



Scientists for cycling

Book of Abstracts

Scientific Sessions at Velo-City Access to Life

Rio de Janeiro – June 12-15, 2018



UNIVERSIDADE FEDERAL
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LABMOB
Laboratório de Mobilidade Sustentável



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Preface

The Scientists for Cycling network, launched at the Velo-city Global 2010 conference in Copenhagen, arises from the recognition that there is a large number of experts worldwide in many different academic disciplines who are able and ready to contribute to ECF's mission: to improve and to increase cycling.

Research, research plans and scientific-based publications on cycling or cycling-related matters are often not sufficiently connected to (the networks of) other scientists, to professionals and to volunteers who work on cycling. The Scientists for Cycling network is designed to bridge this gap.

For the first time in the global south, the Scientists for Cycling 2018 took place in Rio de Janeiro from 12 to 15 June 2018 during the Velo-city Access to Life, in partnership with the Federal University of Rio de Janeiro (UFRJ).

High quality research contributions from all fields of study and disciplinary backgrounds that are relevant were selected to participate in the following theme tracks: *A Lively Economy*; *Happiness and Quality of Life*; *Integrating Life and Transport*; and *Learn to Live*.

This book of abstracts reunites all the works that were presented and discussed during the event. We kindly thank everyone who participated as speakers and listeners. Your contribution has been extremely inspiring for the promotion of bike-friendly cities at their different interfaces.

The Scientific Programme Committee

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Session: A Lively Economy

Which cycling infrastructure do you prefer? A multidimensional typology of German cyclists

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Abstract: Bicycle infrastructure planning requires reliable data. For motorized traffic a variety of data is available in German cities to enable goal-oriented traffic planning. For cycling on the other hand only limited data in the form of few punctual counts is available. The data collection takes place either through permanent counting devices or manual counts. The permanent counting devices enable continuous data supply and analysis of the main network but are not distributed enough around the cities to enable conclusions for the sub network. One solution for this problem could lay within GPS-data generated by the riders themselves, e.g. using smartphone applications like Strava or BikeCitizens. Previous studies on GPS-data yielded promising results on the network coverage and velocity of recorded routes. The interpretation of aggregated GPS-data however poses a new problem as conclusions on individual users cannot be drawn for privacy reasons. To tackle this problem knowledge about traffic behavior of different groups of cyclists is necessary.

The existing typologies of cyclist behavior are however insufficient as they usually only concentrate on one or two factors such as the skill level (Wilkinson et al, 1994), the biography (Jones, Chatterjee, & Gray, 2014), the frequency of cycling (Larsen & El-Geneidy, 2011), every day and leisure cyclists (Reiche, Froitzheim & Fahrrad-Club, 1998) or the self-perception of the cyclists (Geller, 2006). Another more complex typology by Damant-Sirois (2014) includes more criteria but the sportive aspect of cycling is missing here. Overall, the existing typologies are differing in their content and cannot easily be integrated into a single model. Also, a theoretical basis is usually missing. In most cases, empirical

data was collected but categories were built based on qualitative aspects and not statistical methods. This research gap is addressed in the following study. A comprehensive questionnaire based on an analysis of all major studies in this field as well as literature research was set up. The influence of individual, route and environmental factors on cycling behavior, as well as instrumental, symbolic and affective motives is also examined, and infrastructural preferences are recorded.

The results of a nation-wide online-survey, conducted in December 2017, are presented (n = 10,500 participants). The general research question is: Which types of cyclists exist and how can they be described? The survey participants include employed persons (76%), students and trainees (14%) and pensioners (5%) of different gender (40% female, 60% male), age (M = 40.8) and income (average income between 2,000 and 3,000 Euro). Many of the participants are cycling regularly with 55% who cycle almost daily, but also 20% who walk, 10% use public transport and another 10% use a private motor vehicle almost daily.

The online-survey serves as the basis for an empirically and scientifically derived multidimensional typology of cyclists. The cyclists are grouped with factor and cluster analyses, the socio-economic factors and cyclist's socialization are analyzed, and infrastructural preferences of the groups based on the stated preferences of the individuals will be derived. These user-typologies based on the stated behavior could help in the interpretation of GPS-data in the future, even without exact knowledge of the user group that the GPS-data is based on, as the infrastructural preferences of different groups are now

comparable. This enables a better design of the cities' cycling infrastructure for the needs of different groups. Also, the analysis of different socio-economical groups will yield information on preferences of these groups, which result in policy recommendations for bicycle traffic planning. This knowledge can be used in the communal traffic planning for the choice of guidance for the bicycle traffic or the handling of sections with high-risks for accidents. The results can also be

included in transport policies and be the basis of new route choice models in bicycle traffic.

Acknowledgements

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Cycle path in Pinheiros, São Paulo: impact study on the local economic vitality

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Abstract: The development of studies that value the economic impact of active transportation is essential to increase the political will to invest in pedestrian and cyclist infrastructures. In Brazil, these studies are still incipient. However, in the international context, there are articles and reports that show benefits of improved walkability and bikeability in local economic vitality. This study aims to analyze the impact of the implementation of a cycle connection in Pinheiros neighborhood, in São Paulo, on the local economic vitality.

The cycle path will be implemented on a street with mixed-use, residential and commercial, with local shops on the ground floor, interacting directly with the pedestrians and cyclists. This local environment creates an opportunity to study the impact of the intervention on the local economic vitality. The concept of the economic vitality of an urban environment relates to the economic well-being of a community. Economic vitality is a process that generates a

healthy economy with a quality of life for its inhabitants, offering jobs opportunities and lively environments.

The impact study uses as a method of observational study called PSM (Propensity Score Matching) that seeks to estimate the effects of an intervention by comparing non-randomized groups, called treatment and control, where the first refers to the one who receives the intervention and the second refers to the group that is not changed. The study is divided into two phases, one before – for the baselines – and one after. The second phase will collect data during the first five years after the construction of the cycle path to follow the impact on the area.

The first phase of the study was concluded in November 2017. The data was collected for the baselines of the impact study through surveys and forms applied in the period of one week. The survey was applied to local visitors, drivers, clients, and merchants. Detailed information of the built environment was also collected to correlate the perceptions and habits of the visitors with the quality of the local urban design.

Analysis of cycling potential in small and medium-sized Brazilian cities

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Abstract: The Brazilian cities, particularly the large ones, present growth dynamics characterized by the urban sprawl provoked by several factors, including the adoption of motorized individual transport as the predominant solution of urban mobility. This phenomenon brings exponential increase in the traffic volume on the roads which, in turn, requires more space for movement, stopping and parking, resulting in urbanism geared towards vehicles, not people. One of the consequences is the inhibition of the active transport modalities, mainly the bicycle, that has its use reduced due to the difficulties of the displacements and insecurity in the traffic.

Although cycling is framed in the guideline of the National Policy on Urban Mobility (Law 12587/2012), which establishes the prioritization of active modes over individual motorized vehicles, bicycle travel represents only 4% of the country's modal distribution. Most of these users are in small and medium cities (between 5% and 14% of the modal matrix) and drastically reduces in large cities (between 1% and 3% of the modal matrix) (ANTP, 2016). While in large cities and metropolitan regions, urban growth oriented to individual motorized transportation is strongly established, medium cities are still in the process of transition, reducing the use of the bicycle as they follow this trend in their development process.

Due to its demographic characteristics, with smaller urban territorial extensions and relatively compact in terms of density, the possibilities of intervention in the development

process in small and medium-sized cities are characterized by not yet so complex proportions, seeking to avoid the disorderly growth to improve the transportation systems efficiency (GIZ, 2014). Investing in sustainable urban mobility in the medium-sized cities is also an opportunity to contribute to the regional deconcentration of Brazil, providing a better distribution of the population in the urban system to the detriment of the metropolises (STAMM et al., 2013), since the medium-sized cities constitute most of the Brazilian territory and shelter more than 70% of the country's population (IBGE, 2014).

While a part of these municipalities has satisfactory human development indexes, with a good supply of public services, infrastructure, and attractive job opportunities, to the detriment of others that do not reach satisfactory criteria of services delivered to the population, it is inherent in the countryside cities the quality of life provided when compared to large metropolises. Despite this characteristic, in general, these municipalities have limitations of resources, both financial and human to plead improvements in their transport systems, mostly because this type of intervention requires high and complex investments in both the implementation and the operation. Another fact is that compared proportionately, the automobile-oriented development model is predominant in all Brazilian cities, where investments in infrastructure for individual motorized transport are much higher than in collective and active transport. In this respect, it should be emphasized that investments in active transport, besides requiring fewer resources, the maintenance of the

system is more feasible, from short to long-term, for those municipalities, which can have significant impact on the improvement of urban mobility.

This study aims to investigate the potentialities that contribute to the utilitarian cycling incentive in small and medium-sized Brazilian cities since they concentrate the largest parcel of cycling in the country's modal matrix and they are vulnerable to the threats of disorderly growth which are characterized by the metropolises. It is believed that the exploration of potential keys to reinforce and increase the bicycle use contributes to the containment of the urban sprawl towards the more compact and people-oriented urban development.

