DALY's in the population decreased by 723.

4.3.7 Active transport and subjective general health: Roles of mental health, social support and physical activity

Ione Avila-Palencia, ISGlobal, Centre for Research in Environmental Epidemiology (CREAL), Spain

Ione Avila-Palencia is a PhD student from Pompeu Fabra University and a pre-doctoral researcher in the Barcelona Institute for Global Health (ISGlobal, former CREAL) in Barcelona (Spain). She is currently working under the supervision of Dr. Mark Nieuwenhuijsen in the EU-funded PASTA longitudinal study, investigating the associations between active transport and health.

Dr. Audrey de Nazelle, Imperial College London, United Kingdom

Audrey de Nazelle is a lecturer in air pollution at the Centre for Environmental Policy, Imperial College London. Audrey is an expert in health impact assessment and exposure science. Her research is at the intersection of environmental sciences, health behaviour, transportation, and urban planning. Her work aims at guiding decision makers towards health-promoting built environments and policies. It involves novel and holistic approaches to assessing behavioural, environmental and health impacts of urban plans and policies.

Abstract

Introduction: Active transport has been associated with multiple health benefits from reduction to cardiovascular risk, lowering of body weight, improvement of fitness, reduced risk of diabetes, to higher levels of physical and mental well-being. The association between active transport and subjective general health (SGH) remains unexplored, as are the mechanisms which mediate this association. The current study evaluates the association between active transport and SGH in adult population in seven European cities, and also if mental health, vitality, stress, social support, and physical activity are mediators of this association.

Methods: A cross-sectional study has been performed in seven European cities with approximately 5,000 adults. Participants responded to a comprehensive survey concerning their transport behaviour and perceived health. Participants were categorized as either active transport users or non-active transport users, and as with "good or more" or "less than good" subjective general health. Multilevel Logistic regression models of subjective general health status based on active transport exposure, adjusting for potential confounders, will be used to

estimate any associations. We will follow Baron and Kenny's framework to establish the mediation roles and we will further quantify the relative contribution of each mediator.

Results (expected): We expect to find association between active transport use and better SGH. We also expect to find indications for mediation of this association by mental health status, perceived social support, perceived stress, and physical activity.

4.4 Session A2: Designing Future Infrastructure

4.4.1 Session Chair

Prof Dr. José Carlos Mota, University of Aveiro, Portugal

José Carlos Mota is an Assistant Professor at the Department of Social, Political and Territorial Sciences of the University of Aveiro. Since 2004, he joined the Department has a lecturer and researcher and in 2014 completed his PhD on Participation in Spatial Planning. He is the Director of the Urban and Regional Planning MSc and the coordinator of the Bicycle and Soft Mobility Technological Platform. Has been involved in several research projects focused on collaborative planning and cycling. Presently, is coordinating an Erasmus+ project on «Community Participation in Planning» involving partners from UK, Italy and Portugal and promoting «Portugal Bike Value» network involving partners from local authorities, industry and advocacy groups.

4.4.2 Pedalling into a driverless world: Opportunities and threats

Prof. Dr. John Parkin, University of the West of England, United Kingdom

John Parkin worked for consulting engineers before joining academia, and is now Professor of Transport Engineering at the University of the West of England. He has been involved in transport policy formulation, modelling, forecasting, operational analysis, economic appraisal, design and construction. He has experience in all modes and a specialism in cycling. His research interests include infrastructure design, evaluation of transport interventions, and perceptions of risk and effort.

William Clayton, University of the West of England, United Kingdom

William 'Billy' Clayton is a Research Fellow in the Centre for Transport and Society, at UWE, Bristol. Billy's areas of interest are cycling, public transport, ICTs and travel, and the social impacts of travel. Billy's cycling research includes a study into approaches to encourage family cycling, and ongoing research into disability and cycling, exploring disabled cyclists' experiences of cycle infrastructure, and the barriers that people encounter in doing so.

Graham Parkhurst, University of the West of England, United Kingdom

Graham Parkhurst is Professor of Sustainable Mobility and Director of the Centre for Transport & Society (CTS) at UWE Bristol. Graham has 25 years' experience researching and teaching transport and mobility studies. His cycling-related research has examined bike-rail integration, gender and cycling, and interactions between pedestrians and cyclists. He has also undertaken extensive analysis of sustainable urban mobility policies; recently through the EVIDENCE Project.

Abstract

There is significant interest in driverless vehicles and trials are underway in many countries. This paper explores how authorities can most effectively continue to plan and provide for

cycling within the context of a car fleet which is becoming more sophisticated and potentially ultimately driverless.

The paper reviews the state-of-the-art in driverless technology. Based on willingness-to-pay evidence collected as part of the UK VENTURER project, it outlines possible future trajectories for the use of driverless cars, driverless taxis, and driverless shared demand responsive or scheduled transport. It discusses different infrastructure contexts in which driverless vehicles will be used, and the ways authorities may begin to adapt infrastructure.

The paper goes on to review issues relating to the interaction of driverless vehicles with cyclists, with a focus on social interactions in the street environment and how these may be affected and adapted. It presents research questions for the trialling of driverless vehicles in relation to cycling and reports early findings from a series of three real-world trials with the VENTURER driverless vehicle.

The paper explores the wider potential impacts for cycling, including the legal and regulatory implications and moral issues that relate to driverless control, and the potential for cycling being less attractive as a result of the perceived benefits of driverless vehicles. It concludes with suggestions for actions that authorities might need to take in relation to cycling in an emerging driverless world.

4.4.3 How to become a cycling city?

Anne Abbing. University of Groningen, Netherlands

Born in 1991, Anne Abbing studied Human Geography and Infrastructure Planning to finish her master's in Environmental and Infrastructure Planning in 2016. At the moment Anne, who has also worked for the United Nations Economic Commission for Europe (UNECE) as an intern, is finishing her second master's degree in Population Studies.

Abstract

What can be done in order to become a cycling city? This paper explores the conditions to be perceived as a cycling city, the influences of demographic, spatial and travel behaviour characteristics of city dwellers on calling a city a cycling city and the measures which are perceived as required to be taken in order to become a cycling city. A review on the conditions that determine the bicycle use in a city, has served as a basis for researching the conditions to be perceived as a cycling city. The research methods applied for this study are 2 surveys (n=291) and 3 focus group discussions and the study population consists of people aged 15-74 years old living in Amsterdam, Geneva and Groningen. The research findings demonstrate that the amount of cyclists in a city and the quality of cycling in a city matter for perceiving a city as a cycling city according to respondents. The results also reveal that the place of residence of respondents has an influence on perceiving a city as a cycling city or not. The measures which should be taken in order to become a cycling city according to respondents and focus group participants are related to the road infrastructure, the image of the bicycle and the socio-safety situation in the city. For future research, it is recommended to further test the researched and newly identified conditions to be perceived as a cycling city and the measures which may be perceived as required to be taken in order to become a cycling city on a representative sample.

4.4.4 Integrated design of safe cycling networks

Maurits Lopes Cardozo, Bike-minded & AltaGO-Europe, Netherlands

Maurits is a design & innovation consultant with key experience development of integrated solutions for bicycle network nodes like bridges, underpasses and network challenges. He was

designer and project manager of many cycling infrastructure projects all over the Netherlands. In 2013 he founded the design studio Bike-minded, focusing on design consulting for cycling infrastructure and strategic network innovation. Maurits works with the AltaGO-Europe network and the Dutch Cycling Embassy.

Abstract

This presentation illustrates how an integral design approach can help to develop safe and people centric cycling infrastructure with special focus on to connecting the missing links in cycling networks. To enable experienced and less experienced cyclists to use cycling as a safe and healthy mode of transportation, well-designed cycling infrastructure –separated from fast traffic where possible- is a key precondition. The nation-wide extensive Dutch bicycle network demonstrates that dedicated cycling infrastructure, along with pedestrian and car infrastructure, is crucial in increasing cyclist numbers as well as safety. But a proper bicycle network is as only as good as its weakest links. When developing the cycling network, it is challenging how to overcome barriers, like busy streets, highways, canals and railways. The crossings of these barriers form crucial nodes in the bicycle network, but are also complex and costly to realize. Therefore, it is important to ensure optimal use and effect of these infrastructural solutions for all stakeholders involved. A successful approach to develop effective, desirable and affordable infrastructure is to use an integral design approach where all different stakeholder needs are addressed in the design process. A thorough analysis of the design challenge, stakeholder needs, the spatial context, possibilities and constraints is fundamental for developing feasible design solutions. Drawing on a range of illustrations and photos, several in-depth cases of realized infrastructure solutions will be showcased to illustrate how cocreation with stakeholders resulted in effective design solutions. Applying an integral design approach to infrastructural challenges has potential benefit for a wide range of audiences, including policy makers, urban planners, researchers, traffic engineers and designers. The best practices of cycling infrastructure demonstrated in this presentation provides inspiration for new network development and discussion about similar design challenges.

4.4.5 Supporting Latin America's first bicycle avenue in Bogotá

Sarah Schneider, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Germany

Sarah Schneider holds a master's degree in International Development Studies. Since 2013, she has been working with the German development agency GIZ, first with the Cities Development Initiative for Asia (CDIA) in Manila, Philippines, and recently with the C40 Cities Finance Facility (CFF) in Berlin. Both multi-donor initiatives support cities in developing and emerging countries in accessing finance for sustainable investment projects.

Abstract

The C40 Cities Finance Facility (CFF), implemented by the C40 Cities Climate Leadership Group (C40) and the German development agency GIZ, is supporting the city of Bogotá in the preparations of a 25km bicycle highway for financing. This will include the provision of experts for engineering designs and complementary social, economic and environmental studies, and a Senior Project Advisor to facilitate cross-departmental coordination within the city government and with external stakeholders.

Named the 'Quinto Centenario' Bikeway to commemorate the city's 500th birthday, the route will connect citizens from low, middle and high-income neighbourhoods with work, educational and recreational opportunities. The corridor will support approximately 34,000 bicycle trips in

the morning peak hours and is expected to contribute to achieve emissions reductions of about 29,400 tons of CO₂e per year.

The project is part of the city's overall mobility strategy, aiming to place cycling above motorised transport by providing a more direct route, guaranteeing residents a safe, connected (both internally and to other modes), comfortable and accessible option to travel the city. The 'Quinto Centenario' Bikeway will also change the way the city plans, designs, and implements cycling infrastructure by incorporating context-sensitive and low-impact design and by unlocking financing options for this type of investments.

The presentation will discuss challenges and opportunities of the CFF support to project preparation and capacity development of the city.

4.4.6 Benefit evaluation of transportation switching model – A case study for motorcycle to bicycle in Taipei Wan-yu Lee, National Taiwan University, Taiwan

Wan-yu Lee, National Taiwan University, Taiwan

Wan-Yu LEE is a master's student at the Graduate Institute of Environmental Engineering, National Taiwan University in Taiwan. Her research interests lie in the area of urban sustainable transportation, especially active mobility. Furthermore, she has been studying in the area of transition to sustainable cities, circular economy and sustainable materials management. At present, she is focusing on completing her thesis, 'Benefit Evaluation of Transportation switching model - A Case Study for Motorcycle to Bicycle in Taipei.'

Abstract

Nowadays, the phenomenon of urbanization in the world leads to a high concentration of population, and excessive use of private transports, especially congestion and air pollution caused by motorcycles and cars. It's not only endangering human health, but affecting energy consumption, lifestyles and the environmental quality. Therefore, in order to achieve sustainable development in urban transport, route planning should be rethought. To achieve this goal, the hypothesis made in this study is to increase the density of cycle network to help shift motorcyclists to bicyclists. Simultaneously, the results will help reduce energy use, enhance human health and facilitate sustainable transport.

This study focused on setting up a transport switching model to simulate transport behavior, which is based on an Agent-based model (ABM). Furthermore, evaluated the benefits including human health, air quality, resources and energy consumption with lifecycle thinking.

Under the city scale, through considering the cycle network density increase as the influencing parameters of the transport mechanism, and motorcycles and bicycles as transfer objects. They have functional similarities, both are for short-range transportation in a city. However significant differences occur while comparing their energy consumptions and environmental pollutions. Therefore, simulation results are used as quantitative data in benefit evaluations, including mortality rate reduced by riding bicycles, air quality improvement by emission reduction, and no additional energy use in bicycles compared to motorcycles as well as lower maintenance supplies.

Overall, there will be positive and effective achievements by increasing the density of the cycle network, which helps shift motorcyclists to bicyclists, and this study can be provided for follow-up researches or government policies.

4.4.7 How can bicycle planning benefit from smartphone based data? A validation of data collection approaches

Sven Lißner, Technische Universität Dresden, Germany

Sven Lißner holds a diploma degree in Transport Engineering from the TU Dresden in Germany. He wrote his diploma on the CO₂ saving effects of cycling in 2013. Until 2014 he was working for an engineering office in Dresden. Currently he is working on a project, which evaluates the chances of GPS-data for bicycle-planning at the chair of Transport Ecology at TU Dresden. Further qualifications are environmental effects of mobility, especially e-mobility and life-cycle-analysis.

Angela Francke, Technische Universität Dresden, Germany

Angela Francke graduated in Transportation Economy with a specialization in Transportation Psychology and Ecology at TU Dresden, Germany. She works as researcher at the Chair of Transportation Psychology at TU Dresden with focus on transportation behavior, pricing, non-motorized transport and developing countries. Since 2015, she has also worked for the International Climate Protection Program (Humboldt Foundation) at the Centre for International Postgraduate Studies on Environmental Management.

Thilo Becker, City of Bremen, Germany

Thilo Becker holds a diploma degree in Transport Engineering from the TU Dresden in Germany and a master's degree in Transport Systems from KTH Stockholm in Sweden. He finished his PhD on social equity aspects in transportation and their environmental effects at TU Dresden in 2016. After having worked as a post-doc in the chair of Transport Ecology at TU Dresden until this summer, he is now a strategic transportation planner for the City of Bremen.

4.5 Session B2: Policy and Strategies

4.5.1 Session Chair

Francesca Racioppi, World Health Organization (WHO)

Francesca Racioppi is a Senior Policy and Programme Adviser on Environment and Health Policy and Governance at the World Health Organization Regional Office for Europe, in Copenhagen. Her professional interests include the promotion of active mobility policies and interventions. In this context, she coordinates the development of the WHO Health Economic Assessment Tools (HEAT) for walking and cycling, to estimate the economic value of reductions in mortality as a consequence of regular cycling and/or walking.

4.5.2 Impact evaluation of cycling measures – Exploring the state-of-practice in German municipalities

Julia Gerlach, Technische Universität Dresden, Germany

Julia Gerlach studied Industrial Engineering in Dresden and Guayaquil, Ecuador and is now working as a research associate at the Technische Universität Dresden. She coordinates the research project “RADeval” which aims at facilitating cycling evaluations at the municipal level. Additionally her research focuses on sustainability indicators as well as mobility-based social exclusion and environmental justice analysis.

Susan Hübner, Technische Universität Dresden, Germany

Susan Hübner completed a master's program in Transportation Economy and is working as a research associate in the chair of Transportation Ecology at the Technische Universität Dresden. Her research focuses on the environmental impacts and external costs of transportation as well as spatial and transport related measures aiming at more sustainable development. The evaluation of cycling measures is of particular interest for her and is the subject of her current research project.

Thomas Böhmer, German Cyclists Association (ADFC), Germany

Thomas Böhmer, German Cyclists Association (ADFC), Germany Thomas Böhmer is a researcher and engineer from Dresden, Germany. He is working in the field of cycling and integrated traffic planning. In the years 2012, 2014 and 2016 he coordinated the Bicycle Climate Test survey of the German Cycling Club (ADFC). Previous activities include research projects (potential of cycling for climate protection, interdependencies of bicycle and public transport), bicycle networking (MeetBike conferences) and bicycle promotion in cities (certified BYPAD auditor).

4.5.3 The role of governance and planning in the delivery of major cycling infrastructure in London

Brian Deegan, AltaGO, United Kingdom

Brian is one of the UK's leading experts in cycling infrastructure. He was co-author of the London Cycling Design Standards and has written and contributed to many engineering journal papers on the subject of cycling infrastructure. He was one of the expert panel members for the EU cycling strategy and led on the infrastructure chapter. He works for Transport for London ensuring the design quality of London's £1 Billion investment in cycling infrastructure

Abstract

The aim of this paper is to analyse the £100M London Cycle Network Plus (LCN+) project and assess its governance and planning in order to measure their effectiveness in delivering improved conditions for cyclists in London. The LCN+ commenced in 2002 and concluded in 2010 and was responsible for the delivery of over 600 cycling schemes. When the project concluded it had delivered 740km of the proposed 900km network. The approach was replaced by the superhighway programme initially and finally by the Quietway programme in 2013.

The author of this paper was part of the LCN+ project team and so can effectively highlight areas where changes could have been made to improve the delivery of the project. This paper also shows the implications of key leadership decisions on the project and offers a unique research insight into the effectiveness of governance.

The research method involved analysing each area of the project and inspecting its positive and negative aspects before suggesting how the negative aspects could be remedied in future major cycling schemes.

In conclusion, this review highlights several project errors, such as the use of constrictive key performance indicators, which placed too much emphasis on the length of delivered facilities rather than the quality of the network and its level of service to the user. It makes five clear policy recommendations that all future major cycling infrastructure projects could consider if they wish to be a success;

1. Establish a robust performance indicator baseline at project start up,
2. Ensure political engagement,
3. Engage all civic authority officers and not just those who cycle,
4. Record all assets so they can be protected and

5. Never compromise on key design principles when synergising schemes with other modes.

This paper is a companion piece to the following paper published by the Institute of Civil Engineering which assesses the standard of infrastructure delivered as part of the LCN+ and its role in increasing cycling whilst reducing collisions.

4.5.4 CiclovíaSP: Promoting a sustainable bicycle program in São Paulo city

José Evaldo Gonçalo, Transportation Secretary of São Paulo, Brazil

Agronomic Engineering, graduated at Federal University of Viçosa (1992), Master's degree in Public Policy from the Institute of Social Sciences - ICS of the University of Brasília, UnB (2000), PhD in the Postgraduate Program in Automation Engineering at the Polytechnic School of the University of São Paulo (2016). A large experience in Public Policy, with emphasis on Government Management, acting as manager in the following subjects: public transportation and urban mobility, health, tourism and environment.

Suzana Leite Nogueira, Traffic Engineering Company of Sao Paulo City, Brazil

The architect urbanist graduated at Mackenzie Presbyterian University, obtained a post-graduate degree in Transport Engineering at the University of São Paulo, specializing in non-motorized traffic. Experience coordinating the implementation of the Urban Mobility Plan in the city of Guarulhos, participating as a consultant in construction projects of Municipal Master Plans, public transportation networks and non-motorized transport as well as in the preparation publications on the topics. Currently working with bicycle planning in the Traffic Engineering Company of São Paulo.

Abstract

São Paulo is a city of 12 million people, being the most populous capital of Brazil. It is also the main financial, corporate and mercantile Centre of South America. It is therefore by its characteristics, the immense challenge of organizing its territory, as well as its transport system. In 2013, São Paulo completed the development of its Strategic Plan, and in 2015, its Mobility Plan. Among the axes, include Mass Transport Policy, with the implementation of BRT, and deployment of a cycle system, which includes the deployment of 400 km (248 miles) of bike lanes until 2016. With this action, São Paulo who had just 63 km (40 miles) of bike lanes until 2012, increase its structure, arriving in the end of 2016 with 463 km (287 miles), integrated terminals and subway stations, train and bus. The action included also new bicycle parking in all bus terminals, and 2500 new bike parking racks around the bicycle lanes. . Other complementar structures were made in the project, like adapting old bridges to the bicycle circulation, and constructing new bridges including bicycle lanes and also pedestrian walk.

It was a bold goal, which was reach by the Transportation Secretary of São Paulo, and this action was made with social participation, including hundreds of people in the process. The Mobility Plan provides that the city reach in 2030 a network of 1400 km (870 miles) of bike lanes

4.5.5 The complexities of a biking transition in a car dependent city: Evidence from Kuala Lumpur

Roya Shokoohi, Hanze University of Applied Sciences Groningen, Netherlands

Roya Shokoohi is a postdoc fellow at the Hanze University of Applied Sciences Groningen. Her background is architecture and urban planning, with a focus on active transportation and physical activities. She did project at Utrecht University, department of Human Geography and Spatial Planning about promoting cycling in a car dependent city, while she was there as a

visiting research scholar. Her current project is to understand adolescents' perception of cycling to school in the Netherlands.

Abstract

The study analyses the influence of Kuala Lumpur's (KL) residents' attitudes toward willingness to use the bicycle as a mode of travel for short distance as well as examining the impact that socio-demographic characteristic, cycling related interventions (e.g. car free morning, new cycling lane in KL), subjective norms and perceived behavioral control have on stimulating cycling. We assume that recent cycling policies and interventions, in Kuala Lumpur and the health beneficial of cycling (good for health and/or good for environment) helped attitudes towards cycling become more positive and increase the number of cyclists. Although, provision of limited cycling infrastructures in KL does not play an important role in encouraging people, because the current cyclists in KL are not utility cyclists. However, lack of cycling infrastructure and cycling facilitating attitudes of car and truck drivers, make cycling in KL very unsafe. As such the importance of safety is higher than countries where cycling is common, and safe like the Netherlands and Denmark; similarly the influence of other factors are also different. Factor analysis reveals five underlying attitudinal, cycling related interventions and cycling facilities factors: feeling about cyclists and cycling, cycling related interventions, safety, direct benefits of cycling, and cycling facilities. The results of Binary Logistic Regression show that cycling in KL is still a form of recreation mostly for male middle-income people and mostly among Malays and Malaysian-Indians. Findings also reveal cycling (mostly for leisure) is motivated by interventions (Car free morning), perception of cyclists/cycling (cycling is relaxing and/or fun), direct benefits of cycling (mostly health beneficial) and if the number of cyclists will be increased. This finding indicates that attitudes, subjective norms, and cycling related interventions have a relatively strong impact on stimulating cycling in a car dependent city.

4.5.6 How Austria became a cycling climber country – Austrian Masterplan Cycling 2015-2025

Martin Eder, National Cycling Officer, Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, Austria

After his master's degree in Regional and Town Planning at the Vienna University of Technology, Martin Eder worked as a transport planner at Austrian Postbus, IPE – iC Consulten and Siemens Austria. Since 2008 he is responsible at the Austrian Federal Ministry of Environment as National Cycling Officer for the implementation and enhancement of the Masterplan Cycling. He is also involved in the development of the Pan-European Masterplan Cycling under the umbrella of UNECE/WHO THE PEP.

Abstract

With the Austrian Masterplan Cycling 2006 and in setting the priority for implementation in the klimaaktiv mobil programs on cycling, the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) launched a new national initiative to support cycling in Austria.

Between 2006 and 2010 the share of cycle travel in Austria increased from 5% to 7%. The target for 2015 was a 10% share. Documented increases in local cycle mode shares already show that the direction taken by promoting cycling in Austria is correct and that the federal government's aim of increasing the share of cycle traffic to 13% by 2025 is attainable with consistent implementation.

Despite the successes achieved in the promotion of cycling over the last few years one can see that there is still more potential for further development, which is why new measures have been developed and a new Masterplan Cycling 2015-2025 have been formulated with 24 measures in six priorities:

- ▶ klimaaktiv mobil cycling initiative: the successful nation-wide coordination of cycling shall initiate an investment drive for the promotion of cycling.
- ▶ cycle-friendly conditions: Cycle-friendly settlement structures, the development of infrastructure, cycle-friendly legal conditions and the development of a pan-European Masterplan for Cycling Promotion in the context of the UNECE/WHO THE PEP to support cycling.
- ▶ information systems and awareness raising
- ▶ optimizing connections to other means of transport
- ▶ cycling as an economic factor
- ▶ cycling for the promotion of health

Within the wide range of cycling measures the most successful have been for Austria the installation of a national cycling officer, the setup of a national funding program for cycling and the awareness raising through award ceremonies and campaigns. The Austrian Masterplan Cycling as a national framework and his implementation in the last ten years is a good practice how a national cycling strategy can push forward cycling promotion and how cycling beginner countries can become a “climber” country.

4.6 Session C2: Mobility Cultures and Education

4.6.1 Session Chair

Jakob Baum, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

Jakob is a transport planner and throughout advocate for cycling. He is advisor to the German Federal Ministry for Economic Cooperation and Development (BMZ) in respect to transport policy in developing and emerging economies. Before joining GIZ, he worked as a consultant in mobility management and bicycle planning. Jakob holds a master's degree in transport system planning from the Technische Universität Berlin. He also studied psychology and urban studies at the University of California and the Freie Universität Berlin.

4.6.2 Social practices and the importance of context

Dr. Peter Cox, University of Chester, United Kingdom

Peter Cox is a senior lecturer in Sociology and Politics at the University of Chester, UK. He has been researching and writing on the sociology of cycling since 2004. He edited *Cycling Cultures* (University of Chester Press 2015) and is author of *In Bewegung: Ist nachhaltiger Personentransport möglich?* (WBG 2012) and *Cycling: A sociology of vélo-mobility* (Routledge 2018). Before life in academia he ran a cycle shop and helped organise cycling festivals as well as working for peace and environment campaigns.

Heike Bunte, Federal Environment Agency (UBA), Germany

Heike Bunte worked as a trained cycle mechanic before finishing her MA in Economic and Sociological Studies at Universität Hamburg. After working for a Dutch consultancy in mobility, traffic and transport she worked at the Technische Universität Dresden. Currently she works for the Federal Environment Agency, Germany on different cycling (research-) programs. She has published and researches on the sociology of cycling and sport, corporate mobility management and spatial mobility behavior.

Abstract

Social practice theory provides insights and approach to understanding not only for the analysis of existing social habits but also into their formation. Better understanding of the complexity of practices also allows insight into their relative degrees of obduracy: the potential for change or resistance to change. Characteristic of much work in recent analysis of cycling promotion is a tendency towards abstract generalization that ignores the specificities of practices as they occur in given locations. Cycling practices are not only located in space but also in time, and meanings, competencies and technologies are all inheritors of particular histories.

This paper argues that much current promotional activity and research into changing behaviour is problematic inasmuch as it is ahistorical, lacking in analysis of the social and political forces that are responsible for the sedimentation of current practices. Following Oosterhuis' (2016) argument, the paper argues that without embedding analysis of transport processes in a much broader context, that pays heed to forms of governance, citizenship, the relative competencies of different levels of polity and the ways in which these forces are historically constructed, interventions aimed at behavioural change have little chance of success. Developing the work of Aldred (2010) on cycling and citizenship and Shove (2015) on social practice and policy, the paper links these to the field of comparative environmental politics (Steinberg & Van Deever 2012) through a lens of historical analysis.

Drawing on a survey of over 100 recent papers analysing problems and interventions designed to promote modal shift in general and toward cycling in particular, the paper considers the degree to which these are sensitive to the social political and historical forces against which they operate. It then uses a comparison between historic campaigns for change in the UK and Germany to argue that the impact of interventions is less to do with their design than with the political context into which they are introduced.

4.6.3 The Brazilian way of promoting bicycle planning: Results of the bicycle in the plans campaign

João Paulo Amaral, Associação Bike Anjo, Brazil

He is co-founder of the Bike Anjo Network (bikeanjo.org), currently coordinating the "Bicycle in the Plans" project (bicicletanosplanos.org). He has a bachelor degree on Environmental Management at the University of São Paulo and works for sustainable urban mobility since 2008. He is part of the German Chancellor Fellowship program for tomorrow's leaders from the Alexander von Humboldt Foundation, working with international cooperation on cycling promotion, especially between Brazil and Europe.

Abstract

The Brazilian National Policy on Urban Mobility determined that starting from 2015 all municipalities with more than 20,000 inhabitants must prepare their Urban Mobility Plans (UMPs), ensuring priority to active mobility and mass transit modes over individual motorized modes, giving guidance to a transformation in the country's urban mobility, which is becoming increasingly motorized.

However, a research done in 2015 showed that less than 30% of the municipalities of Brazil did this UMP.

Therefore the Brazilian civil society organizations Bike Anjo, Transporte Ativo and União de Ciclistas do Brasil, with support from Instituto Clima e Sociedade, launched the campaign Bicycle in the Plans (bicicletanosplanos.org/en), aiming to engage and guide the civil society and municipal governments to include cycling in UMPs.

After 1 year of campaigning, over 5.000 guides on how to include cycling in UMPs were distributed to more than 300 Brazilian municipalities and bicycle groups, almost 500 people participated in 2 training workshops, over 20 activities were done in the local level and 21 cities are participating in the campaign. These cities gained technical assistance to municipalities by getting advisory and promoting workshops, as well as mobilization and institutional development of local associations. The first period of the project ended with a status report, presenting results and learnings of the campaign and evaluating some of the UMPs from Brazil, indicating processes which have at their core the inclusion of the bike in their contents and evaluating how valid they are.

With this research we noted: there is still a lack of dialogue between the municipality and civil society; the campaign helped the organizations to succeed in including the bicycle in UMPs; the participating organizations were strengthened institutionally; the UMPs already published mention cycling vaguely integrated to urban planning, but its effective implementation depends on the constant action of civil society for a change, especially in the way cities make their policies.

In 2017, the methodology of campaign will be increased and more civil organizations will be selected to advocate so that the National Policy on Urban Mobility is implemented in all regions of Brazil.

4.6.4 Cyclist-related content in driver licensing processes

Dr. Jennifer Bonham, University of Adelaide, Australia

Jennifer Bonham is a Senior Lecturer in Human Geography at the University of Adelaide. Her research draws on post-structuralist and feminist theoretical frameworks to explore the relationship between bodies, spaces, practices and meanings of travel. Jennifer's current work explores cyclist-motorist interactions focusing on cyclist-related driver education and training. She is co-editor of *Cycling Futures*, a book that draws together the latest cycling research from Australia and New Zealand.

Prof. Narelle Haworth, CARRS-Q Queensland, Australia

Professor Narelle Haworth is the Director of CARRS-Q, the Centre for Accident Research and Road Safety-Queensland. She has almost 30 years of experience in road safety research. Her special focus is improving the safety of the most vulnerable road users – pedestrians, bicyclists and motorcyclists – and other groups such as roadworkers. The interaction between safety and environmental and other health outcomes is also an interest that is most relevant for these groups.

Dr Marilyn Johnson, Monash University Melbourne, Australia

Dr Marilyn Johnson is a Senior Research Fellow with the Institute of Transport Studies, in the Department of Civil Engineering at Monash University in Melbourne, Australia. She is also the Research and Policy Manager at the Amy Gillett Foundation, the leading national cyclist safety organisation. Marilyn's research expertise is in cycling including cyclist safety, cyclist-driver

interactions and electric bike use in Australia. She was recently awarded a Fellowship by the Australian Research Council to investigate the impact of coroners' recommendations on road safety outcomes.

Abstract

Driver education and training is an important piece in the puzzle of creating 'cycling friendly' cities and societies. In emerging cycling countries like Australia, cyclists and motorists must use the same road space so it is especially important to equip these road users with the knowledge and skills necessary to safe and respectful interactions.

This presentation reports on research into cycling-related content in Driver Licensing Systems across Australia. The project commenced with a content analysis of the online and hard copy materials used by Australian states and territories in their driver licensing processes. Initially, we identified the specific knowledge and skills being developed (e.g. overtaking safely, taking care when turning across cycle lanes), where and when these were incorporated into the licensing process, and whether they were supported by theory or competency tests. We found limited references to interacting with cyclists and inconsistency across Australian jurisdictions in developing cycle-awareness. When cyclists were discussed it was often in relation to problematic traffic situations, disobeying road rules or 'hazard perception'.

Following the work of van Winsen et al (2015) on situation awareness, our research has gone on to examine how 'hazard perception' has become an integral part of the road safety literature and driver licensing processes, how cyclists have come to be identified as hazards in the academic literature and road safety practice, and the potential effects of constituting cyclists (and indeed other road users) in these terms.

The study is a collaboration between three Australian universities, state transport departments, local government, and cycling, motoring and motor insurance organisations. It is a multi-stage, multi-jurisdiction, interdisciplinary project aimed at ensuring appropriate cyclist-related content at a national level.

4.6.5 The bicycle as teaching object for the training of technical and soft skills in university education. A practitioner's report from the interdisciplinary teaching project „Kompass“ at Mannheim University of Applied Sciences

Matthias Bandtel, Mannheim University of Applied Sciences, Germany

Matthias Bandtel obtained his magister degree in Political Science, Media and Communication Studies, and Philosophy from Universität Mannheim. He has conducted research projects in the field of media sociology and coordinated government funded programmes promoting the quality of education at the Universities of Wuppertal and Marburg. Since January 2017, Matthias Bandtel holds the position as head of the teaching project kompass at Mannheim University of Applied Sciences.

Abstract

This presentation highlights the potentials of the bicycle as a teaching object in university education for the integrated training of both technical and soft skills. Drawing on experiences from the teaching project kompass at Mannheim University of Applied Sciences, we argue that the bicycle constitutes an ideal topic to stimulate interdisciplinary teamwork of undergraduate students. It is shown, how working on bicycle-related assignments enhances the students' practical knowledge and contributes to the development of communicative, interpersonal, and social competences.

Funded by Baden-Wuerttemberg State Ministry of Science, Research and the Arts, kompass aims at introducing students of engineering, information technology, economics, social work and design to the potentials and challenges of interdisciplinary teamwork. In jointly solving a common problem, the participants learn to represent their expertise and get to know professional skills beyond their own course of studies. Furthermore, in committing themselves to the group, the students develop a sense of responsibility and expand their communication abilities.

kompass follows a constructivist principle of teaching as well as problem-based, project oriented didactics. Therefore, the assignment that students work on for one semester has to be realistic, application-oriented and socially relevant. At the same time, the task must allow for contributions from different academic disciplines. In this regard, assignments around the topic “bicycle” have proven to be particularly suitable. Not only does the bicycle introduce students to large-scale societal challenges like mobility, sustainability, health, and security. These, in turn, serve as so-called bridging concepts, that bring together approaches, methods, and knowledge from different academic disciplines. Thus, the bicycle functions as an ideal locus, where perspectives from engineering, economics, social sciences and design studies can be integrated seamlessly. Moreover, the bicycle relates directly to the students’ lifeworld and hence presents a low-threshold entry to more complex problems. Finally yet importantly, assignments on the topic of the bicycle encourage students to create haptic objects using low-tech procedures, virtual-reality-modelling, or high-end construction techniques. In the process of implementing such projects, relevant soft skills like mediation techniques, communicative competences, and group dynamics can be trained in practice.

The presentation proposed here introduces examples of the projects realized by students at Mannheim University of Applied Sciences in the course of kompass, like new ideas for cargo bikes and innovative concepts on the topic of “smart bikes”. Discussing the process of implementing these projects, a rather uncommon application of the bicycle will be illustrated – its role as a teaching object for the training of soft skills in university education.

4.6.6 Bike uses over three generations

Prof. Dr. Ana Santos, Lisbon University, Portugal

Ana Santos (Human Kinetics Faculty - Lisbon University) is the Chair of Pedagogical Board, sociologist and anthropologist assistant professor for Sport Sociology and Sport and Mobility, researcher in the area of Governance, Policies and Livelihoods at the Centre for Research in Anthropology (CRIA). She is the Coordinator of the Project Dar a Volta ao uso da bicicleta (The new tour of bicycle use).

4.7 Session A3: Active mobility and health: Insights from the PASTA Project

4.7.1 Session Chair

- ▶ Mark Nieuwenhuijsen, Barcelona Institute of Global Health (ISGlobal), Spain

4.7.2 What makes people walk and bike? A longitudinal online survey of 10,000 Europeans

- ▶ Thomas Goetschi, University of Zurich, Switzerland
- ▶ Evi Dons, Vlaamse Instelling voor Technologisch Onderzoek, Belgium

4.7.3 What does it mean for health? Assessing health impacts in 7 European cities

- ▶ David Rojas-Rueda, Barcelona Institute of Global Health (ISGlobal), Spain
- ▶ Michelle Laeremans, Vlaamse Instelling voor Technologisch Onderzoek, Belgium
- ▶ Natalie Mueller, Barcelona Institute of Global Health (ISGlobal), Spain

4.8 Session B3: Economic Benefits of Cycling

4.8.1 Session Chair

Holger Haubold, European Cyclist' Federation (ECF)

4.8.2 FLOW – Cycling as a means of reducing urban congestion

Bonnie Fenton, Rupprecht Consult, Germany

Bonnie Fenton is a researcher and educator specialising in sustainable urban mobility. She works at Rupprecht Consult in Cologne, Germany managing European mobility projects. She currently coordinates the FLOW project, which looks at the role of cycling and walking in reducing urban congestion. She has also researched and reported on good practices in cycling in Europe and North America, coordinated a public consultation on the future of cycling in Metro Vancouver and contributed to the book *On Bicycles: 50 Ways the New Bike Culture Can Change Your Life*.

Abstract

Traffic congestion is a growing problem in many cities. For many years the standard solution has been widening roads for automobiles. Cycling (and walking) has rarely been considered as possible solutions in spite of their well-documented benefits for travellers and cities. Some decision makers are reluctant to implement cycling and walking measures because they fear these will increase congestion. In addition, the socio-economic benefits of cycling are often difficult to quantify, making it difficult to justify the investment. In both cases transport professionals need better tools for evaluating the impacts of cycling and walking.

The current inability to fully analyse the congestion reduction impacts of walking and cycling measures results in an over-emphasis on motor vehicle measures and an under-emphasis on cycling and walking. The difficulty in evaluating congestion impacts of cycling and walking measures feeds into potential fears that their implementation will increase congestion.

The socio-economic impacts of walking and cycling measures are also difficult to fully assess due to the data requirements and complexity of standard evaluation processes. Again, this lack of information can make it difficult to generate support for walking and cycling measures.

The EU FLOW project has developed a user-friendly methodology to help transport professionals evaluate these impacts and assessment tools for cities to use to evaluate the effects of walking and cycling on urban road performance (where poor performance is usually described as “congestion”). Existing transport demand models are being calibrated and customised in FLOW partner cities to help analyse the relationship of cyclist and pedestrian movements to network performance. Modelling and impact assessment identify the congestion reducing effect of cycling and walking measures. FLOW cities are developing implementation scenarios and action plans for adding or up-scaling cycling and walking measures that are shown to reduce congestion.

FLOW targets three audiences: cities are learning about the value of new transport modelling tools, planning consultancies are being made aware of how FLOW outputs support accurate modelling of cycling and walking and decision makers are being provided with facts to argue for putting cycling and walking on equal footing with motorised modes of transport.

4.8.3 Who is in? An exploration of the participants in the German campaign “Mit dem Rad zur Arbeit” (‘Cycling to work’)

Bernhard Schrauth, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

Bernhard Schrauth studied at the Universität Erlangen-Nuremberg and at the University of Utrecht and earned his diploma in social sciences in 2011. Since 2011 he is research assistant at the “Institute for Empirical Sociology”. His current work is dedicated to the research of road safety and mobility behaviour where he collaborates on numerous projects. He is a PhD candidate at the Universität Erlangen-Nuremberg, focusing on the sociological research of road safety and mobility behaviour.

Dr. Walter Funk, Friedrich-Alexander-University Erlangen-Nürnberg, Germany

Dr. Walter Funk earned his diploma in social sciences in 1986 at the Universität Erlangen-Nürnberg and was conferred a Ph.D. in Economics and Social Sciences there in 1992. Since 1999 he is a researcher at the “Institute for Empirical Sociology” working mainly in the field of road safety as contractor of the German Federal Highway Research Institute (BAST). His current research focuses on young drivers as well as children and youth as vulnerable road users.

Abstract

The campaign ‘Cycling to work’, organized by the General German Cycling Club ADFC and the German health insurance AOK, is the largest event in Germany to promote cycling to the workplace. Since 2001 the event takes place every year and in 2015 it attracted up to 150,000 cyclists. From June to August 2015 campaign participants were invited to cycle at least 20 days to work. The campaign was promoted via several communication channels, but mainly via contact persons of the health insurance company AOK in companies. By promoting active transport modes, the campaign brings together aspects of company mobility management, workplace health prevention and environment protection.

For an evaluation of the 2015 campaign a probability sample was drawn from the participants in fourteen German federal states. 2,296 participants took the online survey that included questions i.e. about the physical impacts of cycling to work, details of the commuting distance, the usual travel mode choice, or the individual cycling habits.

The presentation follows the aim of getting to know the participants of the campaign. Therefore, the results will mainly cover three aspects. Firstly, the campaign participants will be examined regarding their motivation and their cycling habits. Secondly, the daily transport mode choice will be analysed with special regard to participants changing their transport mode for joining the campaign. Lastly, the presentation will shed light on the participants’ social networks in the company and in the family and will point out the mutual interaction between the participation in the campaign and these social networks.

‘Cycling to work’ is a successful best practice example that combines active travel behaviour and individual health prevention. As the event is mainly promoted in companies, the project contributes to companies’ mobility and health management. For practitioners, the evaluation results will highlight practical reasons that contribute to the success of the campaign from a social science perspective.

4.8.4 Cycling as a job creation mechanism

Dr. Ian Skinner, Transport and Environmental Policy Research, United Kingdom

Dr Ian Skinner is an independent consultant, who specialises in the development, implementation and evaluation of sustainable transport policies. He has a PhD from the University College London and has spent the last 20 years working in consultancy and academia. Ian undertakes projects for clients ranging from the local to the international level, including the European Commission and UNEP. He is currently the transport expert on the Commission's evaluation panel for the annual Green Capital award.

Abstract

This paper reports on research that has been undertaken in the context of the Transport, Health and Environment Pan-European Programme (THE PEP), in partnership with UNEP, WHO and UNECE, that aimed to increase the evidence base for the job creation potential of cycling. This is important in order to demonstrate that cycling has the potential to bring economic, as well as environmental and health benefits, to local areas. Other studies on the job creation potential of cycling, including studies undertaken for the EU as a whole and for France and Austria, have taken a largely top-down approach to estimating the number of jobs associated with cycling. This research, on the other hand, took a bottom-up approach by contacting municipalities directly to ask them to estimate the number of jobs associated with cycling in their respective administrative areas. Municipalities were provided with a template and guidance document to demonstrate the type of information that was being sought and how this might be collated. The main high level finding was that 435,000 additional cycling jobs might be created in the pan-European region if 56 major cities achieved the same cycling modal share as the Danish capital Copenhagen. This was based on a simple methodology, but underlines the job creation potential of cycling. The more detailed findings suggest that jobs associated with cycling are diverse and can also be generated as the amount of cycling increases in a municipality. Tourism jobs also appear to be important in some areas, although the average proportion of cycling jobs in tourism in the municipalities covered was distinctly less than some of the other national studies have suggested. This suggests that more research into how cycling creates jobs in tourism might be beneficial. The research suggests that municipalities would benefit from a better understanding of the number of jobs associated with cycling in their areas in order to strengthen the economic case for investing in cycling.

4.8.5 Fietsen Op Zuid – Promoting cycling on Rotterdam's south bank as a means for socioeconomic development

Chris Roorda, Erasmus University Rotterdam, Netherlands

Chris Roorda is senior advisor at DRIFT at Erasmus University Rotterdam. He supports public authorities, NGOs and companies in understanding and accelerating sustainability transitions, in the fields of a.o urban development, energy and mobility. His work involves performing in-depth analyses of sustainability challenges, facilitating co-creation processes as well as capacity building for transition governance. Chris holds a bachelor's degree in Mathematics and a master's degree in Energy Science.

Morgan Geile, Erasmus University Rotterdam, Netherlands

Morgan Geile is an intern at DRIFT at Erasmus University of Rotterdam where she has just completed her master's thesis on urban transport. She has worked for over 7 years in various academic research fields centered around the environment and sustainability and is pursuing a career in renewable energy and sustainability solutions. Morgan holds a bachelor's degree in

conservation biology and a master's degree in Renewable Energies Engineering and Management.

Abstract

The Netherlands is considered to be the main cycling country in the world with a high, still growing, modal share of cycling in almost every city. However, on Rotterdam's South Bank another reality is noticeable. The South Bank of the city of approximately 240.000 inhabitants is the most socially challenged part of the city. Here biking is yet far from mainstream. The current growth is hampered because biking does not fit the dominant paradigm. The bicycle is still not an option for everyone, as many people don't own one or simply did not learn how to cycle.

'Fietsen op Zuid' is an integral program that aims to promote cycling as a means for socioeconomic development of Rotterdam's South Bank. To increase social mobility by solving transport poverty, strengthening the local economy by promoting craftsmanship and entrepreneurship and improving social health and safety by creating safe, healthy and inclusive public space.

Through projects and experiments Fietsen op Zuid aims to create a new cycling culture, targeting four aspects for successful promotion of biking: lifestyle, education, access to bikes and infrastructure & public space. The experiments are intended for broadening and upscaling new ideas and practices. The program works on mutual learning, for example in communities of practice, to inspire and support others to work on similar initiatives.

Too often, the promotion of cycling is treated quite narrowly as a strategy of mobility planning, and not seen as part of city's larger agendas regarding health, economy, spatial planning, etc. Playing into especially the social-economic benefits is a key strategy to establish links to more diverse agendas and create a broader commitment for the promotion of cycling.

The program challenges a diverse group of entrepreneurs, citizens, activists, housing corporations, NGOs, public entities, companies and others to relate the social benefits of biking to their own agendas and practices, using different instruments like the so-called 'transition arena'. Participants are invited to structure their shared problems with the current system and develop shared visions and goals which are then tested for practicality through the use of experimentation, learning and reflexivity.

4.8.6 Sustainable urban goods delivery in Rio de Janeiro: Cycle logistics in nine commercial centres

Jonas Xaver Hagen, Columbia University, United States

Jonas Hagen is an urban planning and transportation researcher, educator and consultant. He has practice experience in New York City, Bogotá, and Rio de Janeiro, among other cities. Jonas is currently a PhD candidate in Urban Planning at Columbia University. His research focuses on the public health and environmental impacts of transportation and land use systems.

Zé Lobo, Transporte Ativo, Brazil

Zé Lobo is managing director and founder of Transporte Ativo, CSO dedicated to quality of life through the use of human powered vehicles. He won a Cycling Visionary Award in 2013 at Velo-City Vienna – Austria, and was also a finalist of the Cycling Luminaires Award in 2014 and 2015 at Velo City Global, in the International Leadership category. He has been a member of the Cycle Planning Group of the City of Rio de Janeiro since 2003 and is currently a board member of ITDP Brazil and WCA - World Cycling Alliance.

Clarisse Cunha Linke, Institute for Transportation & Development Policy (ITDP), Brazil

Clarisse Cunha Linke is the Brazil Country Director to the Institute for Transportation & Development Policy (ITDP). She has 14 years professional experience in Brazil, Mozambique and Namibia, and holds an MSc in Social Policy from the London School of Economics and Political Science. From 2006-2011, she helped deliver the biggest community-based enterprise bicycle distribution network in sub-Saharan Africa with BEN Namibia. In 2010 she won the Ashoka Challenge “Women, Tools and Technology”.

Abstract

This paper presents information on cycle logistics (the use of bicycles and tricycles for last-mile urban freight delivery) in Rio de Janeiro. The authors present the results of an inventory and survey of businesses using cycle logistics in nine commercial centers of the city. They also provide estimates on air pollutant emissions and space savings that these vehicles provide versus motorized delivery options. The authors then compare the practice of human-powered urban freight delivery in Rio to current trends in bicycle and tricycle freight delivery in Europe and the North America. Finally, they outline a research agenda for cycle logistics in Rio de Janeiro.

4.8.7 Economic factor bicycle

Stephan Kritzinger, Prognos AG

Having studied geography, economics and ethnology in Frankfurt and Toulouse, Stephan Kritzinger started his career as research assistant at the Universität Frankfurt with a focus on urban transport. As project manager, he specialised in mobility and transport with BPI-Consult, ProgTrans and Prognos. His key areas of experience are transport modelling and planning from urban to international scale, analysis and long-term traffic forecasts for passenger and goods transport and economic impact assessments of mobility and transport – including cycling.

Dr Theresa Gutberlet, Prognos AG

Dr Theresa Gutberlet, PhD and MA in Economics, has been working on topics in transport economics and industrial organisation for 8 years. In her PhD from the University of Arizona she focused on the rollout of the German railway network. As a graduate research assistant in the fields of public finance and industrial organization she gained experience in revenue and cost assessment for both public and private investment. As consultant for the Prognos AG, she has contributed to studies of the German bicycle sector and development of a municipal mobility concept.

Simon Westphal, Prognos AG

Simon is a traffic engineer and working with Prognos AG since 2014 as a project manager in the field of Mobility & Transport. Previously, he worked for seven years as a consultant for ProgTrans AG - a spin-off of the Transport research field of Prognos. His work focuses on traffic modeling, cost-benefit analyses and feasibility studies, market analyses and forecasts as well as transport infrastructure planning. He has many years of experience in the modeling of road traffic with the traffic planning software VISUM in large-scale networks. In addition, he is a member of the Working Committee 1.4 of the FGSV, which deals with issues of economic evaluation of road infrastructure investments.

4.9 Session C3: Digital and Data

4.9.1 Session Chair

Prof. Dr. Daniela Nicklas, Universität Bamberg

Since 2014 Daniela Nicklas is a full professor for Computer Science for Mobile Software Systems / Mobility at the University of Bamberg. Before that, she was Junior Professor for Database and Internet technologies at the Carl von Ossietzky Universität Oldenburg since 2008. She received her PhD (Dr. rer. nat.) in Computer Science 2008 from the University of Stuttgart. In 2008, she received an IBM Exploratory Stream Analytics Innovation award for „Data Stream Technology for Future Energy Grid Control“.

4.9.2 Cycling and the built environment: An evaluation of bicycle suitability indicators with actual route choices

Raymond Pritchard, Norwegian University of Science and Technology, Norway

Ray has a background in civil engineering, working today on a PhD at NTNU with the aim to improve understanding of how the urban built environment impacts the willingness to cycle for utility purposes. The primary research question to be addressed is: “To what extent does new cycling infrastructure cause transport modal shift, route substitution or the creation of induced trips?” The research also focuses upon how bicycle route choice is influenced by the built environment.

Yngve Frøyen, Norwegian University of Science and Technology, Norway

Yngve is a professor in the Department of Architecture and Planning at NTNU. He has worked in both research and teaching related to transport planning and GIS and has additionally spent a number of years as a consultant and project manager both in Norway and abroad. Currently he is part of the core teaching group responsible for the NTNU masters of physical planning whilst he maintains research interests in planning and modelling for walking, cycling and public transport.

Bernhard Snizek, metascales.org, Denmark

Bernhard is a consultant sharing his time between an IT systems developer position at SWECO Denmark and his own company metascales.org. He completed a PhD at the University of Copenhagen in 2015 with the topic “Mapping cyclists’ experiences and agent-based modelling of their wayfinding behavior.” His focus now is with web GIS development and he continues to contribute to research in the field of active transport and GIS.

Abstract

Introduction

In order to improve our understanding of how bicycle networks are used and valued, many metrics have been developed to assess an urban area’s suitability for bicycle use. Such metrics take account of built environment factors as infrastructure quality, traffic volumes, perceived/actual safety, directness and attractiveness.

Bicycle suitability indicators (BSIs) are a subset of the aforementioned metrics that attribute numerical values to individual segments in a bicycle network (also taking intersections into account). A distance-weighting can be applied using BSIs for entire origin-destination route traces. These indicators are developed based on empirical data from real-world cyclists. The purpose of this study is to test the correctness of fit of a selection of BSIs against empirical bicycle route choice data collected in a medium sized city in Norway. The tested metrics are mostly based on Level of Service methodologies for bicycle traffic in mixed traffic environments.

Methods

The route choice data used to test the BSIs was collected through an online survey of students living in three student residences in Trondheim in November 2015. Respondents were asked to plot their preferred route choice from their residence to a well-known destination. Thus three origin-destination pairs were created, each with a selection of routes. Every unique route is attributed a score from each of the metrics tested. This allows us to test the appropriateness of each methodology in explaining the route preferences of the study participants.

Expected Results

460 valid responses were received from nearly 3000 students who were sent the survey. Not all respondents were regular bicycle users which would lead to reduced familiarity with the choice set of available routes. This lead subsequently to a distinctly higher preference for bus routes amongst public transport users.

It is expected that a correlation will be found between both experience and gender of users and the route directness and traffic volumes.

Conclusion

The survey's use of limited origin-destination pairs is highly suitable for testing of bicycle suitability, however the route choice explanation power of the metrics is expected to be low-moderate.

4.9.3 Streetlife berlin field trial – gamification and crowd sourcing for cycling safety

René Kelpin, German Aerospace Center, Germany

René Kelpin studied Mathematics in Berlin and since 2000 he has been a research associate at the DLR Institute of Transport Research. His focus is on mobility data – collection, analysis and modelling. In a series of European and national projects he was responsible for in-field mobility data survey collections and an impact assessment of respective applied ITS solutions. He is the head of the Clearing House for Transport Data at the Institute of Transport Research.

4.9.4 Supporting bicycle monitoring from civil society: The example of Bogotá's bicycle account

Carlosfeliipe Pardo, Despacio.org, Colombia

Psychologist with a MSc in Contemporary Urbanism from LSE. He focuses on urban development, mobility, and, climate change projects in the developing world. He has participated in consultancies in more than 30 cities in Asia, Latin America and Africa, and has delivered more than 70 training courses on urban development, climate change, bus rapid systems, non-motorized transport, travel demand management and sustainable transport. He is currently the executive director of Despacio.org

Abstract

The presentation describes the effort done by a civil society organization to compile and analyze data on bicycle use, perceptions and how this relates to cycling policy in Bogotá, Colombia, an effort called "Bogotá Bicycle Account 2014". The lack of a coherent set of data or a comprehensive document that described cycling in Bogotá was generating great misunderstandings and ill-conceived policies in Bogotá during various years. The lack of a reference document describing how cyclists felt was also an obstacle for proper bicycle infrastructure planning. Despacio (a civil society organization based in Bogotá) went into the effort of compiling all existing information (travel surveys, independent studies) that mentioned the bicycle to any extent, as well as did their own surveys to determine other factors. This led to

the publication of the document and the clear indication of issues such as the evolution of bicycle mode share, positive and negative factors associated to cycling, and estimations of benefits of cycling in Bogotá. The document was originally published in English as an outreach document for international settings, but was later also translated to Spanish to push forward proper cycling policies in the city. The presentation aims to present the reasons for publishing the document, the impact generated due to its publication and the lessons learned from the experience.

4.9.5 From people to people – The self-benefit of crowdsourced cycling data as part of the European cycling challenge

Giuseppe Liguori, SRM, Reti e Mobilità, Italy

Giuseppe Liguori is an expert in project management. From 2003 to 2009 he worked as project manager, advisor and expert lecturer on EU topics for the EUROPE DIRECT relay in Reggio Emilia (Italy). Since September 2009, he has been working at the Public Transport Authority of Bologna (SRM) with the role of Project manager and financial assistant on projects such as Flipper (Interreg IVC), Mimosa (FP7 CIVITAS+), Star-Trans (FP7), EPTA (Interreg IV C), SIMPLI-CITY (FP7-ICT), P-REACT (FP7), TRACE (H2020), The European Cycling Challenge, Bella Mossa – EMPOWER (Take-up city H2020).

Francesco Iacorossi, Roma Servizi per la Mobilità, Italy

Former rugbyplayer and devoted cyclist Francesco Iacorossi has been working as a project manager at Roma Servizi per la Mobilità since 2009 within EU funded projects mainly in the field of sustainable and active mobility through the promotion of cycling and walking measures in urban areas. Communication and dissemination strategy leader in several projects and initiatives such as P.A.S.T.A, ECC, Bike Challenge, SUMP Roma. Author of “When in Rome, go sustainable” a green-guide featuring the Italian Rugby Federation and FIAB to reach the Stadio Olimpico in Rome through public transport and cycling.

Abstract

The European Cycling Challenge (ECC) is a team competition among urban cyclists that takes place every year May, 1-31. Born in 2011 in Bologna as a small test within the CIVITAS Mimosa Project, the ECC is now an event joined every year by thousands of cyclists all around Europe.

The ECC applies the gamification approach to daily commuting. In 2016, the fifth edition, 52 European cities joined the Challenge, from 17 different countries. 46.000 people cycled 4.000.000 km in a month, producing a huge amount of GPS data that are shown as live cities’ heatmaps during the ECC and used by cities to assess user needs and for the cycling planning activities.

ECC has been rewarded twice in 2013 and 2016 with the CIVITAS Award as the best communication initiative and for its novel use of online applications in order to assess user needs.

Since the more cyclists join a team, the more chances a city has to win the Challenge (and the more GPS data are collected), each city implements its best local communication strategy to involve the highest number of people. ECC created a fun environment at local and international level, able to facilitate new partnerships between cities, new local groups (NGOs, advocacies, etc.), a countless number of linked events and to trigger behaviour changes among commuters.

Furthermore, crowdsourced GPS data have multiple effects in participating cities and most of the effects are eventually a direct benefit for the same people that produced those data. One

important step to reach those effects is to build on research results. There have been different research approaches at local level: applied researches on pure data, GIS mapping and paths assessment, physical infrastructure safety checking and cross matching with GPS data, thesis on cyclists' behaviour, etc.

This paper describes in details how Bologna and Rome have built around the ECC a sparkly movement of committed researchers, practitioners, decision makers and users, their achievements and failures. This paper also strongly focuses on lessons learnt from the point of view of the organizer of the initiative and from one of the most enthusiastic city.

4.9.6 Reading's EMPOWER Project as a take up city: Incentivising new people to cycle instead of driving using a smartphone app and other ICT

Marian Marsh, Reading Borough Council, United Kingdom

Marian Marsh is a Transport Planner at Reading Borough Council, and Lead Officer at Reading for the EMPOWER project. She has worked collaboratively across Europe on other EU projects. She has a Geography BA, MA in Town and Regional Planning and is a chartered member of the Royal Town Planning Institute and the Chartered Institute of Logistics and Transport. She has travelled extensively across Europe by public transport, speaks German and is always on the lookout for examples of good practice.

Abstract

Reading joined the EMPOWER project as a Take up City in October 2016 and is working on incentivizing cycling using a Smartphone App for just 6 months.

The city aims to double the number of cyclists in the modal split by encouraging drivers to switch to cycling for short trips by nudging and informing through an Incentives App for Sustainable Travel already used by around 20,000 people in Reading. Users of the BetterPoints App are incentivized with points and prizes to switch to sustainable travel and with further incentives to switch to cycling in the form of reminders of how this reduces the carbon footprint and keeps them healthier.

The project will link in with the new easyGo multimodal smartcard unlocking bike share, car share and bus travel which is to be launched in early 2017 to encourage cycling as part of a multimodal journey and hence to encourage people to look at when they can cycle as part of an end to end journey.

The EMPOWER package will include cycle training for adults and particular help to break down barriers to cycling for vulnerable groups including the elderly, women, newcomers to reading and refugees. The ReadyBike cycle share scheme of 200 bikes at 30 docking stations will offer incentives together with a local charity promoting cycle repairs and access to recycled bikes to help those without a bike of their own to get started.

The presentation will tell the story of how the project unfolded, the challenges the project team encountered and the findings on what worked best to incentivize cyclists and the numbers of cyclists that took up the challenge by using the App and Smartcard, by taking up training and by using cycle share or a recycled bike from the local charity.

The presentation will draw conclusions on what worked best and what may work for other cities wishing to implement a similar programme.

4.9.7 Moving towards happiness? Understanding travel moods through twitter data in Turin

Giulia Melis, SiTI – Higher Institute on Territorial Systems for Innovation, Italy

Architect, researcher at SiTI - Urban regeneration unit. In 2009 she started working for the Italian program Health in All Policies, and later for the project SOPHIE (7FP): thanks to an interdisciplinary team, she developed analyses processing individual and aggregate data to assess the health equity impacts of urban and transport policies. Recently, she started exploring the use of big data/data from social media as a powerful source for a better understanding of urban mobility behaviours. She is involved in the Cost Action TU1209 - Transport Equity Analysis.

Greg Rybarczyk, University of Michigan-Flint, United States

Greg Rybarczyk received his M.S. and Ph.D. from the University of Wisconsin-Milwaukee with a focus on urban transportation and Geographic Information Systems (GIS). He is currently an Associate Professor at the University of Michigan-Flint (UM-Flint), Department of Geography, Planning, and Environment, where he has been leading campus-wide GIS efforts since 2010. Dr. Rybarczyk has over a decade of experience utilizing GIS to analyse transportation, urban, and environmental phenomena within government, non-profit, private, and within academia.

Abstract

The research will address the following questions: does urban mobility matter for health, and mental health in particular? How does each transport mode relate to our level of stress/happiness?

A previous study conducted on Turin (Melis et al. 2015) showed that among indicators related to urban structure and social composition, 'accessibility by public transport' seems to be the one with strongest relation with mental health (depression) outcomes. Starting from this results, we decided to further explore this association through the use of data from social media.

Recent trends in the use of social networks have opened up new opportunities in the field of urban and transport studies: the great amount of data coming from Twitter is an example, providing easily available, often geo-referenced, marginally costly, datasets offering new insights on individual and collective life. The accuracy and reliability, as well as representativeness of the results coming from the use of this new source of data in the mobility and planning field is undoubtedly growing.

The project uses Twitter data collected for the metropolitan area of Turin (IT) and analyses it using a Semantic Analysis algorithm to show spatiotemporal levels of happiness (valence) of users, related to the transport mode they have been using. Geographic Information Systems (GIS) and spatial analysis techniques are then used to visualize spatial patterns and associations among happiness levels and contextual variables, such as land-use. From a methodological point of view, results can be compared to research conducted on US cities by Flint University (Rybarczyk and Banerjee 2015), as the method used is the same. The purpose of the study is exploratory, in order to understand which use can be done of such a rich data source as social media information.

Therefore, the results may be used to promote the use of social media data by transportation planners and public health officials for developing more effective transportation plans and policies, as well as to understand the degree of satisfaction/stress linked to different transport modes.

4.10 Session A4: Taking research into action: the PASTA tools.

4.10.1 Session Chair

- ▶ Julian Sanchez, London Borough of Newham. United Kingdom

4.10.2 Translating research for policy and practice. Key facts and lessons learned from literature, stakeholders and cities

- ▶ Sandra Wegener, University of Natural Resources and Life Sciences (BOKU), Austria
- ▶ Audrey de Nazelle, Imperial College London (ICL), United Kingdom

4.10.3 Learning from the best: A compendium of successful measures and policies.

- ▶ Florinda Boschetti, Polis network, Belgium

4.10.4 The new HEAT (Health Economic Assessment Tool): New modules on air pollution, crashes and carbon emissions.

- ▶ Francesca Racioppi, World Health Organization Regional Office for Europe, Germany
- ▶ Sonja Kahlmeier, University of Zurich (UZH), Switzerland

4.11 Session B4: Safety

4.11.1 Session Chairs

Sabine Schulten, German Institute of Urban Affairs

Sabine Schulten has worked as a scientific assistant at the German Cycling Academy at the German Institute of Urban Affairs (Difu) since 2013. Before joining Difu, Sabine worked for the Landkreis Barnim in Brandenburg and was responsible for public transport and cycling in the county. She studied applied geography and economics at the Universität Trier.

Sebastian Bührmann, German Institute of Urban Affairs

Sebastian Buehrmann is head of the German Cycling Academy at the German Institute of Urban Affairs (Difu). The Cycling Academy offers a broad programme of activities to stakeholders involved in improving cycling conditions on the local level. Before joining Difu, Sebastian worked for many years in European projects on sustainable mobility solutions. He has a background in Economic Geography and Urban Studies, including studies and work experiences in Germany, Mexico and Canada.

Abstract

This is a proposal for a workshop format. Please note that the authors are involved with the preparation of the conference via UBA and made this suggestion before to the project team (contact person at UBA: Heike Bunte).

Cycling infrastructure needs to be safe. Accident research and guidelines developed by practitioners point towards infrastructure that is relatively safe to use – from an objective point of view. On the other hand, there is the question, what cycling infrastructure also “feels” safe for the user - subjectively. These two angles on the safety topic do not always fit together in discussions among different stakeholders. Different countries have developed different

approaches to build up-to-date safe cycling infrastructure. While in Germany, a lot of cycling infrastructure is now provided as cycling tracks that are marked on the roads, Danish and Dutch planners favor for many settings separated cycle tracks. These are two very different planning approaches.

The idea of this workshop is to bring together practitioners and researchers from different countries (e.g. The Netherlands, Denmark, Germany) and stakeholder groups to discuss the topic of safe infrastructure, looking into both – objective studies of accident research and the perception of safety among users. There are still gaps in research to understand how different kinds of cycling infrastructure are perceived by different groups of cyclists and other traffic in specific conditions.

The aim would be to exchange on current insights and planning practices in the field of safe cycling infrastructure and to identify research gaps.

Short impulses from participants could provide input for a discussion moderated by Difu. The maximum number of participants should be limited to 25 to ensure lively discussion.

4.11.2 Accident analysis and comparison of bicycles and pedelecs

Dr. Tina Gehlert, German Insurers Accident Research, Germany

Tina Gehlert holds a PhD in Traffic and Transportation Psychology. Since 2013 she leads the research unit “Traffic behavior” at the Unfallforschung der Versicherer (UDV, German Insurers’ Accident Research Centre). Her areas of expertise include traffic and travel behaviour analysis, traffic safety of e-bike cyclists, driving performance of elderly car drivers.

Sophie Kroeling, Freie Universität Berlin, Germany

Sophie Kroeling studied Psychology: Human Performance in Socio-Technical Systems at Technische Universität Dresden. After receiving a Master of Science degree, she worked at the German Insurers Accident Research in Berlin and led various traffic psychology research projects. Since 2017 she has been working at the Research Forum on Public Safety and Security at Freie Universität Berlin. She works in the project REBEKA, which focuses the resilience of emergency responders.

Marcel Schreiber, German Insurers Accident Research, Germany

Marcel Schreiber holds a diploma in Traffic Engineering from the Technische Universität Berlin (Germany). There he served as researcher and lecturer at the Department of Road Planning and Operation for five years. Since 2013 he has been employed as project manager for traffic infrastructure by the Unfallforschung der Versicherer (UDV, German Insurers’ Accident Research Centre). His expertise includes the design and operation of traffic infrastructure as well as road safety research.

Katja Schleinitz, Technische Universität Chemnitz, Germany

Katja Schleinitz has been working as lecturer and researcher in the field of cognitive and traffic psychology at the Technische Universität Chemnitz since 2010. In 2016 she finished her doctoral thesis on the topic of „Cyclists’ road safety - Do bicycle type, age and infrastructure characteristics matter?“ She has gained expertise in several projects on cyclist and e-bike rider safety, electro mobility, driver distraction and automated driving.

Abstract

The number of electric bicycles (pedelecs) has increased in recent years and continues to increase both in Germany and elsewhere. Recent research shows that pedelec users ride

somewhat faster than conventional cyclists, there is more variation in speed (Schleinitz, et al., 2014, 2016) and car drivers use shorter gaps for turning off in front of pedelec users (Schleinitz et al., 2015). This raises concerns about higher accident risks for pedelecs. In Germany recently representative police accident data became available which distinguishes between cyclists and pedelec users. For the investigation presented in this paper a sample of 2.463 pedelec accidents from 2012 to 2015 was analysed in comparison to a sample of 84.921 bicycle accidents. Compared to bicycle accidents the share of elderly was higher for pedelec accidents. Also there were more fatal accidents and accidents with severe injuries for pedelecs. That holds true for younger as well as for older pedelec users. Compared to bicycles for pedelecs there were more driving accidents where the user loses control over the vehicle. Moreover for pedelecs more accidents with inappropriate speed as cause of accident, especially among the elderly cyclists occurred. Furthermore, there were more often other bicyclists involved in pedelec accidents compared to bicycle accidents. In summary there are specific accident risks due to the current user group – mainly middle aged and elderly cyclists - and the pedal assistance of pedelecs. Controlling a pedelec in a critical situation seems to be more difficult than controlling a bicycle in general. Especially elder pedelec users may cycle too fast given their ability to control the pedelec. Therefore, they may be at risk, a group that was not regarded as risk group for bicycle accidents so far.

4.11.3 Loving or hating bike paths? Why do some cyclist prefer separation and some cycling in mixed traffic?

Prof. Dr. Carmen Hagemeister, Technische Universität Dresden, Germany

Prof. Dr. Carmen Hagemeister studied psychology in Bochum and Aachen and finished her PhD dissertation „Individual tendency to make errors in concentrated work“ in 1993. Since then she has been teaching psychological assessment at TU Dresden. Her habilitation treatise in 2005 was on “Recognizing practice in concentration tests”, Hagemeister is mostly practicing research on traffic psychology and psychological assessment.

Maike von Harten, TU Dresden, Germany

The student of transport engineering at TU Dresden carried out an internship at GIZ in Costa Rica before becoming a student assistant at the Chair of Transport Ecology.

Abstract

Bike paths have become a symbol for the promotion of cycling in Germany and in other countries. But some cyclists are not happy with separation and demand that they cycle on the street which they share with cars. Better quality of bikepaths (width, surface, sight) and improved maintenance helps to reduce the criticism against separation of slow and fast vehicles. The general conflict of interests of different cyclists remains.

We programmed an online study in order to find out why different cyclists prefer different parts of the street when cycling on a main street with little or much traffic. We asked for riding on a bike path, in an on-street cycling lane and in mixed traffic. 424 female and 1330 male cyclists from 18 to 76 years answered most questions of the survey. 60% of the sample said that they biked every day. With more traffic present, separation became more attractive. Women preferred separation more than men, younger and older adults more than those from 26 to 54 years. Cyclists who cycled more often and in winter preferred mixed traffic more than others. Cyclists who preferred separation described their own cycling as less fast and as less predictable than cyclists who preferred to ride in mixed traffic.

It was remarkable that the preferred place to cycle was judged as needing less attention and as being less stressful. The results show that persons use the part of the street which they like – they like the part of the street which they use. The preference for a part of the road is rather general: it needs less attention, is less stressful, severe accidents are seen as likely. The rather undifferentiated image of the preferred ("loved") and not preferred ("hated") shows that preference and the "reasons" for them are closely related. The question, why cyclists prefer a part of the road cannot be answered such judgements.

For further studies it is interesting how much own experiences, observation of other road users, and information from media contribute to the preference for separation or mixed traffic.

4.11.4 Cyclists' red light running – Influence of bicycle type under different conditions

Sebastian Mach, TU Chemnitz, Germany

Sebastian Mach has a background in mechanical engineering and completed his studies in psychology at the Technische Universität Chemnitz in 2016. From 2009-2015 he worked at the Fraunhofer Institute for Machine Tools and Forming Technology in Chemnitz. Since 2016 Sebastian Mach has been a research assistant at Technische Universität Chemnitz, department of Cognitive and Engineering Psychology. His current research topic is human-machine interaction.

Katja Schleinitz, Technische Universität Chemnitz, Germany

Katja Schleinitz has been working as lecturer and researcher in the field of cognitive and traffic psychology at the Technische Universität Chemnitz since 2010. In 2016 she finished her doctoral thesis on the topic of „Cyclists' road safety - Do bicycle type, age and infrastructure characteristics matter?“ She has gained expertise in several projects on cyclist and e-bike rider safety, electro mobility, driver distraction and automated driving.

Tibor Petzoldt, Technische Universität Dresden, Germany

Tibor Petzoldt is Professor of Traffic and Transportation Psychology at the Technische Universität Dresden. He obtained his PhD from the Technische Universität Chemnitz in 2011, followed by his Habilitation in 2016. He has (co-)authored more than 20 peer reviewed journal articles, as well as multiple proceedings papers and book chapters. He has been involved in a variety of research projects both on a national and European level. His areas of expertise include cycling safety, driver distraction, driving education and driver assistance.

Sophie Kroeling, Freie Universität Berlin, Germany

Sophie Kroeling studied Psychology: Human Performance in Socio-Technical Systems at Technische Universität Dresden. After receiving a Master of Science degree, she worked at the German Insurers Accident Research in Berlin and led various traffic psychology research projects. Since 2017 she has been working at the Research Forum on Public Safety and Security at Freie Universität Berlin. She works in the project REBEKA which focuses the resilience of emergency responders.

Dr. Tina Gehlert, German Insurers Accident Research, Germany

Tina Gehlert holds a PhD in Traffic and Transportation Psychology. Since 2013 she leads the research unit "Traffic behavior" at the Unfallforschung der Versicherer (UDV, German Insurers' Accident Research Centre). Her areas of expertise include traffic and travel behaviour analysis, traffic safety of e-bike cyclists, driving performance of elderly car drivers.

Abstract

Red light running is one of the most common traffic violations among cyclists. From different surveys, we know that about 40 % of all cyclists run a red light at least occasionally (Alrutz et al., 2009; Bacchieri, Barros, Dos Santos, & Gigante, 2010). However, specific data on red light running of e-bike riders (pedelec and S-pedelec riders), a population of cyclists that has been growing steadily in the past few years in Germany and elsewhere (COLIBI & COLIPED, 2014), is largely missing. As of now, only a number of investigations from China, where the definition of e-bike differs considerably from the Western one, provide some indication in that regard, with higher rates of red light running reported for e-bike riders compared to conventional cyclists (Wu et al., 2012; Yang, Huan, Si, Gao, & Guo, 2012; Zhang & Wu, 2013). The goal of this study was to investigate the red light running behaviour of three different bicycle types (bicycle, pedelec, S-pedelec) in Germany. The investigation focused on the conditions under which the cyclists' showed this form of behaviour. To address this, we reanalysed data obtained in a naturalistic cycling study, in which we observed 88 participants riding their own bicycles (conventional bicycles, pedelecs, S-pedelecs) on their daily trips over four weeks each. The video material of these trips was annotated and analysed with regard to red light running. Overall, the participants experienced nearly 8.000 red light situations. In nearly 18% of these situations, they ran the red light. We found no significant difference between the three bicycle types. The red light running rates of cyclists and pedelec riders were nearly equal, and only slightly lower for the S-pedelec riders. For riders of all bicycle types, red light running was more common when they were about to turn right instead of turning left or riding straight through the intersection. Further analyses revealed that for less complex intersection types, e.g. T junctions, the occurrence of red light running was higher than for intersections of higher complexity, e.g. four-armed intersections. We also observed a considerable number of cases in which the riders changed their used infrastructure (e.g. from the road onto the sidewalk) to avoid a red light.

4.11.5 New road regulations for cyclists at traffic lights – What is the safety impact?

Thomas Jouannot, Cerema, National Center For Studies and Expertise on Risks, Environment, Mobility, and Urban and Country planning, France

Thomas Jouannot is a project manager in the CEREMA (National Center For Studies and Expertise on Risks, Environment, Mobility, and Urban and Country planning.) He wrote several national guidelines for cycling facilities in urban and interurban areas and is currently working on changing French regulations for safer cycling and walking. He is also a member of the international OECD working group that published the report “cycling, health and safety” monitoring international trends and exploring options that may help decision makers design safe environments for cycling.

Pierre Toulouse, French Sustainable Development and Transports Ministry, France

Assistant of the French interministerial coordinator for development of walking and cycling use, he works in the French sustainable development and transports ministry. Specialized engineer in road design and road safety, he is a convinced daily cyclist participating actively in the formulation of the last French masterplan for active modes with new road regulations and a mileage allowance for cyclists and pedestrians. He is also committed to the pan European cycling officers coordination introduced in the Transports, Health, and Environment, Pan European Programme. (THE PEP).

Abstract

Since 2012, French regulations for road signage have given local authorities, when they consider it possible, tools to allow cyclists not to come to a stop at an intersection with lights before turning right or going straight on.

Permission for cyclists to go through a red light in order to turn right or continue straight on meets with the objective of making it easier for these users to keep moving by avoiding stops that waste time and make it difficult to restart, while fully meeting the requirements of traffic safety for all road users.

Cycles have special features that make this new measure possible. The forward position of cyclists at intersections that is made possible by the small size of the cycle and its moderate approach speed often mean that the cyclist has much better visibility than motorists. In addition, its small size lets him get back into traffic more easily once he has gone through the lights.

This measure has been positively evaluated in Strasbourg, Bordeaux and Nantes, in a regulated environment, with following results:

- ▶ No accident related to cyclists being authorized to turn right at a red light;
- ▶ No negative impact on compliance with lights for other movements or at other intersections;
- ▶ Cyclist behaviour that had been erratic up till now is better channelled
- ▶ Cyclists remain on the road and stopped making a short cut via the pavement to avoid the light.

Based on this evaluation, more than 10000 traffic lights have been equipped in France with plaques that represent an outline of a bike and show the permitted direction.

This measure has been positively evaluated in Strasbourg, Bordeaux and Nantes [1], in a regulated environment. Based on this evaluation, more than 8000 traffic lights have been equipped in France with plaques that represent an outline of a bike and show the permitted direction.

The French national active mobility plan extended this measure in September 2015, to allow other movements at red traffic light, like turning left, or riding in any direction.

4.11.6 Coordinated traffic signals for cyclists on main bike routes

Denise Kramer, Technische Universität Berlin, Germany

Denise Kramer is a research associate at Technische Universität Berlin whose project work focuses on urban cycling and the safety and efficiency of cyclists at intersections. She attended courses at universities in Austria, Lithuania and Sweden and completed her master studies in Intelligent Transport Systems, with the thesis topic of “simulation based evaluation of public transport stop designs”.

Thomas Richter, Technische Universität Berlin, Germany

Thomas Richter is a full professor and head of the Chair “Planning and Operation of Roads” at the Institute of Land and Sea Transport Systems at Technische Universität Berlin. In addition to his academic experience, he provides years of practical experience as managing director of the transport engineering company SHP Ingenieure. As an active member of several transport associations (DVWG, VSVI, FGSV) he is involved in the latest traffic planning related developments.

Abstract

This research project focuses on the implementation of coordinated traffic signals for cyclists without causing severe losses in traffic flow for motorists and public transport. The main goal is

to examine the realistic possibilities to increase the average speed of cyclists on a specific road section in Berlin without slowing down motorized vehicles and therefore further cycling in general. The project is divided into two phases. Phase 1 outlines international best practice-examples of progressed traffic lights for cyclists as well as the challenges and restrictions of implementing such signalization. The main part of phase 1 examines possible tracks covering different criteria. Seven test tracks around Berlin are evaluated and ranked depending on their side effects on motorized traffic and public transport. Every progressed signalization presents an individual solution for the specific initial situation. Phase 2 of the project deals with the implementation of one of the three most promising test tracks. The chosen road section is part of Uhlandstraße between the intersections Lietzenburger Straße and Berliner Straße and consists of seven signalized junctions. Four of the signal time plans are optimized for cyclists to achieve a coordinated system in both directions without slowing down cars and public transport. To validate the traffic simulation model used for developing the coordinated system, traffic surveys based on video monitoring are conducted. The given results from phase 1 and the continuous work on phase 2 underline the complexity of coordinated traffic lights as well as the benefits of such systems. The conclusion of this project should help to implement similar measures on other road sections and to provide a scientific approach for the evaluation of such measures to promote cycling.

4.12 Session C4: Bike-Sharing, Electric Bikes and Intermodality

4.12.1 Session Chair

Parvesh Kumar Sharawat, Innovative Transport Solutions (iTrans). India

Parvesh Kumar is a cyclist, a planner, and a cycling technology innovator. He is the COO at iTrans, which works with policy makers, city governments and the private sector to plan and design sustainable and inclusive cities. He is a man who chooses to stand for the rights of cyclists who are mostly as silent as their mode is. He is also pursuing his PhD studies on assessment of socio economic benefits of non-motorized transport (NMT) integration with public transit (PT) with a case study of a bike share (BS) system in Pune, India.

4.12.2 Evaluating cargobike sharing's potential for sustainable mobility: Early adopters' characteristics and user behavior

Clemens Rudolf, Universität Stuttgart, Germany

Activist at the Berlin Bicycle Referendum „Volksentscheid Fahrrad“. Founder Lastenrad Stuttgart - a cargo bike sharing system in the free cargo bike scene (2014). Social Innovator at „Reallabor für nachhaltige Mobilitätskultur“ at Universität Stuttgart, a collaborative research project towards sustainable mobility culture. Five years working experience as 1st chairman and managing director of an international NGO (Bicycles for Africa). Electric bicycles trade expert. Diploma in Economics (2011).

Sophia Becker, Institute for Advanced Sustainability Studies Potsdam, Germany

Research associate at the Institute for Advanced Sustainability Studies Potsdam (Kopernikus Energiewende Navigation project). Diploma in Psychology (2011), dissertation thesis submitted (topic: individual rebound behavior in car-based mobility) at the Universität Stuttgart, Department for Sociology of Technology and the Environment (2013-16). In 2015: visiting scholar at the Department for Innovative Mobility at the Transportation Sustainability Research Center, University of California Berkeley.

Abstract

Shifting user behavior from private car use to low-carbon mobility routines is a crucial factor for the transition to sustainable cities. While numerous municipalities support car sharing with free parking and bike sharing with public funds, they currently do not foster cargobike sharing despite its huge potential to reduce car use. Meanwhile, a cooperative network of over 40 cargobike sharing operators has grown rapidly within the last three years in Germany, Austria and Switzerland. The vast majority of these operators have been initiated by civil society actors (individuals or associations). They share the idea of cargobikes as common goods (called „Freie Lastenräder“), renting out cargobikes to everyone without rental fees. Today, about 11,000 users have registered to this innovative mobility service. However, few is known about the characteristics and usage behavior of these „early adopters“. Moreover, an assessment of the environmental and behavioral impacts of cargobike sharing is missing. To address these questions we conducted an online survey among users (N= 856). A first sociodemographic analysis reveals that the mean age of users is 38 years (range: 14-76) and that 35 % of users are female. The majority of users (71 %) claim the bicycle as their main mode of transport. However, 40 % of respondents indicate that they would have done the trip by car (own car: 16 %; car sharing: 25 %) if there were no cargobike sharing operator. At the same time, about two third (68 %) of respondents are unexperienced cargobike users (1st-3rd time use of a cargobike). Thus, cargobike sharing has an important behavioral and environmental impact. It helps users to try out new mobility patterns and avoid car use. Moreover, users seem motivated to continue this low-carbon mobility behavior because 93 % indicate that they would like to use a cargobike again. However, most users (90 %) evaluate the current cycling infrastructure as inadequate for regular cargobike usage. We recommend that municipal decision-makers and urban planners consider cargobike users' need for an adequate and safe infrastructure in order to facilitate the wider adoption of cargobiking as a low-carbon mobility innovation.

4.12.3 Clean transport for a clean city – applications of electric cargo bikes in city cleaning (TRASHH)

Dr. Christian Rudolph, German Aerospace Center (DLR), Germany

Christian Rudolph has worked as a researcher at the DLR Institute of Transport Research since August 2014. His research focus is the determination of potentials for electric vehicles and electric cargo cycles in commercial applications. Between 2009 and 2014 he worked as a researcher at Technische Universität Hamburg (TUHH). After his civil engineering studies at Karlsruhe Institute of Technology (KIT), he worked as a consultant for transportation engineering services for Masuch+Olbrisch GmbH in Hamburg between 2007 and 2009.

Dr. Verena Charlotte Ehrler, German Aerospace Center (DLR), Germany

Following a degree from St. Gallen University, Verena Ehrler worked for over 15 years in the logistics and transport industry. This was followed by a PhD in Transport Research from the Technische Universität Berlin in 2011. Since 2010 Verena has worked at the DLR Institute of Transport Research, until 2013 as head of the Department of Commercial Transport, and since 2014 as project manager and lecturer. Her main fields of research are sustainable logistics, physical internet, emission calculation and electric mobility.

Lukas Schäfer, Stadtreinigung Hamburg, Germany

Lukas Schäfer coordinates research projects for Stadtreinigung Hamburg, the municipal waste management company in Hamburg. Previously, he worked on European topics for a circular economy at Wuppertal Institute for Environment, Climate and Energy. He holds an MSc in Urban Environmental Management from Wageningen University and Research Centre in the Netherlands.

Abstract

Waste management in European cities is already highly efficient nowadays: waste is separated, recycled and used as a resource to generate new products or energy. Waste management can therefore be even climate neutral.

Still though, transport related to waste management and city cleaning often depends on fossil fuels and generates air pollutants and noise emissions. With the aim to green their own activities, municipalities seek effective measures to reduce their transport related emissions whilst increasing health and safety as well as quality of life in cities. Electric mobility, and in particular the use of electric cargo bikes is one of the possibilities investigated in this context by municipal organisations. Therefore, current processes, routings and activities have to be analysed. Based on such an analysis, specifications towards e-cargo bikes suitable for the replacement are also to be carried out.

The municipal waste management of Hamburg, Stadtreinigung Hamburg (SRH), together with the DLR Institute of Transport Research, currently carry out such an investigation within the project TRASHH to analyse, for which processes in the field of city cleaning e-cargo bikes can be used instead of combustion engine vehicles. This includes both established work routines as well as work routines that will be implemented in the near future of SRH and which are not finalised yet.

Based on the experiences of the TRASHH project, the paper maps out the methodology mix applied for the analysis of processes at SRH. It shows first findings of this process analysis of current work structures and derives first cargo bike specifications. Furthermore, it maps out the methodology applied to identify potential applications within a municipal organisation for the use of e-cargo bikes and how the complexity of the organisation is approached. Challenges encountered within the analysis process are described and summarized in a “lessons learned” overview. The paper closes with an outlook on objectives and requirements towards the next steps within the process of introducing e-cargo bikes within SRH as an example for a public organisation.