A cycling network adopted as a structuring system of urban mobility favored by fundamental characteristics of prioritization in circulation (as well as walking), and integration with public transport, connecting neighborhoods and centralities, enables a city's transport system to absorb with greater resilience the short, medium and even long distances.

Considering that the bicycle has a high yield on trips of up to 5 kilometers (ITDP, 2017), it is possible to establish the efficiency of this mode in urban perimeters up to 10 kilometers in diameter. This spatial range possibly covers almost all the small and medium-sized Brazilian municipalities, denoting to the high investment feasibility in this type of sustainable transport.

To ratify the hypothesis, these concepts were analyzed under the reality of two medium-sized Brazilian cities with distinct urban expansion characteristics: Uberlandia, in the western part of Minas Gerais' state, and Cabo Frio, on the east coast of the state of Rio de Janeiro. The first, driven by the strong agricultural, industrial and logistic economy, has a population of approximately 670 thousand inhabitants, a territorial extension of 4115.21 km² and a demographic density of 146.78 inhabitants/km². The second, driven by the real estate speculation and seasonal tourist industry, has a population of approximately 200 inhabitants, a territorial extension of 410.42 km² and demographic density of 453.75 inhabitants/km² (IBGE, 2017).

Urban Cycling as an Energy Efficiency Policy for Transportation

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Abstract: Urban mobility and energy problems are a combinatory of civic challenges that are wicked and difficult to tame. Besides its contradictory perspectives, governments, citizens and companies should work integrated to find suitable solutions to those challenges. The current transport matrix, which is car-centered and highly dependent on fossil fuels, is unsustainable for such an expansion and imposes an environmental threat. In this context, several automakers responded by launching battery-powered electric vehicles (EVs), and so, most of the corporate efforts have been concentrated towards the improvement of new electrical vehicles. This article, however, presents a different approach, by increasing non-motorized.

This paper aims to discuss trends regarding energy consumption in passenger transport in Brazil, to analyze the potential of urban cycling as an energy efficiency strategy and to simulate scenarios for its implementation. As a developing country, Brazil's transport demand is expected to increase significantly, but the country has set a challenging goal of 37% GHG emissions reductions compared to 2005. Transport is responsible for 46% of GHG emissions of the Energy Sector, and within passenger transport, light duty vehicles account for 77% of emissions (Arioli, 2017), even though the motorization rates are still low compared to developed countries.

In 2012, Brazilian Urban Mobility National Policy (PNMU – Política Nacional de Mobilidade Urbana) was created, and one of its principles was the priority of non-motorized transport over motorized transport. It also enforces the design of a municipal Urban Mobility Plan for most cities, which was considered a big step towards a more efficient transport

design. Although walking is the most common means of transport, accounting for 36% of trips, only 4% of the trips are made by bicycle (SIMU & ANTP 2016). A study in São Paulo, the biggest Brazilian city, shows that 50% of the motorized trips have a total distance of 5km or less, and 26% distances of less than 2km (Metrô 2012), which indicate potential shifts from motorized modes to cycling.

Besides, McKinsey (2009) segmented consumers based on four “driving missions”. While the consulting firm identified consumers in the “driving around town” as target to EVs, this article claims that, in developing economies, such as Brazil, where the cost of EV is still too high, this consumer may adopt non-motorized transport.

For the analysis of energetic impacts of these sustainable shifts, the Global Transportation Roadmap model (GTRM) is applied. It consists in an Excelbased tool designed by the International Council on Clean Transportation (ICCT) to assess emissions and energy-efficiency implications of different policies and scenarios. The ICCT provides the model with its Base Case, with options for stablishing alternative scenarios. By creating assumptions of modal shifts from motorized transport to bicycle, it is possible to examine and discuss variables such as energy demanded and GHG emissions from 2020 to 2050.

In conclusion, when a significant proportion of trips shifts to bicycle, it is possible to notice a softer growth curve both in Energy and carbon emissions. The political incentives for these shifts may be further discussed, since Urban Cycling still has many cultural and infrastructural obstacles to overcome to become a more popular means of transport.

Corporate Sustainable Mobility: Impacts on the energy, health and economy

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Abstract: Currently, studies and practices of Corporate Mobility are strategic for companies, and it is extremely important to reflect on the workforce displacements in an environmentally appropriate, socially responsible and economically viable way. Corporate Mobility can contribute to support more sustainable and efficient commuting habits. Consequently, it also measures the impacts on energy consumption, health and the economy from the way the workforce moves.

However, in the Brazilian context, there are many challenges that still need to be addressed in favor of better mobility. The lack of more effective public policies for modal integration, as well as urban design and the provision of public transport services, are factors that impact the workforce daily, and consequently in the environment in which it is inserted.

Considering the workforce as the subject of this research, this project has two main objectives: (1) to diagnose patterns of displacement of the workforce and the impacts on energy consumption, health and the economy; and (2) to develop a Sustainable Corporate Mobility Plan based on the impacts of workforce displacement patterns on energy, health and economic consumption and in line with the company to be studied.

Commonly associated with leisure and sports practices, the active mobility has been politically supported in commuting as a means of locomotion. Published in 2012, the Brazilian National Urban Mobility Policy guidelines attest that bicycles and walking are legitimate modes of urban transport, as are

sidewalks, bicycle paths and parking lots – such as bicycle racks – are considered as fundamental infrastructures for compliance with the principle of universal accessibility guaranteed by law.

Several studies show that the provision of infrastructure is an incentive factor for active mobility. However, the challenges are still many. The lack of more effective policies to integrate active mobility with other modalities, urban design and the built environment profile impacts directly on whom depends on or wants to join this modality.

The methodology of the work involved the application of questionnaire and use of secondary data to identify habits and patterns of the workforce commuting, socioeconomic profile, level of satisfaction and impacts on the economy, productivity, health, and well-being. In the second stage, it was carried out a fieldwork is through an unsystematic observation and use of secondary data to feature the built environment. In the third stage, interview and documentary research was applied to indicate the relevant stakeholders to the theme “mobility” in the territorial section studied.

The preliminary results indicate that the urban design profile has a preponderant correlation in the impacts on the energy, health and economy. For this reason, promoting cycling and walking through a Sustainable Mobility Corporate Plan may be of great relevance for a better workforce’s economic performance and the company’s social responsibility indicators.

Efficient bamboo bicycle

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Abstract: This article aims to discuss the use of bikes as a means of transport that is widely known as efficient and ecologic, but whose making uses production practices from the traditional industry. The focus of this analysis is centered on the bamboo potential as a substitute for traditional materials, and the theoretical bases of the research are the works, thoughts and methods of two experts on this theme: José Luiz Ripper¹ and Klaus Volkman². Ripper defends a rather holistic approach of the use of bamboo, while Klaus, on the other hand, accepts a direct comparison between his method and the industrial production of bikes. Klaus has incorporated bamboo parts as replacements of traditional bicycle parts, and so he deals with all the advantages and difficulties that this action implies in the manufacturing process of this kind of bike.

The term efficiency is widely used in contemporary societies³. It is broadly used in business, usually related to meritocracy, and even in the academy, linked to themes such as climate changes and energy conservation. There is no doubt that the word has become a [cultural] common thread in Western culture⁴, whose interpretation simultaneously restricts some aspects and privileges others: time and speed, for instance.

But the term efficiency is not restricted to performing some action in the shortest time and at the highest speed possible, and if it were, it should not have as much weight in our decisions, since frequently allocating more time to do something and consequently being slower, can result in more efficient achievements. Along all the human history⁵, humanity was defined by movement⁶ (Mumford 1968); we are social beings of high energy efficiency⁷, and we are always in movement, most of the time slowly, but always in movement.

Movement is life itself; if you talk to a geologist, he can tell you about the importance of magmatic and tectonic movements for the life on Earth. But every movement as a rhythm; a rhythm that is nothing less than suitable for each cause or effect, which is particularly true for the biological rhythms, although we are presumably not paying the due respect for those kinds of rhythms⁸.

It is not by chance that bicycle is demonstrably one of the most efficient means of transport, in the broadest sense. It provides a highly efficient way of traveling and does not violate the biologic rhythm (Illich, 2005). Considering the relation between spent energy versus weight of the transported cargo, it loses only for shipping and for some kinds of air transport, like the airships. It would not be an exaggeration to say that it implies a symbiosis between an energetically efficient organism and a mechanical structure that is appropriated as a sort of endoskeleton, mimicking the very organic structure of the human being.

Under this symbiotic perspective, we can say that there are materials that are adequate, considering the several meanings of the term efficiency. In general, most of the raw materials used in the production of bicycles are of mineral origin, either in the metallic parts or in the rubber or plastic parts, that are derived from petroleum.

Environmental degradation in mining processes is widely known. Its harmful effects, although, are still considered negligible in face of the benefits that this kind of practice brings for the society. It is true that the world as we know would not exist today without mining, that is certainly an essential activity for the society in which we live. But we can think of alternatives to make this practice more rational,

specially by the replacement of mineral materials by similar ones, that presents less impact and higher efficiency.