4.12.4 Bicimad: Madrid public bike system, experiences and future steps

Sergio Fernández Balaguer, Madrid Public Transport Company (EMT Madrid), Spain

With a degree in Civil Engineering and major in Forestry by the Polytechnic University of Madrid and being an expert in GIS and remote sensing by the Complutense University of Madrid, Sergio joined the Madrid City Council with special emphasis in mobility governance, soft modes, electric mobility and international projects and networks in 2008. He is currently leading the European and International Projects department of the Madrid Public Transport Company, EMT Madrid, providing technical assistance to the city council itself.

Abstract

Oddly enough, cycling was much more popular in Madrid before the 50's of the XX century. Since then, the need of industrial development of the country, together with a chronic lack of motorized transportation, made cycling a minor mobility option as the car was taking a dominant role in the city.

However, in the last years, the urban needs to achieve a more sustainable mode of transportation together with the raising awareness of the population, made cycling again a shy new way of moving around the city of Madrid. Of course numbers are not impressive compared to other northern European cities, but still, the trend has been steadily growing since 2008, with a 0,22% share in the modal split, up to a 0,81% share in 2014.

The need of implementing more ambitious policies regarding air quality, together with the development of the SUMP of the city of Madrid, and the promotion of dialogue tools with different stakeholders to start a process of mindfulness towards the importance of the role of cycling in any city that intends to become sustainable, made possible the launch, in mid-2014, of the public bike system of the city of Madrid: BiciMAD.

This system, fully formed by pedelecs (bicycles with electrical assistance), provides an alternative mean of transportation, clean and healthy, which has shown itself as a very powerful tool to foster additional urban policies such as wider uptake of cycling infrastructure, change of local regulations to allow bringing bicycles into trains, subway or buses, installation of on-street bicycle racks, development of guides and maps, safer cycling routes, etc.

Initially the system was formed by 1.560 pedelecs and 123 stations, with 3.120 locks. However, the great acceptance of the system led quickly to the increase of the service up to the current 2.028 pedelecs, with 4.116 locks, and 165 stations, and more than 65.000 active users and more than 6,32 million uses since it was launched.

Despite these good numbers, and the extremely utility of the system to launch further urban policies to favor cycling in the city of Madrid, the system has also suffered numerous problems that the private company that was awarded with the management of the service after the call of tender and procurement process was not able to deal with (vandalism by non-users, technical problems with 20% failures in the locking processes, etc.).

This fact, together with the aim of improving the service by the city council and fostering public services as one of the pillars to create a truly cycling culture in the city, has made the city council to transfer the management of the service to the Madrid Public Transport Company (EMT Madrid) and therefore, we would like to explain in the conference not only the initial life of the system but also the future plans to improve it and the synergies that have appeared in the city thanks to BiciMAD, which make us being very optimistic about the cycling future of Madrid.

4.12.5 The economic and social efficiency of bike sharing systems in French cities

Haingotiana Rajaonah, Université des Sciences et Technologies, Lille1, France

Haingotiana Rajaonah is a PhD student in Economics at CLERSE UMR 8019 / University of Lille1-France. Besides research on bike sharing systems, she is a teaching assistant in statistics, econometrics and microeconomics at University of Lille1.

Abstract

As contemporary urban policy seeks to overcome the challenges presented by sustainable mobility, setting up bike sharing systems (BSS) have emerged as an increasingly common response in many French cities. In these cities, BSS are considered as a magic bullet to increase the modal share of cycling. Local authorities that have set up BSS expect an increase in the use of both public bicycles and privately owned ones. Self-service bicycle schemes have developed from being interesting experiments in urban mobility to mainstream public transport options in 38 French cities with different models of provision and different realities. In large French urban areas, BSS have undeniably found their place in the transport system. However, in smaller urban areas, the system doesn't always meet the success which was expected. Furthermore, local authorities have to deal with a much more complex situation due to the excessive operating costs of BSS. Real numbers on system's operating cost are hard to collect as perpetuating or closing a scheme is often a sensitive topic. According to these facts, it is time to take stock of bike share schemes in these 38 French cities. Firstly, I will outline and assess the benefits, costs and impacts of these schemes at an individual and community level. The qualitative and quantitative

assessments present the different benefits of implementation of BSS, the “cost of sharing” bicycle in public space, the real impact of BSS one bicycle use and mobility in different French cities. Secondly, based on the assessments results, I will provide some answers to explain the gap between reality and expectations. Finally, I will put forward some lines of thought about economic and social efficiency of BSS in France.

4.12.6 E-bikes for new citizens in Munich: Insights into determinants and barriers of e-bike use and ownership

Ruth Blanck, Oeko-Institut e.V., Germany

Ruth Blanck has a degree in mathematics. She has been working at Oeko-Institut as a researcher with a special focus on sustainable mobility since 2011. Her key research focus is the modelling of climate protection measures in the transport sector in Germany and their effects on energy demand and GHG emissions. Furthermore, she works on transition processes towards sustainability in the transport sector and the impact of e-bikes on mobility behaviour and transport systems

Abstract

E-bikes (pedelecs) offer a much higher potential for modal shift than conventional bikes and may thus contribute to a more sustainable transport system: They increase mobility options in various dimensions, e.g. by facilitating bike use on longer distances, in any topography, for goods transport, and for any fitness level. So far, there is only little scientific understanding of use patterns and modal shift associated with e-bike-use. Furthermore, political support focuses rather on electric cars than on electric bikes.

Within the BMBF-funded project “TRAFO 3.0”, a pilot project for promoting e-bike use was initiated in cooperation with the City of Munich. 130 new citizens in Munich were given the opportunity to use an e-bike for one week for free (Sep 2015 – Nov 2016). Telephone surveys of non-users and users (before use, after use, after one year) were carried out.

The results give insight into barriers for e-bike-use and ownership, mode choice behavior and use patterns. Preliminary findings show: Modal shift to e-bikes occurred mainly from public transport, but also from private cars and conventional bikes. The image of e-bikes (as a means of transport for elderly and unfit people) as well as the price remain important barriers to e-bike ownership. On a more practical level, knowledge was generated on the operational challenges of implementing a test week for new citizens.

4.12.7 Can electric bikes empower future mobility solutions?

Dr. Amy Guo, Newcastle University, United Kingdom

Dr Guo is a lecturer in Intelligent Transport Systems (ITS) and executive team member of various groups. She received a BEng degree in Railway Transportation from Central South University, China; MSc and PhD degrees in Transport Engineering and ITS from Newcastle University, UK. She is specialised in intelligent mobility, user behaviour analysis and interaction design for ITS and is particularly interested in testing and evaluating the effectiveness of technologies in improving road safety, meeting growing and evolving mobility needs and enhancing the provision of travel information.

Abstract

Electric bikes refers to bicycles that have a small electric motor paired with rechargeable batteries to assist the power provided by the user of the bike. Therefore, it requires less effort

when compared to conventional bikes and this has enabled more people to travel further for either business or leisure purposes. For a vehicle to be characterised as an electric bike, it must be able to retain the ability to be pedalled by the user, this is how electric bikes differentiate from electric scooters and motorcycles.

In 2016, data from Navigant Research have shown that the highest electric bikes sales in terms of region showed that the Asia Pacific were leading by a massive amount (32.8 million) when compared to other regions around the world. This was followed by Western Europe (1.6 million), North America (152k), Latin America (90k), Middle East and Africa (67k) and Eastern Europe (44k).

Research has demonstrated significant benefits of bike sharing schemes on health and well-being, modal shift, access to jobs, education and amenities, road safety, tourism around cities and the overall economy. E-bikes allow long distance journeys and easy climbing and have the potential to reduce the risk of damaging the rider's knees and joints. If more people are motivated to cycle instead of driving because of the available and affordable e-bike sharing schemes, energy, money and journey time can be saved and air quality in cities will be improved.

A study has been carried to review existing e-bike sharing schemes and understand the barriers to and potentials of the schemes using data from the UK and China. It is clear that, in the UK, the cost and inconvenience of renting an e-bike are the prominent barriers and the success of such a scheme is in great need of government support. We are in the process of analysing the data, which will be completed and presented in the full paper.

4.12.8 Equity of access to bike-and-ride trips in the city of Malmö

Zahra Hamidi, Malmö University, Sweden

Zahra Hamidi is a PhD candidate in urban studies at Malmö University and K2 (The Swedish Knowledge Centre for Public Transport). She is conducting research on tools to incorporate social justice and equity in decision-making process, and evaluation of transport projects. Her research specifically focuses on accessibility-based measures to investigate the impacts of cycling policies from The Just City perspective.

Rosalia Camporeale, Politecnico di Bari, Italy

Rosalia Camporeale is a postdoctoral researcher at Politecnico di Bari, Italy, although she is actually carrying out her research at K2 (The Swedish Knowledge Centre for Public Transport), Lund, Sweden. Her studies primarily focus on horizontal and vertical equity issues incorporated to the network design problem. Recently, she is also approaching topics related to shared mobility systems, in particular clustering, forecasting, and fleet relocation techniques.

Leonardo Caggiani, Politecnico di Bari, Italy

Leonardo Caggiani is an Assistant Professor at Politecnico di Bari, Italy. He has been carrying out his research activity since 2006. The studies carried out have led to the proposition of new methodologies in various areas related to transportation: quantitative methods for the transportation networks design, the mobility demand estimation (people and freight), the fleet redistribution problem of the shared mobility systems (bike and car sharing) and more recently equity issues on network design.

Abstract

Multimodality and intermodality as combination of different modes over time or in a single trip are key to sustainable and resilient transport systems. They facilitate modal shift from private car to combination of more environmentally friendly modes, such as public transport, cycling, or

walking, and offer additional social benefits. Bike-and-ride – that is, integrating bike and public transport in one trip - is an attractive combination, as bicycle is faster than walking and more affordable and flexible than other alternative modes. Using bike as a feeder mode to public transport could potentially allow people to reach more opportunities and improve their mobility and ultimately their wellbeing. Therefore, it is relevant to investigate the equity in accessibility to bike-and-ride options across population groups.

In this paper we focus on the role of private and public bikes (BSS – Bike Sharing Systems) to access existing public transportation system. We suggest to assess the equity in the bicycle access to the main transport hubs of a city, by developing a composite indicator based on accessibility measures and Theil index of inequality. The novelty of our approach is that this indicator, taking into account egalitarian perspectives, is able to capture the inequalities ‘within’ and ‘between’ any arbitrarily defined population groups. Moreover, this accessibility measure, in addition to travel time by bike, incorporates the typology of bike lanes (separated from or shared with roads), the presence of a bike sharing system in the network, as well as bike facilities (e.g. parking racks) in transport hubs.

The proposed methodology is applied to a real case study, the city of Malmö, Sweden, in order to prove its efficacy and usefulness. Considering the fact that more than 40% of the population in Malmö has foreign background, the equity of accessibility by bike to the main train stations and regional bus hubs is analysed across different ethnic groups. It is easily possible to extend this analysis by including further features of the population, such as income and gender, and apply the same approach to different contexts.

4.12.9 Analyzing the potential of bike & ride to improve suburban access to the city center: a case study of Seville

Robin Lovelace, Leeds University, United Kingdom

Robin Lovelace is a University Academic Fellow at the Leeds Institute for Transport Studies (ITS). Robin has wide ranging experience modeling sustainable transport systems and visualizing transport futures. These skills have been applied on a number of projects with real-world applications, most recently as Lead Developer of the Propensity to Cycle Tool and the stplanr package for sustainable transport planning.

Ricardo Marqués, Universidad de Sevilla, Spain

Ricardo Marqués is a Professor of Physics at the University of Seville. He is also a member of ConBici - the main Spanish association of urban cyclists - and has actively participated in the founding and development of the local association of urban cyclists of Seville „A Contramano“. He authored reports, articles, books and contributions to conferences, both in English and Spanish, related to the promotion of cycling as a sustainable transport. At present, he is studying the intermodality between bicycle and public transport, as well as the effect of infrastructures in cycling safety.

Javier Herrera Sánchez, Universidad de Sevilla, Spain

Javier hold a degree in geography by the University of Seville and is an expert in geographic information systems (S.I.G) who has specialized in aspects related to transport infrastructure in Andalusia, where he has integrated measures on sustainable mobility and promotion of non-motorized transport in cities. He specializes in the development of GIS, cadastral cartography, digital street and analysis of transport infrastructure networks in urban and metropolitan environments.

5 THE PEP Relay Race: Cycling and walking make THE Link – Transport, Health and Environment

Moderator: Franklin Apfel

5.1 Opening and Framing the Agenda

5.1.1 Welcome

- ▶ Francesca Racioppi (Senior Policy and Programme Adviser, WHO) & George G. Georgiadis (Secretary, Inland Transport Committee, UNECE)
- ▶ Hand-over ceremony of THE PEPBaton from Vladivostok, Russia to Mannheim
- ▶ Konstantin Loboda (First Deputy Head of Administration of the city of Vladivostok, Russian Federation)
- ▶ Lothar Quast (Deputy Mayor of Mannheim)

5.1.2 Keynote: Linking the International Cycling Conference, PASTA and THE PEP – Lessons learned from the last two days

- ▶ Lucy Saunders (Public Health Specialist, Transport & Public Realm Transport for London / Greater London Authority)

5.1.3 Questions & Answers

5.2 Session I: Developing Cycling Policy

5.2.1 Cycling Policies in Germany

- ▶ Birgitta Worringen, Federal Ministry of Transport and Digital Infrastructure, Germany: Head of Directorate „Sustainable Mobility, Energy, Logistics“

5.2.2 Pan-European Master Plan for Cycling Promotion

- ▶ Robert Thaler (Head of Division Mobility, Transport and Noise, Federal Ministry of Agriculture, Forestry, Environment and Water Management, Austria) & Pierre Toulouse (Interdepartmental coordinator assistant for development of cycling use, France)

5.2.3 Developing Cycling Policy in “Starter-“, “Climber-“ and “Champion“ Countries:

Interview with representatives from: Azerbaijan, Serbia and The Netherlands:

- ▶ Azerbaijan - Rustam Talishinskiy (Deputy Director, Scientific Research Traumatology and Orthopaedics Center)
- ▶ Serbia - Biljana Filipovic (Head of Unit for International Cooperation and Sustainable Development, Ministry of Agriculture and Environmental Protection)
- ▶ The Netherlands - Aletta Koster (senior cycling consultant at Royal Haskoning DHV)

5.2.4 Cycling and EU policy for sustainable urban mobility

- ▶ Piotr Rapacz (Coordinator for urban mobility /cycling focal point, DG Mobility and Transport, European Commission)

5.2.5 Economic Benefits of Cycling Tourism

- ▶ Alexander Stedtfeld, Federal Ministry for Economic Affairs and Energy, Germany

5.2.6 Questions & Answers

5.3 Session II: Environment and Urban Mobility

5.3.1 How can urban transport meet Germany's climate protection and sustainability goals?

- ▶ Dr. Norbert Salomon (Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, Germany: Head of Directorate IG I "Immission Control, Safety of Installations and Transport")

5.3.2 Reverse Innovation: Rethinking urban transport through global learning

- ▶ Dr. Harry Lehmann, German Environment Agency: General Director Division I "Environmental Planning and Sustainability Strategies"

5.3.3 Planning for sustainable transport policies – Assessing CO2-Emissions

- ▶ George G. Georgiadis, UNECE: Environment Division

5.3.4 Fishbowl Conversation

5.4 Session III: Health and Active Mobility

5.4.1 How does Active Mobility help to reach the SDGs?

- ▶ Dr. Ute Winkler, Federal Ministry of Health, Germany: Head of Division

5.4.2 Active Mobility in Ukraine: National and Local Perspective

- ▶ Olena Chernyshova, Ukraine: Board member of "Ukrainian Cycling Network" and Board Member of the NGO "Urban Reforms"

5.4.3 The new HEAT-Health Economic Assessment Tool (WHO): interactive demonstration with the audience;

- ▶ Dr. Nick Cavill, University of Oxford; HEAT core group

5.4.4 Closing Session Summing and Farewell

- ▶ Franklin Apfel (Moderator)
- ▶ Katrin Dziekan (UBA)

► Peter Roßteutscher (City of Mannheim)

followed by the excursion to Heidelberg guided city walk through the romantic center

6 Poster Presentations

Most of the posters can be found online:

<https://www.umweltbundesamt.de/en/international-cycling-conference-2017-programme>

6.1 Quantification of smartphone-generated, bicycle-related multi- and intermodality behavior data in Berlin

Enrico Howe, Innovation Centre for Mobility and Societal Change (InnoZ), Germany

Enrico Howe studied Natural Resource Management, Political and Communication Science at various universities in Germany and Poland. Before joining the Innovation Centre for Mobility and Societal Change (InnoZ), he worked for different research institutions and an environmental consultancy within the fields of renewable energies & sustainable mobility. His work focuses on user acceptance among different mobility solutions: shared and electric mobility, cycling and hydrogen economy.

Dr. Robert Schönduwe, Innovation Centre for Mobility and Societal Change, InnoZ GmbH

Dr. Robert Schönduwe is working as a senior expert at the Innovation Centre for Mobility and Societal Change (InnoZ). He graduated from the Universität Leipzig with a degree in Geography (Dipl. Geogr.) and received his doctorate at Goethe-Universität Frankfurt/Main. A major focus of his research is data driven innovations in the transport sector and travel behavior of special population groups.

Andreas Graff, Innovation Centre for Mobility and Societal Change, InnoZ GmbH

Andreas Graff has been working for the Innovation Centre for Mobility and Societal Change (InnoZ GmbH) since 2012. His areas of expertise are quantitative methods of social research, computer-assisted web interviewing, statistical data analysis (regressions, factor analysis, cluster analysis, hierarchical linear modeling, structural equation modeling). He has been conducting research in the field of mobility attitude groups, user integration, user experience and user needs.

Abstract

The research project “RadSpurenLeser” focused on the question how inter- and multimodal linkages between cycling and public transportation are being shaped in the city of Berlin. In order to answer this question, the smartphone app modalyzer which works as a tracking app has been used to collect individual mobility data and detect linkages between cycling and public transport modes. modalyzer tracks and analyzes individual mobility behavior and automatically identifies users’ modes of transport based on GPS and WIFI information as well as OSM data on public transportation. In addition, this mobility data has been linked to a quantitative online survey by recruiting 151 participants who indicated to occasionally cycle within Berlin and its surroundings. Overall, these participants generated a dataset of more than 6,000 days and 270,000 kilometers driven during two tracking periods (Jan/Feb & Apr/Mai 2016). 3,075 trips and 37,000 kilometers out of this big data sample have been analyzed. In this way, it was possible to link very precise mobility and behavior data on cycling and public transport in Berlin.

In addition, the online survey conducted in parallel to the GPS-tracking delivered key insights into motives and attitudes on intermodal use of cycling. Increasing the diversity and quality of the offered options for bicycle parking, as well as addressing bicycle lorry within public transportation has proved to be of major interest to users.

The study confirmed that multimodality plays a major role for 67 % of the users. Intermodality has been identified for 8 % of the trips, whilst 12 % of the cycling trips were combined with public transport either by bicycle parking, bicycle lorry or bikesharing at public transport stops.

The method of smartphone-generated mobility analysis proved to be very efficient and insightful. For the first time, selected mobility behavior schemes in Berlin such as bicycle related inter- and multimodality could be quantified using a big data set. The project has been supported by the German Federal Ministry of Transport and Digital Infrastructure with the help of funds of the 2020 National Cycling Plan (NRVP).

6.2 Get families to cycle more often by providing a family-friendly tricycle package

Karin Markvica, AIT Austrian Institute of Technology, Austria

DI Karin Markvica, MA, studied Urban and Regional Planning at the Vienna University of Technology and Geography at the University of Vienna. Before joining AIT Mobility in 2014, she worked as a program manager for the construction project „Erste Campus“ at Vienna Central Station and as a project manager for research projects, cycling planning and transport concepts at nast consulting ZT GmbH. At AIT Mobility she focuses on mobility behavior research and personal factors of mobility.

Christian Rudloff, AIT Austrian Institute of Technology, Austria

Dr. Christian Rudloff, studied mathematics at Universität Regensburg before receiving his MSc and PhD in mathematics from the University of East Anglia, Norwich, UK. At the Dynamic Transportation Systems team of AIT's Center for Mobility Systems he focuses on the statistical analysis of complex data sets and modelling of mobility choices. In the years 2012 and 2013 he visited the MIT as a visiting scientist to collaborate on a project extracting mobility behaviour from different data sources.

Abstract

Cycling with children is a sensitive topic since people tend to be more careful and risk aware when taking younger children along on their bikes. The decision whether to cycle with children is not only affected by the infrastructure and ability alone, but also depends on the design of the vehicle, the associated comfort or restrictions (e.g. due to the additional weight, the limited space for goods) and the riding safety (e.g. stability when turning). Even though there are family-friendly bicycle designs on the market and most cities promote cycling amongst young families, a predominant part of the families in cities still avoid cycling. Market research showed that a family-friendly tricycle package providing stable vehicle design (due to three wheels and a tilting mechanism for stability in corners), personalised routing and training offers covering different aspects (e.g. cycling techniques or road safety) could be part of a successful encouragement strategy.

In this paper we present the results of preliminary surveys that will be the basis of the development of the different elements of the above mentioned tricycle package (vehicle design, personalised routing, training). We performed qualitative surveys with twelve people and a quantitative survey with several hundred respondents selecting people with care obligations for children younger than six years old (since these children rarely cycle themselves) as participants, e.g. parents, grandparents, day mothers/fathers. The surveys cover topics like mobility-related group characteristics, group specific user behaviour, and service and design expectations. The gathering and elicitation of design requirements was realised by providing the interviewees with pictures of different design options with the additional feature of carrying

children and/or goods which were evaluated critically by them showing a clear preference for robust and save looking transportation options for children.

The results of the surveys will be applied by a team of transportation researchers, cycle designers and a cycle instructor, to develop and test the tricycle package. The surveys form a baseline to design the tricycle, optimise the routing, conceptualise the training concept and elaborate a market strategy in order to provide a family-friendly tricycle package that encourages families to cycle more often.

6.3 Factors for the perception of active modes health benefits and risks

Francis Papon, Université Paris-Est, AME, DEST, IFSTTAR, France

Francis Papon is head of the laboratory Economic and Social Dynamics of Transport (DEST) at the Department for Planning, Mobility and Environment (AME) at the French Institute of Science and Technology for Transport, Development and Networks (IFSTTAR) in Marne-la-Vallée. He investigates personal mobility, particularly walking and cycling, and travel surveys.

Clement Dusong, Université Paris-Est, AME, DEST, IFSTTAR, France

Clément Dusong graduated in Master 2 Transport and Mobility from Ecole d'Urbanisme de Paris and Ecole des Ponts ParisTech and is applying for a PhD contract in the laboratory Economic and Social Dynamics of Transport (DEST) at the Department for Planning, Mobility and Environment (AME) at the French Institute of Science and Technology for Transport, Development and Networks (IFSTTAR) in Marne-la-Vallée. He worked on the perception of health risks and benefits of active modes.

Abstract

Walking and cycling impact health in three ways: accident outcomes, polluted air inhalation, and exercise benefits. Actual impacts have been studied, but the decision to practice these modes depends on users' perception of health benefits and risks. As benefits outrun risks, for the promotion of active transportation, it is important to make users perceive the actual positive balance. This paper is a literature review on accident risks, polluted air risks, and exercise health benefits of active modes, both actual impacts and perceived impacts. The analysis details the factors affecting those actual impacts or perceived impacts. Individual factors include demographical (age, gender), socio-economical, experience, and psychological factors changing the actual risk or benefit level, and attitude (image, fear) towards risks and benefits. Environment factors include natural environment (weather, season, luminosity), and built environment (traffic volume and speed, road facilities, both mid-block and at intersections). Over 200 scientific papers were reviewed. The paper will summarize the main findings of the literature, but also point out the missing elements in existing research, and the discrepancy between risks and benefits on the one hand, and between actual impact and perceived impact on the other hand. These results will be used to design a survey to improve the knowledge of users' perception of active modes benefits and risks.

6.4 Streetlife berlin field trial – gamification and crowd sourcing for cycling safety

René Kelpin, German Aerospace Center, Germany

René Kelpin studied Mathematics in Berlin and since 2000 he has been a research associate at the DLR Institute of Transport Research. His focus is on mobility data – collection, analysis and modelling. In a series of European and national projects he was responsible for in-field mobility

data survey collections and an impact assessment of respective applied ITS solutions. He is the head of the Clearing House for Transport Data at the Institute of Transport Research.

Abstract

The integration of new services for ITS (Intelligent Transport Systems) into existing transportation systems, and the reliable change of users mobility routines as a consequence of new service interventions, is a very critical challenge for city administrations, mobility planners, and service providers. It means not less than breaking and adjusting existing users' mobility habits; such as individual routines and applied services. In the project STREETLIFE a gamification approach was used to introduce new mobility services in three individual pilot sites and to convince users to leave their "mobility comfort zone". The article will pay special attention to the pilot performed in Berlin. Here, an inter-modal route planning App for daily mobility combined a first "safe" cycling router for Berlin with a gamification approach and crowd sourcing routines for assessing, evaluating, and finally improving cycling safety. From March to May 2016, with the Berlin STREETLIFE game "Berlin BikeRider" user collected virtual points for participating in a game and competed for both virtual and real incentives. For all cycling trips, crowd sourced information on perceived cycling safety was collected by an on-trip survey. Users were able to assess safety matters of this individual trip and to add dangerous spots in a Berlin city map.

In consequence, not only the applied gamification approach and its impacts on main impact categories, i.e. the traffic system performance and carbon emissions, were evaluated. Special attention was laid on an analysis of crowd sourced data on cycling safety and on its comparison against existing public data sets on cyclists' accidents, provided by the Berlin Senate Department of Urban Development in cooperation with the Policy of Berlin. The joint analysis of both datasets allowed an evaluation and a completion of public statistics on cycling safety for Berlin – and in final consequence an improvement of data on cycling safety. It also assessed the concept of "Fahrradstrassen", dedicated cycling streets.

This paper describes the project, the Berlin pilot and the main results of data analysis. It will also provide an outlook to follow-up activities based on the data collected and results achieved during the project field test.

6.5 Challenges and Achievements in road safety and injury prevention in Baku

Rustam Talishinskiy, Scientific Research Institute of Azerbaijan, Azerbaijan

Rustam Talishinskiy graduated from Azerbaijan State Medical University with a "Master in Medical Science" in 1989. He worked as a Trauma Surgeon in a Traumatology and Orthopedics hospital attached to the Azerbaijan State Institute of Doctor's Advanced Training until 1994. He started working in the Azerbaijani Institute of Traumatology and Orthopedics in 1994 and did a PhD in Medicine in 1998. In 2009 he became NFP on THE PEP and later, in 2012

he became an associate professor.

Fidan Talishinskaya, SOCAR, PR department, Azerbaijan

Fidan Talishinskaya graduated from the State University of New York ESC with a degree in Human Development. Her thesis research dealt with "Empathy versus Fear: Persuasion in Health Campaigns." Upon completion of her degree, she successfully completed a „Managing Gender-based Violence Programmes in Emergencies“ course by the UNFPA. Later she was employed at

the United Nations World Health Organization in Baku as a Program Coordinator. She currently works as a Research Analyst at SOCAR.

Abstract

Baku is the capital of the Republic of Azerbaijan. According to official reports, the population of the city amounts to 2 181 800, however in reality that number far exceeds 3 000 000. Roughly 143 000 people were living in Baku before the first oil boom. Thus, the spatial planning and architectural decisions of that age are no longer suitable for modern requests. The fact that Baku is situated on the coast of the sea limits road traffic by cutting off along the bay line. Death toll of road accidents has been very high and has constituted 925 cases in 2010, 1 016 in 2011, 1 168 in 2012, 1 164 in 2013, 1 124 in 2014 and 894 in 2015. Mainly vulnerable groups, consisting of pedestrians and cyclists, have been affected. Road traffic and road infrastructure failed to make cycling a safe way of road mobility. The WHO and Health Ministry of Azerbaijan Republic have been working together and ran a few interventions in order to decrease the number of road traffic accidents. As a result of these interventions, the number of road accidents and mortality rate of the general population have relatively decreased, based on the data by the State Statistical Committee. National Focal Person on THE PEP and volunteers working group chose strategy for improving capacity building of cycling and creating few cycling zones in the city. A brand-new cycling path has been created along the coast of the sea up to Shikhov settlement in 2012. The total length is around 2000 meters. The project brought about positive trends in cycling. More people engaged in this activity. The result of this has been witnessed in 2016, when a new bicycle route was established along the north coast of Absheron peninsula. Although a lot has been done in the field, that has previously been basically non-existent, there is still room for improvement. THE PEP NFP and volunteers will continue efforts in improving experience of cycling in Baku, aiming to increase public engagement in this healthy and environmentally-friendly activity.

6.6 Cycling Attitudes and Behavior of Families in Urban Areas – Temporal Development and Findings from current surveys

Uta Schneider, Fraunhofer ISI, Germany

Uta Schneider studied Social Sciences with Psychology at the universities of Mannheim, Giessen and Brussels, specializing in Micro-sociology, Consulting and Advisory Services. From January to December 2011, she was research associate in the Competence Center Energy Policy and Energy Systems at the Fraunhofer ISI and since January 2012 in the Competence Center Energy Technology and Energy Systems. The research areas of Uta Schneider are the acceptance of new mobility technologies and infrastructure and qualitative and quantitative methods.

Martin Kagerbauer, Karlsruhe Institute of Technology (KIT) & INOVAPLAN, Germany

Dr.-Ing. Martin Kagerbauer is a senior researcher at the Institute for Transport Studies at the Karlsruhe Institute of Technology (KIT) and managing director of the INOVAPLAN GmbH. He studied civil engineering at the Technische Universität München and afterwards worked for five years as a project manager in the consulting office INOVAPLAN in Munich. The research areas of Martin Kagerbauer are travel surveys, analyses of the mobility behavior and travel demand modeling. He leads projects on travel behavior and travel demand modeling.

Tim Hilgert, Karlsruhe Institute of Technology (KIT), Germany

Tim Hilgert (MSc) is a researcher at the Institute for Transport Studies at the Karlsruhe Institute of Technology (KIT). He studied Industrial Engineering and Management at the KIT and worked as a student employee at the PTV group in the planning department during his master's studies.

Since 2014, Tim Hilgert has worked at the Institute for Transport Studies and focuses his research on analyses of mobility behavior and travel demand modeling, i.e. activity based modeling of daily routines.

Abstract

When starting a family, mobility requirements are often increasing in daily life. As a consequence, more trips are done and cars are used more frequently than before. This applies to rural as well as urban areas even though in different intensities. At the same time, in the last decades, car usage is decreasing in Germany especially in younger population groups and multimodal behavior is increasing, i.e. they use different modes within certain time periods.

In terms of attitudes and values, people are more aware of negative consequences when using cars. This may also apply to families. They might be willing to reduce their car use in order to preserve a viable environment for their children. In urban areas – since transportation supply and mobility options for using alternative modes are often better than in rural areas – a sustainable travel behavior is more feasible. The infrastructure and the supply side contribute to this trend in the sense of better conditions for cyclists (e.g. cycling lanes, bicycle trailers or cargo bikes). At the same time, families are facing a higher complexity managing their trips and organizing family life.

The question arises if there are new trends with regard to travel behavior of families in urban areas. Is there an increase in active travel (i.e. cycling and walking) in the last years? What are motives and needs of families with regard to cycling and walking?

In this paper, we examine travel behavior as well as motives and attitudes of urban families in Germany focusing on active travel. Data from a qualitative study with 22 families is analyzed to find out about the motives for cycling and walking as well as the demands with regard to the infrastructure for active mobility. To prove the results and findings from this study, we analyze data from the German Mobility Panel. This annual longitudinal survey since 1994 enables to show the temporal development of mode usage concerning urban families in a quantitative context with about 2,000 participants per year.

Both independent surveys – qualitative and quantitative – indicate an ongoing trend towards a more sustainable mode usage in urban areas.

6.7 Accessing and egressing bike sharing stations – findings from Vienna

Michaela Leitgöb, Vienna University of Technology, Austria

Michaela Leitgöb finished her studies in spatial planning at TU Wien in October 2017. The theme of her master's thesis was „Access and egress behaviour at Citybike Vienna bike sharing stations“. In addition she is a trained engineer in civil engineering (HTBL Krems). Now she is working as spatial planner in the area of regional and local planning in Vienna.

Tadej Brezina, Vienna University of Technology, Austria

Tadej Brezina studied civil engineering at TU Wien with a specialization in transport and infrastructure. He is currently a researcher at TU Wien's Research Center for Transport Planning and Traffic Engineering. Besides hosting two lecture series (public transport and active mobility), his latest research comprises of rail commuting potentials, public transit service opportunities in commuter-belt municipalities or the infrastructural circumstances of cyclists running red lights.

Guenter Emberger, Vienna University of Technology, Austria

Guenter Emberger studied Computer Science and Business Administration and presently holds the position of Associate Professor at TU Wien's Research Center for Transport Planning and Traffic Engineering. He has been working in the field of transport research since 1990 and cumulated experience as Guest Research Fellow at ITS Leeds from 7/2002 to 6/2004, by being involved in more than 30 international and more than 35 national research projects and by publishing more than 100 scientific articles and book chapters.

Abstract

Bike sharing systems, such as the Viennese system Citybike Wien, are sustainable, active and easily accessible public transport systems. Through the promotion of bicycle traffic, these systems contribute to a sustainable urban development. Due to the growing global demand for bike sharing systems and the diverse political and planning objectives, which are pursued through the implementation of such systems, a huge research interest has arisen.

As conditions of access to and egress from a transport mode are commonly understood as a key feature of success and acceptance, our paper surveys the access and egress behaviour at Citybike Wien stations. First, existing scientific findings of bike sharing systems are briefly explained and on this basis the Vienna's system is analysed. Based on the system's actual two month lending and return data, the stations to be surveyed in detail are chosen. Citybike Wien users were surveyed at these selected stations in three separate waves of personal interviews while picking up or returning their bike.

Afterwards the data collected via on-site user surveys are presented. Inter alia they contain user characterisation data, trip purposes, reasons for Citybike usage and trip chain information. Trip chaining data is classified as main travel mode vs. access and egress mode to public transport and a tiny fraction used for interconnection between public transport trips. Finally the trip chains and path lengths are analysed and the range and catchment area of each station is derived.

The catchment area is cumulatively depicted clustered in four classes of the station's vicinity to public transport stops. The basic hypothesis is that there is a difference in access and egress behaviour, depending on the position of the Citybike station in relation to the next station of public transport and its quality of service. Concerning the catchment area this hypothesis is validated. Clustered catchment area radius medians range between 113 and 317 meters. Based on these quantitative catchment area findings, suggestions for system density development are drawn.

6.8 The influence of surface roughness on cyclists' velocity choices

Marko Toljic, Vienna University of Technology, Austria

Marko Toljic is a civil engineer who recently graduated from Vienna University of Technology with his master's thesis on the influence of surface roughness on cyclists' velocity choices. Currently he is employed at Dorr-Schober & Partner Ziviltechnikergesellschaft mbH as a structural engineer for planning and design. Tadej Brezina, Vienna University of Technology, Austria

Tadej Brezina, Vienna University of Technology, Austria

Tadej Brezina studied civil engineering at TU Wien with a specialization in transport and infrastructure. He is currently a researcher at TU Wien's Research Center for Transport Planning and Traffic Engineering. Besides hosting two lecture series (public transport and active mobility), his latest research comprises of rail commuting potentials, public transit service

opportunities in commuter-belt municipalities or the infrastructural circumstances of cyclists running red lights.

Guenter Emberger, Vienna University of Technology, Austria

Guenter Emberger studied Computer Science and Business Administration and presently holds the position of Associate Professor at TU Wien's Research Center for Transport Planning and Traffic Engineering. He has been working in the field of transport research since 1990 and cumulated experience as Guest Research Fellow at ITS Leeds from 7/2002 to 6/2004, by being involved in more than 30 international and more than 35 national research projects and by publishing more than 100 scientific articles and book chapters.

Abstract

The purpose of this paper is to examine the influence of the roughness of different roadway surface types on cyclists' velocity choices. Could surface roughness be efficiently used for designing velocity choices according to needs in different locations? After researching the relevant facts and figures on infrastructure, speed, the impact of the roadway surface and bicycle dynamics, they are analysed and summarised. Additionally, a survey is employed to identify which environmental conditions have the biggest impact on velocity choices of cyclists.

The main part of the paper analyses the speed measurements of 3,750 cyclists, which were performed on seven different surface types using a radar gun: smooth and rough asphalt, painted bicycle lanes, concrete, large and small cobblestones and gravel. The voluntarily expended power is calculated using the average cyclist's weight and height.

Additionally, by utilising the built-in accelerometer of an off-the-shelf smartphone and affixing it to a bicycle, the roughness of the surface types is determined by measuring three-dimensional accelerations over a fixed measuring distance on these sections. In order to investigate the impact of the suspension, a bicycle with a lockable suspension fork is used.

After processing the three-dimensional data, the vertical component – in contrast to lateral and longitudinal accelerations – reveals to be of the highest quality and approximates the total accelerations best. A numerical integration approach is used to convert the acceleration data to covered distances. One aggregated value per surface type and fork stiffness remains to be used for comparison.

The analysis of the collected data shows that the fifty and eighty-five percentile speeds of cyclists are similar on all surface types: $19.4 \leq v_{50} \leq 20.7$ km/h, $23 \leq v_{85} \leq 25.5$ km/h, respectively. The only significant deviation that was measured between gravel (17.4 km/h) and concrete surfaces (23.7 km/h), can be explained by the differing surroundings of the selected measurement tracks. Furthermore, the data shows only a weak correlation between measured velocity and surface roughness, thus suggesting that other factors – which we don't take into account – outweigh the influence of the road surface and pointing the way to future research needs.

6.9 Hannover – Lust auf Fahrrad

Tim Gerstenberger, Landeshauptstadt Hannover; Germany

Mr. Dipl. Ing. Tim Gerstenberger (11.08.1970) is a civil engineer with a specialization in traffic and graduate from the Universität Hannover (1998). Since 2013, he has been a traffic planner for the city of Hannover in the Department of Planning and Urban Development with a focus on sustainable and intermodal traffic development planning, conception of traffic and mobility management systems and smart solutions for the future of urban mobility and logistics. A personal focus is set on the topic of bicycle traffic.

Abstract

Hannover – Lust auf Fahrrad (Hannover – keen on cycling) is a campaign of the federal state capital Hannover to promote the daily cycling and to make it more popular.

The development of a bicycle-friendly infrastructure is in focus of this campaign just as well as cultural topics like safety, creativity and innovation. This is how a bicycle friendly culture should be established. The long-term targets are to change people's mobility behavior, to reach a percentage of cyclists of 25% in the year 2025 and to create a thoughtful cooperation of traffic participants.

The campaign contains activities like:

- ▶ development and modernization of main cycling tracks, bicycle parking facilities in public and private properties as well as at important stations for public transport
- ▶ numerous arrangements to establish an area-wide and efficient infrastructure for cycling
- ▶ service facilities like a mobile bicycle and light check
- ▶ public participation and information about cycling in Hannover like traffic rules, new infrastructure (e.g. city-cycle-lanes, bicycle-parking, service)
- ▶ public participation, including a competition (prize: bicycle made in Hannover)
- ▶ release of a music video by local musicians, including statements on bicycle themes by citizens
- ▶ support of existing bicycle events like Hannover-Helmet, Velo City Night, guided tours using local express highways with useful giveaways, services and information

The activities are already started, still in progress and will be continued the next years. Due to these activities bicycle related themes are being spread in public. Cycling gets a positive image; citizens begin to identify themselves with bicycle-related themes and participate in improving the infrastructure for cyclists.

The diversity of the campaign Lust auf Fahrrad addresses to all user groups and shows the advantages of cycling. Nevertheless the car is always a useful and efficient partner in traffic. Therefore the campaign tries to create a joint cooperation of all traffic modes in public space.

6.10 The potential cyclist

Katja Leyendecker, Northumbria University

Katja Leyendecker's research zooms in on the intersection of spatial justice and gender. As PhD candidate - sponsored by Northumbria University in Newcastle, UK – she is currently (auto) ethnographically following activist women who speak out for cycleways in Newcastle and Bremen, Germany. Notwithstanding her Chartered Engineering education and related professional work in the private and public sector, Katja Leyendecker is interested in both the social and the spatial construction of “the cyclist” and its potential for activism.

Seraphim Alvanides, Northumbria University

Seraphim Alvanides is an Associate Professor at Northumbria University (UK) and Associate Editor with the Journal of Transport & Health (JTH). He has substantive expertise in social

geography, quantitative methods and Geographical Information Science (GISc). His current research concerns obesogenic environments, such as lack of physical activity opportunities in the context of social and environmental justice. Seraphim Alvanides is particularly interested in active transport behaviours and infrastructure as a form of preventive health.

Abstract

Cycling is an efficient mode of transport in urban areas and should be supported through spatial prioritisation and inclusion to enable people to cycle in comfort and safety. Space-change projects however can be controversial as recent high profile cases have shown in New York (Sadik-Khan & Solomonow, 2016) or London (The Guardian, 2016) where road space was converted to exclusive cycle use. It is vital for decision makers to recognise the sensitivities surrounding space-change projects and public involvement. This project draws on the categorisations used in two existing transport segmentation studies (Anable, 2005; Dill & McNeil, 2013). We gather the data for this project by conducting an online survey (link below), which has collected circa 1,000 responses (December 2016). The survey data will be analysed for variations in the preferences of non-cyclists and cyclists, relating to the built environment and the social environment. The conclusion makes links to space-change projects and discusses implications for public engagement processes. The results should be of interest to decision makers, transport planning practitioners, and advocates for cycling.

6.11 Biking with a baby – what do young parents need after the birth of their child to continue biking?

Hannah Eberhardt, Verkehr mit Köpfchen, Germany

Hannah Eberhardt studied geography, political science and spatial planning in Germany and Switzerland. She worked for several years as an employee in the municipal administration in the fields of mobility management and climate change. In 2012, she changed to the private traffic planning office Verkehrslösungen, where she became a partner in 2014. Since April 2017, she is the owner of the planning office 'Verkehr mit Köpfchen' in Heidelberg. Her strengths lie in mobility management, climate-friendly mobility, and shared mobility.

Anna Gering, Verkehr mit Köpfchen, Germany

Anna Gering finished her bachelor in Open Space Planning (B.Eng.) and afterwards a master in environmental management and city planning in urban areas with the focus on traffic planning (M.Eng.) Next to her studies she worked as a landscape architect and traffic planner. She made experience abroad for one year in landscape architecture and project management in South Africa. Since 11/2015 she has been a traffic planner with a focus on bicycle traffic and mobility management. One of her projects is 'Biking with a baby'.

Abstract

After the birth of their child, many parents in Germany stop using a bicycle, opting instead for a different means of transport; in particular, they tend to travel by car or on foot. This switch often translates into purchasing a car. What makes cycling so unattractive during this period? What needs do parents with a baby have with regard to cycling? And what are the possibilities of making it easier for young parents to go by bike?

These questions were the focus of a three-year research project (from 6/2015 - 5/2018). The objective is to develop, test and promote tailor-made offers for parents with a baby. Doctors and midwives also participate in our project, as they have direct contact with parents before and after the birth of their child.

In 2016, we conducted a survey with 700 parents and pregnant women. The results show

- ▶ that one fourth of the women surveyed already started cycling less during pregnancy and one third of them were discouraged from riding a bike during this time.
- ▶ that even bike-savvy young parents (nearly) do not use their bikes for an extended period of time.
- ▶ that young parents have an extremely high need for security and infrastructure that they deem to be safe.
- ▶ that they would like to start cycling again soon, but it is difficult to do so (lack of parking spaces for bikes, security and health concerns, high acquisition costs).

Our project takes up the obstacles and needs of parents and extends offers to parents which make it easier for them to use bicycles, including

- ▶ reliable information (website, brochures, ...), currently in progress
- ▶ action days on which bikes and bike trailers can be tested.

There is great interest among parents and pregnant women, and the action days had a very positive response. On the other hand, health care institutions often showed a fundamental interest, however, cycling is not a main concern for them and they have little time in their daily activities to address the topic.

6.12 Promoting children's cycling through cycling courses in city traffic

Marlene Mellauner, University of Natural Resources and Life Sciences, Austria

Marlene Mellauner is a landscape planner and researcher based in Vienna with work experience in Hamburg and Milan. She works at the Institute of Landscape Planning, University of Natural Resources and Life Sciences Vienna (BOKU) and focuses on the topics of participation, spatial social work and urban open spaces as well as on sustainable urban mobility. She is a board member of the non-profit organisation 'Schulterblick – Die Wiener Radfahrschule'.

Abstract

The spatial, the legal and the social conditions (skills), which allow children to navigate through city traffic, and the synergies of different measures are subject to my research interests as this approach is just starting out. Even though different fields of research proof the various benefits of cycling, children who ride a bike on a daily basis are not yet part of our everyday life. The presentation/paper will discuss the key role of cycling education by promoting cycling through offering support by the transition towards active urban mobility of children and their families.

One successful approach to bridge the gap is the awarded "Schulterblick-concept", which will be introduced in the presentation/paper. It is based on the idea that children need to practise in real life traffic situations and focuses on a side-by-side city traffic to establish a new cooperative cycling culture between road users. Others are not perceived as potential obstacles or threats but as interacting partners. The presentation/paper will focus on the development of the unique road safety and mobility management program by the non-profit association "Schulterblick - The Viennese cycling school". Their activities gained a broader attention this year, not only in schools but also in the public awareness. Besides realizing 50 cycling courses with 1.300 children aged between 9 and 11 in public space within the last two years the association managed to discuss

the determinants of cycling for children with numerous stakeholders in Vienna. Presenting those and using the example of Viennese schools which already participated in the Schulterblick-courses the impact of skills acquisition based on the methodological approach to practice in real life traffic situations on children's cycling will be shown.

The achievements of the association were accompanied by challenges concerning the funding as well as questions of responsibility and insurance. Not yet answered is the question of how this new approach can be implemented in the long term. Feedback from children, teachers and qualified visitors, success factors and lessons learned within the reflection of the team concerning the organisation, implementation as well as the positioning of cycling courses will be shared with the audience.

6.13 Behavioural differences among cyclists in choosing the space to ride

Gregor Gaffga, Technische Universität Dresden, Germany

Dipl.-Ing. Gregor Gaffga studied Transport Engineering at Technische Universität Dresden and wrote his diploma thesis on how cyclists choose the space to ride on a street. After his internship at "Planungsgemeinschaft Verkehr – PGV Dargel Hildebrandt GbR" in Hannover he is now the transport planner at the municipal administration of the city of Konstanz.

Prof. Dr. Carmen Hagemeyer, TU Dresden, Germany

Prof. Dr. Carmen Hagemeyer studied psychology in Bochum and Aachen and finished her PhD dissertation „Individual tendency to make errors in concentrated work“ in 1993. Since then she has been teaching psychological assessment at TU Dresden. Her habilitation treatise in 2005 was on "Recognizing practice in concentration tests", Hagemeyer is mostly practicing research on traffic psychology and psychological assessment.

Abstract

In Germany, cyclists on main streets often have multiple options where to ride: on the roadway mixed with motor traffic, on dedicated cycling infrastructure or (often illegally) on the pavement. Counts show that cyclists decide differently, but the reasons have not been explained yet. We conducted a non-representative online survey in Germany to investigate how cyclists decide to ride on a specific part of the street. The sample consists of 5575 mostly frequent cyclists.

The results point out that on-street cycling lanes are used by more than 95 % of all respondents. In situations with no cycling infrastructure, cycling allowed on the pavement or separated cycle paths the use of the infrastructure differs significantly with regard to gender, age and cycling frequency of the respondent. Men, persons between 35 and 54 and all-year frequent riders choose more often to share the road with motorized traffic than women, the youngest and oldest age group and respondents only cycling in summer do.

In a literature review of German and international research on how cyclists choose the space to ride, 20 motives of which space to choose for cycling were identified. Survey participants were asked to rate the importance of each motive on a five-point rating scale. The desire to ride safely turned out to be the most important motive. Conversely, it cannot explain differences in riding behaviour. A factor analysis of the 20 motives led to four factors: 1) avoid contact with motor traffic, 2) obey rules and show consideration, 3) ride fast and 4) avoid obstructions. These four factors explain part of the variance in the use of the infrastructure. Differences with regard to gender, age and cycling frequency are very small.

The observed differences in infrastructure use between groups of cyclists could not be found in the motives investigated. The results of our online survey point out that more research is necessary to explain the behaviour of different groups of cyclists. In future studies on the behaviour of cyclists distinctions with regard to gender, age and cycling frequency are indispensable as cyclists are a very heterogeneous group.

6.14 GPS-data tracks from smartphone applications - a useful support for bicycle infrastructure planning?

Angela Francke, Technische Universität Dresden, Germany

Angela Francke graduated in Transportation Economy with a specialization in Transportation Psychology and Ecology at TU Dresden, Germany. She works as researcher at the chair of Transportation Psychology at TU Dresden with focus on transportation behavior, pricing, non-motorized transport and developing countries. Since 2015, she has also worked for the International Climate Protection Program (Humboldt Foundation) at the Centre for International postgraduate Studies on Environmental Management.

Sven Lißner, Technische Universität Dresden, Germany

Sven Lißner holds a diploma degree in Transport Engineering from the TU Dresden in Germany. He wrote his diploma on the CO₂ saving effects of cycling in 2013. Until 2014 he was working for an engineering office in Dresden. Currently he is working on a project, which is evaluating the chances of GPS-data for bicycle-planning at the chair of Transport Ecology at TU Dresden. Further qualifications are environmental effects of mobility, especially e-mobility and life-cycle-analysis.

Thilo Becker, City of Bremen, Germany

Thilo Becker holds a diploma degree in Transport Engineering from the TU Dresden in Germany and a master's degree in Transport Systems from KTH Stockholm in Sweden. He finished his PhD on social equity aspects in transportation and their environmental effects at TU Dresden in 2016. After having worked as a post-doc in the chair of Transport Ecology at TU Dresden until this summer, he is now a strategic transportation planner for the City of Bremen.

Lisa-Marie Schaefer, Technische Universität Dresden, Germany

Lisa-Marie Schaefer holds a bachelor's degree in Business Psychology from Leuphana Universität Lüneburg in Germany. She is now in her Master of Psychology at TU Dresden with a focus on traffic and engineering psychology. Currently, she is finalising her master's thesis on bicycle usage among migrants and works as a student assistant on different projects in the chair of Traffic Psychology at the TU Dresden. Traffic culture, individual differences, and cycling motives are her main areas of interest.

Abstract

GPS-data are easy to conduct and can be a simple access to individual mobility patterns for infrastructure planning. To understand boundary conditions of user generated GPS-data and the practical contribution for the bicycle planning and transportation research, two online surveys were conducted.

The first survey was distributed to bicycle planning divisions in city governments in Germany as online questionnaires (n=61) to gain insight into planning practices of municipalities and their experiences and attitudes towards GPS-based data. On average the small to medium sized municipalities reported only one person responsible for cycling and have never worked with

GPS-data in their planning routines (77%), even though half of them stated to have access to this data. The three main purposes for GPS-usage are: network-planning (n=38), monitoring and evaluation (n=33) and infrastructure planning (n=32). As main reasons for the disuse of GPS-data missing personnel capacities and technical facilities are reported. Arguments against GPS-data usage differ between participants, who used it and those who didn't. Unexperienced users reported more often missing capacities but also concerns about data privacy and costs.

The second survey examines the possible bias due to the sport-oriented app with a user survey of Strava's data contributors. The competitive character of the app and of the user structure may influence the everyday usage as well as mobility and behavioural patterns and limit the external validity of the data. The online questionnaire was distributed in various in-app forums. The sample structure (n=182; 171 male; mid-thirties) reflected the application users. The results show that everyday routes longer than 5 km are tracked by most of the users in order to generate statistics about their cycling-performance. Increased motivation, distances and velocity was reported when the application is activated, but most participants claimed no or minor changes in route selection. In conclusion, the GPS-data generated by the Strava-users can be used for a realistic impression about road users, if factors like higher overall speed and distances are controlled.

The two surveys promise high relevance of app-collected GPS-data for network and infrastructure planning. A careful validation is essential to avoid structural biases from the sport-oriented users.

6.15 Correlating cycling network typology and collisions involving motorized vehicles and bicycles in Berlin

Quentin Jammot-Paillet, Technische Universität Berlin, Germany

The freelance GIS expert studied geography, urban planning and regional development at University of Paris 1 Panthéon-Sorbonne, Paris, before realizing various traffic projects with GIS. With his volunteer experience for the Berlin bicycle referendum he combined personal and professional interests.

Rafael Milani Medeiros, Technische Universität Berlin, Germany

Rafael Milani Medeiros is a PhD candidate at PUCPR (Brazil) and at Technische Universität Berlin (Germany), building his thesis around "the disruption of urban mobility through information and communication technologies". With long term experience in design lead, market research and innovation, he has edited books and didactic materials and has lead planning, technology development and implementation of bike share schemes in Brazil. As urban designer, he has managed teams for public policy making and the design of urban mobility infrastructure, focusing on active transport modes.

Abstract

Every day, 1.4 million journeys are made by bicycle in Berlin. In 2008, 13% of all daily trips were made by bicycle in the city, and since then, this modal share has increased by 3% every year. This positive trend also reflects an increasing number of collisions involving motorized vehicles and bicycles. In 2016, there were 16 fatalities on cyclist's side. As policies and urban planning measures are currently being discussed in order to promote bicycle use and bicycle safety in the city, the aim of this paper is to investigate correlation between urban cycling networks and road collisions. Based mainly on Geo Information System (GIS) analysis of the datasets provided by the police, we focused on the 197 intersections and hotspots where 72% of fatalities and 65% of severe injuries happened between 2011 and 2015. There were a total of 25.575 collisions

involving bicycles and motorized vehicles during this time. Four typologies were present at the related cycling infrastructure in these spots: (1) on road bicycle lanes, adjacent to motorized lanes, (2) segregated bike paths, (3) bike paths on pedestrian sidewalk and (4) no cycling infrastructure at intersections. Based on the preliminary statement of accident guilty, included with police dataset, results show that drivers are at fault for 57% of collisions, while cyclists are at fault for 31%. We also reveal that cyclists are more likely to be at fault at intersections without cycling infrastructure. By far, most of collision that were located at roundabouts, the person driving the motorized vehicle was at fault primary cause. Finally, the person driving the motorized vehicle is more likely to be at fault at intersections where the cycle path is on the same level as the pedestrian sidewalk.

6.16 Macroeconomic effects of compulsory bicycle helmets

Dr. Michael Meschik University of Natural Resources and Life Sciences, Austria

Michael Meschik lectures at the Institute for Transport Studies, University of Natural Resources and Life-Sciences, Vienna, where he is also the mobility manager. He has been involved in (inter)national research on mobility behavior, mobility management, sustainability, economic and health aspects, traffic calming, traffic safety etc., focusing on bicycling and walking. He is committed to promoting non-motorized modes, trying to achieve their full beneficial importance and health potential.

Huem Otero-Garcia, University of Natural Resources and Life Sciences, Austria

Huem Otero-Garcia is an activist with Greenpeace trying to preserve our natural resources and encouraging active travel modes. In her master thesis, she undertook a comprehensive literature screening and performed calculations for several scenarios to assess the probable macroeconomic costs and benefits of bicycle helmets under realistic conditions. The results are a valuable and objective contribution to the discussion on bicycle helmets.

Abstract

For decades now, experts and the public fiercely argue about compulsory helmet laws. International examples also show that compulsory helmet-wearing deters people, especially teenagers, from cycling, subsequently reducing beneficial effects of active mobility. Politicians favor compulsory helmet-wearing regulations to protect cyclists from harmful results from accidents, whereas health and bicycling advocates speak for traffic environments like traffic calmed zones or shared spaces, enabling safe cycling and also motivating newcomers to give cycling a try. From the economic point of view it is interesting to estimate, which strategy is resulting in a surplus or loss for the overall economy.

The potential impacts of a helmet law in Austria were assessed in a cost - benefit- analysis based on Austrian data on bicycle use and accidents. In this CBA, different cost-components were evaluated, mainly injuries in general, head-injuries, health-economic impacts from active mobility, environmental and climate impacts. Also, possible effects of unreported accidents, of mode shifts, rising accident risks with decreasing cycling mobility (due to “safety in numbers”) and the reduction of injury severity attributed to helmet use were discussed.

Different scenarios vary the assumed protective effect of helmets and helmet wearing rates to be expected after the introduction of a helmet law. The economic costs outweigh the benefits, when the total kilometers cycled decrease more than 7.9 % (1.8 % for the scenario with the lowest helmet-protection assumed). The data basis for the assessment could be better, especially on unreported bicycle accidents and the capacity of helmets reducing accident severity. Even when 20 % of all bicycle accident-costs are assigned to head injuries, the biggest savings in accident

costs were calculated as a consequence of the reduction of non-head injuries due to a reduction in cycling.

For more detailed results, better data would be needed. It seems necessary to reduce numbers and severity of bicycle accidents as a whole, not only focusing on head injuries. Acknowledging various benefits of active mobility, traffic environments should be provided, where severe accidents are avoided in the first place. Such environs would also improve the safety for pedestrians and the quality of life for all.

6.17 Adaptive road network assessment for context-sensitive bicycle routing

Dr. Martin Loidl, Dr. Bernhard Zagel, Robin Wendel, University of Salzburg, Austria

Dr. Martin Loidl and Dr. Bernhard Zagel head the research group „GI Mobility Lab” at the Department of Geoinformatics, Z_GIS at the University of Salzburg. Their research activities lie at the intersection of GIScience and mobility research, with a special focus on active mobility. Robin Wendel is an expert in spatial data modelling and analysis. All three are involved in externally funded, cutting-edge research projects and act as consultants for companies and authorities.

Abstract

Bicycle routing applications require at least one impedance value for finding the most optimal connection between origin and destination. Common impedance values are distance (shortest route) and travel time (fastest route). Spatial models and geographical information systems (GIS) have paved the path for further routing criteria that address the needs of bicyclists more specifically. Current applications allow for a variety of criteria, which account for gradient, pavement, safety, attractiveness, comfort and many more (Loidl et al., 2016).

However, independent from the routing optimization itself, almost all existing routing applications calculate routes for averaged users. Such a generalization might be valid for car routing, but it hardly represents the reality of bicyclist’s route choice. Personal preferences, trip purpose or external effects (such as weather or darkness) impacts the route choice and departure time substantially (Ehrgott et al., 2012, Flynn et al., 2012, Krenn et al., 2014, Tin Tin et al., 2012). Thus, there is a gap in many cases between an averaged routing recommendation and personal trip preferences.

Consequently we argue for an adaptive bicycle route optimization that accounts for personal and temporal particularities. We propose an adaptive network assessment model, which forms the basis for context-sensitive routing.

As a proof of concept we extend an existing network assessment model (Loidl and Zagel, 2014) with components that allow for personalization and the integration of real-time precipitation data. With this model an impedance value can be calculated that reflects individual demands (e.g. subjective safety threats, trip purpose etc.) and takes weather effects into account.

6.18 Cycling promotion – the lessons of history

Rosemary Sharples, Freelance, Australia

Rosemary has been actively involved in cycling since 1982, when she joined a cycling pressure group in Manchester, England. She was employed as a cycling specialist at a transport consultancy. In Australia, her PhD, on the topic of reduced road capacity, included consideration of cyclists. She feels that applying the lessons of history can prevent much waste of energy and

money by contemporary practitioners, while producing better results than those which are the result of pure optimism.

Abstract

In some countries, cycling is seen as a normal part of everyday life for the average person. In other countries, such as Australia and the United Kingdom, it isn't. In some of these latter countries, there are people who want to see more cycling done. They often want to see the conditions in cycling countries duplicated in their own state, both in terms of numbers of people cycling and in terms of infrastructure for cyclists. Technological determinists believe that cycling infrastructure is responsible for getting peoples on bikes. But is any of this likely? Are there any cases where it has actually happened? Is there any reason to assume that it is possible? If not, what should the promoters aim for, that is realistic?

If we look back at history in some of these countries where cycling is not a social norm, we can see that widespread cycling has occurred in fits and starts, apparently in cycles of fashion, of greater or lesser duration. It is worth asking why the increases in cycling have come about and why interest in cycling (expressed as the number of everyday cyclists) has fallen off again. What has happened to cycling in the meantime? Are there any lessons that can be learnt from history for today's promoters of cycling, both in terms of their own citizens' reactions to cycling and also in terms of how applicable other nations' (that is, different cultures') experiences of cycling are to the promoters' own situation? Why can some cultures 'do' cycling and others not?

6.19 Bicycle Oriented Development – The 'bikeability' of urban corridors

Rybels Stijn, University of Antwerp, Netherlands

Stijn Rybels holds a master of sciences in Architecture and Urbanism. Since October 2015 he is a member of the Research Group for Urban Development at the Faculty of Design Sciences at the University of Antwerp. His research focuses on the relation between infrastructure and urban developments and more specifically on integrated bicycle infrastructure. He is author of several studies such as the 'Evaluation of the traffic and transport structure in the province of Antwerp'.

Maarten Van Acker, University of Antwerp, Netherlands

Maarten Van Acker is a professor of Urban Design and spokesman of the Research Group for Urban Development at the Faculty of Design Sciences of the University of Antwerp. His research focuses on integrated infrastructure design. He coaches several city planning departments and architecture offices with the realisation of complex urban projects, the integration of infrastructure and the coordination of design competitions. He is the author of several publications such as From Flux to Frame, Highway x City, In Via Veritas, Spoorboek, Groene Singel, Zaaien op Beton, Turnhout 2012 ...

Dirk Lauwers, University of Antwerp, Netherlands

Dirk Lauwers is a civil engineer and MSc in spatial planning and urban design with a working experience of more, than 30 years. He is visiting professor at Ghent University, University of Antwerp and University of Leuven, where he teaches and acts as research promoter in the fields of Mobility Planning and Traffic Engineering Design. Apart from his academic activities he has been a consultant in traffic planning and engineering and regional and urban planning. He was manager for traffic and mobility planning and member of the scientific committees of several conferences.

Jolein Bergers, University of Antwerp, Netherlands

Jolein Bergers is a PhD candidate at the Research Group for Urban Development at the University of Antwerp. Her research focuses on the urban design potential of cycling infrastructure. She studied architectural engineering at the KU Leuven and the University of Ghent and was a visiting research student at the Department of Landscape Architecture and Environmental Planning, University of California, Berkeley. Before joining the University of Antwerp in 2017, Jolein worked as an architect and urban designer at Belgium-based offices Architecture Workroom Brussels and 51N4E.

Prof. Dr. Tom Coppens, University of Antwerp, Netherlands

Prof. dr. Ir. Architect Tom Coppens holds a PhD in Engineering specialized in Urban and Spatial Planning. Within the Research Group for Urban Development at the Faculty of Design Sciences at the University of Antwerp, he focuses on urban development processes. His expertise is situated on the interface of urban planning, spatial planning and governmental management. His fundamental research focuses on spatial governance and processes of spatial commons. Additionally, Coppens has broad experience in process and project management at AG Stadsplanning.

Abstract

Global challenges such as congestion, climate changes, changing demography and physical inactivity have shifted the collective focus of the disciplines of urban planning and transportation towards strategies to reduce motorized traffic and to promote active transportation (Frumkin et al, 2004).

Cities such as Copenhagen and Amsterdam, where the modal shares for cycling are respectively 45% and 32 % (Copenhagenize Index, 2015), show the potential and utility of cycling for transportation. While the technical knowledge for developing cycle infrastructure on a micro scale is extensive (e.g. CROW, 2016; Vademecum fietsvoorzieningen, 2014), these requirements do not contribute to the relation between infrastructure and its urban context and therefore fail to reveal the full potential of high quality cycle infrastructure for urban environments (Bendiks et al. 2013)

‘Bikeability’ is introduced as a concept that goes beyond the design of urban infrastructure: it captures the whole urban infrastructure and it’s relation to the urban environment on a cyclist’s scale. ‘Bikeability’ implicates a Bicycle Oriented Development (BOD) - in analogy with the American concept Transit Oriented Development (TOD). Concerning bikeability, international research (e.g. Winter et al, 2013; Bhat et al, 2009; Bendiks, S., & Degros, A. 2013; Heinen, E., et al, 2010) provides evidence of the correlation between the built environment and cycling behaviors. The correlation, however, between these determinants is not clear.

This research aims to provide insight into the factors that determine the ‘bikeability’ of our cities and indicate how we can improve the cycling conditions and the physical environment of the cyclist. It aims to outline a fundamental method to define the spatial factors that determine the routes of cyclists. The existing literature is questioned and supplemented with (international) best practices and on-the-ground conditions: using a mixed-use corridor with different transport modes (‘Mechelse Steenweg’) in the city of Antwerp as case study. Thus resulting in a set of manageable (spatial) bikeability criteria.

This research is positioned between the existing technical criteria on a micro scale and the larger traffic models on a regional scale. This way, it aims to respond to a scientific knowledge gap situated at the interface between mobility and urban planning.

6.20 A hot spot for your bike? Resident cycle parking in Flanders' main cities

Wout Baert, Fietsberaad Vlaanderen, Flemish Cycling Embassy, Belgium

Wout Baert has a Master's in Public Management (2005, University of Antwerp) and a master's in Political and Social Sciences (1997, University of Antwerp). He has been working as an advisor to local, provincial and regional governments in Flanders in the field of spatial planning, sustainable urban mobility planning and strategic urban developments. He is now program manager of Fietsberaad Vlaanderen (Flemish Cycling Embassy), a knowledge centre on cycling policy which stimulates and supports the dynamics in cities and municipalities that want to invest in more everyday cycling.

Elke Franchois, Mobiel 21, Belgium

Elke has a professional degree in Social Work and a Master's in Political Science, International Politics (2005, KULeuven). Since 2008 she has been working at Mobiel 21 as a project collaborator in Research & Behavior change. She focuses on campaigns for sustainable transport and action-oriented research. Thanks to her experience in several European projects such as CIVITAS, BAMBINI, NISTO and MAX, she has an extensive knowledge of recent developments, planning and research in sustainable mobility in Europe.

Abstract

The Flemish Cycling Embassy together with Mobiel21 investigated the use of existing resident cycle parking. These are locked, indoor spaces where a resident can rent one or more spots for a bike. The aim of the study was fourfold: (1) have an overview of existing resident cycle parking systems based on literature and expert interviews, (2) have a user evaluation of current users, (3) make recommendations to cities, and (4) develop a roadmap for cities that are eager to start with resident cycle parking.

The issue of resident cycle parking takes place against the background of an increasing use of the bicycle in Flanders. Especially in Ghent and Antwerp the bicycle use grows above average, but the space for cycle storage is scarce. There is also a problem of bicycle theft.

Sustainable Urban Mobility Plans in these cities want to encourage the use of bicycles even more. Cities therefore invest in cycle parking. Cycle parking has 3 aspects: origin (home), routes (train stations...) and destination (shops,...). When the bike isn't protected against theft, vandalism, or it is difficult to access, bike usage will be low. Investing in cycle parking for residents seems to have a positive impact on bicycle usage. This is the reason why resident cycle parking is an integral part of the mobility plan in those cities. But limited knowledge is available.

The following steps are the basis of the implementation plan build up upon the research:

- ▶ Cycle parking embedded in policy
- ▶ Setting up a pilot
- ▶ Division of tasks
- ▶ Choice type of storage
- ▶ Permits and placement criteria
- ▶ Administration and management
- ▶ Renting terms

- ▶ Design and sealing systems
- ▶ The financial picture
- ▶ Communication and dissemination

Some conclusions of the user evaluation are:

- ▶ The majority of the users are satisfied with system, price, distance...
- ▶ The need is high, due to lack of parking options at the own property, theft and vandalism...
- ▶ There is a significant impact on bicycle usage. 23% of the respondents states that they bike more often than before.
- ▶ 25% of the respondents states that having a spot enhanced them to buy a new bike.

The practice presentation and full paper will describe in depth the research and results and will show testimonials from the cities that participated.

6.21 The reflective bicycle - practical solutions for safer cycling and public bicycle-sharing

Eberhard Schilling, Happarel Bicycles, Germany

The master of Political Science and bachelor of Communication Sciences studied in Vienna and Berlin before founding Happarel Bicycles together with Antoine Capeyron in 2014, to develop reflective solutions combining cycle safety with design aesthetics.

Abstract

Too many cyclists still lack sufficient visibility at night resulting in avoidable accidents. Reflectors and the use of reflective wear are often avoided due to their unfashionable appearance and circumstantial use.

Happarel Bicycles pushed the bounds of innovation with the world's first fully customised reflective bicycle frames. Using an outstanding reflective film selected for its adaptability and durability, bicycles are made more visible in urban traffic without the need of using additional gadgets and without compromising design aesthetics.

This is a great chance for public bicycle-sharing systems worldwide which are quickly becoming fixtures in today's cities. Happarel Bicycles has developed an affordable and easy to implement solution that improves visibility of city cyclists while at the same time increasing the attractiveness of public bike-hire to private sponsors. Reflective designs that match private sponsors' corporate logos and design philosophy are placed on bicycles and reflect the light from vehicles' headlights back to the source and therefore improve cyclists' visibility on the streets. Publicity itself becomes an extraordinary means to increase bicycles' visibility and thus safety for cyclists.

Both city councils and private sponsors highly benefit from these safety measures: Implementation and maintenance costs are reduced to a minimum while at the same time their reputation improves and gets associated with being fresh, innovative and socially and environmentally responsible.

One major obstacle that need to be faced is strict local traffic regulations such as german “Straßenverkehrszulassungsordnung” (StVZO) which regulates the use of passive illuminants on a bicycle. The overwhelming positive feedback about Happarels approach by individual customers, associations and executive calls for a flexible handling of visibility enhancing measures.

Custom reflective upgrades are not limited to bicycles only, but can be applied to any vehicles that are exposed to road traffic.

6.22 Active travel in european urban regions - a review of initiatives stimulating a greener and healthier lifestyle for all

Elise Schabus, Maastricht University / EuroHealthNet, Belgium

Elise Schabus holds a Master’s degree in Biology from the University of Vienna and a Master’s degree in European Public Health from the University of Maastricht. As a part of her EPH Master’s programme, she did a placement at EuroHealthNet and wrote a thesis related to the INHERIT (INter-sectoral Health and Environment Research for InnovaTion) project. She had previously worked as a teacher with TFA (Teach For Austria) and is currently working at the Federal Ministry of Health in Austria.

6.23 The effects of bicycle mileage allowance for French civil servants

Thomas Jouannot, Cerema, National Center For Studies and Expertise on Risks, Environment, Mobility, and Urban and Country planning, France

Thomas Jouannot is a project manager in the CEREMA (National Center For Studies and Expertise on Risks, Environment, Mobility, and Urban and Country planning.) He wrote several national guidelines for cycling facilities in urban and interurban areas and is currently working on changing French regulations for safer cycling and walking. He is also a member of the international OECD working group that published the report “cycling, health and safety” monitoring international trends and exploring options that may help decision makers design safe environments for cycling.

Pierre Toulouse, French Sustainable Development and Transports Ministry, France

Assistant of the French interministerial coordinator for development of walking and cycling use, he works in the French sustainable development and transports ministry. Specialized engineer in road design and road safety, he is a convinced daily cyclist participating actively in the formulation of the last French masterplan for active modes with new road regulations and a mileage allowance for cyclists and pedestrians. He is also committed to the pan European cycling officers coordination introduced in the Transports, Health, and Environment, Pan European Programme. (THE PEP).

Abstract

In September 2016, the French Ministry of sustainable development launched a bicycle mileage allowance program for its 43,000 employees. Commuters are offered an allowance of 0,25 euros per kilometre they cycle to work, way and back. The annual amount is limited to 200 euros. It can be combined with the reimbursement of the public transport ticket, in case of an intermodal commute.

A global survey was launched in October 2016, with the following goals:

- ▶ Determining mobility profiles of the commuters that are interested in the bicycle mileage allowance
- ▶ Evaluating the modal shift that can be expected with this measure
- ▶ Identifying the reasons why commuters don't use the bicycle to go to work

The first phase of the evaluation is conducted with a web-based questionnaire that will be closed in march 2017. As of December 2016, 1000 answers have been collected. The first results will be released in June 2017.

6.24 Evaluation of cycling policies and strategies by Oxfordshire County Council and the subsequent validations of these measures through analysis of traffic and environmental factors

Sridhar Raman, Oxford Brookes University, Oxfordshire County Council, United Kingdom

Sridhar Raman is a researcher at Oxford Brookes University. He has a background in software engineering and urban mobility. He has worked as a technology lead in Bangalore, India for more than 10 years and is currently doing his PhD, with a focus on sustainable mobility. His interests involve modelling and simulation, public policy analysis and active mobility. His research is on agent-based modelling and the influence of traffic dis-incentivising measures on modal shift and commuter behaviour.

Abstract

Governance is defined as a process of coordinating actors, social groups, and institutions to attain particular goals, discussed and defined collectively in fragmented, uncertain environments. With increasing effects of climate change, and the significant contribution towards climate change in the transportation sector, the push towards sustainable modes of transport is quite evident.

Various forms of horizontal and vertical collaboration are relevant to the success of urban climate governance beyond the local level. There are different modes of climate governance (self-governing, governing through enabling, governing by provision and governing by regulation) with intrinsic challenges in each, the understanding of which, will help us understand the combination that best helps promote active travel.

This paper will look at strategies and policies implemented in Oxfordshire County to promote cycling and walking and determine the parameters that have been used to validate the measures and also identify the gaps in existing validation mechanisms.

We will also need to understand the different cycling strategies worldwide, identify the pinch-points that were responsible for the success/failure of the strategy, and translate the same onto Oxford.

The study will gather primary data available in the form of modal trends and travel-distances that can be analysed using traditional models such as regression analysis to help identify the segment of population that would be most likely to shift towards cycling. Additionally, cycle counter loops installed in various intersections of Oxford will help provide data for validation.

In some cases, testing the evidence of efficacy of cycling policy and strategy can be done by structuring the investigation around a more conceptual mode, such as actor-network theory, which is a way of thoroughly exploring the relational ties within a network.

A supplementary source of input for analysis will be Big Data, that can be used for agent-based modelling and help unearth attributes of governance and policy measures that result in most active travel usage.

The primary focus of this study is to look at how various cycling strategies implemented by the Oxfordshire County Council were decided upon and how the efficacy of these measures has been validated through data analysis.

6.25 Should bike-sharing programs be profitable?

Aleksandar Bauranov, Urbanova Novi Sad, Serbia

Aleksandar Bauranov graduated from the Faculty of Civil Engineering, University of Belgrade, and obtained a Master's degree in Transportation Engineering at the University of California Berkeley in 2013. Prior to his current position as a transportation engineer at Urbanova, Novi Sad, Aleksandar was a lead researcher at NEXTOR, Berkeley, and a visiting transport researcher at Monash University, Melbourne.

Abstract

Cities around the world have recognized the important role of bicycles in solving the last mile problem. Investments in the cycling infrastructure are on the rise. The number of bike-sharing programs has skyrocketed in the recent years. As of December 2016, there are 1150 bike-sharing programs globally, with another 360 in the planning or construction phases.

Despite these positive trends, it is not yet clear what are the best ways to fund a bike sharing program. After the initial launching enthusiasm, it quickly becomes clear that the programs are losing money. Once the political support is gone, so are the bike-shares. In fact, around 140 programs have been cancelled in the last 3 years, mostly when the local government discontinued the funding. Should the bike-sharing programs be managed as a business, or a deficit-running public transit option? The positive effects of mass cycling on climate, health, and travel efficiency are well documented, and the governments should invest in these policies and infrastructure projects. However, if there is a way to present a bike-sharing program as a feasible investment option, we could see the emergence of the programs in the developing countries and locations where biking is not a priority for the local transport agencies.

This paper analyzes the revenue-models of the 1100 programs world-wide, and identifies the best practices in securing the financial stability. The initial results show that the funding is primarily secured through a combination of sources: a combination of municipal, regional, and state government funding. Operational costs are typically funded through a mix of subsidies, user fees, sponsorships and loans. The results of the paper will identify the most profitable programs, the optimal "mix" of funding sources, and test the effects of for-profit policy on the goals of bike sharing: reduction of traffic congestion, public health, and increased mobility.

6.26 Lessons learnt from Vienna's bike-sharing system to bring migrant women on the bicycle

Eliza Brunmayr, Radlobby Wien, IG Fahrrad, Austria

Eliza Brunmayr, working for the Austrian cycling advocacy „Radlobby Österreich“. Focus: road safety and sociocultural aspects of mobility. Bicycle trainer for adult beginners, esp. migrant women. Educational background: MA in cultural anthropology.

Astrid Segert, Institut für Höhere Studien Wien (IHS), Austria

Astrid Segert, senior researcher at the Institute for Advanced Studies Vienna, Dr. phil., research interests in social studies of everyday practices and social milieus as well as in studies of the interface between spatial mobility and integration.

Abstract

Immigrants are an important and a still growing part of European societies. But people with a migrant background cycle less - especially female migrants. For Vienna it was documented that female migrants usually have a very narrow range of action. One of the reasons is: many don't have access to a bicycle. If everybody should be able to enjoy the freedom of cycling, the challenge to be met lies in removing the barriers that prevent migrants from cycling.

The research project FiF, "Frauen in Fahrt" (women on the move), funded by the Austrian ministry for transport and innovation, analyses the potential of public bike-sharing schemes to foster multimodal mobility of female migrants. We were looking at the capabilities of female migrants of using public bikes in Vienna to identify necessary preconditions for strengthening their multimodal mobility.

In interviews with women who previously attended bicycle lessons we learned about barriers that still prevent them from cycling. A new module on how to use the public bike has been developed for cycling lessons and is tested as a part of the study. The qualitative and quantitative study is complemented by an international good practice research on bike-sharing systems and innovative models of cooperation that support migrants bicycling. We started our research in August 2015 and have completed more than two thirds of all working packages with remarkable results. In June 2016 the project will finish, therefore we will already be able to present final results.

6.27 Cooperative ADAS for Increasing Cycling Traffic Safety in EU Project XCYCLE

Kay Gimm, German Aerospace Center (DLR), Germany

Kay Gimm holds a master's degree in Industrial Engineering at the Technische Universität Braunschweig with a focus on transport engineering. Since 2014 he is a research assistant at German Aerospace Center (DLR), Institute for Transportation Systems in Braunschweig working in the field of analyzing traffic situations based on infrastructural gained trajectory data and system managing of the AIM Research Intersection. He is leading the group "situation interpretation in traffic".

6.27.1 The effects cycle highways

Tina Caers, Province of Antwerp, Belgium

Tina Caers is Team Leader of the Team Cycling Policy, at the Mobility Department in the province of Antwerp in Belgium. The Cycling Policy focuses on functional cycling, the realization of cycle highways and all kinds of monitoring on cycling.

Abstract

Cycle highways are game changers in many ways. They are fast and safe connections between cities and in combination with the e-bike, they reduce travel time for commuters. Due to the dedicated and separated space, cyclists are not only physically active but they are less exposed to air pollution and they have a lesser accident risk. A triple win situation! Even more: cyclists don't cause emissions like CO₂ and greenhouse gasses.

But without data to prove this, the benefits cannot be quantified objectively. The province of Antwerp (Belgium) started an strategic cycle count network in 2014. In 2015 they started the Cycle Barometer where infrastructural data, accident data, cycle counts and user experiences are brought together. This data was used to test and calibrate the HEAT-tool for walking and cycling. Within the PASTA-project the return on investment of building a cycle bridge was calculated.

In this presentation the importance of collecting and providing this data are illustrated. Calculating tools like the WHO HEAT-tool for walking and cycling help to confirm the need for ambitious investments in Cycle Highways. We will demonstrate the trends in cycle counts and user experience and take you on a virtual tour over the new cycle bridge.

6.28 Linking cycling with public transport – options for improving the combined usage

Lucas Czwolla, Goethe-Universität Frankfurt, Germany

Lucas Czwolla has been working since 2016 as a research associate at the Department of Human Geography at Goethe-Universität Frankfurt. He studied sociology at the Universität Bielefeld and then worked at the Institute of Transportation Design in Brunswick.

Mathias Wilde, Goethe-Universität Frankfurt, Germany

Mathias Wilde has been working as a research associate at the Department of Human Geography at Goethe-Universität Frankfurt since April 2013. He studied traffic and transportation systems at the Erfurt University of Applied Sciences and the Technical University of Vilnius. He worked at the Institute for Transport and Spatial Development at Erfurt University of Applied Sciences. In 2012 he received his PhD at the Faculty of Chemistry and Geosciences at the Friedrich Schiller Universität in Jena.

Martin Lanzendorf, Goethe-University Frankfurt, Germany

Martin Lanzendorf has been teaching and researching since 2008 as Professor for Mobility Research at the Department of Human Geography at Goethe-Universität Frankfurt. He received his PhD at the Wuppertal Institute for Climate, Environment, Energy and the Universität Trier. He worked as a post-doc at Utrecht University, as junior professor at the Helmholtz-Centre for Environmental Research UFZ and at the Institute of Geography at the Universität Leipzig. He also held a substitute professorship at Ludwig-Maximilians-Universität Munich.

Abstract

Positive synergies can be realized when bicycle and public transport are combined to an intermodal trip chain: Both, the accessibility-radius of the bicycle increases significantly, and the catchment of public transport. When combining both modes the travel speed increases significantly and this intermodal mode becomes one of the fastest travel-options (Kager et al. 2016). The bike-public transport mode is not only part of the environmental alliance for sustainable mobility and a healthy mode of active transportation, but could also contribute to the solution of some of the most crucial problems faced by today's cities and societies: traffic jams, atmospheric und noise pollution, fine particles, high rates of land consumption and increasingly sedentary lifestyles - all of which are related to motorized private transport.

The combination of cycling and public-transport to an intermodal trip chain has been improved in recent years due to the increased availability of mobile internet and new telecommunication systems as well as due to bicycling being part of a trend towards a general "cycling culture" (Lanzendorf & Busch-Geertsema 2014). In order to support this intermodal mode of transport, new concepts and infrastructure are being developed: (1) bicycle parking next to stations, (2)

improved bicycle transport inside trains/busses and (3) bike-sharing systems as an integrated part of public transport. Best practices as well as “up-to-date” information on current developments are difficult to find, since the know-how often remains on the local level.

The ongoing project “Linking cycling with public transport - options for improving the combined usage” aims at providing stakeholders with best practice examples of the linkage of bicycle and public transport as well as with practical knowledge of measures to improve this intermodal mode of transport.

Following an overview of recent developments in Germany, the presentation summarizes current best practices, systematizes existing implementations and gives insights in spatially differentiated intermodal usage patterns. Based on qualitative research and quantitative data analysis further findings are presented. They underline the role and the importance of co-operations and marketing to help successfully implement the intermodal bike-public transport mode.

6.29 Cyclists’ Anger Experience in Road Traffic: From Anger Provoking Incidents to Developing a Cycling Anger Experience Measure

Dr. Anja Katharina Huemer, Technische Universität Braunschweig, Germany

Since 2012, the psychologist Anja Huemer has been working at the chair of Engineer and Traffic Psychology at the Technische Universität Braunschweig. Her dissertation had the topic “Towards an effective measurement of driver distraction in real life and in low cost simulation”.

Michael Oehl, Leuphana Universität Lüneburg, Germany

Michael Oehl is senior human factors researcher and lecturer at the Institute of Experimental Industrial Psychology at Leuphana Universität Lüneburg and adjunct senior lecturer for traffic psychology at the German Police University. He studied Psychology at the Universität Konstanz and RWTH Aachen. During his PhD at Technische Universität Berlin and Leuphana Universität Lüneburg he was a visiting scholar at the University of Tokyo, Tsinghua University and Beijing Normal University.

Dr. Stefan Brandenburg, Technische Universität Berlin, Germany

Stefan Brandenburg studied psychology at the Technische Universität Chemnitz and University of Oklahoma, USA, until 2008. Since then he has been a scientific assistant in the field of cognitive psychology and ergonomics at the Technische Universität Berlin. He mainly focuses on the temporal changes of experience in the human-technicinteraction and the human perspective on traffic and respective technologies.

Abstract

Cycling anger defined as the propensity of cyclists to become angry in traffic is a concept so far neglected in research. Research on emotions in traffic has been focusing rather only on car drivers. However, as the popularity and use of bicycles is growing, cyclists are increasingly involved in accidents. At the same time the number of reports of driving anger among cyclists are increasing, e.g., in bigger German cities. Traffic research shows that especially anger and aggression among road users lead to maladjusted driving and thereby to a higher accident risk. Therefore, our contribution focuses on cyclists’ traffic related anger. To ensure a huge range of anger provoking incidents we conducted two studies. Firstly, cyclists discussed anger provoking events they have experienced in daily traffic in focus groups. Secondly, we asked participants to keep a bicycle riding diary registering all anger provoking events they had experienced during one week. Results of both studies showed that most anger provoking incidents that occurred are

conflicts between car drivers and cyclists. Conflicts with car drivers caused more anger than conflicts with other cyclists or pedestrians. On the basis of these qualitative studies a questionnaire was developed as a measure assessing cyclists' anger experience in interaction with their cycling environment. Factor analyses proposed four subscales, i.e., police interaction, car interaction, cyclist interaction, and pedestrian interaction. Confirmatory cross-validations with different samples of cyclists supported these results. Alpha reliabilities were acceptable to good. Significant correlations with the Driving Anger Scale for car drivers and with the general State-Trait Anger Expression Inventory suggested convergent validity and providing a complementary instrument for measuring cycling anger in traffic. Furthermore, significant correlations between cycling anger and self-reported risky cycling behaviors were observed.