Although they are not vehicles of great proportions, bicycles can have a variety of components of considerable complexity. This is because they are usually produced for very specific purposes, that range from matter-of-fact activities to sports competitions where the lightness of components greatly improves the performance of the equipment. But, as we said before, efficiency is not necessarily a synonym of shorter time and higher speed. It can also mean greater comfort, less environmental impact, increased access to productive practices (workmanship), and the presence of pieces that could be easily replaced by non-mineral components. The frame of a bicycle is usually responsible for a third of the value of the vehicle, including all the other parts that compose it, and this price varies according to the purpose aimed and the quality of the bike. Replacing the traditional frame with a bamboo frame means reducing the environmental impact of a bicycle by a third or more. But what about the other properties of bamboo: which efficiency criteria could, or should we use to measure them? According to an article by Laura McCamy (McCamy, 2015), using bamboo could result in a negative impact. In this article, we are going to present some reflexions on those questions.

¹ Ripper is a researcher emeritus at PUC Rio de Janeiro. He has a wide experience and a critical knowledge of the uses of bamboo. He currently advocates the similarity of bamboo to human bone, and defends its use in the manufacture of bicycles, although in different situations as those in which metallic materials are traditionally used.

² Klaus makes bamboo bicycles for more than a decade, and his vehicles are used by travelers around the world, such as Ricardo Martins, from Rio de Janeiro. He has achieved significant success with the intensive use of bamboo in replacement of metal parts, notably frames, forks, handlebars, and spokes. Currently, he studies bamboo lamination techniques, including the use of this material in sensitive parts of bicycles, such as rims and cranks.

³ Specially in the West.

⁴ The use of the term is reasonably appropriate in broader social groups, but it is always necessary to observe this use in different places of speech.

⁵ And, in the vast prehistoric period.

⁶ The life in the cities is quite recent, when compared with the biological age of mankind.

⁷ Today we know, for example, that from an energy point of view, the human body is one of the most efficient living organisms. Along the evolutionary process, although, we become fragile in terms of physical strength and strife for life. We do not have a shell like a tortoise, and the density and strength of our heads resemble watermelons, even with external bony structures protecting the brain. However, we became extremely efficient in the control and domination of other species, and there is no doubt that social interaction is one of the keys to understand this success.

⁸ Evidence of this aspect are blatant; they are, for instance, in high-performance sports, that prioritize the shortest time and the highest speed, even if the cost is causing serious damages to athlete's body. They are also in the need for traveling at high speed, which requires protection shells or exoskeletons, fairings, bodyworks, helmets.

The study of the bicycle economy in Brazil: dimensions and methodological propositions

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Abstract: Considering the growing demand for information on the bicycle market and the associate benefits for society, this work aimed to map and monetize the bicycle economy in Brazil, constituting an unprecedented study within this field of studies. To this end, we designate bicycle economy as a systemic economic complex. We consulted about 20 bibliographical references related to the discussion of what would be the bicycle economy and its representations. Among reports, dossiers and studies in general, such as the "The EU Cycling Economy" (2016), by European Cyclist's Federation, "O uso de bicicletas no Brasil: qual o melhor modelo de incentivos?" (2015), by Rosenberg Associados, and "Economic Impact of Bicycling and Walking in Vermont" (2012), by VTransport-Vermont Agency of Transportation, we sought to consider the definitions and concepts. Next, we list a set of indicators translated into a methodology for collecting, systematizing and analyzing the data collected. Finally, the analysis was developed from the conception of five analytical dimensions through which the Bicycle Economy was associated with (Productive Chain, Public Policies, Transportation, Related Activities, and Benefits) and distributed in 22 themes associated to each of these groups.

Among other findings, the Productive Chain dimension revealed that Brazil produced more than 5 million bicycles in 2005 according to the Brazilian Institute of Geography and Statistics. By the way, there is low expressiveness regarding national bicycle exports. Regarding the foreign trade of bicycles, we evidenced a low economic dynamism as well as regarding exports. This finding indicates that most of the

bicycles circulating in Brazil are assembled in the country itself. Therefore, domestic demands seem to be the main driver of the Brazilian Bicycle Economy and reflected by the production data, which has grown in recent years. The Public Policies dimension indicated the economic participation of the bicycle in the public sphere, both directly and indirectly. It was estimated that the public authority invested

US\$ 380.331.000 for the implementation of 3,008.5 km of cycle routes in the 27 capitals, with emphasis on São Paulo and Rio de Janeiro, which together represent 45% of the total invested in Brazil.

The Transport dimension evaluated the participation of the bicycle from the way it is used in the domestic sphere (Personal Use) and in the commercial sphere. We carried out a case study interviewing five families that declared to be bike users themselves in the Rio's metropolitan area, pointing out that this mode of transportation may generate an economy of approximately US\$ 20,272.00 per year in the household budget. The commercial sphere showed that the use of the bicycle presents numbers in the range of U\$ 3 million in revenues for a specialized bicycle courier company and a 16.3% share in deliveries in the commercial area of Bom Retiro neighborhood, in the city of São Paulo.

In the Related Activities dimension, it was verified that in 2016 there were 55 organizations and groups working in favor of bicycle mobility in Brazil, receiving value around US\$ 1,648 million in revenues from public and private financing programs. In the scientific field, between 2007 and 2017, 124

research projects were surveyed with the theme "bicycle", involving 270 researchers and US\$ 117,287.000 in financing. In the Benefits dimension, we realized that the use of the bicycle could avoid a total emission rate of 1,879,488 tons of CO₂ for private cars and 17,364,672 for buses of the Diesel fleet per year.

Respectively, these values correspond to 0.08 and 0.76% of the 2,278 billion gross tons emitted in total by Brazil and were contextualized in the Climate and Energy theme. In Health, we resorted to a brief bibliographical review to indicate the

impacts of the use of the bicycle in the improvement of the national public health.

Overall, the results showed the challenge of identifying points that are both objective and at the same time versatile of the economic complex of the bicycle. In many cases, it was difficult to monetize the economy given the lack of institutional data to support our calculations and even lack of data on the economic bicycle informality in Brazil. In this sense, this work presents a very objective picture of the data that exist about the bicycle, but little speculative about the blind fields still existing.

The challenge of measuring the social impact of the bicycle in São Paulo, Brazil

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Abstract: Recently, we have seen in Brazil an important increase of interest about the theme of bicycle's impact. The studies are usually very specific and localized in certain places or regions of the cities. Though they are crucial to understand the bicycle use in cities, they don't allow us to understand the impact of bicycle use in the city. Therefore, to measure the impact of bicycle in Brazilian context is such a challenge, since there's few data available that can be used as a starting point.

Brazilian Center of Analysis and Planning (CEBRAP) conducted a study that aimed to understand the impacts of bicycle use in three different areas: Environment, Health and Economy. The data collected is based on a random household survey of 1,100 interviews. This sample was split in two groups: i) a group with statistical representation of general population of the city. ii) a control group of bicycle users. The samples were designed based on Pnad 2013 (national household survey sample) and Origin-destination research 2007 (São Paulo metropolitan region transportation research).

We considered cyclist, those people who had done at least 1 travel with bike, for any purpose, on the last week-day before the research. We capture the cyclist's information applying their interviews in the same places raffled to the São Paulo's population sample. Then, it was interviewed cyclists that live both in the outskirts (poorest areas) and the expanded center of the town (richest area), assuring the diversification in terms of social class.

We investigated two dimensions of the impact of bicycle use in the city. One is the individual dimension, so as the observed impacts on individual's living conditions, health conditions, life experience with the city, wellbeing and economic life. The other is the social dimension, that is, the impacts on macro social dynamics, such as environmental impacts, impacts on health and economic systems.

On the health issue, we compared physical exercises profile between cyclists and São Paulo population. We estimate that R\$ 34 (9,3 million USD) could be saved by SUS (Brazilian health care public system) in the city if more people cycled in their daily trips to work or school, growing then the patterns of physical exercise.

On the environment issue, this work looks at individual relation with city of both cyclists and São Paulo population. We found that 18% of all CO₂ emitted by travels could be saved if part of population changed from their usually means of transportation to bicycle. On the other hand, we estimate that if the actual cyclists (1,2% of population) used the same pattern of means of transportation as the São Paulo population, the emission could be up to 3% higher. On the economy issue, we calculated the individual expenditures with transportation. Then, besides making a comparison between groups (cyclists and São Paulo population), we projected how much money some groups of people in São Paulo could save if they cycled in their daily transportation. We tried to find how much disposable income could grow in these groups.

For social impacts in economy, we admitted as true a postulation from transport economy which sets that as faster are travels to work, as higher is be the productivity. Then, the gross income is impacted by the time people waste in traffic jams. Thus, we estimate how much the municipal gross income could grow, taking account trips that could be faster if were made by bicycle. This study is far from analyzes all possibilities of the impacts of bicycle use in São Paulo or any other city. We have a lot of questions inside these 3 areas (Environment, Health and Economy) with no answer. We faced a lack of methodology to estimate some crucial bicycle impacts. For instance, how to measure the impact of bicycle use on the respiratory diseases in Health. In Economy, we couldn't find a methodology or model that allowed us to

calculate how much GDP could be higher if people don't spend money with transport and apply this money in services and consumption. In Environment, we couldn't find strong methodology that helps us to calculate how much bicycle use can contribute to decrease the rates of public space occupied by privet vehicles.