6.30 Bicycle commuting as part of the sustainable mobility - a case study of City of Koprivnica

Antun Plenковић, Ivo Pilar Institute of Social Sciences, Croatia

Antun Plenковић (1987) works as a research administrator at the Ivo Pilar Institute of Social Sciences in Zagreb, Croatia. He has M.A. (University of Zagreb). His research interests include sustainable mobility, travel behaviour, and impact of social sciences and humanities. He is a member of the national project regarding bicycle use in daily migrations and a member of two COST actions (one regarding research administration and other regarding the impact of social sciences and humanities).

Mateja Plenковић, Croatian Catholic University, Croatia

Mateja Plenковић (1988) has an M.A. in Sociology (2012) from the University of Zagreb. She was awarded the Rector's Award, Dean's Award for the best student, and scholarship of the City of Zagreb. Since 2013 she has worked at the Croatian Catholic University as a research assistant. She is currently doing a Ph.D. in the field of information and communication sciences at the University of Zagreb. She has participated in two research projects, five conferences, and has published four scientific papers.

Dr. Marko Mustapić, Ivo Pilar Institute of Social Sciences, Croatia

Dr. Marko Mustapić (1977) has a PhD in sociology and is a researcher at the Ivo Pilar Institute of Social Sciences in Zagreb. His research interests include youth, sport, and political communication. He has co-authored 1 book, co-edited 1 anthology, and authored or co-authored more than 40 scientific and research papers. He is currently the principal investigator on 1 national project, a researcher on the H2020 project, and member of a COST action regarding populist political communication.

Abstract

Sustainable mobility plays a key role in the framework of sustainable development - an idea according to which the current total effect on the micro and macro social level should not endanger future generations, in particular wearing of non-renewable energy sources and the long-term devastation and pollution of the environment. Following this path, in Croatia, the general aim of the Croatian Strategy of Traffic Development (2014-2030) is to achieve an efficient and sustainable transport system in the national territory. The purpose of our research is to gain insight into the determinants that favor the use of bicycles as means of commuting in Koprivnica. Being the bicycle friendly city, Koprivnica was selected as a case study because of its special status in terms of bicycle traffic - it has the most kilometers of bike infrastructure with regard to number of inhabitants in Croatia and it has one of the largest modal share of bicycle traffic in the total turnover, as stated in the Plan of Sustainable Urban Mobility of Koprivnica.

The aforementioned determinants are the following: built environment (distance, infrastructure), natural environment (landscape, weather conditions), socio-economic factors (age, gender, income), socio-psychological factors (attitudes, habits) as well as cost, time, effort and safety. The research includes the implementation of eight focus groups, with the participation of people living and working in Koprivnica and whose experiences provide a deeper understanding of the determinants that favor the use of bicycles in commuting, and also determinants that favor the use of other means of transport in daily commuting.

6.31 Measuring accessibility for cycling

Juan Pablo Ospina Zapata, Universidad Nacional de Colombia, Colombia

Juan Pablo Ospina received a master's degree in Urban Planning at the Institut Français d'Urbanisme in Paris. Focussing on his dissertation on "Measuring accessibility by cycling taking into account the spatial effects" at the Universidad Nacional de Colombia, he is also an active member of RiSE (Research in Spatial Economics). His teaching experience and work on consulting projects is mainly focused on urban transport and urban planning while his research interest is specialized in non-motorized modes, accessibility, spatial analysis, and sustainability.

Verónica Botero Fernández, Universidad Nacional de Colombia, Colombia

Verónica is a Professor of GIS, Remote Sensing, and Geospatial Analysis in Undergraduate and Graduate Engineering Programs at the Department of Geosciences and Environment of the Faculty of Mines of the National University of Colombia, Medellin campus. She is an active member of several research groups in which she has served as principal investigator or co-PI in more than 50 research and extension projects that have involved the use of geo-information for urban and rural planning, and disaster management.

Juan Carlos Duque Cardona, RiSE (Research in Spatial Economics)

Juan C. Duque has been a Full Professor in the School of Economics and Finance at EAFIT University (Colombia) since 2007. He is founder-director of RiSE (Research in Spatial Economics), a research group devoted to the development of quantitative methods for space-time data analysis. Having studied on executed research for his Ph.D. and as a post-doctoral researcher in Spain and the USA, Duque has published about 35 international papers and participated in consulting projects for various international funding institutions.

Abstract

Despite the necessity of having good urban transport systems, the dominance of private motorization during the last decades has led to the decline of public transport and non-motorized modes. Current sustainability agendas for cities suggest the development of a set of integrated measures involving land use and transport actions more than just to keep on increasing the speed and the efficiency of transport systems. These actions imply the comprehension of the land use-transportation planning process in order to understand the causes and consequences of actions. Some authors recognize the concept of accessibility as an indicator of the role played by the land use and transport systems in society. Thus, they define it as the extent to which land use and transport systems enable individuals to reach a desired activity in a given territory. Despite all the research found about this topic, most of the methodological approaches used for accessibility measurement, have a strong influence from the traditional methods used for motorized transport modeling, therefore they use distance and travel time as the key variables for their analysis. However, some authors indicate that elements associated with the urban environment may be determinants of travel behavior. Factors such as density, mixed land use, infrastructures and topography may affect people's attitudes towards

the use of walking, cycling, public transport or car as a transportation mode. No current studies have analyzed yet (1) neither the effect of urban conditions, notably those of the route on bicycle accessibility; (2) nor the possible variability of the effect of these conditions depending on the location in the territory. This research studies the effect that urban conditions in the origin, destination and route, may have on bicycle accessibility when used as a single mode. Medellin-Colombia will be the case study, taking into account the urban socioeconomic segregation, the diversity of land uses and the variability of topographic conditions. A tool for analyzing bicycle accessibility will allow to account for the gaps on methodologies to evaluate strategies concerning cycling promotion.

6.32 Think bike workshops, best of both worlds in two days

Richard ter Avest, Goudappel Coffeng & Dutch Cycling Embassy, Netherlands

Richard ter Avest (1962) studied Urban and Transport Planning. Richard has been working at Goudappel Coffeng, since 1992. Richard helps regional and local governments carry out projects in which cooperation between government, business and social organisations is vital to solving transport and traffic problems. He specialises in urban cycling studies, cycle highways, sustainable road safety, and developing attractive and liveable city centres. His international experience is built up in countries like Germany, Scandinavia, United Kingdom, USA.

Abstract

How to realize cycle networks and cycle infrastructure in the car-oriented countries like USA, as well as in European countries?

During our 'Thinkbike Workshops' we have worked with local traffic planners, technicians and cyclists to make, for example, Los Angeles a more bike friendly city. The format has been the same in every city: a kick-off attended by a large number of members of the public followed by an inventory of three selected projects. The case-groups then go into conclave for two days in order to come up with a proper plan. The process is coordinated by Dutch experts of the Dutch Cycling Embassy (for example Goudappel Coffeng), but the Group appoints the presenter itself. These presentation are for the general public again, with the city's mayor attending as well.

We introduce the ABC: starting with

- ▶ All the planners, designers, researchers, NGO's and decision-makers from the city and region.
- ▶ (design the) Bike –network, but also the network for Public Transport (connection with bike for long distances). And including the network for cars with difference in speed and capacity.
- ▶ Change is cool! Implementing the first part within a few months. And combine the implementation with communication through informative and attractive campaigns, for example by smartphone.

Use a webbased tool (Mobiliteitsscan of Movemeter) for this compact interactive process, to visualize short car trips, and calculate how investments in the bike is good for the whole traffic system and liveability in the city. By substituting the short, local car-trips with bike rides, there will be more space for cars on the long distances. So it's a win – win for everyone! A product of combined knowledge and cultures of both worlds: USA and NL, Germany and NL, Australia and NL.

This approach has been proven to be highly effective. Everyone involved has been extremely curious and eager to learn about how we do things in the Netherlands (integrated thinking,

planning and making designs). The design is sometimes implemented within a few months! The workshops have been great success in all 10 cities the US, and will continue to constitute for the forthcoming design processes.

6.33 Play with Mobility

Eric Treske, intrestik – further with gaming, Germany

Dipl. Soz. Eric Treske founded the consultancy agency intrestik – further with gaming in 2004, and since 2014 his focus lies in participative mobility and city development. As a research associate at the chair for organizational sociology at the Ludwig-Maximilians-Universität München (LMU) he was teaching and doing research on micropolitics and organizational change with gaming as a main method to provoke dialogue between politics, administration and also with normal citizens.

Abstract

Cycling is the most popular and the most environmentally friendly transport vehicle. Nevertheless, it appears that it is very difficult to convince normal citizens to switch over to ride a bike. On the contrary, every parking space for a car, which is provided to the bicycle traffic, provokes a storm of indignation in the public.

So, why not try something unusual? Why not just play with the bikes? The game Traffic Planning is a moderation tool that creates a shared view of mobility among the participants. The participants play with their different experiences of everyday mobility in their region. The input question is "How do I get to my workplace every day?" The playful, research-based approach to traffic planning ensures that people with different knowledge levels - from the ordinary citizen to the mobility expert of the local transport agency - are heard and taken into account.

The result is a haptic model of reality for participants who are willing to try something new in mobility, without pressure, fear, or embarrassment. The successes from our first pilot project in the Region Schweinfurt confirm our approach in this game.

6.34 Register of Initiatives in Pedal Powered Logistics (RIPPL)

Tom Parr, RIPPL, The Netherlands

Tom Parr is a Writer and Project Manager specialising in cycle logistics, infrastructure and community. After studying Audio Technology he worked as an Audio Technician in northern England for several years, before working for an environmental consultancy. He then moved to London and worked for start-up cycle parking business Cyclehoop, running the installation team. Following a stint in Australia working as a cycling instructor, Tom is now based in Amsterdam where he works freelance on cycling-related projects.

Abstract

Worldwide, the use of cargo bikes for transport of freight or the carrying out of services is on the rise, especially in urban settings. The use of cargo bikes for these purposes, compared with the use of carbon consuming vehicles, has many well documented environmental, public health, social and economic benefits; on micro, meso and macro scales.

The Register of Initiatives in Pedal Powered Logistics (RIPPL) project began in October 2016 and runs for one year. As such, the presentation at the International Cycling Conference will be the first based on the complete results of RIPPL. This presentation will briefly introduce the project and run through some of the most interesting examples found including any notable trends or findings. The presentation will relate most closely to conference theme 2; Impacts of

cycling and walking, but is also likely to touch on theme 1; Determinants of cycling and walking, theme 4; Mobility cultures and theme 6; Developing technologies in transport.

RIPPL is funded by Stichting Connekt, a Netherlands-based independent foundation which promotes sustainable mobility. The project will gather information about the most innovative, interesting and successful examples of organisations' use of cycle logistics, with a particular (but not exclusive) focus on Europe. With this information, the project attempts to identify trends and best practices which will then be shared as a curated list with the aim of promoting cycle logistics. Subjects of the project are organisations which use cargo bikes to transport goods or carry out services which would formerly have been transported by carbon-consuming vehicles and in which a mode-shift has occurred towards the cargo bike. Examples include a plumber from Paris, health workers in Sweden, Dutch supermarket Albert Heijn and municipal cleaners in Graz, Austria.

6.35 Opportunities for the Combined Bicycle and Transit Mode - insights into trip and user characteristics of the bicycle and transit mode

Niels van Oort, Delft University of Technology, Netherlands

Niels van Oort (1978) works as an assistant professor Public Transport at Delft University of Technology and via his job as a public transport consultant at Goudappel Coffeng, he is involved in several public transport projects. His main fields of expertise are public transport planning, service reliability, bike and transit combination and Big Data. In addition to teaching, Niels often presents his work at conferences and he frequently publishes articles in (international) journals. He finished his PhD research on service reliability in 2011.

Raymond Huisman, Goudappel Coffeng, Netherlands

„Raymond Huisman (1988) is a Public Transport consultant at Goudappel Coffeng. He believes that the flexibility of the bicycle and the speed of public transport make it a powerful future-proof combination of transport modes. At Goudappel Coffeng Raymond works in the field of Public Transport; but always related to other related fields, such as the relationship with active travel modes. Before working at Goudappel Coffeng Raymond studied traffic management (B.Sc) and urban planning (M.Sc).“

Abstract

Around the world cities face negative effects generated by increasing mobility needs. To tackle these issues, mobility should be environmental and spatial friendly. Combining bicycle and public transport into a 'bicycle + transit mode' will create a synergy with the best of both worlds: superb door-to-door accessibility offered by the bicycle and a large spatial reach from transit modes. These complemented modes combined easily challenge private cars in terms of speed as well accessibility.

Research regarding the users and trip types of the bicycle and transit mode is largely missing. This is unfortunate, since understanding both user and trip characteristics is of the utmost importance to improve the share of the bicycle and transit mode. Policy-makers can make concrete decisions on infrastructure and service investments only when the gap between the aforementioned societal need and scientific knowledge is filled.

The main analysis in the study eventually leading to the poster-sized infographic is based on data from the Netherlands. The Netherlands is one of the countries with a head start regarding the use of the bicycle + transit mode. A one-day trip diary survey, representative of the population of the Netherlands, with more than 250,000 respondents who made nearly 700,000

trips over the course of 6 years (2010-2015), is used to derive important trip and user characteristics of the bicycle + transit mode. Finally, latent class cluster analysis is applied to find prototypical users of this mode on the basis of their socio-demographic attributes.

The conclusions are ideal to display in a visually attractive manner. Of course this counts for information related to (1) trip and (2) user characteristics, but also to (3) spatial and (4) temporal behaviour. It is, for example, found that the most important purposes of the bicycle and transit mode are work or education, typically involving relatively long distances. Bicycle and transit-potential for other transit network levels, such as metros and bus rapid transit can be found. Moreover, seven unique user groups – from middle-aged professionals to school children – are identified, and their different travel behaviour is discussed.

6.36 How HOD is your city?

Erik Tetteroo, Erasmus University Rotterdam/TU Delft, APPM Management Consultants, Netherlands

Abstract

Cycling is hot. More and more cities encourage cycling as it improves livability, health, economics and accessibility. Projects and measures that aim at a shift from car to bicycle, seems successful, and also an increase in the number of multimodal trips that combine train and bike can be acknowledged.

But as the city benefits from more cyclists, it is important to understand how urban planning can stimulate more people to shift to cycling. A study about the relation between urban planning and bicycle-inclusive mobility delivered insights in models for urban development. In this sense, I distinguish apart from the 'old-fashioned' Car Oriented Development (COD), a stronger focus on Transit Oriented Development (TOD) and Bicycle Oriented Development (BOD). Yet the most promising form seems to be the Hybrid bicycle-train Oriented Development (HOD). HOD delivers the perfect conditions for sustainable urban planning, which combines the speed and long distance of the train with the door-to-door flexibility of the bicycle.

This study provided insights in the factors that stimulate the Hybrid bicycle-train system, and helps to identify to what extent a city is focused on these factors. This includes as well aspects from spatial planning (as density, proximity) as infra planning (e.g. bicycle facilities and quality of rail network). The ratio between these factors indicate how well a cities' ability to facilitate Hybrid Oriented Development. In this sense policy makers are helped to understand How HOD their city is.

6.37 New recommendations for bicycle streets

Rico Andriesse, Goudappel Coffeng, Netherlands

Rico is a leading professional on the subject of bicycle infrastructure. How do you organize your city in a bikefriendly way? Which bike facilities fit in best? What to do if cycling does not seem to fit in at all? Rico was responsible for several Dutch design manuals on cycle highways, cycle paths and roundabouts. Rico is working at Goudappel Coffeng. Rico conducted several ThinkBike workshops (Helsinki, Tampere, Joensuu, Goteborg, Turku, Espoo).

Robert Hulshof, CROW, Fietsberaad, Netherlands

Robert Hulshof is a medior project manager at CROW. CROW is the technology platform for transport, infrastructure and public space. Robert is involved in several projects related to road

safety and cycle infrastructure in The Netherlands. The main objective of these projects is to develop practical knowledge for road managers and their consultants.

Abstract

In the beginning of the 1990'ies the Dutch stole the Bicycle Street (Fahrradstrasse) from Germany. After 25 years of fostering the concept to maturity it's time to give something back. This is what we learnt.

Main cycle routes are often part of the distributor road network for (through) motorized traffic. However, it is also possible that main cycle routes and distributor roads for motorized traffic are not combined or have deliberately been separated. In that case, the main cycle route should run through the residential area via access roads. This introduces a specific type of main cycle route: the bicycle street (sometimes called 'bicycle boulevard').

Bicycle streets are - since the introduction around the end of the twentieth century - becoming more and more popular in The Netherlands. Despite or perhaps because of a lack of design standardization, a lot of bicycle streets have been built. Time to find out what works and what does not work? In particular many questions are asked about how much motorized traffic is acceptable on a bicycle street and what the relationship should be with the amount of cyclists and the street cross section?

Therefore CROW and Rijkswaterstaat conducted research on the above mentioned questions. Based on the experiences with current bicycle streets, we set several provisional recommendations. In the next phase of the project we tested (or confirmed) these provisional recommendations in practice by doing research on the effects on traffic safety and perceived safety.

This research results in recommendations for multiple aspects of the application and design of bicycle streets. The provisional recommendations are:

- ▶ Match the width of the street with the typical user combinations
- ▶ Use one or two lanes for bicycles in red or reddish asphalt (Dutch bike path color)
- ▶ The rest of road is paved
- ▶ Slow down car traffic
- ▶ Use circulation measures to reduce car traffic when necessary
- ▶ Right of way for the bicycle street
- ▶ No parking on the road
- ▶ A dedicated area for pedestrians
- ▶ Use the (non-official) bicycle street sign
- ▶ Use vertical elements

6.38 Realworld laboratory for a sustainable mobility culture – insights from transdisciplinary research with social innovators in mobility projects in Stuttgart, Germany

Marius Gantert, Universität Stuttgart, Germany

Dipl.Ing. Marius Gantert (* 1984) studied architecture and urban design at the Karlsruhe Institute of Technology and has been a freelance architect and member of ‘Teleinternetcafe Architecture and Urbanism’ in Berlin since 2012. As part of a research master at the Bartlett School of Planning at University College London, he is researching the perception of urban space from the cyclist’s perspective. Since 2015 Marius Gantert has been a research associate at the Institute of Landscape Planning and Ecology at the Universität Stuttgart and works as a project coordinator.

Eric Puttrowait, Universität Stuttgart, Germany

Eric Puttrowait MSc. (* 1988) studied Integrated Design at Anhalt University of Applied Sciences and Integrated Urbanism and Sustainable Design at the Universität Stuttgart and the Ain Shams University in Cairo. His master’s thesis focused on the potential of the bicycle as a sustainable urban transport mode in Cairo. Since 2015 Eric Puttrowait has been a research associate at the Institute of Landscape Planning and Ecology and the Chair of International Urbanism at the Universität Stuttgart. He is responsible for the planning and realization of real-world experiments within the Realworld Laboratory for a Sustainable Mobility Culture.

Antje Stokman, HafenCity Universität Hamburg, Germany

Antje Stokman is a landscape architect and professor of architecture and landscape at HafenCity Universität Hamburg. As a professor and director of the Institute of Landscape Planning and Ecology at the Universität Stuttgart from 2010-2017, she co-founded and directed the German-Egyptian master programme “Integrated Urbanism and Sustainable Design” with Ain Shams University, Cairo and the „Future City Lab_Stuttgart: Real World Laboratory on Sustainable Mobility Culture“. Her work focuses on strategies to develop infrastructural and ecological systems as a basis for sustainable urban form and design of urban landscapes.

6.39 Cyclists and non-cyclists representations and motivations of utilitarian urban cycling in France

Carolina Martinez Tabares, French Institute of Science and Technology for Transport, Development and Networks, France

Carolina Martinez Tabares received her doctoral degree in Psychology in 2017 from the Paris VIII Vincennes-Saint- Denis University, France. Her PhD thesis focused on identifying individual factors related to utilitarian urban cycling. She is currently a postdoctoral researcher in Social Psychology at IFSTTAR in the project “Urban New Cyclists”. The aim of the project is to develop measures to help new urban cyclists overcome their difficulties and to use the bicycle on their journeys.

Nadine Chaurand, French Institute of Science and Technology for Transport, Development and Networks, France

Nadine Chaurand obtained her PhD in social psychology in 2008 from University Blaise Pascal. She is a researcher at Ifsttar. She is interested in psychological factors related to cycling as a mode of transportation, such as subjective risk perceived by cyclists and other road users interacting with cyclists, psychological motivations and barriers to cycling as a mode of

transportation, and designing interventions to promote urban cycling based on theories of behavioral change.

Prof. Patricia Delhomme, French Institute of Science and Technology for Transport, Development and Networks, France

Prof. Patricia Delhomme is a senior researcher of the Mobility and Behavior Psychology Lab at IFSTTAR. She participates in numerous projects to increase road safety, research strategies to encourage individuals to use their car less and to increase the use of public transport or active modes of transport. She has supervised over 40 PhD students and post-docs, and has authored over 90 publications. The impact of her research is significant as evidenced by several of her papers being cited 300 times.

6.40 The relationship between bicycle commuting and perceived stress: a cross-sectional study & Effects of active mobility, physical activity, and air pollution on blood pressure

Ione Avila-Palencia, ISGlobal, Centre for Research in Environmental Epidemiology (CREAL), Spain

Ione Avila-Palencia is a PhD student from Pompeu Fabra University and a pre-doctoral researcher in the Barcelona Institute for Global Health (ISGlobal, former CREAL) in Barcelona (Spain). She is currently working under the supervision of Dr. Mark Nieuwenhuijsen in the EU-funded PASTA longitudinal study, investigating the associations between active transport and health.

Dr. Audrey de Nazelle, Imperial College London, United Kingdom

Audrey de Nazelle is a lecturer in air pollution at the Centre for Environmental Policy, Imperial College London. Audrey is an expert in health impact assessment and exposure science. Her research is at the intersection of environmental sciences, health behaviour, transportation, and urban planning. Her work aims at guiding decision makers towards health-promoting built environments and policies. It involves novel and holistic approaches to assessing behavioural, environmental and health impacts of urban plans and policies.

Abstract

Introduction: Active commuting –walking and bicycling for travel to and/or from work or educational addresses– may facilitate daily, routine physical activity. Several studies have investigated the relationship between active commuting and commuting stress, but there are no studies examining the relationship between bicycle commuting and perceived stress, or studies that account for environmental determinants of bicycling commuting and stress. The current study evaluated the relationship between bicycle use for commuting among working or studying adults in a dense urban setting and perceived stress.

Methods: A cross-sectional study was performed with 788 adults who regularly travelled to work or study locations in Barcelona, Spain, excluding those who only commuted on foot. Participants responded to a comprehensive telephone survey concerning their travel behaviour from June 2011 through to May 2012. Participants were categorised as either bicycle commuters or non-bicycle commuters, and based on the Perceived Stress Scale (PSS-4), as stressed or non-stressed. Multivariate Poisson regression with robust variance models of stress status based on bicycling exposure, adjusting for potential confounders, were estimated.

Results: Bicycle commuters had significantly lower risk of being stressed [RR (95%CI) = 0.73 (0.60, 0.89)]. Bicycle commuters who bicycled four or more days per week had lower risk of

being stressed than those who bicycled less than four days. This relationship remained statistically significant after adjusting for individual and environmental confounders, and when using a different cut-off of perceived stress.

Conclusions: Stress reduction may be an important consequence of routine bicycle use and should be considered by decision makers as another potential benefit of its promotion.

6.41 The Bicycle as a Symbol of Lifestyle and Status – Towards the Cultural Meaning of Urban Cycling

Maximilian Hoor

Maximilian Hoor is a research associate at the Department of Integrated Transport Planning at the Technische Universität Berlin, with his PhD research focusing on urban cycling cultures and their political implications. He studied Human Geography, worked at the Department for Transport Geography at HU Berlin, and was involved in various bicycling projects on a freelance and volunteer basis. Since 2016, Max has been a board member at paper planes implementing „Radbahn“, a cycling path underneath Berlin’s elevated U1.

Abstract

Bicycling has been gaining more and more attention in media, politics and planning. Although the bicycle is first and foremost a practical object, it does not only function as a means of transportation, leisure or sports, but is becoming increasingly relevant for urban lifestyle practices and social distinction: hipsters with messenger bags on fixed-gear bikes, bicycles on shopping displays and advertising, or wall holders presenting bikes like artwork in the living room, are some examples among many.

My qualitative research – ethnographic participation and media analysis – undertaken mainly in Berlin, focusses on understanding how bicycles function as objects of distinction and lifestyle, drawing on highly individualised bikes as aesthetic and representative manifestations of urban cycling. It shows, for example, that fixed-gear bikes were removed from their original subcultural and professional context in the early 21st century and have since become integral to urban popular cultures, implementing commercialisation, standardisation and specialisation as key aspects of postmodern consumer cultures.

Blogs, magazines, and films focussing on urban cycling and lifestyle, and many bike-centered events such as parties, races, political actions or shop openings indicate an active and diverse urban cycling scene. Various liaisons between fashion and cycling (from advertising campaigns to high-fashion bike apparel to wall-holders and well-designed bicycle lights) show that product innovations focus not only on practicality, but rather on aesthetic and representative functions.

6.42 Open Service Innovation and Active Mobility in a German City: Managing mobility changes by building an eBike-Sharing System as an integrated intermodal sustainable solution

Dominik Eichbaum, Stadt Siegen, Germany

Dominik Eichbaum works for the City of Siegen, a 100.000 inhabitants strong city in the federal state of North Rhine-Westphalia. He is a professional business development consultant in the field of regional and economic development. He has a university diploma master of business administration, innovation management and entrepreneurship of small and medium sized companies. As project manager, he is responsible for a federal research project on e-mobility.

His research questions are focused on strategies for modal split infrastructures and community based mobility platform services to set up livable cities for people.

6.43 The ADFC Bicycle Climate Test

Thomas Böhmer, German Cyclists' Federation (ADFC), Germany

Thomas Böhmer is a researcher and engineer from Dresden, Germany. He is working in the field of cycling and integrated traffic planning. In the years 2012, 2014 and 2016 he coordinated the Bicycle Climate Test survey of the German Cycling Club (ADFC). Previous activities include research projects (potential of cycling for climate protection, interdependencies of bicycle and public transport), bicycle networking (MeetBike conferences) and bicycle promotion in cities (certified BYPAD auditor).

6.44 Active mobility, children's cycling skills and the role of parents

Dr. Michael Meschik, University of Natural Resources and Life Sciences, Austria

Michael Meschik lectures at the Institute for Transport Studies, University of Natural Resources and Life-Sciences, Vienna, where he is also the mobility manager. He has been involved in (inter)national research on mobility behavior, mobility management, sustainability, economic and health aspects, traffic calming, traffic safety etc., focusing on bicycling and walking. He is committed to promoting non-motorized modes, trying to achieve their full beneficial importance and health potential.

Juliane Stark, University of Natural Resources and Life Sciences, Austria

Juliane Stark is researcher and lecturer at the Institute for Transport Studies, University of Natural Resources and Life Sciences Vienna (since 2004). Since 2009 she is also external lecturer at the University of Applied Sciences (Technikum Wien). She is project leader of (inter)national research and educational projects in the field of sustainable transport planning (e.g. travel demand management, electromobility) with a key focus on travel behaviour and attitudes of children and youth.

Abstract

In young age groups, bicycle-related accidents are relatively frequent and usually not harmless. Studies show that lots of these accidents were considered to be the cyclists' fault. Furthermore, results out of a series of international studies demonstrate that psychomotor skills of children decrease over the years. These deficits express themselves also as deterioration of bicycle handling capabilities. In Austria, this is also confirmed by trainers of cycling exams. According to Austrian traffic legislation, passing the cycling exam is the prerequisite for children to cycle on public roads before the age of twelve. These ongoing developments are clearly heading in the wrong direction - as far as it is being admonished by health authorities that more and more children are overweight and do very little physical exercise.

We assume that parents do not (want to) take the time to train cycling in typical daily traffic situations. Thus, children in the last years of primary school are not adequately prepared for road traffic although they – in principal – prefer bicycling over other modes of transport.

The aim of the study in 2016 was to determine the short-term effects of cycle training with several test stations on basic cycling skills of children aged eight to ten years at primary schools in Lower Austria. The study follows a before and after design. All participating children also received a parental questionnaire to motivate their parents to take part in an in-depth interview. We examined the parental attitudes towards their own and their children's' bicycle use in daily

mobility. The results were set in correlation to the level of cycling skills as analysed before and allowed mode choice. We also surveyed their initiatives in preparing their children for cycling tests and performing joint practicing.

In addition, interviews with teachers were conducted. Although this is a sensitive issue, the results should give an impression whether pupils' cycling skills respectively the overall level of physical activity has an influence on educational outcomes or social behaviour in school.

6.45 Access to Cargo Bikes for Everyone – Research and Practice Project "TINK"

Maxie Schulte, Fachhochschule Bielefeld, Germany

Maxie Schulte studied psychology (M.Sc.) with an emphasis on environmental psychology and is currently employed as a research assistant at the University of Applied Sciences Bielefeld. At the moment she is pursuing her PhD in the field of group relations and collective action. Her research interests are sustainable lifestyles and wellbeing, engagement in (sustainability) initiatives, collective action and behaviour change processes.

Marco Walter, e-fect eG, Germany

Marco Walter studied psychology and is working as an environmental psychology consultant within the network e-fect eG. He is the founder and national project leader of the TINK project (rental cargo-bikes for all). Last winter he cycled together with a colleague more than 1000 Kilometres with a non-motorized cargo-bike across Germany from south to north. He is also interested in the topic of sustainable tourism: he is co-founder of Ecocamping, an association for sustainable campsites in Europe.

6.46 City Cycling – cycling for a better climate

André Muno, project & event manager, Climate Alliance, Germany

André Muno has been a project and event manager at Climate Alliance since 2008. Within the largest network of local authorities committed to protecting the world's climate, he is mainly involved in campaigns throughout Germany and across Europe to promote sustainable mobility. The business/marketing graduate has developed the CITY CYCLING campaign and its integrated RADar! reporting tool into one of the biggest cycling campaigns with over 600 municipalities and around 200,000 cyclists participating in 2017.

7 Pictures of the conference (selection)



Opening Ceremony at the Baroque Rittersaal



International Mosaic



Bike Tour starting at the Baroque Palace



Hand-over ceremony of THE PEPBaton



Get-Together at the Foyer

8 Selected Paper: Promoting children's cycling through cycling courses in city traffic (practice paper)

Marlene Mellauner

University of Natural Resources and Life Sciences, Vienna

Department of Landscape, Spatial and Infrastructure Sciences

Institute of Landscape Planning (ILAP)

marlene.mellauner@boku.ac.at

8.1 Abstract

To promote children's cycling in Vienna the non-profit organization "Schulterblick – the Viennese Cycling School" has developed a unique road safety and mobility management program. It is based on the idea that children need to practise in real life traffic situations in order to be well prepared for cycling in urban traffic. The main educational goal is to promote a new cycling culture which contributes to a cooperative atmosphere between road users (a side-by-side city traffic). Based on the Schulterblick concept the association has been organizing on-road cycling courses for school classes in the city centre of Vienna since 2015. About 1.500 children aged 9 to 11, their teachers, parents and grandparents took part in 63 Schulterblick cycling courses. In addition, Schulterblick initiated a discussion between stakeholders about the importance of high-quality cycling courses and the potential of cycling education measures for a successful transition towards active mobility. Since 2016 their activities and achievements are gaining broader attention. Nevertheless, the success is accompanied by challenges concerning the positioning and long-term implementation.

Keywords: children, cycling, cycle training, schools, active mobility

8.2 Introduction

The benefits of cycling are numerous. Cycling has not only positive effects on the personal well-being and physical health. It improves also the quality of life in our cities and plays a crucial role regarding the mobility and energy transition. Stakeholder commitment to active mobility is increasing in many countries. In order to contribute to climate protection, health promotion and road safety regions, cities and communities all over the world aim to improve the framework conditions for cycling and walking.

In 2015 the Austrian Ministry of Agriculture, Forestry, Environment and Water Management (Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft (BMLFUW) 2015) passed the „Masterplan Cycling 2015-2025“. The aim is to promote cycling and to boost the number of cyclists in Austria until 2025 to 13%. Therefore, the masterplan focuses on different thematic priorities including actions related to raising awareness, traffic education and cycling workshops. "The Austrian Road Safety Programme 2011-2020" says that "Educating' (young) people in sustainable and environmentally friendly mobility is the one particular measure that will probably make the largest long-term contribution to reducing the number of vehicles on the roads and thereby increasing road safety." (bmvit 2016:26)

However, bridging the gap between goals and reality is not easy. Even though different fields of research prove the various benefits of cycling and even though cycling education is part of

Austrian's policy documents, children who ride a bike on a daily basis are not yet part of everyday life especially in Vienna.

Cycling in urban traffic is challenging, that is why especially children and families need practical help. Based on the commitment of the two mentioned policy documents the practice presentation will discuss the key role of cycling education in Austria using the example of the non-profit organization "Schulterblick – The Viennese Cycling School". The promotion of cycling by offering support with the transition towards active urban mobility of children and their families is seen as the key to reach the goals.

8.3 The background - Legal requirements for children who cycle in Austria

In Austria, children under the age of 12 must wear a bicycle helmet and are not allowed to ride a bike in public traffic without being accompanied by a person older than 16 years. At the age of 10 children in Austria have the possibility to take part in the Voluntary Bicycle Exam (Austrian Youth Red Cross 2017). The program concludes with a final test, which legally allows children to participate in public traffic on condition that their parents give their consent (§ 65 Straßenverkehrsordnung (StVO)). Usually in the fourth academic year teachers organize the Voluntary Bicycle Exam for their class. The test involves a theoretical and practical part. The practical part may take place in traffic safety gardens, designated car parks or real traffic situations.

While in smaller towns and rural areas the training as well as the practical part of the test are held in real life traffic situations, children in Vienna pass the training and the practical part of the test only in traffic safety gardens. Cycling exercises in real life traffic situations are recommended in the guidelines of the Austrian ministry of education (BMB 2016), but not put into practice. Schützhofer et al. (2017) point out that usually there is no special practice training provided and that "it depends on parents whether they do cycling exercises with their children or not." (ebd. 501)

Concerning the national "Masterplan Cycling 2015-2025" a two stage cycle training including training in protected traffic areas as well as training in real life traffic situations shall be realized nationwide. (BMLFUW 2015:23) "The Austrian Safety Programme 2011-2022" aims for cycling safety training for children in a safe practice area and on the roads to promote cycling safety and to help children to enjoy independent mobility.(bmvit 2016:69)

Therefore, a standardized format for cycling teachers in Austria shall be provided (BMLFUW 2015b). Three members of Schulterblick are appointed to master cycling coaches and are qualified to train future cycling instructors since 2015. The other nine members of Schulterblick took part in one of the first training programs and were certified as cycling teachers by the Austrian Ministry of Agriculture, Forestry, Environment and Water Management in November 2017.

8.4 Best Practice Example "Schulterblick – The Viennese cycling school"

Robert Fuchs who worked as a cycling courier in Vienna for 20 years founded the Viennese cycling school Schulterblick in 2011. It is a non-profit organization based in Vienna, Austria. The German term "Schulterblick" (made up of the words shoulder and glance) means a quick glance over your shoulder, which is an essential skill when navigating through city traffic. Since the beginning, the team of Schulterblick has been working on the development of its own unique road safety and mobility management program to organize in Vienna on road cycling courses with school classes.

The Schulterblick concept covers new approaches to road safety, methods of teaching children to cycle in urban traffic and the role of cycling education within the transition towards child-friendly mobility. The aim is to offer children a first possibility to cycle in the city and to introduce them to cycling as a form of daily commuting. Schulterblick pursues to establish proper framework conditions for child cycling and to offer concrete help for children and families in terms of cycling courses to support the transition towards child friendly urban mobility.

For three years now, Schulterblick has been offering on-road cycling courses for different target groups in the city centre of Vienna. The focus is on one stage cycling courses for school classes with children aged between 9 and 11 who already passed or are going to take the Voluntary Bicycle Exam. In addition, Schulterblick initiated a discussion between stakeholders about the importance of high-quality cycling courses and the potential of cycling education measures for a successful transition towards active mobility.

8.4.1 The Schulterblick concept

The Schulterblick concept relies on two main ideas. First, it is based on the assumption that children need to practise in real life traffic situations and not just in protected traffic areas like traffic safety gardens. The practical experience in urban traffic is necessary to be able to implement cycling on a daily basis. Second, the concept focuses on a new understanding of safety and road safety education. In order to get children cycling in everyday life safety is of course the goal which necessarily must be achieved. However Schulterblick is convinced that cycling in urban traffic must be presented as something attractive and enjoyable instead of pointing out that other road users are potential obstacles or threats. The integration of the goal safety in something more attractive like communication and cooperation leads to a new focus and methods of teaching. Other road users such as people on bicycles, in cars or pedestrians are perceived interacting partners. Therefore the communicative and cooperative skills must be strengthened which leads to a new cooperative cycling culture.

Based on these two ideas Schulterblick pursues different aims which are not yet specified by indicators:

- ▶ **Improvement of cycling skills** of children and their teachers/parents as a necessary basis that children are able to cycle in the city as a form of daily commuting
- ▶ **Contribution to road safety** through a different focus and new methods in traffic education
- ▶ **Public awareness for cycling as child friendly mobility**, which offers a long-term improvement of our quality of life on a personal, local and global level

The Schulterblick concept submits therefore not only a way to organize cycling courses in urban traffic, but a new approach of raising awareness for child-friendly mobility. The positive experience of actually cycling in the centre of Vienna hopefully develop a huge impact on the children wanting to use the bicycle in traffic. As the courses take place in public space, the courses themselves with the enthusiasm and competence of the children are the most visible and convincing arguments for cycling as a new way of urban mobility.

The organization of cycling courses for school classes in real life city traffic situations in a major city like Vienna takes different measures to provide safety for all participants. The Schulterblick concept is characterized by the following aspects which set the framework for a successful implementation of cycling courses for school classes in real life traffic situations. All aspects

refer to reflections of road safety for all participants and public awareness for child friendly mobility.

► Bicycles and helmets are provided

Bicycles and if required helmets are provided for classes up to 30 children. In this way, the road safety of the bikes is assured and each child is equipped with a helmet which is needed for children under 12 according to Austrian law. Moreover, it makes it easier for school classes and teachers to attend the courses.

► High staff-student ratio to practice in small groups

In total eight adults, five cycling teachers from Schulterblick and three teachers from the school, are in charge of one class up to 30 children. For the exercises in real life traffic situations small groups with a maximum of five children are accompanied by one cycling teacher from Schulterblick and one companion from the school.

► Involvement of teachers and (grand)parents within the program

Teachers and (grand) parents are accompanying the whole course and are asked to contribute. In this way the program addresses not only children but also their companions who act as a role model and develop an awareness for child friendly mobility. Moreover, they may assure further cycle training at home or as part of school activities.

► Wearing high-visibility vests

All participants are wearing high-visibility vests to make themselves seen and make it easier for other traffic participants to interact with the children.

8.4.2 The program: Schulterblick cycling courses for school classes

A first pilot phase took place in 2012, where Schulterblick offered a two-stage cycling course for school classes. Due to little funding it was necessary to limit the program to one day. Since 2015 one stage courses are offered to school classes with children aged between 9 and 11. The Schulterblick cycling courses take place in the city centre of Vienna where dense traffic provides perfect conditions for practicing communicative and cooperative skills. The meeting site is conveniently situated within walking distance from a metro station. For Viennese school classes the participation is free of charge. Courses were financed mainly by the Mobility Agency of Vienna. There was additional funding by the third district of Vienna, the city of Purkersdorf and by a funding program of The Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management. In 2017 the federal state of Lower Austria financed a pilot project in the city of St. Pölten which will be extended in 2018.

The course lasts around four hours and consists of two parts where children learn a basic understanding of cooperation in city traffic and the necessary skills to implement this understanding when riding a bike. It's about sending and reading signals, like using hand signals and looking for eye contact. Wearing bright clothes and using lights to make one seen. It is about recognizing others as partners to interact with by saying thank you or sorry, by waving, smiling or talking with each other. Schulterblick is breaking down cycling in urban traffic to a very simple pattern of behaviour which applies to all situations:

1. Signal your intention
2. Check whether your way is clear
3. A) Go when it is clear / 3. B) Wait until it is clear

The pattern helps to structure the behaviour in every possible situation and helps to achieve a good and lasting understanding.

After a short introduction half of the class starts with the theoretical part and works on the characteristics of cycling in the city compared to racing or recreational-cycling. They do various exercises for a better understanding of cooperation in city traffic and the necessary skills for riding a bike in traffic. Moreover, the various impacts of cycling on the personal, local and global quality of life like health, noise or air pollution are discussed with the children.

The other half starts with some basic cycling exercises focussing on techniques, a basic understanding of cooperation in city traffic and the necessary skills to implement said understanding when riding a bike. After this preparation in a protected traffic area the children are introduced to cycling in the city within small groups of a maximum of five children accompanied as already mentioned by two adults. Each small group is going for almost one hour on cycling paths of the Vienna Ring Road around the historical city centre of Vienna.

Children who are not yet able to cycle can also participate in the course. They have the possibility to practice in the protected traffic area and learn cycling.

8.4.3 The success factors and lessons learnt

According to the school year and the seasons the courses take place in May, June and September (July and August are school holidays in Austria). Within these months over the last three years Schulterblick realized 63 cycling courses for school classes with about 1.500 children aged 9 to 11 in real life traffic situations in Vienna. To improve the program and to point out the importance of promoting children's cycling through cycling courses in real life traffic situations Schulterblick did some evaluation by itself. On the one hand each child was asked to put a sticker on a trend indicator (see figure 2).

On the other hand each teacher gave a written feedback concerning the offer, the content and the procedure of the course. Furthermore, the teachers were asked what they liked best, their opinion about the importance of the offer for Vienna and if they want to suggest anything else. Feedback from 2015 and 2016 shows that "very important" was the most given answer of the 30 teachers who were asked.

The characterized aspects of the Schulterblick concept are leading success factors for the implementation of cycling courses. On the one hand the high staff-student ratio fits with the high standards of safety concerning cycling with children in city traffic. On the other hand, it ensures the necessity to cycle in small groups which is the key to practice and experience cycling in real life traffic situations. From a logistical point of view, the provision of bicycles for all participants is one of the main success factors why school classes decide to go for a Schulterblick cycling course. The team itself and the regular reflection and improvements concerning the organisation, implementation as well as the positioning of cycling courses have contributed to the continuing success and the broader attention which is granted Schulterblick.

Besides the successful realization of the Schulterblick cycling courses in real life traffic situations and the positive feedback from children and teachers, the association managed to bring up for discussion the key role of cycling courses in real life traffic situations. 2016 the activities of Schulterblick gained a broader attention, not only in schools but also in the public awareness. Due to the organization of the Schulterblick cycling courses children who actually ride their bike in dense urban traffic with a lot of competence and enthusiasm are perceived by the public and work as major signal for cycling as child-friendly mobility children. Last year the work of Schulterblick was awarded twice. First the association received the mobility award Vienna from the Austrian Traffic Club VCÖ which was handed over by the vice mayor of Vienna, Maria

Vassilakou (see figure 4). Second Schulterblick was awarded within the Austrian Road Safety Award (AQUILA 2016).

Schulterblick cycling courses for school classes are recommended by the Austrian ministry of education and by the Austrian ministry for transport, innovation and technology as an additional preparation and supplement to the Voluntary Bicycle Exam. Cycling exercises in real life traffic situations as a part of the practical preparation for the Voluntary Bicycle Exam are included in the guidelines concerning of the Austrian ministry of education (BMB 2016). Next year the Schulterblick cycling courses will be expanded to Lower Austria, which is the largest county in Austria surrounding Vienna.

However, the achievements of the association are accompanied by challenges concerning the question of how this new approach can be implemented on a long-term and accordingly funding. There is still little awareness that investing into cycling courses is not only investing into education and road safety but also into promoting active and sustainable mobility. Questions of insurance and liability cannot be answered in general as they depend on the positioning of the activities within local school authorities and their arrangements with insurance companies.

8.5 Conclusions

Within the last three years the activities of Schulterblick gained broader attention, not only in schools but also in the public awareness. The association managed to start a discussion on the potential of cycling education measures with different stakeholders on local and nationwide level. Being aware of the importance and urgency of the transition towards active mobility in cities the activities of Schulterblick should be considered in research to support evidence based policy in the future. A specification of indicators to reach the three mentioned goals would allow an evaluation of the Schulterblick concept. The results would probably help to point out the potential of cycling education programs which go beyond the goal of improving safety and contribute to develop the necessary dynamic in the transition towards active and sustainable mobility.

There is still little research on the role of cycling education measures. A pre-post comparison would give answers to the impact of the courses on cycling skills of children. Furthermore it would be interesting to do research on the impact of the Schulterblick cycling courses regarding children's and their parents' attitude and behaviour towards cycling in the city even if there must be taken various influences such as availability of bicycles or infrastructure into account. In addition research on the interaction of cycling educational and infrastructural measures is needed.

Nevertheless the Schulterblick concept can be seen as a very successful approach to bridge the gap between the recommendations and aims of the guidelines and master plans and the reality of children's cycling. Schulterblick has shown that on road cycling courses for school classes can be organized in dense urban traffic. They promote cycling through offering concrete support in terms of cycling courses with the transition towards active urban mobility of children and their families. An expansion to a multi-stage program and a long-term implementation should be pursued by authorities.

The Schulterblick concept may be also a good example for imitation which could be transferred to other countries which have not developed a cycling culture yet and would like to support their citizens with the transition towards active mobility.

8.6 Figures

**Figure 1 Theoretical and practical part of a Schulterblick cycling course for school classes
(Schulterblick – Die Wiener Radfahrschule)**



Children on bikes waiting in front of a red light.



Children training on a public square.

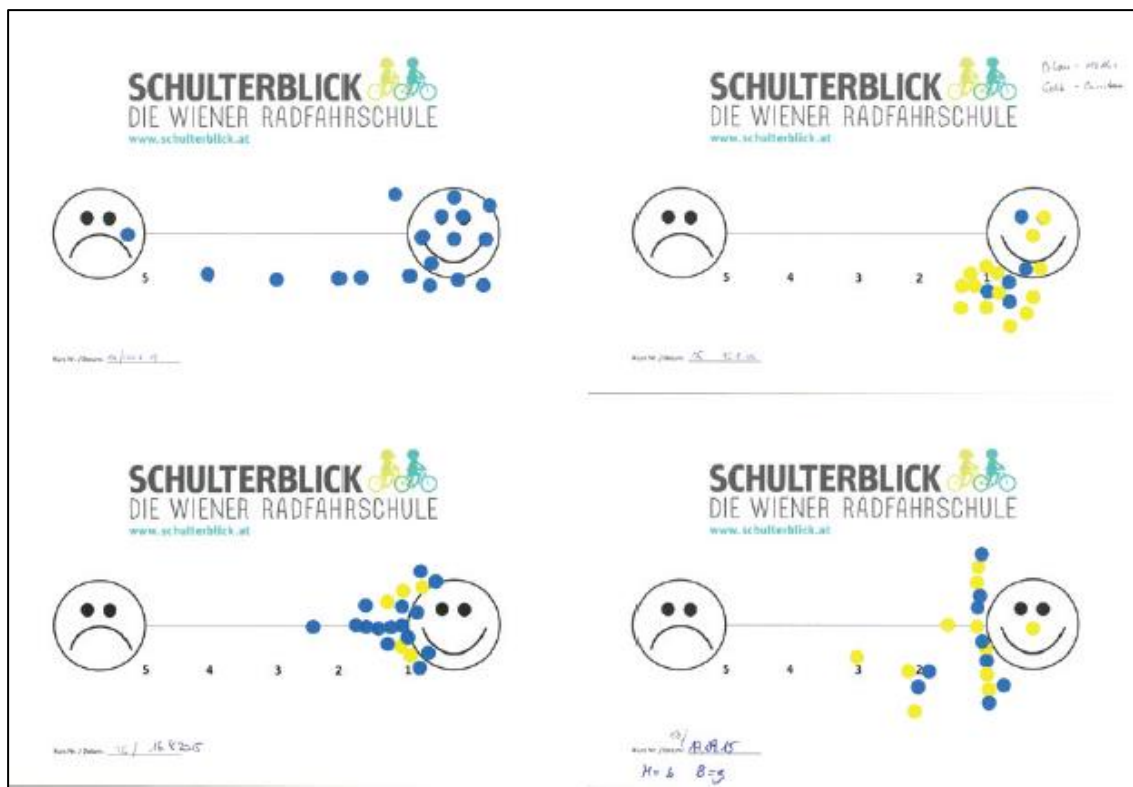


Children riding a bike lane through a park.



Children sitting in a park listening to their trainer.

Figure 2 Children's trend indicator after a Schulterblick (look over your shoulder) cycling course (Schulterblick – Die Wiener Radfahrschule)



The graphic illustrates the evaluation of the bicycle courses in which the children could place stickers between a smiling and a sad face to give their opinion. The headline says "look over your shoulder – the Vienna Cycling School".

Figure 3 Feedback from teachers concerning the question "How important do you think is the offer of the Schulterblick cycling courses for school classes?" (Schulterblick – Die Wiener Radfahrschule)



The graphic highlights the teachers' feedback, especially the words „very important“

Figure 4 Hand over of the mobility award Vienna from the Austrian Traffic Club VCÖ (PID Fürthner)



Picture showing the winners and prize givers at the ceremony of the mobility award holding a certificate and a prize figure.

8.7 References

Austrian Youth Red Cross. 2017. Freiwillige Radfahrprüfung [Voluntary cycling test]. [Online]. Available at: <http://www.jugendrotkreuz.at/index.php?1572> [accessed: 31.05.2017].

Bundesministerium für Bildung. 2016. Richtlinien zur Durchführung der freiwilligen Radfahrprüfung an Schulen [Guidelines for the implementation of the Voluntary Bicycle Exam]. [Online]. Available at: https://www.bmb.gv.at/ministerium/rs/2016_24.html [accessed: 31.05.2017].

Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft BMLFUW. 2015. Masterplan Radfahren 2015–2025 [Master plan Cycling 2015–2025]. [Online]. Available at: https://www.klimaaktiv.at/dam/jcr:b12274b7-5813-4c7e-b1f6-8ff72c33f136/MP-Radfahren_2015-2025%20englisch_web.pdf [accessed: 15.12.2017].

Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft BMLFUW. 2015b. Curriculum Radfahrlehrer/in [Curriculum Cycling teachers]. [Online]. Available at: https://www.klimaaktiv.at/dam/jcr:52185e61-a3b6-4aa8-a9a6-3cef6c1897af/_kam_curriculum%20radfahrlehrerinnen_WEB_.pdf [accessed: 27.05.2017].

Bundesministerium für Verkehr, Innovation und Technologie bmvit. 2016. Austrian Road Safety Programme 2011-2020. [Online]. Available at: https://www.bmvit.gv.at/en/service/publications/transport/downloads/rsp2020_2016.pdf [accessed: 15.12.2017]

Schulterblick – Die Wiener Radfahrschule. 2017. [Online]. Available at: www.schulterblick.at [accessed: 25.05.2017].

Schützenhofer, B., Lüftenegger, M., Knessl, G., Mogel, B. 2017. Evaluation of the FASIKI traffic safety programme for parents of cycling children. [online], 46(B), 500-508. Available at: <https://doi.org/10.1016/j.trf.2016.08.004> [accessed: 20.05.2017].

Straßenverkehrsordnung (StVO). 2015. § 65 StVO Benützung von Fahrrädern [Road Traffic Act: Use of bicycle]. [Online]. Available at: http://www.jusline.at/65_Ben%C3%BCtzung_vonFahrr%C3%A4dern_StVO.html [accessed: 25.05.2017].

Figure 1 Theoretical and practical part of a Schulterblick cycling course for school classes (Schulterblick – Die Wiener Radfahrschule) 118

Figure 2 Children's trend indicator after a Schulterblick cycling course (Schulterblick – Die Wiener Radfahrschule) 119

Figure 3 Feedback from teachers concerning the question "How important do you think is the offer of the Schulterblick cycling courses for school classes?" (Schulterblick – Die Wiener Radfahrschule) 119

Figure 4 Hand over of the mobility award Vienna from the Austrian Traffic Club VCÖ (PID Fürthner) 120

9 Selected Paper: Can Public Bike Sharing Systems Encourage Migrant Women to Use Bicycles?

Astrid Segert

Institut für Höhere Studien Wien (IHS)

Austria

Eliza Brunmayr

Radlobby Wien, IG Fahrrad

Austria

9.1 Abstract

To increase the number of cyclists more detailed knowledge about potential user groups is required. This article provides empirical results on one such potential user group: migrant women who did not learn to cycle in their childhood but then trained in adult cycling courses. We argue that many of these migrant women interested in cycling will not own bikes even after successfully finishing the course. This article considers whether and how the use of public bike schemes (PBS) can bridge this gap between (re-)starting cycling and owning a bike. In an experimental setting, a PBS- training-module was tested and a survey among migrant cycling course participants was conducted.

9.2 Introduction

Recently, cycling has become a rising trend in modern mobility. There are many reasons for this trend as well as many obstacles. First, in order to achieve the Paris climate goals all European countries need to reduce their climate-damaging emissions. Therefore, they need to reduce traffic as well as to switch from the so far dominating motorised individual mobility mode to motorised and non-motorised eco-modes. Without any doubt, cycling is an important part of this eco-mode mobility (EU 2011, Massink et al. 2011).

Second, modern urban lifestyles are changing towards active and healthy mobility, including cycling and walking (Oja et al. 2011, Goetz/Ohnmacht 2011). Therefore, grassroots organisations or movements have been growing in several cities. These groups put pressure on transport policy to enhance cycling-friendly infrastructure and services (see e.g. Volksentscheid Fahrrad Berlin). They are rooted in urban milieus where cycling is not only beneficial but somehow also a sign of delimitation from outdated mobilities (Dangschat/Segert 2011).

Third, the sustainable mobility modes' potential is increasingly considered in some regional transport policies not only as a mode to improve effective transport but also as a way to enhance the quality of life, people's health and to develop real smart cities (Pucher/Buehler 2010). Therefore, cycling measures were put on the table, including public bike sharing schemes (PBS). PBS have been conceptualised and offered as a link to public traffic, car sharing and other innovative services, to make 'last mile' more sustainable and to provide quickly accessible means of transport for short and very short distances in urban centres (ECF 2017, BMLFUW/klimaaktivmobil 2015, Stadt Wien 2014). PBS is regarded as a useful supplement to

public traffic and they are addressing young cyclists in particular, fostering active mobility (Liu et al. 2012, Buehler/Hamre 2015).

However, there are also several obstacles on the way to rising number of cyclists, including PBS-user, such as the persistent automotive culture in daily life, vehicle production and traffic policy (Urry 2007). Other obstacle is the lack of knowledge about the different mobility needs of several (potential) user groups of new mobility forms such as cycling and using PBS. Therefore, to enhance the number of cyclists in general and the users of PBS in particular, more profound research of the specific barriers for active and healthy mobility of specific groups needs to be undertaken (Harms 2007, Welsch et al. 2014, Van der Kloof 2014).

One of such (potential) groups includes people with migrant background², women and men. People with migrant background are in many respects still on the margins of mobility research (Asum et al. 2011, Segert et al. 2017). There are many good reasons to investigate migrants' obstacles when it comes to cycling and their chances for (more) cycling (Wixey et al. 2005, Uteng 2009). First, people with migrant background are a big and growing population group in many countries. For example, in Austria, migrants make up a 22% (and expanding) share of the population (Statistik Austria 2017). Thus, this expanding group has - or better - could have an increasing impact on spreading active and sustainable forms of mobility. As migrants mostly settle in urban centres, they particularly influence the mobility in these regions and could play an important role in further spreading sustainable mobility. For example, in comparison with Austria's other provinces, Vienna has the highest share of people with migrant background. 38% of Vienna's population have a migrant background (Stadt Wien 2017, 69³). Up to 55% of Viennese migrants are between 20 and 39 years.

Additionally, one must note that, migrants, just like every native-born population, are heterogeneous in relation to their socio-demographic and economic status such as gender, age, education, origin, employment etc. Therefore, it is reasonable to investigate not only cycling migrants as a statistical ethnic group but to conduct case studies, for example, on migrant women. One case in point: in Vienna 51% of migrants are women and these migrant women make up nearly 20% of Vienna's population. To be more specific, 208,000 Viennese migrant women come from non-European countries and 150,000 women from other European Union countries (Stadt Wien 2017, 66). Listed by numbers, the first place is taken by migrant women with Serbian/Montenegrin background and the second place by those with Turkish background (ibid, 69).

Among this heterogenic group of migrants, migrant women from non-European Union countries in particular often encounter specific mobility barriers and need specific support to gain access to bikes and cycling (Segert et al. 2015). Many of them were not able to learn cycling in their childhood for several reasons. Some did but their parents did not allow practicing it after puberty. Some of these women grew up in poor families with no resources to buy a bike. Some other families had limited money and they bought a bike only for male family members. Additionally, migrant women often suffer from language barriers, which also impede self-reliant mobility (Assum et al. 2011).

In fact, migrant women do not only suffer obstacles, they also are agents of change. A qualitative case study on migrant women in Vienna revealed 'latent cycling needs' among migrant women

² We follow the common Austrian definition of persons with migrant background: persons with foreign-born parents, regardless of current citizenship. Therefore, Austrian citizens with foreign-born parents are 'second-generation migrants'. Twenty-five percent of Austrian migrants are 'second-generation migrants'.

³ Depending on definition of migrant background, one can find other data from 43% to 'every second' (Statistik Austria/ÖAW 2016, Stadt Wien).

regardless of their origin. However, the public and the sponsor organisations have not sufficiently taken in account these needs so far. We define ‘latent cycling needs’ as resulting from varied social, economic and cultural conditions that have limited a person’s opportunity to learn to cycle and to practice this mobility autonomously. Many migrant women have a secret wish to use bicycles. Thus, when the social climate begins to change in the host country, and sometimes also in the country of origin, it influences the mobility climate in the migrant families. Additionally, when more women have more peers, who openly start to cycle, and can find more offered cycling courses, than these latent cycling wishes take up a more prominent space in women’s consciousness. Under these circumstances, many migrant women in fact do decide to (re-)learn and to (re-)start cycling. The long waiting lists for courses reveal unsatisfied interest in training (Radlobby Wien 2017). Such waiting lists exist also in other European cycling schools like those in Amsterdam, Montreuil, and Clichy.

Migrant women play an important role in their families for teaching their children to adopt new mobility practices or even to stick to old habits. Therefore, they can become social key agents to increase the number of cyclists among the group of migrants in general. Not only do they look for their own new mobility chances but also for those of the next generation. Mothers using bicycles are role models for their daughters and enable them to learn cycling during childhood. Both ecological and social reasons trigger the study of migrant women’s potentials for cycling, and force us to understand how to improve conditions to facilitate them to use a bicycle.

This also touches the question about the PBS’ impact on migrant women’s (potential) cycling practices. In recent research on bike sharing schemes most scholars see PBS as a sustainable transport service (DeMaio 2009, Fishman 2016). They identify various positive impacts on the environment and on society (Shaheen et al. 2013). For example, PBS foster cycling and multimodality by solving the last-mile problem and increase access to as well as the range of public transport (Liu et al. 2012, Buehler/Hamre 2015). Some mention its impact on health (Woodcock et al. 2009, Dill 2009 and Reynolds et al. 2010). Finally, scholars emphasise use of PBS strengthens the new sharing economy favoured by those living in young urban milieus. Therefore, many analysts have high expectations for strongly positive results from the further development of PBS (Midgley 2009, Jäppinen et al. 2013). Many scholars expect PBS to help increase use of emission-free mobility and to offer access to affordable mobility for all people.

However, currently research on PBS focuses on issues of secure and efficient providers, the advantages and disadvantages of public programmes versus public- private partnerships, solutions for balancing demand for and supply of bikes and efficient density of PBS-stations.⁴ It mostly reflects the political interest in efficient and sustainable services and the private providers seeking return on investments (Raviv/Kolka 2013, Fricker/Gast 2016, Kaltenbrunner et al. 2010, and Faghih-Imani et al. 2017). Therefore, the majority of scholars use a technical perspective.

In contrast, from the perspective of various users completely different issues emerge. Their concerns range from easy access to affordable, comfortable and attractive means for transport and leisure offered via a good network of stations and bikes (Van der Kloof 2003, Segert et. all 2015). We need to interlink these different interests of different stakeholders (municipalities, providers, users) involved with PBS for study purposes. This interlinked research perspective requires a much more detailed knowledge about the access to and the obstacles for the use of PBSs among several (potential) user groups. Based on this knowledge municipalities and PBS providers can efficiently conceptualise user-friendly designs of rental bike systems for all. That

⁴ We carried out our research before new international providers started (like Ofo or O-bike).

means for all groups with different backgrounds and habits. They can also implement target-group-specific information channels and languages.

Against this background, this paper provides research results of a case study on migrant women, who did not learn cycling in their childhood but are nevertheless interested in cycling and therefore have participated in a cycling course for adults. Because many of these female cycling-course-participants do not have their own bike, we investigated if and how with the help of an innovative measure it is possible to overcome this obstacle. This innovative measure was a 'Training Module for the Use of Public Bike Sharing Systems'.

This paper addresses three research questions:

1. What do migrant women need to (re-)start cycling?
2. Can using PBS bridge the gap between '(re-)starting cycling' and 'buying her own bike'?
3. Can using PBS, therefore, foster migrant women's cycling and if so, under which conditions?

In other words, the paper comprises a case study, which tested and surveyed the use of the local public bike sharing service in Vienna for a completely different aim than that for which it had initially been conceptualised. We did not investigate the usual PBS concept: to support traveling short distances. Instead, we wanted to learn how to support the practical learning processes of adult cycling (re-)starters by using existing infrastructure.

9.3 Research Approaches and Methods

The empirical investigations follow a practice-theoretical concept. We conceptualise the increase of migrant women's share in cycling as a '(re-)starting practice' by building on the work of Schatzki (2014) and Jonas et al. (2017). Within this theoretical framework, we define '(re-)starting cycling' and 'use of PBS' not as an outcome of individual choices. We rather define it as a social learning practice on a specific physical mobility belonging to a bundle of other mobility practices. This bundle of mobility practices is in itself linked to group-specific daily routines and lifestyles. Moreover, it is linked to political and administrative practices more or less facilitating sustainable mobility practices (Larsen 2017). Furthermore, all these mobility practices facilitate the access to the necessary places, means and stakeholders of daily routines usually separated in modern societies. In specific ways, they influence speed, rhythm and diversity of the aspired routines. Without mobility practices, there is no access to these places and means of daily routines; without access, no share in society; without this share in society, no individual development. There is no modern subject without complex mobilities (Urry 2007).

However, spatially dispersed daily practices and a growing pressure to move and be mobile do influence mobility modes in general. Therefore, individual decisions for active or motorised mobility are not free. The spatial context and societal requirements frame them in a specific way. People can carry out their mobility practices, such as cycling, only within this frame. As with any mobility practice, cycling has three aspects: the moving aspect, describing the kind of moving; the using aspect, describing the links to means of transport; and the social aspect, describing links to other (im-)mobile actors. From this perspective, we understand cycling as technically supported, non-motorized, individual self-movement practiced alone or together with others in urban or natural space in multipurpose ways. It can link people and practices and can be linked easily with other forms of moving, especially with forms of sustainable traffic (Banister 2008). In public spaces, cyclists can compete and conflict with people using other means of mobility. One can practice cycling by using personal or rental bikes. The new PBS services allow bicycle mobility without owning a bike but also offer more options to those who have a personal bike.

From this user- and practice-centred perspective, one can understand the meaning of PBS as being rooted in new ways of living, including a set of interlinked mobility practices. Different groups and milieus are involved in these changes in different ways and to different degrees (Dangschat/Segert 2011, Goetz/Ohnmacht 2011 and Segert 2013). Therefore, we investigate the use of PBS as a specific practice to realise easier access to bikes and as carrying out specific forms of active movement. This will help us understand how PBS could be more frequently used by a broader public as well as better meet the needs of migrant women.

Investigating the effectiveness of PBS from this practice-theoretical perspective means to focus not on technical or economic efficiency but rather on the various meanings of reasonable use and on some unexploited potential for PBS. This means not studying it as part of technical traffic systems but rather as a socialised means of mobility functioning only within specific mobility practices of several user groups. Focusing on overlooked groups helps to develop both a practical and ambitious image of cycling possibilities including PBS.

The investigation was designed as a case study on the knowledge, the interest in and the autonomous use of PSB by 180 female migrant cycling-(re-)starters. They were participants of 22 Viennese cycling courses 2012–2017. We expected by using PBS they could bridge the observed gap between (re-)starting cycling and owning a bike. We also expected that if these cycling-interested women use PBS in this specific biographical context it could positively influence their future PBS use.

The case study combines qualitative and quantitative methods of empirical social research in the framework of an experimental and participative setting. First, in four focus groups with migrant women interested in cycling and migrant experts, we discussed the mobility problems of migrant women. We used the results to shape the survey's questions. We asked for several aspects of

- ▶ Access to their own bike
- ▶ Current cycling in Vienna
- ▶ Knowledge about the local PSB
- ▶ Use of the local PSB
- ▶ Requests for adaption of the local PSB to their needs
- ▶ Requests for cycling-friendly infrastructure tailored to their specific needs
- ▶ Socio-demography.

Most of the questions were closed-ended. Additionally, we encouraged the respondents freely to express their requests for an appropriate configuration of PSB and for new PSB stations in three open-ended questions. For this purpose, a scholar with the suitable mother tongue or with the help of an interpreter conducted the interviews.

Our starting hypothesis consisted of the assumption that easy access to a usable bike, whether owned or rented, would increase the frequency of cycling. Because we observed many women without their own bike a 'module' to train cycling course participants in the use of PBS was conceptualised. We have tested this module in the cycling courses since 2016. In autumn 2016

and spring 2017, we contacted all course participants from 2012 to 2017. In total, 119 respondents of the 180 women filled out the questionnaire.⁵

The respondents' structure is quite diverse by origin, age and education. Relating to country group of origin, 40% of them have Turkish roots (corresponding to the second largest share in Vienna's migrant population), 9% come from other European countries, 30% have Asian and 21% have African roots. More than half of the women have lived in Vienna for more than 10 years, but over the last two years, the share of newcomers (especially from Syria) is growing. Therefore, we expect more newcomers among the cycling course participants in the future. Relating to age, the biggest group (61%) is between 31 and 50 years, followed by women over 50 (21%) and the younger between 18 and 30 (16%). Most of the migrant women (46%) attended a secondary school, 33% attended university, even though not all graduated, and for 21% the highest finished education is primary school. All these figures show there is no absolute specific origin, no age or education status excluding migrant women from being interested in cycling. However, secondary education, middle age and a longer stay in Vienna make it more likely to (re-)start cycling by participating in cycling courses. We analysed the data in a descriptive statistical analysis (cross tables, Pearson-Chi2-Value) and by using a regression analysis on the factors for cycling and Citybike use.

9.4 The „usual“ use of Vienna's Bike Sharing Scheme „Citybike“

The city of Vienna was one of the first cities in the world to introduce a modern public bike sharing scheme in 2003, Citybike Vienna. The operator Gewista currently provides 121 stations with 3,115 boxes and 1,500 bikes. User can hire 1,500 bicycles at any of the 121 public cycling stations and return them at any station after completion of travel. The first hour of each ride is free and costs only occur after that. For most users it remains free because nearly 95 percent of all trips take less than an hour. The most common duration is 10 minutes. (Citybike Vienna 2017)

Citybike Vienna is a success story. Since 2003, the number of stations doubled and the annual number of rides has increased from less than 5,000 to more than one million. Registered users increased from about 30,000 in 2004 to more than 521,000 in 2016 (Citybike Vienna 2017). Currently, the focus is on increasing the system's efficiency. The provider and the municipal government no longer have a contract to install new stations, but they are discussing one. With the new tenders, there is an opportunity to not only to improve efficiency but also to adapt the service to attract new user groups and to enhance significantly the number and diversity of the PBS-cyclists.

So far, Citybike Vienna does not conduct a target group analysis. Like other providers in other cities, the company provides data on gender and age based on user- registration information. They do not collect data on other socio-demographical structures. In Vienna, as in other cities, a little less than half of the users are female. Most users are under 30 years old. Online surveys among the users show that 75% are Viennese. However, this data do not provide a representative image of the users' background, because the 75% classified as Viennese users include users with migrant background. In addition, even though 25% of the users have registered with a non- Viennese bankcard, they may have lived in Vienna for many years. Furthermore, the online surveys address current users only and cannot reflect concerns of potential users with different needs. A public survey should focus on the mobility and mobility needs of the interested non-users and identify their interests in PBS and general cycling

⁵ The rate of return was about 70%. This rate resulted from the very committed work of a project partner who phoned all participants and informed them about the survey's purpose. She organised face-to-face interviews for every woman, if necessary in her mother tongue.

conditions. This all the more as the ‘Cyclist Report’ published by Vienna’s Mobility Agency documents the rising number of PBS users and their needs but does not represent potential users of different social groups (Mobilitätsagentur 2017). It reports, for example, most of the current users want more stations, particularly those users who use the PBS less than once a month (Mobilitätsagentur 2017, 8). It reports nothing about the requirement of Viennese who live in districts without Citybike stations.

9.5 Results from Vienna’s Modular Cycling Course Scheme for Women

Starting point of the bicycle courses for women in Vienna has been the interest of women with a migrant background to learn cycling. These women discussed their mobility needs in a local women’s centre and the organisers started to look for a partner who could teach cycling to adult beginners. They found such a partner in the local bicycle advocacy organisation. A training program was conceptualised and a first course was organised. The interest in learning cycling was bigger than anticipated. Therefore, the local mobility agency started to fund another course as a pilot project in 2013. The course operator in cooperation with several social and neighbourhood associations professionalised, expanded and developed the offered cycling courses. The city of Vienna financed some training bicycles and three to five courses per year, additionally the operator financed a few courses via project funds. However, every year dozens of migrant women interested in participating in a cycling course find themselves on a waiting list. The demand for training to (re-)start cycling is still higher than the supply.

Furthermore, in the first bicycle courses we observed that offering bicycle lessons for beginners is often not enough to prepare the participants for riding the bicycle in traffic. Therefore, since 2014 the course operator has provided a new follow-up program for advanced cycling classes. The advanced classes take part on cycle lanes and quiet streets. Learning rules of traffic as well as safe cycling behaviour are the focus. We did observe that integrating the new cycling skills into women’s daily mobility remains a challenge. The lack of a personal bicycle is a main barrier for many participants even after visiting a cycling course.

Due to the fact, that many participants do not own a bicycle and hesitate to buy one, a ‘Citybike Training Module’ was developed and implemented as part of the bicycle courses. The purpose of this training module is to show the participants how the public bike sharing scheme works in theory and in practice so that after the training module they are able to use Citybike independently – either to continue to practice cycling in green spaces or as an additional mobility option. The Citybike training module seems to be unique; there is no research or practical information available on similar initiatives to integrate the usage of public bikes in cycling courses.

The training module takes place at the end of a cycling course and lasts 2 hours. It takes place in a park at and around the Citybike station closest to the regular course location. The module starts with an exchange of experiences and knowledge about how the public bike sharing system works. Then the trainers explain the practical framework in detail: the rent-and-return process, the costs, possibilities of multimodal combinations of rental bikes and public transport. After that, they present the options to register. The last topic of the theoretical part is how to find a Citybike station, for example via Citybike app, bicycle map or on the Citybike terminal. We observed that the majority of migrant women have smartphones and are familiar with apps and that they are interested in mobility apps.

The practical part of the Citybike training module consists of renting a Citybike at the terminal, riding it and returning the Citybike correctly. For this part, the trainer chose a Citybike station close to a quiet and green area. The experiences show it is helpful if the participants have

already registered as Citybike users when the practical part of the training module takes part. The cycling trainers provide Citybike cards for the duration of the cycling lesson for those participants who do not have their own Citybike account. We realised that two hours are a short time for theoretical and practical training. Therefore, some more tests are necessary to optimise the training process.

The practical training has revealed another problem. Citybikes differ from the usual training bikes, as they are heavier and have a back pedal brake. For beginners this complicates things, as it is more difficult to put the pedal in the ideal starting position. The characteristics of cycling with this type of bike also differ. Therefore, it is important to practice stopping, cycling with one hand, going around curves and cycling with luggage in the handlebar pannier. Beginners who still struggle to ride with a training bike should first improve their cycling skills before they try to ride a heavier rental bike. However, we found in the courses that most participants could overcome their initial concerns about the public bikes being too heavy or too difficult to ride in the practical part of the module. The positive practical experiences while using rental bikes for the very first time empower these women to continue using PBS.

9.6 Results from the survey on (re-) starters' use of PBS and requests for comfortable sharing services

Considering the mentioned lack of knowledge about potential new user groups of PBS, of their specific motivation(s) to use rental bikes, their destinations and required infrastructures our survey focused on such a new group: the participants of cycling courses, who are currently PBS users or non-users. We asked about their knowledge, usage, wishes regarding the local PBS and analysed factors such as age, education, migrant background, level of cycling course attended and bicycle ownership.

The survey responses revealed that 25% of the course participants use the local PBS. More exactly, 15% use it at least once a year, 7% at least once a month, another 7% use it at least once a week and 75% do not use it (so far). They mostly use PBS for seasonal trips near to the city, but much less for transport purposes. Thus, for this user group in this specific (re-)starting phase the PBS bikes seem to be more a means for training in a leisure setting than for regular use in traffic. Only one of the surveyed women routinely uses PBS to commute to work. The usual destinations correspond to the cycling duration: More than three-fourths of the course participants using PBS ride these bicycles up to the free limit of 60 minutes; 4% say they use it even longer, up to two hours.

However, many of the surveyed women were interested in future use of PBS: 28% are currently interested (but need some more advice) and 30% are not immediately interested but (possibly) may register as a user when they 'feel more secure cycling'.

The real use of PBS is significantly associated with limited practical knowledge on the procedures of registering, borrowing and returning the bicycles (Chi2 sign. 0,000). 89% of the course participants in the courses from 2012 to 2016 have seen the bikes and the stations, but only 30% know how to register in practice. This share was increased by up to 52% including women with PBS training in 2017. There is only a slightly increased probability that migrant women with a higher education have usable practical knowledge.

Nevertheless, age and employment status are significantly associated with PSB use (Chi2 sign. 0,000 and 0,001). 68% of women less than 30 years of age and 54% of the employed women but only 18% of women aged between 31 and 50 and 18% of unemployed women use PBS. In contrast, the country of origin is not significantly associated with PBS use. However, those from Turkey and Egypt use it slightly more than average. In contrast, the personal possession of a

monthly or yearly public transit pass is significantly associated with PBS use. Women who do not have such a card very likely do not use PBS (90% of non-owners do not use PBS, but 67% of owners). The frequent usage of public transportation is not necessarily associated with less PBS usage. Instead, both (re-)starters as well as the general population public see PBS as complementary to public transportation. However, the general population uses PBS more often for daily trips than (re-)starters. They generally, in this learning phase, use PBS as a means for leisure mobility.

The level of training is significantly associated with confidence in cycling and use of the PBS. 36% of migrant women who finished an advanced level course use PBS but only 19% of the participants of a beginners' level course. Furthermore, participating in the PBS training is associated with PBS usage. In general, easy access to courses that enable participants to develop cycling skills as well as practical knowledge on PBS is associated with the use of PBS for (re-)starters.

In addition, the survey revealed the importance of a (re-)starter-friendly configuration of the PBS stations and bikes for this group of (re-)starters. In addition, a starter-friendly configuration of the cycling and traffic infrastructure is important.

In the survey, the migrant women offered many specific suggestions to increase the usability of PBS (Figure 1).

The request for a bike sharing station near their homes found most support. In Vienna (as in many other cities), the city centre has a higher density of stations than the outer districts where many migrants live. Some of Vienna's outer districts do not have any PBS stations. In Vienna, 66% of the respondents noted there are not enough or no stations nearby.⁶ Concerning more comfortable bikes 48% would like lighter bicycles and 45% more comfortable saddles. Women who have practical knowledge about PBS and women between 31 and 50 years of age more frequently mentioned these concerns. The fourth-ranking priority was easy linguistic access to registration: 43% would like an interface option in their mother tongue, especially in Turkish and in Arabic. The participants of cycling courses without PSB training had ranked this concern first (interim analysis 2016).

A surprisingly high number of (re-)starters (29%) wanted an additional, 'attended PBS' that would address the needs of (re-)starters. As with the current system, this PBS should be free or partly free, but include advisers offering support. The bikes should be more ergonomically adaptable and should come in different sizes. These concerns were expressed more by women who finished a starting-level course, who recently arrived in Austria, who have language problems, who have no bankcard or who live in districts with many migrants. In general, the survey shows that cycling-interested, migrant women have a good awareness of cycling issues and can offer specific suggestions on improving PBS.

The desire for safe and user-friendly cycling and transport infrastructure is particularly pronounced. When asked, 'how safe do you feel while cycling near your home?' 66% answered with 'very' or 'somewhat unsafe'. Figure 2 shows that the reconfiguration of cycling infrastructure for all those interested in cycling was very important for (re-)starters.

The survey indicated that 59% want secure bicycle stands because they or their relatives fear or have experienced bike theft. The second ranking concern is reduced speed of cars (54%) followed by wider bike lanes (49%), more separate bike lanes (46%), fewer cars on the streets (43%) and more bicycle racks in the neighbourhood (24%). This group of (potential) cyclists and PBS users is particularly sensitive to high safety standards and sees cycling infrastructure as

6 In an open question, the women mentioned 39 specific locations for new PBS stations.

an underrepresented part of traffic facilities. This user group is very sensitive to dominant car traffic and its threat to safe cycling. They prefer better cycling infrastructure and car-free areas near their homes.

9.7 Discussion and Conclusions

This paper discovered empirical insights on the following issues. First, adult migrant women starting or restarting cycling equally emphasise the importance of complex cycling-friendly conditions including societal climate, personal encouragement, spatial conditions and traffic preferences. More than other types of cyclists these (re-)starters need a cycling-friendly societal and family climate in order to start cycling regularly. They particularly benefit from collective learning experience in cycling courses on several levels including PBS training. Additionally, they require starter-friendly cycling infrastructure as well as car-reduced traffic infrastructure. Addressing only one of these issues would not greatly increase the number of cyclists and PBS users from this group of (potential) cyclists. Therefore it is necessary to combine 'hard' and 'soft conditions' to meet the feelings and desires of these women interested in cycling in a targeted way and thus strongly affect the number of cyclists.

Firstly, it is important for migrant women starting and restarting cycling to learn and practice it in their leisure time and in traffic-reduced areas. They later can train their skills in traffic situations and everyday life. Therefore, they need adequate training spaces in their districts. However, this learning process is more than a mobility learning training; at the same time, it is a kind of rehearsing of new gender roles as well as practicing integration in the host society. Migrant (re-)starters in cycling have an invisible but, nevertheless, important role with multiple effects on social integration and societal development.

Secondly, PBS use can help to bridge the observed gap between (re-)starting cycling and owning a bike. This is particularly true for (re-)starters who participated in an advanced level course and who are motivated and able to cycle for leisure or transport purpose. Even though many migrant women, like most other people, understand the PBS concept, many do not have practical, detailed knowledge on how to operate it. Hence, those who are interested in using PBS are grateful for some advice. Cycling courses comprising a PBS module and providing the needed practical knowledge facilitate (re-)starters interest in cycling in an appropriate way. Information on PBS or its practical use could also be integrated in educational or language courses and cultural or integration events. Therefore, co-operation is required between stakeholders of the different fields of mobility, education, health, gender empowerment etc. The better they are interlinked the more heterogenic the group of (re-)starters as well as PBS users will be and more women with and without migrant background as well as people with more diverse ethnic backgrounds can be addressed.

In contrast to this group of (re-)starters interested in PBS use, another group of surveyed migrant cycling course participants prefer easier access to an affordable personal bike and secure bike-parking facilities. It has to be stressed most migrant women surveyed prefer owning a bike and think the PBS could be used additionally or not at all. For migrant women, a personal bike is more than a means of mobility. It can rather be a symbol of integration in family, community and society; it also demonstrates strength to make a lifelong dream come true. These migrant (re-)starters need detailed practical information or supported access to a second-hand bike or to a repair shop. For this purpose, course providers should network with organisers of bicycle flea markets and recycling projects to make it easier for (re-)starters to get information and contacts, so no time is lost and skills remain active.

A very interesting point is the demand of more than a fourth of these women for ‘personally attended public bike sharing points (PBP)’, addressing their specific needs in the learning phase between cycling in secure zones and biking on cycling paths or streets with little traffic. Such public bike services for adults interested in learning and developing cycling skills would increase their comfort with bicycles; it could be organised like the existing public bike offer for other user groups such as children. For example, the Paris municipal government funds seasonal public bike sharing points ‘P’tit Vélib’ for children; the service is organised by NGOs and thus cost-efficient (P’tit Vélib’ Paris). Personal staff provides personal advice for children cycling in traffic-free locations. They offer bicycles in various sizes. Some adults also want this learner-friendly service. In some cases, PBP for (re-)starters could offer cargo bikes or e-bikes too. Such attended rental points for (re-)starters require organised co-operation between municipal government and interested NGOs or neighbourhood centres. Organisers could come from the field of mobility as well as from the sports, health, women or integration. Such projects would need another form of contract than the usual PBS agreements in public-private partnerships.

Third, PBS and the required PBP can play a specific role for (re-)starters in a specific phase of the process of changing their mobility practices towards cycling. This phase may last a short time, such as one or two summers. However, in this time, it can play a key role in retaining the learned skills and to develop them to a level at which it ‘makes sense’ to invest in a personal bike and to be sure not to waste money for an experiment. Later, in the next phase of changing mobility routines, it can support the development of confident cycling skills in car traffic and learning the shortest and safest routes to routine destinations. Guided bike rides and city tours using PBS-bikes or PBP-bikes can facilitate the learning process in this phase. In a third phase, the (re-)starters could use the main form of PBS as a means of multimodal mobility for traveling to work or school, to run errands, and to visit family or friends. It is obvious that only some of the current (re-)starters will reach this level. However, this is true for all people changing their mobility practices; some will evolve more, others less.

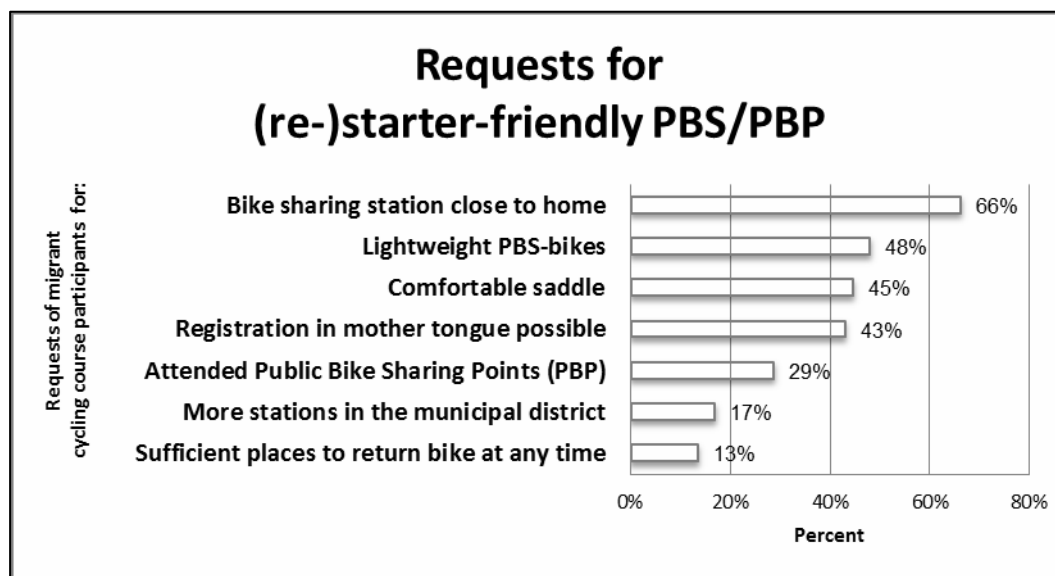
Can one find some generalised results from this research on a specific group of cycling-oriented women? Yes, indeed. When we understand increasing cycling and using rental bikes as social learning practices interlinked with group-specific daily routines and lifestyles, we need to research user needs and practices of both current and potential cyclists. To increase the number of cyclists and PBS users, one can learn from the needs of a ‘weak group’ whose sensitive ‘learning conditions’ help identify almost neglected key factors for cycling in general and for PBS success. Furthermore, considering the different access of different groups to cycling, one can use all infrastructures such as PBS in an unexpected, innovative way. Using PBS as an instrument for practical learning processes as (re-)starting cycling is such an innovative way.