With the study we intended to show how bicycles can be impact factor in a language that public and privet stakeholders understand (GDP, diseases and CO₂ emission, etc.). With the discussions in Velo-City, we hope to get new ideas to amplify the possibilities of measurement, as well as to improve our own methods.

Session: Happiness and Quality of Life

Urban health and cyclist safety: what can we learn from traffic accidents and cyclist injuries in Chile?

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Abstract: Road traffic injuries in the Region of the Americas kill 154,089 people yearly. Over half of the road traffic deaths occur among pedestrians, motorcyclists and bicyclists. In Chile, bicyclist injuries and deaths and their causes have not been documented. This study documented the severity of bicyclist injuries and examined the factors associated with injury severity in incidents between motorists and bicyclists. Data from the 2016 traffic accident database of the Government of Chile's Ministry of Transport and Telecommunications were analyzed using multilevel mixed-effects modeling. The database captured 4093 incidents between motorists and bicyclists. Most of these occurred in urban zones, on well-maintained roads, in dry road conditions, on sunny days, and with male bicyclists aged 18-34 years. One fourth (25.1%) of incidents resulted in severe injury or death to a bicyclist. The reported causes were motorist imprudence (50.4%), disobedience of traffic orders (11.1%), driving drunk (4.7%) and loss of vehicle control (3.4%). Incidents caused by drunk driving resulted in more severe injuries than those caused by motorist imprudence ($p=0.046$). Crashes ($OR=9.2$), collisions ($OR=16.7$), and a vehicle overturning and striking a bicycle ($OR=27.1$) were associated with the most severe outcomes ($p<0.001$). Compared with bicyclists aged 18-34 years, bicyclists aged <18 years had more severe incidents ($p=0.006$) and bicyclists aged 35-44 years had less severe incidents ($p=0.034$). These findings provide a better understanding of the factors associated with the severity of cyclists' injuries. This information can guide priorities in road safety efforts in Chile.

Bicycle culture in small Brazilian cities

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Abstract: Brazil has 5570 cities and only 310 of them with more than 100 thousand inhabitants. That is, 5260 Brazilian municipalities - or 94.4% - have less than 100,000 inhabitants, considered by the Instituto Brasileiro de Geografia e Estatística (IBGE) as "small-sized" municipalities. Cities with less than 20 thousand inhabitants still represent 68% of all Brazilian municipalities.

Despite many municipalities considered small, demographic data and indicators indicate a reality that divides the country: 56.5% of the Brazilian population lives in cities with more than 100 thousand inhabitants, while 43.5% of the population live in small-sized cities.

Although large and medium-sized cities have the highest growth rates – large cities have growth rates two and a half times the size of small cities – life in small cities pulsates and cannot be disregarded, especially for a deeper understanding of active mobility in Brazil. Small cities, compared to medium and large-sized cities, have advantages and strengths in practically all the indicators studied.

Still motorization in Brazil is increasing year by year, especially motorcycles, scooters and mopeds – a process that have been more intense in small cities and outside the metropolitan regions, which registered more than 70% of all Brazilian motorcycles between 2001 and 2014 –, bicycle culture as a mean of transportation resists and survives with intensity in Brazilian small cities, be it in the rural or in the urban environment.

This exploratory research presents comparative aspects of 11 small Brazilian cities from all regions of the country, different biomes and distinct federation units (states). The selection included both remote and neighboring metropolitan areas

cities. The studied cities are Afuá (PA), Antonina (PR), Cáceres (MT), Gurupi (TO), Ilha Solteira (SP), Mambai (GO), Pedro Leopoldo (MG), Pomerode RJ), Tamandaré (PE) and Tarauacá (AC).

While circulation of motorized vehicles is banned in Afuá (PA) by local government, more than 50% of the daily trips made in Cáceres (MT) are made by motorcycles and scooters. While Gurupi (TO) has only 7% of bicycle trips (modal share), bicycles in Tarauacá overcome 70% of all trips.

In addition to the data collected, the study seeks to deepen answers to some of the big questions regarding active mobility in Brazilian cities: Who are the cyclists who keep bicycle culture alive in small cities? What are the impacts of the increasing motorization for the population of these cities and for the culture of cycling and the active mobility itself? What are the characteristics of these cities that make them examples of resilience for active mobility? The selection process involved collecting hundreds of indications by Brazilian researchers and activists, filtering and gathering the results, contacts with the cities and, finally, the final selection according to the sample variance and the quality based on the replies by the City Hall of each place. More than a dozen researchers from all regions were involved in the research in loco.

The methodology was structured to include: a diagnosis of the mobility of each city – with primary and secondary data, socioeconomic data and characterization of the city; cyclists profile survey; vehicular counting and characterization of cyclists; interviews with characters and participant observation. The results of this exploratory research – unpublished and exclusive –, compose a framework of data



and fundamental indicators to understand in some depth the bicycle culture in Brazil beyond the great urban centers. This is expected to broaden and diversify the knowledge about the bicycle as a mean of transportation, to contribute with arguments for its adoption by all Brazilian municipalities and alerting to the accelerated and deep changes that Brazilian cities are going through increasing motorization.

This research, still unpublished, will be edited in a book and its launch is scheduled to take place next to Velo-City Rio conference. The research was coordinated by the researchers Daniel Guth and André Soares, representing a coalition of four national organizations: Associação Brasileira do Setor de Bicletas (Aliança Bike), União de Ciclistas do Brasil (UCB), Bike Anjo and Associação Bicicleta para Todos.

Cultural landscapes of the bicycle: a study on the cycling infrastructure of Ilha do Governador, Rio de Janeiro

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Abstract: The urban mobility issue, mainly on larger urban centers, has become one of the greatest challenges of our time. Among all research possibilities, bike mobility is for sure a field where increasing extension and investigation of potentialities is needed. The search for a connected and efficient city model but aware of environmental issues put the bike in a very important role in the modern urban planning of many cities around the globe.

However, the trivialization of this speech may ignore the fact that bike mobility is the result of a complex process in which many institutions, infrastructures, learnings and urban competencies are involved. The risk of neglecting these aspects is implementing public politics dis-connected with the daily needs of people, exactly how it's observed on the cycling planning developed in Rio de Janeiro.

The Government's speech about "sustainable mobility" shows the quantitative number in kilometers of cycling infrastructures built as an example of bike mobility improvement. However, it brings solutions that many times aren't related to the landscape where they are, ignoring the sociocultural and environmental diversity. This puts at risk the safety of those who use bikes in the city. The reality seen in Rio de Janeiro demonstrates the incipience of public policies

for the effective utilization of bikes in a country ruled by road transports.

Despite the uncountable obstacles faced by its use, cycling affirms its presence on the city routine, bringing light to the need of new measures and policies to its insertion on the environment in an efficient way. The traditional models of planning, of technical normative character, are inefficient on this scale since they ignore the non-motorized user and his right to the public space.

Most recent actions are emphasizing the participative planning and management share of the space, just like the project developed for the cycling routes from Centro and Tijuca neighborhoods. Other projects, like the Maré's cycling route and the cycling route of Ilha do Governador, were only implemented by popular appeal from part of the society. These projects aim to put the people that use those spaces as the central object for the validation of the route to be implemented. However, changing on the original projects or decreasing it collaborates to the problems found on the routes.

Here is presented part of the research developed to analyze the cultural aspects of biking in Rio de Janeiro, observing its many appropriations functions and relationships with the surroundings.

Session: Integrating Life and Transport

Methodology proposal for analysis of the use of bicycles in peripheral spaces: a case study in Santa Cruz, Rio de Janeiro

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Abstract: The paper presents a methodology built with the purpose of serving as an analysis tool to verify the suitability of peripheral spaces for bicycle use. Through a review of the literature on the subject, and using pre-existing methodologies, a scoring system for the analysis of centralities and roads was developed, with objective metrics that generate a score.

The study also addresses a pilot application of this methodology in the Santa Cruz neighborhood, on the outskirts of the city of Rio de Janeiro. The choice for this neighborhood is justified by the fact that it has one of the highest rates of bicycle use in the city (ESTADO DO RIO DE JANEIRO, 2005). In addition, some of its characteristics, such as large population, the presence of an important economic centrality in the local scale and the existence of two high capacity transit terminals also motivated the choice.

From the theoretical references of Pedro Bocauyva, which addresses the “centrality of the periphery” (BOCAYUVA, 2013), and Milton Santos, who discusses the existence of “slow men” (SANTOS, 2002), the present study was designed to investigate how the use of the bicycle in peripheral spaces could contribute with the emancipation of slow men, thus assuring them access to the city. Considering that the cost of transport in Brazil is high (MARICATO, 2013), it is assumed that the bicycle may be adopted as a mode of transportation that guarantees some independence to these individuals.