9.8 Acknowledgements

The article is based on results of the research project ‘Women get moving’. The ‘Future Mobility’ program of the Austrian Ministry supported it for Transport, Innovation and Technology (BMVIT). The Institute for Advanced Study Vienna (IHS) together with the cycling advocacy organization Radlobby Wien, the women’s centre Piramidops, and the women’s health centre Fem South carried out this project in cooperation with Caritas Vienna, Mobility Agency Vienna and the operator of Citybike Vienna. The authors are thankful to Aysel Kilic and Rene Mayr for scientific support.

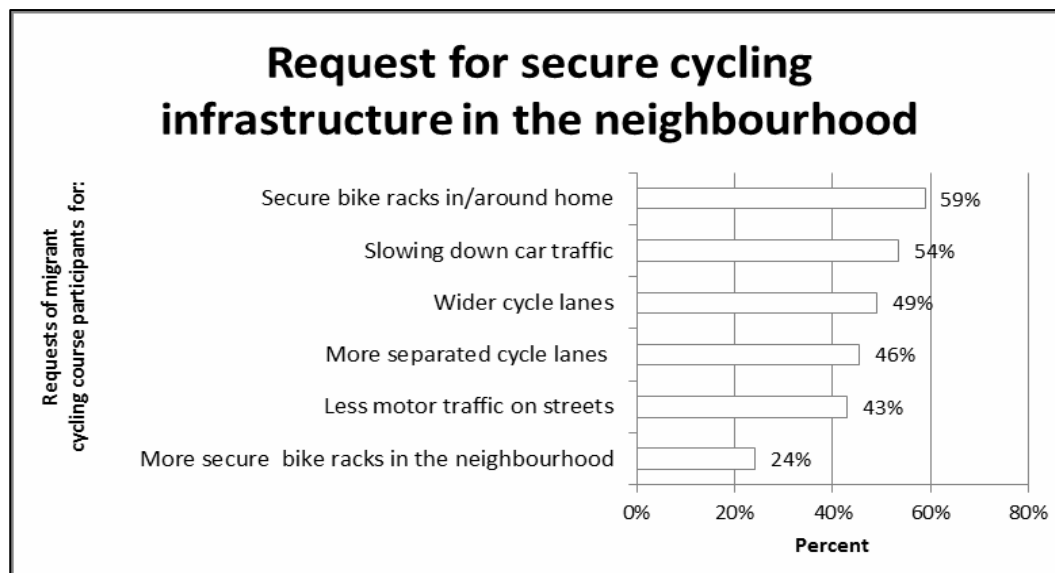
9.9 Tables

Figure 1: Requests by migrant cycling course participants for (re-)starter-friendly Public Bike Services [multiple answers, N=308] ‘What do you wish for using PBS bikes?’



The table illustrates the wishes of the participants concerning PBS bikes. The home proximity is the most important factor, followed by the weight, saddle comfort and easy registration process. The points and stations as well as free places to return bikes are not as important.

Figure 2: Requests by migrant cycling course participants for secure cycling infrastructure [multiple answers N=307] ‘What do you wish for safe cycling in your neighbourhood?’



The table shows the participants' wishes towards safer cycling in the neighbourhood. Secure racks close to their home, slower car traffic and wider lanes as well as the separation of bike lanes are more important than less motor traffic and more secure bike racks.

9.10 REFERENCES

- Assum, T., Panian, T., Pfaffenbichler, P., Christiaens, J., Nordbakke, S., Davoody, H. and Wixey, S. (2011): Migrants in Europe, their travel behaviour and possibilities for energy efficient travel. Project TOGETHER, Report. [Online]. Available at: http://www.together-eu.org/docs/file/together_d2.1_state-of-the-art.pdf [15.05.2017].
- Banister, D. (2008): The sustainable mobility paradigm. *Transport policy*, 15(2), 73-80.
- BMLFUW and klimaaktivmobil. (2015): Cycling Master Plan 2015 – 2025. <https://www.bmlfuw.gv.at/> [28.09.2017].
- Buehler, R. and Hamre, A. (2015): The multimodal majority? Driving, walking, cycling, and public transportation use among American adults. *Transportation*, 42(6), 1081-1101.
- Citybike Vienna (2017): [Online]. Available at: <https://www.citybikewien.at/de> [15.05.2017].
- Dangschat, J. S. and Astrid Segert. (2011): Nachhaltige Alltagsmobilität—soziale Ungleichheiten und Milieus. *Österreichische Zeitschrift für Soziologie*, 36(2), 55-73.
- DeMaio, Paul. (2009): Bike-sharing: History, Impacts, Models of Provision, and Future. *Public Journal of Transportation*, 12(4), 41-56.
- Dill, J. (2009): Bicycling for transportation and health: the role of infrastructure. *Journal of public health policy*, 30(1), S95-S110.
- ECF. (2017): EU Cycling Strategy. https://ecf.com/sites/ecf.com/files/EUCS_full_doc_small_file.pdf [28.09.2017]. Ehmayer, C. (2013): Pilotprojekt 'Mama fährt Rad'. Mobilitätsagentur Wien, Wien.
- EU. (2011): Weißbuch Verkehr. Amt für Veröffentlichungen der Europäischen Union, Luxemburg. [Online]. Available at: https://ec.europa.eu/transport/sites/transport/files/themes/strategies/doc/2011_white_paper/white-paper-illustrated-brochure_de.pdf [08.09.2017].
- Faghih-Imani, A., Hampshire, R., Marla, L., and Eluru, N. (2017): An empirical analysis of bike sharing usage and rebalancing: Evidence from Barcelona and Seville. *Transportation Research Part A: Policy and Practice* 97, 177-191.
- Fishman, E. (2016): Bikeshare: A review of recent literature. *Transport Reviews*, 36(1), 92-113.
- Fricker, C. and Gast, G. (2016): Incentives and redistribution in homogeneous bike-sharing systems with stations of finite capacity.' *Euro journal on transportation and logistics*, 5(3), 261- 291.
- Goetz, K. and Ohnmacht, T. (2011): Research on mobility and lifestyle—what are the results. *Mobilities. New Perspectives on Transport and Society*, 91-108.
- Harms, L. (2007): Mobility among Ethnic Minorities in the Urban Netherlands. *Urban Mobility and Social Inequity*. [Online]. Available at: <https://difu.de/publikationen/mobility-among-ethnic-minorities-in-the-urban-netherlands.html> [15.05.2017].
- Jäppinen, S., Tuuli T., Salonen, M. (2013): Modelling the potential effect of shared bicycles on public transport travel times in Greater Helsinki: An open data approach. *Applied Geography*, Vol. 43, 13-24.
- Jonas, M., Littig, B., Wroblewski, A. [eds.] (2017): *Methodological Reflections on Practice Oriented Theories*. Berlin, Springer, Berlin.
- Kaltenbrunner, A., Meza, R., Grivolla, J., Codina, J., and Banchs, R. (2010): Urban cycles and mobility patterns: Exploring and predicting trends in a bicycle-based public transport system. *Pervasive and Mobile Computing*, 6(4), 455-466.

- Larsen, J. (2017): The making of a pro-cycling city: Social practices and bicycle mobilities. *Environment and planning A*, 49(4), 876-892.
- Liu, Z., Jia, X, Cheng, W. (2012): Solving the last mile problem: Ensure the success of public bicycle system in Beijing. *Procedia-Social and Behavioral Sciences*, 43, 73-78.
- Massink, R., Zuidgeest, M., Rijnsburger, J., Sarmiento, O. L. and Van Maarseveen, M. (2011): The climate value of cycling. *Natural Resources Forum* 35(2), May, 100-111.
- Midgley, P. (2009): The role of smart bike-sharing systems in urban mobility. *Journeys*, 2(1), 23- 31.
- Mobilitätsagentur Wien. (2017): *Fahrrad Report 2016*. Wien. Mobilitätsagentur GmbH, Wien.
- Oja, P., S. Titze, S., Bauman, A., de Geus, B., Krenn, P., Reger-Nash, B. and Kohlberger, T. (2011): Health benefits of cycling: a systematic review. *Scandinavian Journal of Medicine and Science in Sport*, 21(4), 496–509.
- Pucher, J., Buehler, R. (2010): Walking and cycling for healthy cities. *Built Environment*, 36(4), 391-414.
- Radlobby Wien. (2017): [Online]. Available: <https://www.radlobby.at/wien/radfahren-lernen-erwachsene> [15.05.2017].
- Raviv, T., Kolka, O. (2013): Optimal inventory management of a bike-sharing station. *IIE Transactions*, 45(10), 1077-1093.
- Reynolds, C., Winters, M., Ries, F., Gouge, B. (2010): *Active Transportation in Urban Areas: Exploring Health Benefits and Risks*. National Collaboration Centre for Environmental Health. [online]. Available at: http://www.ncceh.ca/sites/default/files/Active_Transportation_in_Urban_Areas_June_2010.pdf [15.05.2017].
- Schatzki, T. (2014): Practices, governance and sustainability: Social Practices, Intervention and Sustainability Beyond Behaviour Change eds. Y. Strengers et al. Routledge, Abingdon, 15-30.
- Segert, A., Brunmayr, E., Ibrahimoglu, F., Kilic, A., Lüle, G., Sarikaya, N., Wolf, H. (2017): *Frauen in Fahrt*. Research Report. IHS Wien. [online] abrufbar unter: <http://irihs.ihs.ac.at/4501/> (12.02.2017).
- Segert, A., Brunmayr, E., Ibrahimoglu, F., Sarikaya, N. (2015): *Migrantinnen erobern das Fahrrad*. Research Report. [Online]. Available at: <http://irihs.ihs.ac.at/3238/1/IHSPR6661164.pdf> [15.05.2017].
- Segert, Astrid. (2013): *Geschlechtsspezifische Alltagsmobilität und soziale Milieus*: Research Report IHS Vienna. [Online]. Available at: <http://irihs.ihs.ac.at/2219/1/IHSPR6141098.pdf> [15.05.2017].
- Shaheen, S., Adam C., Elliot M. (2013): Public bikesharing in North America: early operator understanding and emerging trends. *Transportation Research Record: Journal of the Transportation Research Board*, 2387, 83-92.
- Stadt Wien MA 18. (2014): STEP 25. *Stadtentwicklungsplan Wien*. Wien [Online]. Available at: <https://www.wien.gv.at/stadtentwicklung/studien/pdf/b008379a.pdf> [08.09.2017].
- Stadt Wien. [Online]. Available at: <https://www.wien.gv.at/menschen/integration/grundlagen/daten.html> [08.09.2017]
- Stadt Wien. (2017): *Statistisches Jahrbuch 2016*. [online] Available at: <https://www.wien.gv.at/statistik/pdf/menschen-2016.pdf> [15.05.2017].
- Statistik Austria (2017): [Online]. Available at: http://www.statistik.at/web_de/statistiken/menschen_und_gesellschaft/bevoelkerung/bevoelkerungsstruktur/bevoelkerung_nach_migrationshintergrund/index.html [15.05.2017].
- Statistik Austria, ÖAW. (2016): *migration & integration. zahlen.daten. indikatoren 2016*. Wien: OIF.
- Urry, John. (2007): *Mobilities*. Polity, Cambridge.

Uteng, T.P. (2009): Gender, Ethnicity, and Constrained Mobility: Insights into the Resultant Social Exclusion. *Environment and Planning A*. 41(5), 1055-1071.

Van der Kloof, A. (2003): Breaking out by bike: cycling courses as a means of integration and emancipation. *Sustainable Transport, Planning for Walking and Cycling in Urban Environments* ed. Tolley R.D. pp. 650–658, CRC Press, Boca Raton.

Van der Kloof, A., Bastiaanssen, J., Martens, K. (2014): Bicycle Lessons, Activity Participation and Empowerment. *Case Studies on Transport Policy*, 2(2), 89-95.

Veloecole de montreuil. <http://www.velocoledemontreuil.com/>, <https://www.mdb-idf.org/spip/spip.php?article816> [15.05.2017].

Volksentscheid Fahrrad Berlin. <https://volksentscheid-fahrrad.de/de/willkommen-beim-volksentscheid/> [28.09.2017]

Vrouw en vaart. <http://www.vrouwenvaart.nl/cursusaanbod/sporten/> [15.05.2017].

Welsch, J., Conrad, K., Wittowsky, I. D., Reutter, I. U. (2014): Einfluss des Migrationshintergrundes auf die Alltagsmobilität im urbanen Raum. *Raumforschung und Raumordnung*, 72(6), 503-516.

Wixey, S, Johns, P., Lucas, K., Aldridge M. (2005): Measuring Accessibility as Experienced by different Socially Disadvantaged Groups. [Online]. Available at: https://www.researchgate.net/profile/Karen_Lucas/publication/37183599_Measuring_accessibility_as_experienced_by_different_socially_disadvantaged_groups/links/0deec519a2280cac74000000.pdf [15.05.2017].

Woodcock, J., Edwards, P., Tonne, C., Armstrong, B., Ashiru, O., Banister, D., Roberts, I. (2009): Public health benefits of strategies to reduce greenhouse-gas emissions. *Urban land transport*, 374(9705), 1930–1943.

10 Selected Paper: Promoting active travel for all in European urban regions - A review of evaluated initiatives. (Research Paper)

Mag. Elise Schabus, MSc

Maastricht University

Faculty of Health, Medicine and Life Sciences

e.schabus@alumni.maastrichtuniversity.nl

10.1 Abstract

Introduction: Non-communicable diseases or so-called 'Lifestyle diseases' such as coronary heart diseases or diabetes are a major threat to public health in industrialised countries. Physical inactivity is believed to be one essential factor for the increase of lifestyle diseases in Europe. 'Walking and Cycling' and its embedment in everyday life (active travel) could become part of the solution to the decrease of lifestyle diseases in European cities. The aim of this review is to provide an overview of recent effectiveness studies on active travel interventions in European cities. It raises the question which barriers and facilitators are addressed, what groups are reached by different initiatives if and how most people can be reached.

Methods: A systematic search for evaluation studies of active travel initiatives in European cities was conducted in four electronic Databases (PubMed, EBSCO, TRID and Web of Science). Included studies were published between June 2011 and May 2016 in English or German.

Results and Discussion: Twelve articles about forty-one initiatives were analysed in respect of the effectiveness and type of initiative, the procedure of evaluation, addressed barriers and facilitators and their intended and actual reach. The initiatives as well as their evaluations varied greatly and are therefore difficult to compare. The data itself does not provide a good overview of the actual reach of the initiatives. Only few initiatives included measures to reach explicitly different groups of people by minimising specific barriers.

Conclusion: There are only a few studies available for European cities although many projects on active travel are undertaken. More research is needed on high-quality evaluation of existing initiatives despite the difficulties to evaluate active travel interventions on a population level. Inter-sectoral collaborations which support multifaceted approaches show promise to reach the whole population (including least active and/or socially disadvantaged groups) and could contribute to prevent lifestyle diseases in predominantly sedentary societies.

Keywords: active travel, cycling, walking, non-communicable diseases, healthy lifestyle, equity

10.2 Introduction

10.2.1 Lifestyle diseases and active travel

Especially over the last two decades, urban societies have become 'sedentary' societies. Due to their occupation, their schooling or their pastime activities, many people spend a lot of time sitting down (mostly in front of a screen). Technical advances foster this behaviour - irrespective of people's age, sex or socio-economic status. Recent research points out interrelations between this 'sedentarism' and premature mortality (Levine, 2015; Middelbeek & Breda, 2013).

Physical activity and particularly its embedding in everyday life, e.g. by increased cycling and walking, is therefore considered a potential key factor in the prevention of non-communicable diseases. For this reason, the WHO European region has published the Physical Activity Strategy for the WHO European Region 2016–2025 (WHO- European Region, 2015).

Walking and cycling are just two ways to increase physical activity. However, they are often named ‘active transportation’ or ‘active travel’ due to their additional advantage. Especially in urban areas, walking and cycling have a dual effect: A person covers distances getting from A to B while achieving an impact on his/her physical and mental health.

10.2.2 Active travel affects both health and environment

The rising awareness of the negative impact of physical inactivity on public health on the one hand and the positive side effect of active transportation on the environment on the other hand constantly provoke new projects and research in order to promote physical activity in urban regions (E.g. PASTA – Physical Activity through Sustainable Transport Approaches (Gerike et al., 2016), Eltis - The urban mobility observatory (European Union, 2014), REPOPA – Research into Policy to enhance physical activity (Aro et al., 2015)).

According to the various projects stated above and to ongoing research on interventions that promote physical activity, the importance of bringing different stakeholders (e.g. policy-makers, urban planners, health professionals and teachers) together as well as motivating and inspiring people for physical activity seems to be evident for tackling this complex public health challenge.

10.2.3 Equity aspects – the reach of initiatives

Initiatives like bike sharing show the complexity of public health issues and the need for inter-sectoral awareness and common action of diverse stakeholders, especially when it is a desideratum to make a sustainable and healthy lifestyle possible for everyone regardless of their socioeconomic status. Even if people do not own a bike themselves, in many cities one can find programmes that support commuting by bike through the installation of so-called “bike-sharing”-facilities. However, a recent review about bike-sharing systems (BSSs) shows that people who benefit most from these facilities are young men from advantaged socio-economic positions (Ricci, 2015).

The lack of considering equity aspects in initiatives that promote physical activity has been pointed out by several studies in the past decades: D. Ogilvie, Egan, Hamilton, and Petticrew (2004) described in their systematic review on interventions promoting walking or cycling instead of using cars that these initiatives mainly increase cycling among people who already cycle and might only foster disparities between different groups of people. Another extensive systematic review focussing on community based interventions to increase physical activity (including interventions supporting a higher level of everyday walking) states that no study reported any results by markers of equity (Baker, Francis, Soares, Weightman, & Foster, 2011). A review on walking interventions supports the finding that most studies fail to report on effects for different socio-economic groups (D. Ogilvie et al., 2007). Moreover a policy summary published by the WHO- European Region (2013) focusses on stimulating physical activity in socially disadvantaged groups and highlights the importance of the built environment and transport policies for promoting walking and cycling. Furthermore, the policy summary stresses the risk of increasing inequalities by one-dimensional campaigns) and might therefore increase disparities between groups.

10.2.4 Aim of the review

Given the situation as it is explained above, the aim of this review is consequently to give an overview of the initiatives to promote and increase active travel in European urban regions. According to evaluation studies of respective initiatives, the following research questions will be addressed: What kind of initiatives have been evaluated in respect of their potential to increase active travel? Which type of initiative has been effective? What kind of barriers or facilitators were addressed? Who is being reached/affected by different approaches? Are some groups more likely to be (directly) reached than others?

Derived from these questions the second aim is to identify and discuss the most promising (combination of) initiatives that enable as many people as possible to increase their level of active travel and contribute to a healthier environment and prevent inequities.

10.3 Methods

10.3.1 Types of study and target groups

For this paper peer-reviewed evaluation studies of initiatives whose prior aim is to promote active travel in middle-sized or larger cities (with at least 20.000 inhabitants) and which were published in the last five years (1/6/2011-31/5/2016) were defined as relevant. There is no limitation in the design of the respective initiative as long as its prior aim is to promote active transport in cities.

Adults (defined as persons aged 18 years and older) who live in European urban regions (including all countries which are part of Europe as a geographical region and not only Member States of the European Union) are the defined study population. Children's and adolescents' self-determined decisions are considered as highly influenced by parents or legal guardians and are therefore excluded from the study population. There is no further limitation to specific groups as long as the main target of the initiative is to promote walking and/or cycling for transport.

10.3.2 Criteria for inclusion and exclusion

Studies published in a language other than English or German are excluded due to feasibility reasons. To give an overview of the situation in European urban regions, studies conducted in countries outside of Europe as well as studies conducted in rural areas are excluded. Studies with an exclusive focus in the field of physical activity other than walking and/or cycling are excluded. In line with the exclusion criteria, studies conducted in Europe, published in English or German with an explicit focus on walking and/or cycling for transport in urban areas are included.

10.3.3 Search methods for identification of studies

10.3.3.1 Databases

For identifying relevant publications, the four electronic Databases PubMed, EBSCOhost, TRID and Web of Science were chosen on grounds of their content related to health and specific other disciplines such as general Medicine, Psychology and Transportation.

10.3.3.2 Search strategy

Boolean operators were used for searching the relevant publications in the particular electronic Databases. The initial search terms were retrieved from another review (Bird et al., 2013) on

walking and cycling interventions and have been adapted for being in line with the concept of this review. The final search terms used for this review are presented in Table 1.

10.3.4 Assessment of the studies

The studies are assessed in respect of their quality (type of initiative, instruments used for evaluation, results, reach of the initiative, risk of bias, limitations). The different types of initiatives and their reported effectiveness are summarised in the next chapter.

10.4 Results

10.4.1 Study selection process

The search strategy identified 897 studies published between June 2011 and May 2016. 285 articles from the Database PubMed, 292 from the Database TRID, 34 from the Database EBSCO and 286 articles from the Web of Science Database.

After a first assessment of the abstracts and de-duplication twenty articles remained for assessment of full text versions. Access to the full text versions was given for all selected articles. No articles had to be discarded due to language criteria. Nine studies had to be discarded after assessing the full text versions of the articles. All of the eleven included studies were published in English. Through snowball sampling one additional article was identified as eligible for this review and was therefore included in the further process. Consequently, twelve publications have been further analysed. In total, forty-one initiatives from Europe are evaluated in eleven publications. One review delivers additional information on evidence of bike-sharing systems worldwide. The following flowchart (Figure 1) visualises the study selection process.

10.4.2 Main characteristics and further analysis of the selected studies

In this chapter, the main characteristics of the selected studies are summarized. (For a better overview see table in the Appendix.)

10.4.2.1 Location and type of initiatives

Seven of the twelve studies, which met the inclusion criteria, evaluated initiatives which were conducted in cities in the United Kingdom (Blake, Zhou, & Batt, 2013; Goodman, Panter, Sharp, & Ogilvie, 2013; Goodman, Sahlqvist, & Ogilvie, 2013; Jones, 2012; Lathia, Ahmed, & Capra, 2012; Norwood, Eberth, Farrar, Anable, & Ludbrook, 2014; Jenna Panter, Heinen, Mackett, & Ogilvie, 2016), one study focussed on several initiatives in the Netherlands and Denmark (van Goeverden, Nielsen, Harder, & van Nes, 2015), another study investigated an initiative in Austria (Götzenbrucker & Köhl, 2012), one publication reported the effectiveness of an intervention in Spain (Marqués, Hernández-Herrador, Calvo-Salazar, & García-Cebrián, 2015) and one publication focussed on a city in Serbia (Mrkajic, Vukelic, & Mihajlov, 2015). Furthermore, one review was included that referred to evaluation studies of Bike sharing schemes conducted in several European cities (e.g. London, Lyon, Barcelona) (Ricci, 2015).

While one study reported active travel as part of an intervention on overall PA (Blake et al., 2013), all the other studies focussed on initiatives aiming to promote active travel in particular. Only five initiatives (Blake et al., 2013; Goodman, Sahlqvist, et al., 2013; Götzenbrucker & Köhl, 2012; Norwood et al., 2014; Jenna Panter et al., 2016) addressed both walking and cycling for travel while the majority (seven out of twelve) of studies focussed only on cycling as a mode of active travel. No study aimed to report the effectiveness of an initiative exclusively addressing walking.

Altogether, the publications investigated (combinations of) interventions that can be categorised in five broad types of approaches: Workplace - based intervention (Blake et al., 2013), improving infrastructure for cycling/walking (Goodman, Sahlqvist, et al., 2013; Jones, 2012; Marqués et al., 2015; Mrkajic et al., 2015; Jenna Panter et al., 2016; van Goeverden et al., 2015), town-wide initiatives combining improvements of the infrastructure and additional 'soft measures' to promote active travel (Goodman, Panter, et al., 2013; Norwood et al., 2014), bike-sharing systems (Lathia et al., 2012; Marqués et al., 2015; Ricci, 2015), and provision of travel information technology (Gö tzenbrucker & Kö hl, 2012).

10.4.2.2 Target population and addressed barriers and facilitators

The selected studies vary greatly in respect of their geographical location but also in the target population they tried to reach. In the work-based intervention evaluated by Blake et al. (2013), the target population were the (more than 13000) employees in an NHS work-place. In the study conducted in Serbia, the main target population were students and teaching staff from a University (Mrkajic et al., 2015). All the other interventions aimed to reach citizens in general. Only one study reported that the analysed town-wide cycle initiatives especially tried to reach also specific groups such as families with children or people from deprived neighbourhoods (Goodman, Panter, et al., 2013).

Looking at the main barriers or facilitators towards active travel, the different initiatives primarily tried to address the following factors: self-efficacy, health awareness and social support (Blake et al., 2013; Norwood et al., 2014), time and/or cost-concerns (Gö tzenbrucker & Kö hl, 2012; Norwood et al., 2014), actual and perceived safety (Goodman, Panter, et al., 2013; Jones, 2012; Marqués et al., 2015; Norwood et al., 2014; Jenna Panter et al., 2016; Ricci, 2015; van Goeverden et al., 2015), threat of bike- thievery (Mrkajic et al., 2015), bikeability in terms of connectivity and convenience (Goodman, Panter, et al., 2013; Goodman, Sahlqvist, et al., 2013; Jones, 2012; Marqués et al., 2015; Norwood et al., 2014; Jenna Panter et al., 2016; Ricci, 2015; van Goeverden et al., 2015), walkability (Goodman, Sahlqvist, et al., 2013; Norwood et al., 2014; Jenna Panter et al., 2016) and accessibility of bikes (Gö tzenbrucker & Kö hl, 2012; Lathia et al., 2012; Ricci, 2015).

10.4.2.3 Methods, Effectiveness and reach of initiatives

All the studies tried to capture the situation before and after an initiative was implemented. Most of the studies were 'natural experiments', the methodologies used for evaluating the effectiveness of the diverse initiatives included various procedures and instruments and not in every case a control group was in place.

Two studies used questionnaires as a single tool for data collection (Blake et al., 2013; Norwood et al., 2014). Two other studies combined data on active travel retrieved from questionnaires with indicators for residential distance from the respective intervention (infrastructural elements such as new cycling paths) calculated with programs using GIS data (Geographic Information System) (Goodman, Sahlqvist, et al., 2013; Jenna Panter et al., 2016). A study aiming to evaluate effectiveness and equity impacts of eighteen town-wide cycle interventions compared Census data from different years including indicators on small-area deprivation (Goodman, Panter, et al., 2013), while another study which aimed to evaluate traffic-free paths and their potential to support creating a new cycling culture used Census data to compare it with data from an additional questionnaire (Jones, 2012). A study which reported and compared evaluations from five older and seven more recent infrastructure interventions in the Netherlands and Denmark (van Goeverden et al., 2015) listed surveys, bicycle counts and telephone interviews as their data collection tools. Especially the more recent studies tend to use surveys only.

For evaluating a traveller information system 38 users had to fill in questionnaires (before and six weeks after the intervention), participate in focus groups and complete travel diaries (Gö tzenbrucker & Kö hl, 2012). For the study on the change of the registration mode of a bike-sharing system the data from the bike-sharing station sensors were used (Lathia et al., 2012). The review on different bike-sharing systems did not report the different methodologies which were used (Ricci, 2015). The evaluation study by Marqués et al. (2015) used a combination of before-after implementation surveys, bicycle counts, observations of bike-parking lots and data retrieved from the bike-sharing system- sensors . To report changes in the saturation of old and new parking lots in front of a University, observations of the lots were conducted (Mrkajic et al., 2015).

The effectiveness and reach of the various initiatives was reported in different ways. The article by Norwood et al. (2014) focussed in its result on the achievement on recommended levels of PA and did not report detailed effects on active travel. Education level had no significant effect and a control for income was not possible. Inhabitants of intervention areas were 6% more likely to achieve the recommended PA-levels; this effect declined over time.

An general increase in active travel during the last seven days was reported in the study by Blake et al. (2013). The traveller information system motivated users to try new routes and combine travel modes. A decrease in car use was reported. No further details of the effect on active travel are reported in the study, but the authors estimate that 15% of daily travelled distances could be made without the car as a consequence of the traveller information system (Gö tzenbrucker & Kö hl, 2012). As this study was a pilot study to test the traveller information system, the potential reach of the initiative remains unclear. (Potentials and pitfalls are discussed in the next chapter.)

Three studies reported effectiveness on walking and cycling. The longitudinal study in Wales on new infrastructures for walking and cycling reported 32% usage of the new infrastructure among the participants of the survey at a follow up after one year and a further increase of 6% after the second year, although most participants used the new infrastructure for recreational walking and cycling. Low response rate and reporting bias limited the strength of this study. The strongest predictors for walking and cycling were proximity to the new infrastructure as well as baseline walking and cycling. Lower use was predicted by people aged older than 65 years (Goodman, Sahlqvist, et al., 2013).

The quasi-experimental analysis (nested in a cohort study) of the effectiveness of traffic- free cycling and walking routes in Cambridge reported a decrease in overall active commuting. The proximity to the new infrastructure was associated with significantly higher likelihoods of increase in cycling for travel per week. Furthermore, an increase in active travel (cycling) among the least active people was reported; there was no evidence for an effect on the level of walking (Jenna Panter et al., 2016).

The review on BSSs (bike-sharing systems) did not report evidence on effectiveness in detail for each system but stated great variations throughout systems and schemes in respect of effectiveness and reach (Ricci, 2015). Among the other six studies focussing exclusively on cycling, five studies could report an increase in cycling for travel (Goodman, Panter, et al., 2013; Lathia et al., 2012; Marqués et al., 2015; Mrkajic et al., 2015; van Goeverden et al., 2015).

Walking and cycling increased significantly in the most deprived areas in the evaluation study of 18 town-wide initiatives. Smaller effects of the intervention were reported for the more affluent towns; initiatives that included work-based interventions were more effective than others (Goodman, Panter, et al., 2013). The change of registration mode for the bike-sharing system in London led to an overall increase in usage of the system. No socio-demographic details of users

could be reported (Lathia et al., 2012). The improvement of the cycling infrastructure including the installation of a bicycle sharing scheme in Seville led to an increase in cycling which could be seen in the saturation of the bike sharing scheme and the saturation of parking lots. Additional surveys reported an increase of female cyclists and that the average user was under the age of 29. No other socio-demographic factors than age and sex were reported (Marqués et al., 2015).

The improvement of a parking lot for bicycles in front of the University in Novi Sad (Serbia) resulted in a significant increase of rack occupancy. As the concept was tailored to and conducted by the students and staff of the University, the reach of this initiative is likely to be limited to members of the University, even if this cannot be reflected by any data (Mrkajic et al., 2015).

In the study on earlier and recent evaluations of initiatives in Denmark and the Netherlands no detailed results of single studies were reported, but the increase of cycling ranged from 7 up to 42%. No further details on reach of specific groups or any markers of equity are reported (van Goeverden et al., 2015). The study by Jones (2012) could not report changes in cycling for commuting after the implementation of traffic-free paths; no differences by any socio-demographic factors were reported.

10.5 DISCUSSION

The review gives an overview of recently published evaluation studies of initiatives that promote active travel. According to the research questions the key findings are the following, that are further discussed in the following chapter:

- ▶ Only a few effectiveness studies are published in scientific journals although many projects on active travel are undertaken.
- ▶ More research is needed on high-quality evaluation of existing initiatives despite the difficulties to evaluate active travel interventions on a population level.
- ▶ How the evaluation of an initiative can be conducted should be a crucial aspect throughout the planning process prior to the implementation of any initiative.
- ▶ Inter-sectoral collaborations which support multifaceted approaches show promise to reach the whole population (including least active and/or socially disadvantaged groups) and could contribute to prevent lifestyle diseases in predominantly sedentary societies.

10.5.1 Lack of evaluation studies and geographical spread

The first thing that stands out when looking at the diverse publications is the small amount of evaluation studies and their minimal geographical spread. This is remarkable considering that nowadays sustainable development seems to have high priority on the political agenda in Europe and around the world (UNDP, 2015; United Nations- Framework Convention on Climate Change, 2015).

At the same time, this is not a new situation. A lack of evaluation studies of high quality was reported in various publications and was for many the main driver to conduct research on effectiveness of initiatives (Goodman, Panter, et al., 2013; Jones, 2012; Scheepers et al., 2014).

Still, as the results of this review show, there are – at least in Europe - just a few peer- reviewed articles available, and reports on long-term effects are rare. On the other hand, many projects in

the field of active travel can be easily found when searching for grey literature (European Union, 2014; "PASTA-Official Website," 2015).

Looking at the geographical spread, a density of studies conducted in the UK is noticeable. As the UK were not always primarily famous for their cycling culture compared to countries like Denmark or the Netherlands, the effort spent on promoting active travel these days could perform as a good practice example for other European countries. Not only is the amount of evaluation studies remarkable, but there are also many mobility studies available that investigate attitudes and perceptions towards walking and cycling (Pooley et al., 2011; Prillwitz & Barr, 2011). Even if this aspect is overstressing the purpose of this review, it may cast light on the potential loss of good practice examples when the UK leaves the European Union. This potential loss can be seen as two-fold since European Legislation on issues such as air quality and road safety provoked essential action in public health in the UK (McKee & Galsworthy, 2016).

Otherwise, European countries that are not (yet) part of the European Union, such as Serbia, must not be overlooked in their approaches to promote public health, as can be seen in the example of Novi Sad (Mrkajic et al., 2015). Even though the target group in this example mainly consisted of academic people, the strong bottom-up and participatory approach appears very promising.

Other countries, such as Denmark or the Netherlands, which are widely known for their cycling culture, apparently have not tried to make their evaluation studies available to a broader, international and scientific audience for a long time (van Goeverden et al., 2015). Evaluation studies have - beside their primary function to assess the intervention - the additional potential to promote interventions to a wider group of stakeholders and thus facilitate the diffusion of innovations by making the benefits observable (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004; Rogers, 2010). It is therefore even less comprehensible why evaluation studies still seem not to be part of a standard procedure in the field of public health.

Partly, this lack can be explained by the difficulties of evaluating public health interventions. Especially in the area of active travel there is no 'best practice' example on how to evaluate the effectiveness of an intervention that addresses the population within their natural environment (and not embedded for instance in a controlled trial). Not only is it difficult to capture the number of individuals who take advantage of an intervention, it is also challenging to make the potential increase of active travel (isolated from walking/cycling for leisure) measureable. For this reason, many studies used self-reported questionnaires or Census Data as their main data collection tool. These data include risks of reporting bias that might lead to individual overestimation of active travel as active travel might be a desirable social behaviour (Motl, McAuley, & DiStefano, 2005; J. Panter, Costa, Dalton, Jones, & Ogilvie, 2014). Moreover, Census Data does not always include questions on active travel, and if so, the questions might not provide detailed information on travel modes, as for example in the study on the effectiveness of different town-wide initiatives (Goodman, Panter, et al., 2013). This is one reason why it is hard to compare the different evaluation studies; there is no standardised procedure on how to evaluate active travel initiatives, as can be seen especially when looking at the variations in outcome measures (see Appendix).

As a consequence of the difficulties in evaluating initiatives, several studies in the field of active travel seem to focus on estimations (e.g. Health Impact Assessments) rather than on actual effectiveness (de Nazelle et al., 2011; Mueller et al., 2015; Woodcock, Givoni, & Morgan, 2013). Another reason for this is the fact that active travel interventions very often include major changes in the infrastructure of a city, which entails political considerations in terms of cost-

effectiveness. The World Health Organization provides tools and trainings for estimating the effectiveness of walking and cycling initiatives with the so-called 'HEAT', the Health Economic Assessment Tool (Kahlmeier, Racioppi, Cavill, Rutter, & Oja, 2010).

Interestingly, more and more studies focus on bike-sharing systems as shown in the review by Ricci (2015). This increase of studies about bike sharing systems may be partly due to the possibility to use automatically collected data. Another crucial aspect of the analysed studies is the absence of studies aiming to evaluate initiatives that focus exclusively on walking for travel.

10.5.2 Addressed barriers and facilitators and elements of good practice

Although the initiatives address a range of different barriers and facilitators, safety and connectivity seem to be the factors addressed the most. This is not very surprising as most of the initiatives mainly concern changes in the infrastructure and therefore addressed mainly levels other than the individual level (e.g. health awareness, self - efficacy).

When looking at the effectiveness of initiatives the most promising ones combine different elements such as improvements in infrastructure and interventions at the workplaces or have a strong focus on participation in improvement of the infrastructure (Goodman, Panter, et al., 2013; Mrkajic et al., 2015; Norwood et al., 2014). Other studies support the possible advantages of multifaceted approaches for reaching the least active groups and achieving long-term effects (Goodman, Sahlqvist, et al., 2013; Jones, 2012). This is in line with previous research in the field of public health, reporting that especially community-based approaches are good practice to minimise disparities between groups (Israel, Schulz, Parker, & Becker, 1998; Wallerstein & Duran, 2010).

At the same time, active travel itself is a very special concept as it combines different disciplines and should therefore easily provoke an inter-sectoral collaboration of experts of different fields, such as urban planners or public health experts. To what extent are decision makers actually aware of the necessity of interdisciplinary approaches when it comes to healthy lifestyles? In the 'Conclusions from the Roundtable on Transport & Health Polis conference' in 2011 – besides a lack in research on active travel – the difficulties to overcome institutional barriers and to share responsibilities were among the main concerns towards 'Securing the health benefits of active travel in Europe' (Clark et al., 2011).

It is arguable whether it makes a difference if the main aim of a policy addresses the increase of physical activity through active travel or primarily aims at the reduction of air pollution. From a "Health in all Policies" perspective, it might not be too important what the main aim of an intervention is as long as it supports population health in the end.

However, the findings of this review foster the assumption that a combination of diverse measures is needed to stimulate healthier lifestyles.

10.5.3 Equity considerations – how to reach all?

Only four of the analysed studies reported some differences according to different socio - demographic factors, mainly focussing on age, gender or level of PA (Goodman, Panter, et al., 2013; Goodman, Sahlqvist, et al., 2013; Marqués et al., 2015; Norwood et al., 2014). This is understandable considering the quality of the available data that was used to analyse the effectiveness of initiatives, but should be alarming nonetheless. Even if it is difficult to evaluate the effectiveness of population wide interventions, it is surprising how little attention is paid to achieving differentiated results. When initiatives are meant to address the whole population, should this not be reflected in the evaluation? Markers of equity are only discussed in the review of BSSs and in the study focussing on impacts on equity by town-wide cycling initiatives

(Goodman, Panter, et al., 2013; Ricci, 2015). Ricci (2015) refers to two studies analysing inequalities in the usage of the BSS in London. While one study raises the importance of expanding the system into more deprived areas (F. Ogilvie & Goodman, 2012), paradoxically a following study describes the problems of higher prices (which not everybody can afford) because of the costs of the expansion (Goodman & Cheshire, 2014). Such aspects need to be considered and might be addressed by policies (e.g. implementation of subsidies).

The pilot study on the traveller information system in Vienna was conducted with mainly young, technically interested male participants; this bears of course a big risk of bias. In the report, the authors make clear that the system will be successful if known and used (Gö tzenbrucker & Kö hl, 2012). This of course means that people do not only need to have access to mobile devices, it also stresses the importance of digital literacy in potential users. According to the literature, there is evidence that digital skills vary between groups of different socio-economic backgrounds (van Deursen, van Dijk, & Peters, 2011; Zillien & Hargittai, 2009).

Goodman, Panter, et al. (2013) reported in their study an increase in walking and cycling and underlined a higher increase in cycling among the most deprived areas. The analysed initiatives included measures geared towards more deprived areas.

Altogether, these findings reflect the WHO's critical appraisal of policies that promote PA in socially disadvantaged groups (WHO-European Region, 2013). Among the key recommendations for researchers are listed the focus on evaluation of existing projects, a stronger focus on quality and representativeness of data prior to the data collection, and the necessity to tailor interventions for different groups.

10.5.4 Strengths and limitations

Although for feasibility reasons no studies published in languages other than English or German could be used for this review, this had no further effect because all eligible studies were available in English. This study tried to give an overview of recent research on effectiveness of initiatives for active travel and could point out the persistent lack of evaluation studies and the partly missing equity considerations in existing studies. This review has tried to focus on both walking and cycling for travel and therefore fills a gap in the research of evidence on walking for travel interventions in the recent years.

10.6 Conclusion

This review shows that there are only a few studies available for European cities and that the studies vary greatly both in the type of observed initiatives and the way of their evaluation. None of the studies aimed at evaluating an initiative that focussed only on walking for travel. The difficulty to evaluate active travel interventions on a population level in cities can be seen as a common thread in every study presented in this review. The focus of this review lay on active travel to or from work or schooling. The addressed factors were mainly connectivity and safety, with an attempt at improvements by infrastructural elements. The most promising initiatives combined many different measures. As most of the studies did not evaluate different groups reached and the measures were almost never geared towards specific groups, not much can be reported on the reach of initiatives. The second aim of the review was to detect initiatives that are most likely to reach the majority of people. Because of the very poor amount of studies and their limited focus on specific groups, this question cannot be answered satisfactorily. Consequently, further research for this purpose is still needed.

These considerations should not keep public health experts from further research in the field of active travel. On the contrary, these questions underline the importance of evidence-based

initiatives including high quality evaluation studies rather than the constant development of (non-evidence based) projects which in reality might bear other underlying driving factors than population health. Furthermore, evaluation studies should focus on the effectiveness for different groups from the start of the data collection in order to report representative results and make future improvements more likely to reach everyone.

10.7 Tables

Table 1 Search terms used

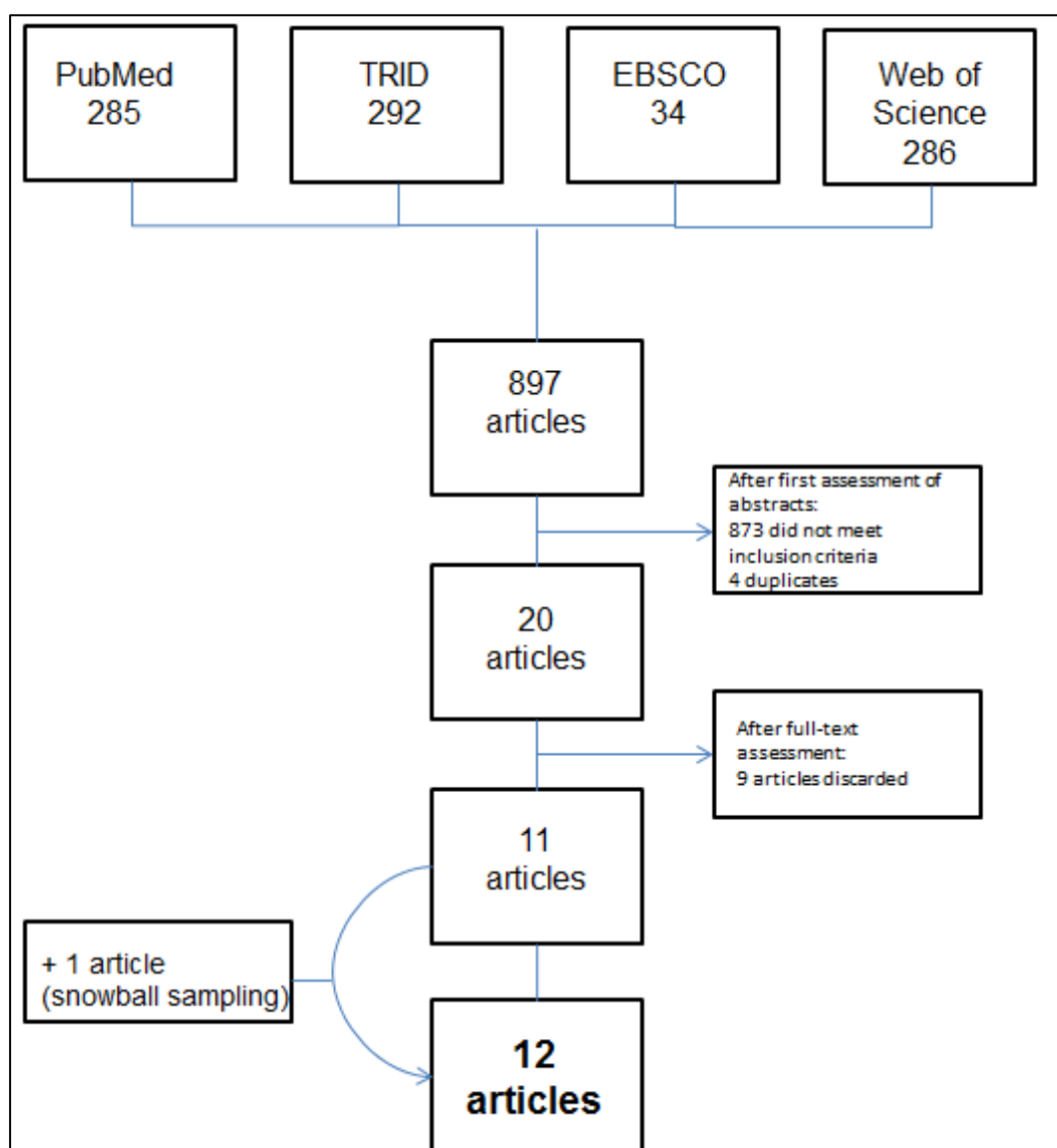
Search terms in Title / Abstract

(Usage of Boolean operators: horizontal “AND”, vertical “OR”, Filter used for “adults”)

Type of Study	Type of initiatives	Activity	Aim of initiative	Region
► Impact	► Intervention	► Walk*	► Promot*	► Urban
► Impacts	► Program	► Cycling	► Increas*	► City
► Evaluat*	► Policy	► Activ*	► Encourage*	
► Effectiveness	► Policies	Transport	► Start*	
► Efficacy	► Strategy	► Activ* travel	► Shift*	
► Effect	► Guideline	► Activ* commut*	► Facilitat*	
► Strength	► Activity	► Green*commut*	► Provok*	
► Evidence	► Campaign*	► Green*	► Stimulat*	
► Appraisal	► Project	Transport*		
► Assessment	► Scheme	► Green* Travel*		
► Analysis	► Incentive	► Ecological Commut*		
	► Urban Design	► Ecological Transport*		
	► Urban Planning	► Ecological Travel*		
	► City Planning	► Non-motorized		
		► Non-motorised		
		► Sustainable travel*		

Type of Study	Type of initiatives	Activity	Aim of initiative	Region
		▶ Sustainable commut* ▶ Sustainable transport* ▶ Bicycle* ▶ Bike* ▶ Biking* ▶ Cycle Hire ▶ Cycling ▶ Cyclist* ▶ Active* ▶ Green* ▶ Transport* ▶ Travel* ▶ Ecological Commut* ▶ Ecological Travel		

The table above lists the search terms used in this paper.

Figure 2 Flow chart – study selection process

The graphic above shows a flow chart of the study selection process.

10.8 References

- Aro, A. R., Bertram, M., Härmäläinen, R.-M., Van De Goor, I., Skovgaard, T., Valente, A., . . . Jakobsen, M. W. (2015). Integrating research evidence and physical activity policy making—REPOPA project. *Health promotion international*, dav002.
- Baker, P. R., Francis, D. P., Soares, J., Weightman, A. L., & Foster, C. (2011). Community wide interventions for increasing physical activity. *Sao Paulo Medical Journal*, 129(6), 436-437.
- Bird, E. L., Baker, G., Mutrie, N., Ogilvie, D., Sahlqvist, S., & Powell, J. (2013). Behavior change techniques used to promote walking and cycling: A systematic review. *Health psychology*, 32(8), 829.
- Blake, H., Zhou, D., & Batt, M. E. (2013). Five-year workplace wellness intervention in the NHS. *Perspectives in public health*, 133(5), 262-271.

- Clark, A., Curtis, P., Frost, M., Haon, S., Insall, P., Meschik, M., . . . Racioppi, F. (2011). Securing the health benefits of active travel in Europe; Conclusions from the Roundtable on Transport & Health
Polis conference, 29–30 November 2011. Brussels, Belgium.
- de Nazelle, A., Nieuwenhuijsen, M. J., Antó, J. M., Brauer, M., Briggs, D., Braun-Fahrlander, C., . . . Lebre, E. (2011). Improving health through policies that promote active travel: A review of evidence to support integrated health impact assessment. *Environment International*, 37(4), 766–777. doi: <http://dx.doi.org/10.1016/j.envint.2011.02.003>
- European Union. (2014). Eltis- The urban mobility observatory. Retrieved 10/01/2016, from <http://www.eltis.org/>
- Gerike, R., de Nazelle, A., Nieuwenhuijsen, M., Panis, L. I., Anaya, E., Avila-Palencia, I., . . . Gotschi, T. (2016). Physical Activity through Sustainable Transport Approaches (PASTA): a study protocol for a multicentre project. *BMJ Open*, 6(1), e009924. doi: 10.1136/bmjopen-2015-009924
- Goodman, A., & Cheshire, J. (2014). Inequalities in the London bicycle sharing system revisited: impacts of extending the scheme to poorer areas but then doubling prices. *Journal of Transport Geography*, 41, 272–279. doi: <http://dx.doi.org/10.1016/j.jtrangeo.2014.04.004>
- Goodman, A., Panter, J., Sharp, S. J., & Ogilvie, D. (2013). Effectiveness and equity impacts of town-wide cycling initiatives in England: a longitudinal, controlled natural experimental study. *Social Science & Medicine*, 97, 228–237.
- Goodman, A., Sahlqvist, S., & Ogilvie, D. (2013). Who uses new walking and cycling infrastructure and how? Longitudinal results from the UK iConnect study. *Preventive Medicine*, 57(5), 518–524. doi: <http://dx.doi.org/10.1016/j.ypmed.2013.07.007>
- G tzenbrucker, G., & K hl, M. (2012). Advanced traveller information systems for intelligent future mobility: the case of AnachB'in Vienna. *Intelligent Transport Systems, IET*, 6(4), 494–501.
- Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: systematic review and recommendations. *Milbank Quarterly*, 82(4), 581–629.
- Israel, B. A., Schulz, A. J., Parker, E. A., & Becker, A. B. (1998). Review of community-based research: assessing partnership approaches to improve public health. *Annual review of public health*, 19(1), 173–202.
- Jones, T. (2012). Getting the British back on bicycles—the effects of urban traffic-free paths on everyday cycling. *Transport Policy*, 20, 138–149.
- Kahlmeier, S., Racioppi, F., Cavill, N., Rutter, H., & Oja, P. (2010). "Health in all policies" in practice: guidance and tools to quantifying the health effects of cycling and walking. *Journal of physical activity & health*, 7(1), S120.
- Lathia, N., Ahmed, S., & Capra, L. (2012). Measuring the impact of opening the London shared bicycle scheme to casual users. *Transportation research part C: emerging technologies*, 22, 88–102.
- Marqués, R., Hernández-Herrador, V., Calvo-Salazar, M., & García-Cebrián, J. (2015). How infrastructure can promote cycling in cities: Lessons from Seville. *Research in Transportation Economics*, 53, 31–44.
- McKee, M., & Galsworthy, M. J. (2016). Brexit: a confused concept that threatens public health. *J Public Health (Oxf)*, 38(1), 3–5. doi: 10.1093/pubmed/fdv205
- Motl, R. W., McAuley, E., & DiStefano, C. (2005). Is social desirability associated with self-reported physical activity? *Prev Med*, 40(6), 735–739. doi: 10.1016/j.ypmed.2004.09.016

- Mrkajic, V., Vukelic, D., & Mihajlov, A. (2015). Reduction of CO₂ emission and non-environmental co- benefits of bicycle infrastructure provision: the case of the University of Novi Sad, Serbia. *Renewable and Sustainable Energy Reviews*, 49, 232-242.
- Mueller, N., Rojas-Rueda, D., Cole-Hunter, T., de Nazelle, A., Dons, E., Gerike, R., . . . Nieuwenhuijsen, M. (2015). Health impact assessment of active transportation: A systematic review. *Prev Med*, 76, 103-114. doi: 10.1016/j.ypmed.2015.04.010
- Norwood, P., Eberth, B., Farrar, S., Anable, J., & Ludbrook, A. (2014). Active travel intervention and physical activity behaviour: An evaluation. *Social Science & Medicine*, 113, 50-58.
- Ogilvie, D., Egan, M., Hamilton, V., & Petticrew, M. (2004). Promoting walking and cycling as an alternative to using cars: systematic review. *BMJ*, 329(7469), 763. doi: 10.1136/bmj.38216.714560.55
- Ogilvie, D., Foster, C. E., Rothnie, H., Cavill, N., Hamilton, V., Fitzsimons, C. F., & Mutrie, N. (2007). Interventions to promote walking: systematic review. *BMJ*, 334(7605), 1204. doi: 10.1136/bmj.39198.722720.BE
- Ogilvie, F., & Goodman, A. (2012). Inequalities in usage of a public bicycle sharing scheme: Socio- demographic predictors of uptake and usage of the London (UK) cycle hire scheme. *Preventive Medicine*, 55(1), 40-45. doi: <http://dx.doi.org/10.1016/j.ypmed.2012.05.002>
- Panter, J., Costa, S., Dalton, A., Jones, A., & Ogilvie, D. (2014). Development of methods to objectively identify time spent using active and motorised modes of travel to work: how do self-reported measures compare? *Int J Behav Nutr Phys Act*, 11, 116. doi: 10.1186/s12966-014-0116-x
- Panter, J., Heinen, E., Mackett, R., & Ogilvie, D. (2016). Impact of new transport infrastructure on walking, cycling, and physical activity. *American Journal of Preventive Medicine*, 50(2), e45-e53.
- PASTA-Official Website. (2015). Retrieved 10/01/2016, from <http://www.pastaproject.eu/home/>
- Pooley, C., Tight, M., Jones, T., Horton, D., Scheldeman, G., Jopson, A., . . . Constantine, S. (2011). Understanding walking and cycling: summary of key findings and recommendations.
- Prillwitz, J., & Barr, S. (2011). Moving towards sustainability? Mobility styles, attitudes and individual travel behaviour. *Journal of Transport Geography*, 19(6), 1590-1600. doi: <http://dx.doi.org/10.1016/j.jtrangeo.2011.06.011>
- Ricci, M. (2015). Bike sharing: a review of evidence on impacts and processes of implementation and operation. *Research in Transportation Business & Management*, 15, 28-38.
- Rogers, E. M. (2010). *Diffusion of innovations*: Simon and Schuster.
- Scheepers, C., Wendel-Vos, G., Den Broeder, J., van Kempen, E., van Wesemael, P., & Schuit, A. (2014). Shifting from car to active transport: A systematic review of the effectiveness of interventions. *Transportation Research Part A: Policy and Practice*, 70, 264-280.
- UNDP. (2015). Sustainable Development Goals.
- Adoption of the Paris Agreement, FCCC/CP/2015/L.9/Rev.1 C.F.R. (2015).
- van Deursen, A. J. A. M., van Dijk, J. A. G. M., & Peters, O. (2011). Rethinking Internet skills: The contribution of gender, age, education, Internet experience, and hours online to medium- and content-related Internet skills. *Poetics*, 39(2), 125-144. doi: <http://dx.doi.org/10.1016/j.poetic.2011.02.001>
- van Goeverden, K., Nielsen, T. S., Harder, H., & van Nes, R. (2015). Interventions in Bicycle Infrastructure, Lessons from Dutch and Danish Cases. *Transportation Research Procedia*, 10, 403-412.
- Wallerstein, N., & Duran, B. (2010). Community-based participatory research contributions to intervention research: the intersection of science and practice to improve health equity. *American journal of public health*, 100(S1), S40-S46.

Physical activity strategy for the WHO European Region 2016–2020, EUR/RC65/9 65th session + EUR/RC65/Conf.Doc./4 C.F.R. (2015).

WHO-European Region. (2013). Physical activity Promotion in socially disadvantaged groups: Principles for action. Denmark: WHO Regional Office for Europe.

Woodcock, J., Givoni, M., & Morgan, A. S. (2013). Health impact modelling of active travel visions for England and Wales using an Integrated Transport and Health Impact Modelling Tool (ITHIM). PLoS One, 8(1), e51462. doi: 10.1371/journal.pone.0051462

Zillien, N., & Hargittai, E. (2009). Digital distinction: Status-specific types of internet usage. Social Science Quarterly, 90(2), 274-291.

10.9 APPENDIX - Overview of the studies included in this review

(condensed version; for comprehensive table of assessment please contact the author: e.schabus@alumni.maastrichtuniversity.nl)

Authors (Year); Country	Type/aim of initiative and study; target/study population	Adressed barriers/facilitators	Methods	Outcome (most relevant for this review)	Reach of initiative/ Equity aspects
Blake et al. (2013); UK	Evaluation of needs-based and theory-driven multi-level ecological workplace intervention (including active travel); 13000 employees of one hospital	Self-efficacy, health awareness, social support at work	Questionnaire (self-reporting; baseline and follow-up) i.a. on health status, mood, PA, job performance, job satisfaction	-Significantly more reported active travel to work in last 7days - significantly more reported active travel for at least 10 minutes in the last 7days -Main reported barriers: lack of time tiredness; lack of motivation, need to rest and relax.	-Employees of one hospital, no specific equity aspects -More active employees had higher self-efficacy, confidence and perceived social support.
van Goeeverden et al. (2015); NL, DK	Summary of evaluation studies of active travel initiatives which have not been published yet. Comparison with recent assessments and insight into new approach "shared space"; Citizens	Self- perceived Safety, Bikeability	Before and after studies using surveys, bicycle counts, telephonic interviews. Note: Some recent evaluations used only after surveys.	Main promoters concluded by the authors (except for three case studies): direct routes, connectivity, minimal exposure to motorized traffic, dedicated infrastructure, wide paths, quality of pavement.	Not applicable

Goodman, Sahlqvist, et al. (2013); UK	Longitudinal study (baseline survey and two follow-ups): Results of questionnaires before and after the construction of new infrastructure in three cities; Adults living within 5 kilometers from core projects	Walkability, Bikeability	Baseline questionnaire: -Walking and Cycling for transport in the last 7 days through seven-day recall instrument. -weight/height -distance from core project Follow-up: -Knowledge about Connect2 -Usage of Connect2	walking and cycling for recreation dominated after implementation of Connect2 Only 8% (first FU) to 9% (second FU) of Connect2 users used pathways for work or business	Predictors of higher awareness and use: proximity, baseline walking and cycling, non-student status, bicycle access, higher income and education Predictors of lower use: older age (<65), obesity and poorer health
Goodman, Panter, et al. (2013) ; UK	Longitudinal controlled natural experimental study- Evaluation of effectiveness and equity; impacts of town-wide cycling interventions; 1.3 million commuters in 18 intervention towns (publci Data of Census) age 16-74	Bikeability, safety	Comparing changes in intervention towns with changes in comparison groups by using English census Data Measure of small-area deprivation using English Indices of Multiple Deprivation	-Cycling to work; changes 2001/2011: Increase from 5.81% to 6.78% in the intervention towns -Changes in walking/driving/taking public transport to get to work: Increase in intervention towns for walking and public transport use, decrease in driving. Smaller intervention effects in affluent towns Intervention towns that included interventions at workplace had larger effects.	Cycling increased significantly in the intervention towns in the more deprived areas. Walking also increased in the intervention towns 'across all fifths of deprivation'. Driving decreased but not significantly in the most deprived areas. No significant changes in use of public transport.
Götzenbrucker and Köhl (2012); AT	Small scale test of actual effectiveness of travel planning tool and future expectations; 38 users, 79%male, mean age 34	Decision-making behaviour, concerns about time/costs, accessibility	Baseline questionnaire and questionnaire after 15 days of use; travel diary (daily until 6 weeks after intervention), 3 focus groups, observation, qualitative interviews 6 weeks later.	-system provided new routes, made decisions easier (travel time, safety), alternative routes were often chosen for non-routine routes. -reduction of uncertainty and stress - motivation to try new routes and combine modes of travel -immediate loss of trust if information turns out to be incorrect	Equity issue is addressed in the study but the potential Reach remains unclear. Main concerns not only accessibility in economic terms but digital skills and knowledge of existence of system.

Jones (2012); UK	Cross-sectional study conducted in Stanford – effectiveness of traffic-free pathways on everyday-cycling; study population „represents averageness“	Bikeability, Safety, gaining confidence to start cycling (again), connectivity	“Door-to-door drop and collect questionnaire survey” -Data between neighborhoods compared (non-parametric tests).	- Level of cycling at Beaconside higher (6% travel mode share) than in Rickerscote (2%). -Census Data from 2001 (before implementation of traffic-free path): travel to work Beaconside (7%) higher than Rickerscote (2%). -Self-reported change in the last 12 months - > decline in cycling in both neighborhoods, slight decrease in both walking and car driving - > cycling did not increase after implementation of traffic-free path	Not applicable (Conclusion of the authors: “wider coordinated multi-faceted approach to promoting cycling is required which combines social marketing with physical measures including wider spread restrictions in urban areas”)
Lathia et al. (2012) ; UK	Effects on bike sharing usage after change from key-dependent system to a debit/credit-card dependent system in a shared bicycle scheme; Visitors and Citizens of London who use the bike-sharing system	Accessibility (Registration vs access through debit card)	Analysis of changes by using data mining techniques for data from the online interactive map of Transport in London and data from all bike-sharing station sensors	After implementation of new policy, overall number of trips by bikes from bike sharing system increased. Greater use at weekends Increase in weekday commuting trends.	Registration requires a more active and foresight approach by the user. But the change of policy requires holding a debit card.
Marqués et al. (2015) ; ES	Analyses of the impact of infrastructural changes on cycling in the city Seville (Policy „Bicycle Masterplan“); Visitors and Citizens of Seville who cycle in the city	Bikeability, Safety	-Survey in 2006 before implementation and after (2012) -Bicycle counts along network (2006, 2007, 2008, 2010, 2011) -Bike-sharing system sensors -observation of saturation of parking lots	-Evolution of trips: “average bicycle daily traffic” increased each year. Characteristics of the cyclists: Increase in female cyclists 25% (2006) to 32% (2011) - 39% younger than average citizen (under 29) -34% between 30 and 44 - 4% older than 64 -most cycle for commuting -average length of trips: 5km -social acceptance still needs further work; infrastructures can only be seen as a starting point. (controversial:	The data cannot show sociodemographic characteristics. The University installed additional own bike sharing stations→ cycling promotion tailored for students and teaching staff (10% of city population) No considerations on equity included

Mrkajic et al. (2015); RS	Case study on the effects of a new bicycle infrastructure (changes in commuting and	Lack of secure places to park bikes	Before and after implementation: Observational study of use of existing physical	Pre-intervention period: both parkings (PA1 and PA2) scarcely used, especially the one that was later on subject of the intervention (PA2).	Students and teaching staff. Concept of initiative was tailored to students and staff from the Faculty of
Norwood et al. (2014); UK	Evaluation of PA of participants after implementation of the active travel initiative „Smarter Choices, Smarter Places“; 8-10% of population of the respective areas (age: 16+)	Safety, bikeability, walkability, health awareness, time concerns	Surveys in 2009 (questionnaire for self-completion) and in 2012 as a computer-assisted survey. Differences-in-differences analysis (pilot areas/control areas).	Citizens in intervention areas were 6% more likely achieving recommended PA- levels. But in each area levels of PA declined over time. No results about changes in active travel.	Education level had no significant effect. Control for income was not possible. (Predicted probability: intervention was more likely to improve PA level of individuals with lower education)
Jenna Panter et al. (2016) ; UK	Quasi-experimental analysis nested within a cohort study of effectiveness of changes in infrastructure on active travel and general PA; Adult commuters living within 30km of initiative who work in parts of the city served by the new infrastructure	Walkability, Bikeability, Safety	Postal Baseline questionnaire in 2009 and follow-up in 2012 Changes in weekly time spent in active commuting (validated 7-day recall instrument). Changes in total weekly time spent walking and cycling and	-Overall decrease in active commuting in cohort -But greater exposure to intervention associated with significantly greater likelihood of increase in weekly cycle commuting time -Increase in overall time spent in active commuting among the least active commuters at baseline. -No evidence on effect on walking	No differential effects on active commuting by subgroups except on total active commuting among least active individuals at baseline Due to workplace recruitment, some groups automatically excluded (e.g. unemployed)
Ricci (2015); incl. Examples from Europe	Literature review on bike sharing systems (BSS). Effectiveness of BSS; lessons from implementation processes	Safety, Bikeability	Literature Review	This review gives an overview on many different BSSs. Generalizability not given.	“Benefits are unequally distributed, since users are typically male, younger and in more advantaged socio-economic positions than average.”

11 Selected Paper: Transport poverty and Urban Cycling: A Case study Rotterdam (Practice Paper)

Morgan Geile

Dutch Research Institute for Transitions

Erasmus University Rotterdam

morgan.geile@gmail.com

Chris Roorda

Dutch Research Institute for Transitions

Erasmus University Rotterdam

roorda@drift.eur.nl

11.1 Abstract

Transport poverty is an inability to achieve adequate transportation to access key activities such as employment, education, and social interaction. This can be caused by an inability to afford transportation, a lack of available services or vehicles in which to travel, an inability to physically access adequate transportation, or the suffering from externalities generated by modern motorized transport systems. Trends toward hyper-mobility play a large role in expanding the influence of transport poverty, particularly in urban settings. As municipalities invest more in motorized infrastructures, those that cannot access car ownership or public transportation are marginalized, limiting the travel options available to them. The prioritization of cycling as a primary mode of transport in urban communities can help to reverse this trend and improve transportation options. Individuals with more access to transportation have better opportunities to find and keep a job, access educational opportunities, and participate in increased social interaction in their communities, on top of enjoying the environmental and health benefits cycling-dominated transport systems provide. This article discusses how cycling can address the many aspects of transport poverty by providing a more flexible, accessible, and inexpensive mode of transportation with fewer negative externalities than modern motorized transport systems. A case study conducted in Rotterdam, a city in the Netherlands, highlights the existing barriers to urban cycling and illuminates the importance of making cycling policies, measures, and initiatives inclusive and equitable, in order to make underserved groups benefit from these efforts as well.

Keywords: transport poverty, social exclusion, urban cycling.

11.2 Introduction

Ever increasing reliance on motorized transport is known as hyper-mobility. In urban centers of developed countries, increased hyper-mobility means an emphasis on investment in infrastructures for cars and other motorized transport services. This means that public transport networks and roads dominate the space-limited traffic ways of urban environments and particularly prioritizes car ownership. However, car ownership requires a significant

amount of time and money, and even when public transport services are an affordable alternative, they still confine users to a specific time-table and route that might be sub-optimal. Therefore, there are many that are marginalized from modern urban transport systems making it difficult to access certain key activities such as work and education.

On top of that, even those that do not own a car or use public transport still have to put up with the negative externalities generated by these systems. These include air and noise pollution and the obstructions busy street infrastructures create in and between communities and neighborhoods. All of these factors, either due to one or combined, result in some people feeling limited and disadvantaged when asked about transport opportunities available to them.

This lack of opportunities as a result of transport is termed transport poverty. This essentially describes a situation where an individual is unable to access key activities such as work, education, or social interactions which are necessary in order to maintain a reasonable quality of life. Transport poverty has been shown to exist all over the world in developed and developing countries, in rural and in urban settings, and has evolved into an umbrella concept in both social and transport related research. According to the most recent definition put forth by Lucas et al. 2016, the concept of transport poverty consists of four parts: Mobility poverty, accessibility poverty, transport affordability, and exposure to transport related externalities. An individual suffers from transport poverty if one or more situations are true.

Mobility poverty describes a situation where the physical capabilities of an individual prevent them from attaining transport. This could be due to a disability, lack of existence of a vehicle in which to be transported, or a lack of knowledge of how one would use an existing system.

Accessibility poverty refers to situations where transport options do not bring an individual to their destination with an adequate level of safety or in a reasonable time period. Sometimes available travel takes too long and does not bring the individual to their destination which prevents the user from reaching key services and activities such as work and education.

Transport affordability plays a role when the weekly transport costs of a family leaves their residual income below the official poverty line.

Exposure to transport externalities refers to the noise pollution, air pollution, spatial segregation, and pedestrian accidents that occur as a result of various transport networks and vehicles. This concept is most relevant among those who participate least in the transport systems and still must suffer the externalities of being near them. A good example for this is that many poor neighborhoods are located near large motorway infrastructures and fast moving roadways. This means that those least able to afford participating in car use and ownership are those that are most exposed to the negative externalities.

Those that are affected by transport poverty are therefore at a disadvantage by having fewer transportation options. This can result in a limited area in which to find adequate employment or education, and can limit social interaction within and outside of their respective communities. This builds divides in society between those who can afford the time and money to reach all of “life’s chances” and those who cannot.

Research has shown attempts to address transport poverty have been largely unsuccessful given the very individual nature of transport needs and the large complexity of identifying the particular causes of transport poverty in an given community (Lucas 2012). Blanket municipal or political solutions for addressing the issue overlook the local nuances within in-need communities, marginalizing those that need help the most.

There is an obvious need to continue to address the issue of transport poverty and to investigate viable solutions to the very complicated and highly individual problem of transportation needs.

The most efficient way to do this is not simply to treat the symptoms of transport poverty by helping marginalized individuals find ways to participate in existing systems, but rather reverse the trends of hyper-mobility that started the problems in the first place. This can be done by promoting cycling as a dominant form of transport within urban contexts.

Cycling is a well-known healthy and green alternative to motorized transport, and, particularly in urban environments, cycling can provide the appropriate ability for individuals to complete the necessary trips required on a daily basis. The majority of urban trips made in Europe are less than 6 km which is a reasonable distance to be traveled by bike. In addition, cycling dominated transport systems have quite a few social benefits as well. This paper is based off of a recent Master's study that argues that prioritizing cycling over motorized infrastructures within cities could be an effective way to combat transport poverty and reduce social inequalities (Geile 2017). Cycling is relatively cheap and accessible to everyone (addressing transport affordability), it provides flexible and efficient transport over short urban distances which helps people reach more of life's key activities and opportunities, and it brings transport to a "street level" making roadways safer and bringing people into closer positive social contact. These three components, in addition to well-known health benefits and the fact that cycling does not contribute to climate change or cause adverse externalities, helps make a prioritization of cycling a prime solution for addressing the many aspects of transport poverty in urban contexts.

11.3 Urban cycling addressing transport poverty

The health and environmental benefits of using a bike over motorized transport are well known. What may not be as well known are the ways that more cycling also offers many social benefits to a society and as a result can address the negatives of transport poverty. Cycling provides efficient and flexible transport that is even sometimes faster than driving with a car or using public transportation. It is cycling is cheaper and more affordable than car ownership, and increasing cycling helps tear down literal and social barriers between urban communities.

11.3.1 Fast and Flexible Transport

Time plays a major role in transport choice and cost. Typically, the cheaper the travel, the longer amount of time is needed to reach a destination. Faster travel, while getting you there in a shorter time period, still costs more money per each additional kilometer traveled. This can limit the types of destinations that can be reached as a function of disposable income. Using public transport is faster but one must comply with scheduling constraints and delays which adds time waiting and walking to and from designated transit stations. Also, the pre-determined routes of public transport do not allow much flexibility for users to travel along the most optimal route given their starting point and destination. Even if one does have enough money for a car, time limitations can still exist fighting traffic and finding parking in the space-limited traffic ways of urban communities.

Cycling provides an alternative scenario. A bike is not confined to a time schedule or a pre-determined route meaning it is instantly available for departure and the most efficient route can be taken. Bikes can also take advantage of shortcuts inaccessible to cars or public transport as they can easily hop curbs or even – as is legal in the Netherlands – go the wrong way on a one-way street (as long as you keep to the correct side of the road).

It has even been argued that cycling is faster than travel in cities with a car or public transport when looked at with the calculation of effective speed (Tranter 2012). Effective speed is calculated by dividing distance by time ($s=d/t$), but time includes the time needed to travel from point A to point B but also the time needed to prepare a vehicle to make the trip. In the example

of a car, this would include time spent for maintenance and fueling the car, driving around looking for parking, walking to and from a parking spot, and even the time spent at work to earn the money needed to afford all of those things including the initial purchase of the car. Some calculations put cycling several kilometers faster (and thus more efficient) than traveling by car, which again provides the user with an enhanced array of access to various destinations.

Cycling therefore has the ability to provide adequate travel that can be more efficient and faster than taking public transport or driving with a car. It must be noted that many of these arguments also rely (1) the cycling ability of the cyclist and (2) on the quality of cycling infrastructure available in a city with more facilities generally leading to increased speed, safety, and efficiency of travel.

11.3.2 Transport Affordability

Cost is a second major factor influencing transport decisions and relates to the affordability component of transport poverty. When compared to the cost of car ownership or monthly public transport subscriptions owning a bike can be much cheaper. In addition, when traveling with many public transport systems or with a car, cost increases with distance traveled. Drivers must pay for wear and tear on the vehicle and for fuel, and public transport systems charge more money for each additional kilometer or stop. This gradual increase in cost is almost non-existent with bike travel as the cost to maintain a bike tends to be much cheaper than that of a car or the marginal increase of cost from riding public transportation. Research has shown that transport poverty can affect those with low skills or poor housing conditions. Cheaper housing tends to be located in areas without much connectivity or opportunities. Therefore, cycling offers a solution to travel further in a shorter amount of time without bumping up the price. This allows for increased access to work and education opportunities that might have previously been too far away to reach.

These savings don't stop there, however, and continue to benefit much more than just the cyclist. Cycling dominant transport systems are cheaper for municipal transport budgets and generate a healthier population meaning cheaper healthcare costs. The construction and maintenance of cycling infrastructure is cheaper than that of cars or public service networks. Bikes have a reduced impact on roadways in addition to taking up significantly less space. One meter squared of pavement serves more bikes for longer than it would for cars. Also, the cost of building cycling infrastructure in cities could be very cheap by simply converting streets previously meant for cars into cycle-ways. It has been shown that cities with the highest rates of active (non-motorized) transport spend smaller portions of their budgets on transportation than those that don't (Kenworthy & Laube 1999). Increased cycling benefits the taxpayer as savings on transport infrastructure can then be allocated for other projects that further benefit the community.

Finally, cycling is not only healthy in itself, but also promotes an active lifestyle (Garrard et. al 2012). The benefit-cost ratio of investing in having an active population translates into cost savings at a ratio of 5:1 (with 2:1 typically being considered a "high value for money"). A healthier and more active population means more healthcare savings for everyone.

11.3.3 Bringing down barriers

Transport infrastructures can seriously affect our ability to connect with neighboring communities and individuals as they are big, provide avenues for fast moving traffic (that is difficult to cross), and concentrates externalities such as noise and air pollution.

Many communities located in poorer areas of a city tend to be in areas far away from the city center. Frequently these neighborhoods are located near major freeways or rail-roads that are difficult or impossible to safely cross which leads to higher instance of pedestrian fatality. These motorized transport infrastructures therefore create structural barriers between neighborhoods and create more dangerous conditions for communities.

Cycling infrastructures need not be as large as those needed for cars and the traffic speed of cyclists is a lot slower and less dangerous to pedestrians. This promotes more street level interaction between individuals making for more “livable” communities. This in turn increases the social and economic value of a community by pushing people to interact more and generating a more “livable” feel.

Investment in cycling infrastructure also makes a positive commitment from a municipality to reduce inequalities. When a municipality invests in a bike path, it is saying, “a bicycle path is a social statement that a person with a \$40 bike is just as important as someone with a \$40,000 car” (Peñalosa 2010). This is important when promoting economic equality in a city.

Overall, when addressing transport systems, it is important to try and create the most equally distributed system that includes as many income ranges as possible while still providing adequate and effective transport opportunities.

11.4 The Case Of Rotterdam

The Netherlands is considered the leading cycling country in the world with high a modal share of bicycles in almost every city. However, the city of Rotterdam is a notable exception: rebuilt after World War II in the image of modernist standards, Rotterdam became a ‘car paradise’ resulting in a low use of bicycles for transportation and commuting purposes. However, the international trend of increased attention to cycling is now also reaching Rotterdam and recently there have been increases in cycling ridership (although ridership is still one of the lowest in the Netherlands). This shift is supported by municipal policy in which the Rotterdam’s political leadership takes measures to promote biking as a strategy to become a more attractive, healthy, and prosperous city. Rotterdam even has the ambition to be elected ‘Bicycle City of the year’ in 2018.

Yet, in low-income neighbourhoods and ethnically diverse communities in Rotterdam, this trend is hardly noticeable and biking remains a marginal form of transportation. This especially holds true in neighbourhoods South of the river running through Rotterdam, an area designated as Rotterdam South. A recent mobility survey shows that only 45% of the population in Rotterdam South uses a bicycle, of which 25% regularly (4 days per week or more). In the Northern part of Rotterdam 64% uses a bicycle, of which 44% use one regularly (City of Rotterdam, 2016). In other Dutch cities, bicycle use is generally much higher. Some of the underlying reasons of the low bicycle use in this city include: the optimization of infrastructures for cars rather than bicycles, a negative social perception of bike riding, lack of bicycle ownership, and people (particularly with a migrant background) not having acquired the skill or accepted the culture of riding. This is unfortunate in light of all that cycling can contribute to healthier, safe, and thriving neighbourhoods.

It is for all the reasons discussed in the first two chapters that cycling can provide a reasonable method to combat transport poverty. Many programs are being initiated in Rotterdam South to enhance cycling ridership along with a study to identify empirically how cycling might be perceived by local inhabitants, and what barriers continue to prevent the use of cycling, even in areas suffering from transport inequalities.

11.4.1 Methods

In order to identify current barriers and perceptions to cycling a series of three focus groups were conducted within two districts of Rotterdam South: Feyenoord and IJssel-monde. These areas are located close to the southern bank of the river dividing Rotterdam South from the rest of the city, and represent neighbourhoods with relatively dense urban infrastructures when compared to other districts in Rotterdam South.

Focus groups participants were selected according to purposive sampling, meaning participants fit the general form of those least likely to cycle so that the most in depth information on existing barriers might be identified. Focus groups allow an intimate environment in which participants have the freedom to discuss in detail their opinions and perceptions on an issue in a way that a simple survey sometimes cannot facilitate. The groups consisted of 8-10 participants, with the majority being from non-Dutch heritage (Moroccan), and consisting almost entirely of women (only one male participant).

Participants were first asked to fill out a worksheet identifying basic demographics, most frequently completed trips (ex: daily shopping trip length and mode of transport), and general impression of cycling as a mode of transport. The focus group consisted of a series of questions spurring conversation on what modes of transport were favored, what aspects factored in to various transport mode decisions, and what the major barriers were to perceiving cycling as a mode of viable transport (that is, top choice).

11.4.2 Results

Of the 72 trip distances reported by all focus group participants combined, 77,5% were shorter than 6,5 km and 53,5% were 2,5 km or less. Many of the trips longer than 10km were for visiting family; one was traveling to Amsterdam. The average trip distance for all trips 10km and under (85% of trips) was 2,53 km (n=61). The average for trips longer than 10km was 75km (n=11).

Almost all of the participants agreed cycling provides a cheaper, more flexible, and healthier transport option, but were reluctant to make the lifestyle change to cycle more (preferring to stick with a car, or reluctantly, to public transportation, if having a car was unaffordable). The primary reasons for the lack of conversion to cycling were reported to be the following (Geile 2017):

1. The perceived level of safety in Rotterdam South is relatively low translating into the fear that a purchased bike would simply be stolen, the feelings of vulnerability when riding on a bike making the rider an easy target for harassment or collision, and the condition of the cycling infrastructure which was reported to be poorly lit, too close to car traffic, and mistrust in the competence of other drivers using the same paths and roadways (such as reckless scooter drivers).
2. The difficulties of incorporating cycling to fit the needs of large families (many children). One needs a multi-functional or cargo bike to haul higher quantities of children and shopping, but many of these bikes were perceived as too costly or difficult to use.
3. The perception of full transport cost of certain transport methods tended to be incomplete and measured on a short temporal scale that did not take into account relevant factors. For instance, many participants stated it was cheaper to drive into the city with a car than public transport citing that parking fees were cheaper than paying for the cost of public transportation tickets for the whole family; this ignores the thousands of Euros that go into sunken and operational costs of a car over its lifetime.

These results provide a lot of insight for the main areas that can be targeted by the Rotterdam municipality in order to increase cycling ridership.

11.4.3 Additional Programs in Rotterdam South

In addition to the focus group work, there are many programs being implemented in the city of Rotterdam with the goal to shed more light on the benefits of cycling and to promote it as an effective transport option.

The 'Fietsen op Zuid' ('Cycling in the South') program was initiated in March 2016 by DRIFT and the Dutch Cyclist Union, funded by and in collaboration with the municipality of Rotterdam. The program aims to promote cycling as a means for social-economic development of Rotterdam South. Through projects and experiments, four aspects for successful promotion of biking are addressed: lifestyle; education; access to bikes; infrastructure and public space.

Since the start of the program, the team has developed and implemented projects such as a pilot project promoting bike-friendly schools (an intensive approach at two schools, including cycling lessons, distribution of bikes to kids from poor families and redesign of the school yard and public space together with the children), a give-a-bike scheme for children (400 bikes collected, refurbished and redistributed in 2017; aiming to scale up in 2018 through a network of local bike-workshops), and a neighbourhood-based approach (introducing a local shared bike system, combined with cycling lessons and other activities).

A clear lesson from the Fietsen op Zuid program is the importance of focussing on the social and economic benefits of cycling to involve a broad range of actors in the promotion of cycling. Many actors and projects have ambitions for which biking could be (a part of) a solution, whether it is entrepreneurs, citizens, activists, housing corporations, NGOs, public entities or companies. Cities fail to tap into this potential, as often the promotion of biking is treated quite narrowly as a strategy of mobility planning, or even as goal on its own, and not seen as part of larger agendas regarding health, economy, spatial planning, etc.

Thanks to the approach followed in Rotterdam, all kinds of organizations are becoming involved in the promotion of cycling at the local level. These include the public health department of the municipality, schools, a mosque, an organisation for empowerment of women, local media and store-owners. Together, they are able to put significant resources and effort in the cycling project, and are managing to reach a wider audience. In addition, they are helping to shape the projects in such a way that it fits to the needs and perspectives of the target groups.

The case of Rotterdam includes another lesson. In The Netherlands cycling seems to be so engrained in daily life that many of the politicians, policy makers, and cycling advocates take the benefits for granted and tend to forget that, for large groups in our society, cycling is not part of their daily practice. This is a more general observation in cities around the world: cycling policies, initiatives, and advocacy often fail to reach low-income neighbourhoods and ethnically diverse communities.

11.5 Conclusions

Transport poverty limits one's ability to access and benefit from all of "life's chances" putting them at a disadvantage. Cycling offers a reasonable method for transitioning away from this trend and level the playing field by addressing social and transport inequalities. Cycling is a method of transport that can be effective in the context of urban communities where the majority of trips are shorter and take place in dense areas where space is limited. A cycling dominated

transport system can help people reach more opportunities and save money, creating a more healthy and inclusive society, all the while still getting people to where they need to go.

It is important to remember that cycling might not be the answer for all cities in addressing transport poverty, as solutions need to be developed according to the local context in which transport poverty exists. However, a transition toward cycling is arguably one of the most effective, as it directly counteracts one of the main roots of transport inequalities: hyper-mobility. This paper shows there is theoretical support to this transition, provides insights into the barriers remaining, and shows examples of current cycling-oriented programs yielding positive results. It is of course remarkable that motorized transport exists, as we can remain interconnected to everyone around us and all over the world. However, it is important to consider the true need for these technologies in certain contexts. In urban areas where space is limited, the many negative side effects of hyper-mobility result in transport inequalities and socio-economic barriers to those that are unable to participate in these expensive and sometimes confusing transport systems.

The example from Rotterdam emphasises cities should do more about making cycling policies, measures, and initiatives inclusive and equitable, and to focus on getting underserved groups involved in order to do so. Only in this way, can low-income neighbourhoods benefit from these efforts as well.

11.6 References

- Buehler, T. & Handy, S. (2007). Fifty years of bicycle policy in Davis. Paper accepted for presentation at the 2008 Annual meeting of the Transportation Research Board. Washington DC.
- City of Rotterdam (2016). Omnibusenquête Rotterdammers over het verkeer 2016. Gemeente Rotterdam.
- Garrard, J., Rissel, C., & Bauman, A. (2012). Health benefits of cycling, in *City Cycling*. Edited by Pucher, J. & Buehler, R. Cambridge, MA. MIT Press. p.31-55
- Geile, M. (2017). Cycling as a viable way to address transport poverty. MSc thesis. [Online]. Available at: www.fietsenopzuid.nl/onderzoek [last accessed 8 June 2017].
- Lucas, K. (2012). Transport and social exclusion: Where are we now? *Transport Policy*, 20, 105-113.
- Lucas, K., Mattioli, G. Verlinghieri, E. and Guzman, A. (2016). Transport and its Adverse Social Consequences. *Proceedings of the Institution of Civil Engineers - Transport*, 169 (6). 353-365.
- Peñalosa, E. (2010). How to turn an urban nightmare into a fairer society, chapter 3, *The Forum*, BBC World Service, April 4, 2010
- Tranter, P. 2012. Effective Speed: Cycling Because It's "Faster", in *City Cycling*. Edited by Pucher, J. & Buehler, R. Cambridge, MA. MIT Press. p.57-74