Thus, the first part of the study is dedicated to the presentation of the methodology, which was built based on the TOD Quality Standard, prepared by the Institute for Transport and Development Policies (ITDP), in addition to the papers of Dixon (1996) and Monteiro e Campos (2011). This

methodology is composed by a series of indicators, whose values derive from the data collection made through observation in the application area of the evaluation. Two metrics were elaborated: one for the evaluation of the centralities of peripheral neighborhoods and another for the evaluation of roads that connect the residential areas of the neighborhood to their centrality. Both have a score ranging from 0 to 100, according to the data obtained.

Both evaluations are based on elements such as road speed, presence of cycle paths, street lighting, road slope and pavement quality. The evaluation of the centralities also includes items such as commercial density, presence of bicycle parking and integration with public transportation. The evaluation of the roads considers the presence of crossings, traffic islands, curbs and garage entrances.

The second part of the study is dedicated to the application of this methodology in the Santa Cruz neighborhood. A perimeter of 0.5 km² was delimited as the centrality taken as object of study. Seven streets, roads and avenues of the neighborhood were selected, and a stretch of one kilometer of each of them was used for the evaluation of the roads. Data collection was done through a virtually using the Google Street View.

After the evaluation, the centrality obtained 35 out of 100 possible points. Among the elements that contributed to the low grades are the maximum allowed speed of the streets in the centrality, the presence of car parking on the edges of the streets, the absence of bicycle parking in the big commercial buildings and the inadequate street lighting and shading. The evaluated roads received grades between 15 and 60, out of 100 possible. The lack of signs indicating the speed limit and

absence of basic structure, such as curbs, in addition to the very great distance between the crossings, are some of the reasons for the low notes obtained.

According to previous research, the choice of bicycle for trips in the Brazilian peripheries has a strong relationship with elements such as income and the absence of public transportation (SOUZA, BODMER, et al., 2011; SOUZA, AMER, et al., 2011; SÁ, PEREIRA, et al., 2016). This article brings as contribution to the debate a methodology that allows the evaluation of spaces where the bicycles are used, with indexes

that can be compared between regions. The research in Santa Cruz indicated that bicycle use in that neighborhood happens despite the poor quality of urban infrastructure for cyclists. It is necessary to investigate if the same phenomenon is repeated in other peripheral spaces of the Brazilian metropolitan regions.

¹ This abstract is based on a paper produced through the initiative "Desafio Mobilidade Itaú-Cebrap 2017", promoted by the Centro Brasileiro de Análise e Planejamento and sponsored by Banco Itaú.

Bike Rio Sharing System: an exploratory analysis to understand user's profile and trip patterns

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Abstract: There are currently around 900 Bike Sharing Systems (BSS) operating worldwide. Among countries with systems identified, Brazil is the absolute leader in Latin America with BSS in 15 cities, behind Asia (17), North America (64) and Europe (165). This phenomenon has been raising the interest of the world community in understanding the factors that drive or restrict the use of these systems and their travel flows. This increase in BSS popularity is related to several factors, some of which are policy related, while others are related to changing cultural and socioeconomic contexts. But the expansion of these systems reveals a paradigm shift from transport planning (sectoral, static and segmented) to (complex, dynamic and integrated) mobility planning and its implications for solving complex problems that occur in the urban environment.

When considering the studies produced in the field of transport planning, a basic premise is that land use characteristics, as well as population profile and aspects of the mobility system, influence on individual decisions related to travel. And the developed planning methods seek to use the observed relations between the travel characteristic and the urban environment and are based on the hypothesis that the trip is a function of three dimensions: land use pattern; characteristics of the population that moves in the study area

(demand dimension); and the nature, size and capacity of the mobility system in the study area (supply dimension).

However, there are not always convergent results in the literature when investigating these interactions, especially on mobility by bicycle. Thus, this study carried out an exploratory analysis to evaluate the factors that influence user behavior and the use of the Rio de Janeiro BSS (Bike Rio) from 2013 to 2016. The multivariate analysis technique, called Analysis of Correspondence, to investigate the interactions between land use, the supply of the system and the behavior of users. The results allowed the segmentation of the user profile and the characterization of their travel patterns. It was also possible to understand how the interactions between land use, supply and demand dimensions can influence or restrict the use of BSS in the study area, and with that, identify priority areas for monitoring and optimization of Bike Rio's performance.

In this way, the study contributes to increasing knowledge about the use of BSS in the city of Rio de Janeiro and allows the development of new studies to compare the results found in Bike Rio with other BSS in Brazilian cities.

Integration between metro and bicycle in Rio de Janeiro in a socioeconomic perspective

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Abstract: Nowadays several studies indicate the bicycle as a strategic modal for sustainable mobility. Its characteristics of not pollutant, low cost and practical, bring numerous advantages for cyclists and the cities environment. Considering large cities, its efficiency is directly related to short routes (averaging up to 12km), so that its articulation with other modes of transportation may offer even more benefits to urban mobility. In this way, the integration between the bicycle and transit – such as metro – allows the rider to reach longer distances, in addition to enlarging the catchment area of the collective modal, in a win-win relationship.

In Rio de Janeiro, like other large Brazilian cities, urban growth occurred in a spread way. This configuration started to demand long daily displacements by a large part of the population, mainly lower income groups, who live in peripheral areas. In this context, the articulation between mass transport and the bicycle can also represent an important tool for the equity in the access to the city.

Thus, the main objective of the study is to understand how the integration between the metro and the bicycle in Rio de Janeiro is established, also evaluating its contribution to equity in the city's commuting.

However, for the consolidation of an integrated system and promoting the bicycle use, the presence of related cycling infrastructure is critical. So, the present study investigates the existing infrastructure in the surroundings of the metro stations in Rio de Janeiro, determined by a buffer of 200m

from each station. The analysis is based on three categories: 1) circulation infrastructure; 2) parking infrastructure; 3) bike sharing system; considering its contribution to consolidating integrated use. To identify these infrastructures, it is used GIS mapping, defining an overview of the theme in the territory.

In this way, the study reveals the spatial distribution of these elements. In addition, it confronts this to the socioeconomic characteristics of the resident population in the surroundings of the stations. Using the statistical method of correlation by Pearson's linear coefficient, the work identifies the areas with the highest and lowest concentration of infrastructure, relating to the population profile who has the most been benefited by it.

The results show a higher concentration of cycling infrastructure around the stations of the metro located in central and affluent neighborhoods. On the other hand, poor and peripheral areas have been neglected and have incipient bicycle infrastructure.

Concluding, the bicycle planning in Rio de Janeiro has been reinforcing the existing social and spatial inequalities by the differences on related infrastructure provision.

In this way, the work brings the discussion about the insertion of the bicycle as a mode of transportation in the context of Rio de Janeiro evaluating its relationship with the metro system, also approached from a social viewpoint of urban displacements.

Cyclists' interactions with motorized vehicles: challenges, user experiences, and technological innovations

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Abstract: The H2020 EU-project XCYCLE has the aim of developing the means to equalize the treatment of cyclists in traffic and thus both encourage cycling and make cycling safer.

In Europe, cyclists suffer a disproportionate share of serious injuries and fatalities, and in recent years that disadvantage has been growing. Bicycle– motorized vehicle (BMV) collisions account for most the recorded bicyclists' fatalities and serious injuries. Results from our systematic review showed that the main factors contributing to BMV collisions identified were classified in accordance with a recently published conceptual framework for road safety. Most studies have identified factors related to road users' behavior (59.3%) and infrastructure characteristics (57.6%). A minority of studies identified variables related to exposure (40.7%) and vehicles (15.3%) as contributory factors to BMV collisions. A small but significant proportion of studies (20.3%) provided evidence that environmental factors may also play a role, although to a lesser extent, in determining BMV collisions. In addition to the three factors comprised of the applied conceptual framework for road safety, we identified environmental conditions as a category of factors contributing to BMV collisions.

Although cyclists are considered vulnerable road users due to their relatively high rate of fatalities in traffic, no study has yet

investigated the effect of anger on cyclists' safety outcomes. The present research aims to investigate, for the first time, the effects of cycling anger toward different types of road users on near misses involving such road users and near misses in general. Using a daily diary web-based questionnaire, we collected data about day trips, bicycle use, near misses experienced, cyclist's anger and demographic information from 254 Spanish cyclists. Anger toward specific road users had different effects on the probability of near misses with different road users. Anger toward the interaction with car drivers increased the probability of near misses involving cyclists and pedestrians. The present study demonstrated that the effect of road anger on safety outcomes among cyclists is different from that of motorists. Possible explanations for these differences are based on the difference in status and power with motorists, as well as on the potential displaced aggression produced by the fear of retaliation by motorized vehicle users.

In addition, the project XCYCLE has analyzed different technological innovations for cycling safety in the interaction with motorized vehicles. The project developed technologies aimed at improving active and passive detection of cyclists, systems informing both drivers and cyclists of a hazard at junctions. A study has been conducted to identify effective warnings to road users and the benefits of multimodality

(combinations of visual-auditory, visual-haptic, auditory-haptic) on information processing, response time, spatial experience. We also assessed the willingness to pay for the XCYCLE systems to have information about the affordability and potential adoption and impact of the XCYCLE systems. The systems have been treated as aftermarket-options. That is, based on the assumption that the system will be bought as an attachment to the bicycle, and there will be no need to buy a new bicycle with the integrated system. The three on-bike

systems for which the willingness to pay have been assessed are the passive systems (tags); a handlebar-based information system, an enhanced version of the connected systems. The result from an online panel survey for existing cyclists across six countries show differences in the willingness to use an on-bike system based on geographical areas, age, gender and type of cycling use (commuters, heavy leisure, and light leisure).

Leisure or Urban Cycle paths? Using “Big-data” and GIS for locating centralities and ranking the cycle paths of Rio de Janeiro.

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Abstract: The first cycleway in Rio was created on the beachfront of the South zone, connecting four neighborhoods: from Leme and Copacabana to Ipanema and Leblon. Taking the place of parking spaces that once dominated and blocked the entire beachfront, it has suffered some opposition prior to its implantation, but now it is part of the image of the beachfront and it is difficult to imagine the beaches of Rio without its cycle paths next to the sidewalks. This powerful image helps to create in Rio the idea that cycle paths are used only for leisure activities. However, this is a view that can be demystified by cyclist counts, such as the one carried out by the Transporte Ativo association in 2014, which showed that almost 4,000 cyclists pass in the Copacabana beachfront, and near half of them (48%) were wearing work or study clothes.

Currently, in Copacabana, thanks to programs of the City Hall of Rio in conjunction with Transporte Ativo and other institutions there is a rich network of cycle paths and zones of 30 km/h, facilitating the circulation of bicycles inside the neighborhood and connecting the streets to the bike path on the beachfront. Data from BaseGeo-web, an IPP's website (Instituto Pereira Passos, of Rio's City Hall), show that today Copacabana has 12 km of bike paths (4km are of the segregated cycle path on the beachfront) from a total of 54.4 km of streets system forming a structuring mesh inside the neighborhood (shared paths and bike lanes) integrated to a feeder network (the beachfront).

Although Transporte Ativo's count has revealed the intensive use of the beachfront cycle path as a space for urban mobility and the presence of the structured mesh inside the neighborhood tends to increase the use of the bike as a mean for mobility, it seems that, with rare exceptions, the location

of the cycle paths is placed at the margins of the city's centralities. That was revealed with the overlapping of IPP's cycle paths map data and big-data showing the centralities location. Using data such as population density, areas of interest mapped by Google Maps points made available by global organizations such as Open Street Maps reveals the location of centralities. The structuring route formed by the segregated beachfront cycle path is used for urban mobility thanks to its proximity to the network of streets and centralities of the neighborhoods, as we see in Copacabana. That proximity and the crossings on the avenues make the beachfront cycle path both accessible and secure.

Here we will be using the term "security" not by the presence of state police agents but under the lens of authors like Jane Jacobs, Christopher Alexander, and Jan Gehl. If we look at the methodology established by the ITDP Brazil (Institute for Transportation and Development Policy) to determine the walkability of the streets we will see that there are indicators such as "visually and physically permeable façades", "mixed-use", "public day and night use", "street lighting" and "day and night pedestrian density". These indicators are based on the ideas of these authors and thus determine the attractiveness and consequently the natural security of areas with these characteristics.

Thus, by identifying areas of centrality and measuring their distance and isolation from the mapped cycle path network, we can determine which are the axes that have an urban vocation (playing a role in mobility) and those with has vocation only to leisure use, being far and isolated from the centralities and therefore becoming unsafe on weekdays during work hours.

A map containing the centrality and the cycle paths can show the duality between urban and leisure bike paths. The annexed map is an example: It shows how the proximity of Copacabana's cycle paths to its centralities makes them urban, while those observed in the park of Aterro do Flamengo, given their distance to the centralities, can be classified as leisure. It was made using the data of the cycle network of the Municipality of Rio (made available by Basegeo-Web through IPP), showing part of the executed network (about 412.2 km) and part of the planned network (194.8 km). The points forming the heat map were created with the information available by Open Street Maps and are locating shops, services, and public facilities - buildings that we consider as attractive to the people and therefore

generators centralities - spaces were pedestrians and cyclists feel safe.

The classification between urban (mobility) and leisure is important for cities in the process of planning their bicycle network to effectively meet the requirements of the national urban mobility policies. If a cycle path connects two important and attractive points of the city, but passes through an isolated area, without pedestrian density, without buildings with permeable façades and places that generate the necessary sense of security, then it means that the city needs to create a new axis, in places where there is enough movement so that people may feel safe to ride, just as it's safe to walk.

Surveying the potential cyclists and their barriers and motivators to bicycle in a low cycling maturity city

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Abstract: Cities with low cycling development and maturity - as opposed to bicycle-friendly cities like Copenhagen or Amsterdam - are cities with a low cycling modal share and few cycling infrastructures and facilities. These cities face hard challenges to encouraging cycling: few cyclists, little infrastructure, no cycling culture, little interest in cycling data collecting, cycling is considered unsafe and not respected, and a car-oriented road design and city planning.

This research explores the motivators and deterrents to cycling adoption in cities with low cycling maturity, by addressing a population that does not use the bicycle on a regular basis and is segmented according to different stages of cycling proficiency.

A cycling behavioral change conceptual model was proposed, based on theories of travel planned behavior. The overall underlying assumption is that the impacts of the factors refraining from cycling do vary over time and can potentially lead to a behavioral change to adopting cycling on a more regular basis. These factors refraining from cycling are caused by a combination of personal and external factors, which constitutes the perceived barriers to cycling and influence the expectations of potential regular cyclists. The influence of individual or external factors on decisions to cycle more frequently may change over time, especially if the impact of acquired experience is also factored in. Some of these factors are subjective and others are objective, and some of the objective factors - for instance, distance or slope - may be perceived differently among the potential cyclists, which may constitute a stronger or irrelevant barrier to cycling. The

challenge is to measure and model the key factors that led to a change in travel behavior, to adopt cycling. Modeling can help to unravel the underlying combination of causes that may further be extrapolated or transferred to other cycling environments and thus support planning and design of pro-cycling policies and actions.

Lisbon, Portugal, is a low cycling maturity city and our case study. Its cycling modal share is below 1%. Many aspects of Lisbon influence cycling adoption although we don't know to which extent, for instance: the orography, the car drivers' behavior associated with the sense of unsafe circulation, the irregular pavement, the presence of tram rails and the few bicycle infrastructures or facilities.

A survey of Lisbon's residents, workers or visitors, was launched ($n \approx 10001$) with one stream of questions to current cyclists and another for the larger group of non-cyclists and/or potential cyclists. The survey was divided into four sets of questions including current mobility patterns; the individual current attitude towards cycling in an urban context; the individual personality and willingness to behavior change; and the individual housing situation. All questions were closed-ended.

An analysis is made to identify and characterize sub-groups of potential cyclists and non-cyclists in this low cycling maturity city, based on socioeconomic and travel behavior variables. From the results of this survey, barriers and motivators to cycle (stated preferences model) will be analyzed and sub-groups of potential cyclist and non-cyclists are expected to be identified and characterized. Based on current cyclist's data,

types of cyclist will be segmented and enablers to cycling and motivators to keep cycling (revealed preferences) will be identified. With this analysis, triggers and motivators to start cycling between cyclists and non-cyclists are compared. Similarities and differences between stated and revealed preferences will be analyzed. This will also allow to understand the needs and difficulties of current cyclists to increase cycling frequency.

The recent municipal cycling improvements are an opportunity to measure how much these investments can potentially impact modal share and if such measures

contribute to overcoming barriers for bicycle adoption. These investments are the expansion and completion of the cycling network, commuting-oriented, and the implementation of an electric bicycle sharing system, both to be concluded by mid-2018.

The results and conclusions may support the design of policies and actions that municipalities and governmental or advocacy organizations (hard and soft measures) might implement to increase cycling levels in low maturity cities in the short, medium and longer terms. The survey is ongoing, with 1000 participants now.

Evaluation of the impact of a bicycle skills training program in increasing cycling levels in Lisbon

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Abstract: This work focuses on measuring and evaluating the impact of a bicycle ride training program held in Lisbon in increasing the number of trips made by bicycle by its participants. More broadly, the goal is to foster the discussion regarding the contribution of these training programs as a policy instrument for increasing cycling modal share in cities, especially those with incipient bicycle use on regular trips.

The study is based on data collected during the introductory level “Learning to ride a bicycle” delivered by a local bicycle shop in Lisbon and designed to teach all ages basic bicycle riding skills such as balance, start pedaling, stop without help, ride in a straight line and curving.

The literature available about the impact of bicycling education programs is scarce, especially when compared to other policies and strategies used to increase cycling levels. Moreover, there is not statistical evidence on the number of people (adults and children) that are able to ride a bicycle or feel confident enough to do it for commuting, since many stop cycling over their lives. This not only precludes adults from participating but also prevents them from teaching directly their offspring to ride a bicycle, thus inducing a negative propagation on the potential future population of cyclists.

We sustain that learning to ride a bicycle can be seen as the first step that allows for future individual engagement in transport modal shift towards cycling, questioning in what ways gaining more skills and confidence in riding may contribute for an effective and more routinely use of the bicycle, especially if this is accompanied by improvements in cycle infrastructures.

The case study that we focus is cities where cycling accounts for no more than 1% of the total number of trips, which is the paradigm of Lisbon. This approach is settled upon the hypothesis that current and historical socio-demographic records in these cities may prevent them from experiencing a rapid and sustained increase in bicycle use albeit the existence of infrastructure investments.

Bicycling education in Portugal is available in a few schools for children under the age of 10 and for adults through cycle training programs run by private business companies and a national cycling organization. However, there is still no literature available on the results and outcomes of such programs taking place in Portugal and other countries where cycling is still incipient, failing to provide useful data for further assessment and researching.

The objective of the present research is to contribute for this discussion and design of bicycle training policies for cities, or former inhabitants of cities, where vehicular cycling is currently incipient and has not been substantial in the past.

Using mixed---methods approach, data were obtained during a bike training program held in Lisbon that was provided by a local bicycle shop and delivered by a certified instructor with UK’s Bikeability certification, using an open---air public park facility.

Classes unfold between April 2015 and December 2017, having had 93 applicants with the age average of 37,7 years (79,6% female; 20,4% male). From April 2017, an open-ended question was added to the registration form, addressing

applicant's personal history in relation to bicycle use and their current motivation to join a training program. Thirty---seven answers were received, and a qualitative analysis is being performed.

A follow-up survey and focus groups will be applied to the applicants in February 2018, aiming to evaluate the effectiveness of this program in increasing the number of trips made by bicycle. This assessment will include queries on the impacts of the program on the

everyday commuting practices of the participants, how many own a bicycle, where do they ride and for which purpose.

Early evidence suggests a higher demand from female adult population, who seek help to learn to ride a bicycle. The expected results of this research are (1) the identification of the main causes for people not knowing how to cycle as well as their motivations to learn; and (2) the evaluation of the impact of the training program in increasing bicycle modal share and cycling safety levels.

“Fusion Mobility” – Discovering the Mobility-DNA of Inclusive Cities

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Abstract: Since introduced from September 2017, Fusion Mobility has launched an academic and practitioner discussion about a new sustainable mobility architecture that sets out to fill gaps in our future world of transport, urban design and beyond to society in general. (1) It is bridging the social and the technical world; (2) it provides an approach for handling benefits and risks of AI (Artificial Intelligence) in the context of connected and autonomous mobility; and (3) it is taking the strengths of ITS methodologies and merging them with parallel developments in Active Mobility and Sustainable Development to ensure further improvement of inter- and multimodal solutions for seamless transport and quality of life. This paper discusses what Fusion Mobility as a systemic approach can contribute to make cities and regions more inclusive, firstly according to all aspects of people's accessibility and social inclusion, but also on the environmental and economic aspects. It is necessary because in the near future existing policy initiatives will have already inaugurated dramatic changes in mobility systems. For example, the use of driverless cars and the phasing out of internal combustion engine vehicles will have significant

effects on mobility systems. Although many aims and objectives are shared the fragmentation of the different academic and practitioner communities can lead to conflicting objectives, language and approaches, which undermine the potential of both. In particular, policy makers at all levels need to be able to make informed choices about the development of future mobility, which maximise both human and technological benefits. Fusion Mobility is prioritising Active Mobility, as Active Mobility approaches are delivering high economic, social and environmental benefits, with cycling alone identified as contributing to 14 of the 17 United Nations Sustainable Development Goals. Therefore, the Fusion Mobility frame of sustainable development can accelerate adoption and acceptability of new approaches and will maximise collaboration between all actors who favour Active Mobility.

* The full paper can be read at:

<https://ecf.com/sites/ecf.com/files/180615_MNeun_FM4VC.pdf>.

Session: Learn to Live

From manifestations to the fight for the right to the city: Using the bicycle as a means to regain public space

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FÁBIO LÚCIO LOPES ZAMPIERI

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Abstract: This paper reflects on the demands that more humane, fairer cities have made while focusing on how social movement activities play a role in the democratization of access to the city itself. It is related to the access to life and the right to the city with urban mobility, the latter being an inseparable part for the consolidation of the former. The historical context of growth and production of the Latin American cities – especially Brazilian ones – is investigated, within the hegemonic capitalist logic. Such context displays the accelerated urbanization process of these cities during the last decades and the effects of the urban mobility model that was adopted. This model, which involves having private cars as the main mode of transportation, culminated in the current crisis of urban (im)mobility. In this scenario, claims for investments in modal diversification become important, as the bicycle arises as an opportunity to mitigate some negative effects of the prioritization of cars. The objective at hand is to understand the tactics of action of social movements, on urban space, that either uses the bicycle in its manifestations as an instrument of claiming space for cyclists or pedaling events to promote other causes. Based on a literature review, the discussions were based on the conception of public space and the relations of power and domination that take place in it, as well as strategies of resistance. Movements such as Critical Mass and Pedal das Gurias, which occupy the street and have it as agenda, express the awakening of a collectivity tuned internationally that, as it is occupied, demonstrates its desire to regain public space.

New movements for new policies: The role of cycling organizations in the context of the preparation João Pessoa's (PB) Mobility Plan

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Abstract: Brazil has been a pioneer in Latin America by bringing together in a single ministry portfolio essential agenda for the development of cities. Between 2004 and 2007, the Ministry of Cities, through its National Secretariat for Transport and Mobility (SEMOB), formulated the guidelines of the National Urban Mobility Policy (PNMU), under Law 12,587/2012. The practical effect of the PNMU consists in the mandatory elaboration of an Urban Mobility Plan (PlanMob) to all municipalities with more than twenty thousand inhabitants. Its guidelines are clear: it is necessary that municipalities prioritize mobility by non-motorized transport means and collective transport, to the detriment of individual motorized transport.

In Brazil, we observed that in the last 15 years, efforts from different fronts have managed to create a new and apparently favorable context for tackling the recognized and widespread crisis of urban mobility. In the normative-institutional sphere, contributions come from the enactment of the Statute of Cities (2001), the creation of the Ministry of Cities (2003), the Conferences of Cities (which occur every two years since 2003), and the enactment of the PNMU (2012). In the financial sphere, are the significant transfers of federal resources to the municipalities through PACs I and II. And finally, in the social sphere urban social movements, with the support of a significant part of the media, are acting in favor of the cause. However, despite the favorable context and the harsh legal penalty foreseen, after the three-year term originally established in the PMNU, adherence to the policy by the municipalities has been extremely low, especially in large urban concentrations of non-metropolitan scale.

This investigation carried out a case study of the municipality of João Pessoa/PB. Considering that the PMNU brings in its concept of urban mobility a new approach to urban planning, the Ministry of Cities has demanded from municipalities a new paradigm in urban transport planning, which although is in line with the specialized international debate, in practice it diverges from the historically established planning in Brazil. What is observed in municipalities with the characteristics of João Pessoa is a resistance on municipal technicians' part to the changes urban mobility entails, because of the methodological implications that the new concept introduces, and the political costs resulting from the mandatory incorporation of citizen engagement in decision-making. On the other hand, civil society, an increasingly empowered actor in urban planning processes, through its demands and actions have assimilated the concept of urban mobility better and earlier.

Under the above-mentioned premise, this investigation's objective was to know the concepts inherent to urban mobility present in the discourse and its practical application by both prominent parties involved –technicians from the Urban Mobility Superintendence (SEMOB JP) and representatives of cycling organizations- during the process of municipal PlanMob development.

To better understand this process barely studied in Brazil, above all in large urban concentrations of non-metropolitan scale, a qualitative approach was chosen, whose frame of reference was the interpretive paradigm. Selected under certain criteria, participants were subject to semi-structured interviews organized into five major thematic blocks: Definitions, Urban Mobility in João Pessoa, PNMU, PlanMob João Pessoa, and the Future of Urban Mobility. The

questions were formulated as to know in each participant: (i) his repertoire about urban mobility in general terms, (ii) his perception of the state of the art of urban mobility in João Pessoa, (iii) his domain on the PNMU, and finally (iv) how they proceeded, from their respective roles, for a successful implementation of the PNMU in João Pessoa.

In their reports, the two parties repeatedly mentioned, under different discourses, some events that occurred in the city during the five years of the PNMU. In parallel, secondary sources –such as reports, notes, and press news– were used to support the chronological understanding and verification of the facts mentioned by the interviewees. From that, it

was possible to characterize the creation and management of the SEMOB JP and the emergence and action of new cycling organizations in the city.

The results obtained are the first steps towards understanding PMNU's degree of penetration in a local context. With the intention of making the PMNU effective, such understanding could lead the activities of both public managers –in federal, state and municipal fields of spheres– and social organizations pursuing the democratization of urban mobility, in their condition of monitors and supervisors of municipal actions.

Cycling in São Paulo: pro-bike activism as a key for pro-bike policies

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Abstract: In recent years, the city of São Paulo has undergone an intense deployment of cycling infrastructure. It can be considered a late process not only in comparison with some European countries but also because it occurred at a time when the automobile supremacy in São Paulo's circulation system had already been consolidated, hindering the feasibility of pro-bike policies. In mid-2013, because of the increase on bus fare, São Paulo held a series of popular riots against the poor conditions of the public transit system and urban circulation in general, incorporating other issues along the way, and became known as "Jornadas de Junho" (Protests of June). Led by the Free Pass Movement, this was "one of those moments in which society's capacity to intervene on politics widens, sweeping away the fragile certainties that mark the routine game of institutional politics" (TATAGIBA, 2014, p. 35, translation by author). The 2013 demonstrations were held in several Brazilian cities and invoked the Right to the City (LEFEBVRE, 1968), a concept translated in this context as free access, without turnstiles, to quality public services. In addition to having the fare reestablished to its previous price, the protests marked the beginning of the deployment of 400 km of cycling infrastructure, as previously indicated in the program presented by the mayor's office for the 2013-2016 period.

The infrastructure deployed between 2013 and 2016 was, for the first time in the history of the city's mobility policies, reducing the space for automobiles to open space for bicycles: on some streets, lanes previously marked as parking space for cars were turned into bike lanes. To analyze this – however small – change of the distribution of space on the streets of São Paulo, one must consider a broader perspective, particularly considering that State and Civil Society are

mutually constituted (SKOCPOL, 1992). Since the late 1970's, actors from the civil society have been demanding pro-bike policies in São Paulo, but it was only on the XXI century that the civil actors with such demands expanded their activities in the virtual networks, on the streets and in institutional arenas within the government (ZÜGE JUNIOR, 2015), changes that appear to have played a fundamental role in the design and implementation of cycling policies.

Considering the recent political science literature that reassesses the importance of Social Movements and its interaction with the State to build policies, this paper proposes to look at the pro-cycling activism in the city of São Paulo, with the hypothesis that it had a remarkable political impact on the cycling policies, through a repertoire of contention (TILLY, 2006), a concept that has been re-elaborated for the Brazilian context as repertoires of collective action and of interaction with the State (ABERS et al., 2014). Taking these issues into account, this paper aims at advancing on the debate regarding the effects of the Civil Society's political incidence, particularly in the period of the last two municipal administrations, based on the demands of actors from the Civil Society for the inclusion of cycling in the circulation system. The debate proposed here will assess the literature about the effects of civil society's incidence and analyze, using secondary sources, the information about pro-cycling policy activists' actions or the context in which demands were posed, as well as interviews with selected State and Societal actors. Without the intention to exhaust the debate, the discussion proposed here intends to contribute with an initial glance about the pro-cycling activism from a historical neoinstitutionalism perspective, raising hypothesis about the state-society interactions that were established.

Is a city with high rates of female cyclists a city safe for cycling? Findings on gendered cycling from São Paulo, Brazil.

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Abstract: Issues of gender and cycling have gained more focus in the past years by both academia and activist groups, especially from a perspective which focuses on correlating the high - or low - indexes of female cycling and the existence, the inexistence or the ongoing implementation of cycling infrastructure in cities around the world. A much common sentence that has been largely used by politicians, practitioners and even cycle activists is that “a city safe for cycling is a city with high rates of female cyclists” – but can something that involves a subject as complex as gender inequality be reduced to such a simple relation of causality? The research presented by this abstract tries to deepen the knowledge on both cycling inequalities and gender and urban planning by exploring the importance of the subjectivity and individual experiences that lead to choosing bicycling as means of transportation.

Since at least the 70’s the different mobility patterns of women and have been studied, helping to bring up issues that have broadened the comprehension on how inequality is expressed through transportation choices – or the lack of choice. This research agenda made it possible to understand that gender wasn’t the only aspect to be looked at, but that class, race, age, family settings and location on the territory also mattered when talking about mobility inequalities. São Paulo, South America’s biggest city, has seen its gender differences on urban mobility patterns first studied at the beginning of the 90’s by using the Origin-Destination Survey data (Forneck & Zucolotto, 1996), which has been later deepened by studies done by Svab (2016) expanding the

analysis to all the historical series of the survey. The automobile-oriented development of São Paulo has led to historical low cycling rates, both in general (around 1% of the total daily trips) and female trips (never above 12% of all bicycle trips). This is the only data there is for Lemos et al. (2016) have discussed the limitations of this dataset when it comes active modes of transportation and how the bike and walking trips tend to be undersized because of the methodology aimed at planning the mass-transit network.

Lately, cycling advocacy groups in Brazil have been putting a lot of effort on gathering their own data, aiming at better subsidizing arguments on the importance of making bicycling as means of transportation visible and pressuring the government on investing on cycling infrastructure. As result of this effort, Ciclocidade, one of the main pro-cycling advocacy groups in São Paulo, has collected three kinds of quantitative datasets that have helped raising issues to be further explored on the gender and cycling research agenda: cyclists counts, the Cyclist’s Profile Research and the Bicycle Mobility and Challenges of Women in São Paulo (Harkot et al., 2017). The articulation of the data with the literature on the subject was able to raise questions that were further explored through semi-structured interviews led with women and men who cycle in São Paulo as means of transportation.

The interviews went on various themes directly related or not to cycling, such as each one’s individual history with cycling and the bicycle, family and employment settings, the joyful and not-so-joyful aspects on cycling in São Paulo, divagations of how the self while cycling is perceived by the other



Scientists
for cycling

individuals who make up the traffic and streets life in São Paulo... Above all, the interviews allowed to perceive the complexity of each individual's subjectivity while opting for

cycling as means of transportation – and how choosing to cycle or not go much beyond one feeling safe to cycle, especially as women.

Construction and execution of the cycle policy agenda in Bogotá, Buenos Aires and São Paulo: An analysis of the interaction between actors, institutions, contexts and ideas

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Abstract: In recent years, urban cycling has gained special attention in the local political agendas of relevant South American cities. Large urban concentrations have stood out by the construction of expressive bicycle systems, which try, in different measures, to insert the bicycle in their profuse, chaotic and aggressive urban mobility systems, ruled historically by motorized individual vehicles.

This work sought to analyze the creation and execution of the cycle mobility agenda in three urban centers in South America: Bogotá, Buenos Aires, and São Paulo. To this end, a qualitative and exploratory study was developed, structured as a comparative case study, which sought to answer the following questions: At what point do ideas related to cycling policies come to enter the political agenda of the selected cities in a way more effective, that is, with more real perspectives to be implemented? Why is this occurring in these moments and who are the responsible actors (civil society as a protagonist, the propensity of the public manager himself, international influences)? How are configured the communities, networks, and subsystems of managers, specialists, and activists who are responsible for entering the topic on the agenda of decisions? How do coalitions form to make the issue "taken seriously"? To what extent is there social participation, by specialists or by civil society in a broader sense, in these processes of formulating and implementing a new policy agenda?

Based on these inquiries, the process of created and execution of the cycle agendas was explored from the perspective of the analysis of public policies. In general, the analysis developed sought to work with post-positivist

concepts of the public policy sciences, paying special attention to the moments of the emergence of a new policy agenda and its execution. Specifically, we sought to explore the "relational fabric" of this process from perspectives that articulate the role of actors, institutions, contexts, and ideas. In methodological terms, process tracing was used as a case study method to trace the trajectory of the analyzed cases through the collection and analysis of secondary data (official documents, technical and scientific studies, written and audiovisual press material) and primary data (semi-structured interviews in depth with actors who participated in the process from the state, organized society and external institutions).

Considering the factors selected a priori (actors, institutions, contexts, and ideas), in an articulated way, it was sought to understand what types of interaction arrangements marked the cases analyzed. The collection of data from various sources, especially the interviews, made possible a holistic analysis of the cycle-building policy-making processes. From the post-positivist theoretical framework, with an emphasis on the reading of the interactive policy-making arrangements, it was found that each case had different types of arrangements, influencing relatively the definition and execution of the analyzed bicycle systems. Approaching the "analytical magnifying glass" about these arrangements, the role of some strategic actors for the success of the cycle schedules stands out. In all cases, the figure of the elected political entrepreneur, especially the mayors, was decisive for the achievement of the cycle systems analyzed, but other categories of strategic actors (activists, specialists, and policy

mediators) were decisive factors for the advancement of the theme in local agendas.

This paper has tried to illustrate, therefore, how the processes of construction of new public policy agendas can be determined by different factors, even when it is the same theme. Some figures are central to these processes, but contextual and symbolic factors can determine the strength these actors will have. In the cases analyzed, social participation presented itself in a different way from that which is idealized in political discourses. Broadly speaking, the institutionalization of participation is very low, as is its

influence on the direction of the agenda. Despite some recent advances, the participation scenario in all cases is far from emblematic participatory experiences (such as the classic example of the participatory budget of Porto Alegre-Brazil). Nevertheless, the observation indicates that participation in these cases occurred in a more localized way, based on the figure of some specific actors, responsible for articulating interested people and developing action plans.

This work was developed in the ambit of the Itaú-Cebrap Mobility Challenge, forthcoming.

