ROUTLEDGE INTERNATIONAL HANDBOOKS

Routledge Companion to Cycling

Edited by Glen Norcliffe, Una Brogan, Peter Cox, Boyang Gao, Tony Hadland, Sheila Hanlon, Tim Jones, Nicholas Oddy and Luis Vivanco

ROUTLEDGE COMPANION TO CYCLING

Routledge Companion to Cycling presents a comprehensive overview of an artefact that throughout the modern era has been a bellwether indicator of many major social, economic and environmental trends that have permeated society.

The volume synthesizes a rapidly growing body of research on the bicycle, its past and present uses, its technological evolution, its use in diverse geographical settings, its aesthetics and its deployment in art and literature. From its origins in early modern carriage technology in Germany, it has generated what is now a vast, multi-disciplinary literature encompassing a wide range of issues in countries throughout the world.

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Routledge
Taylor & Francis Group
LONDON AND NEW YORK

Cover image: Greg Curnoe, Mariposa 10 Speed No. 2, 1973. Watercolour over graphite on wove paper, 101.1 × 181.4 cm. National Gallery of Canada, Ottawa

First published 2022
by Routledge
4 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

and by Routledge
605 Third Avenue, New York, NY 10158

Routledge is an imprint of the Taylor & Francis Group, an informa business

British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library

Library of Congress Cataloging-in-Publication Data
Names: Norcliffe, G. B., editor.
Title: Routledge companion to cycling / Edited by Glen Norcliffe, Una Brogan, Peter Cox, Boyang Gao, Tony Hadland, Sheila Hanlon, Tim Jones, Nicholas Oddy, and Luis Vivanco.
Description: Abingdon, Oxon ; New York, NY : Routledge, 2022. | Includes bibliographical references and index.
Identifiers: LCCN 2022007864 (print) | LCCN 2022007865 (ebook) | ISBN 9780367683993 (hardback) | ISBN 9780367695088 (paperback) | ISBN 9781003142041 (ebook)
Subjects: LCSH: Cycling--History. | Cycling--Social aspects. | Cycling--Economic aspects. | Bicycles--History.
Classification: LCC GV1040.5 .R68 2022 (print) | LCC GV1040.5 (ebook) | DDC 796.6--dc23
LC record available at https://lccn.loc.gov/2022007864
LC ebook record available at https://lccn.loc.gov/2022007865

ISBN: 978-0-367-68399-3 (hbk)
ISBN: 978-0-367-69508-8 (pbk)
ISBN: 978-1-003-14204-1 (ebk)

DOI: 10.4324/9781003142041

Typeset in Bembo
by SPi Technologies India Pvt Ltd (Straive)

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AN INTRODUCTION TO THE COMPANION TO CYCLING

Glen Norcliffe

The academic sub-field of cycling studies has recently emerged from the shadows as researchers in fields as diverse as biochemistry and poetry have found common cause in these unpretentious machines and the aficionados who ride them. The publication of major research articles and books challenging the *status quo* in transportation, and demonstrating an earth- and people-friendly alternative, have gained even greater significance as the recent pandemic made cycling a safe form of commuting, shopping, visiting and exercising. The Paris Accords of 2015, and the annual United Nations Climate Change COP Conferences, have identified fairly ambitious long-term targets, while sidelining the immediate progress that could be achieved by creating physical and policy spaces for cycles and cyclists. This reappraisal of the current social, political and cultural significance of the bicycle has been accompanied by a reassessment of its significance in the past, in diverse places, from diverse disciplinary perspectives. The collection of essays presented in this book illustrate many of these exciting developments that collectively are nurturing this new sub-discipline.

There is no universal understanding of a bicycle. Its function is contingent upon the perspective adopted, and its position in space and time, culture and politics, so it may be understood in many ways. It has been described as having various attributes, some dualistic: it has been a tool for peaceful conviviality and an instrument of war, terrorism and torture; a workhorse and a source of relaxation and pleasure; a sophisticated technology and mobility simplified; the key to velomobility and a cause of traffic congestion; an agent for development and a platform for labor exploitation; a definer of both safe and unsafe places; and an instrument promoting racial, class and gender harmony, but sometimes confrontation. It has also served as an expression of culture and identity; a symbol with its own semiotics; an inspiration for creativity; an investment; democracy on wheels; a training engine; a piece of environmental detritus; a valued player in the Anthropocene; a garden ornament; and a quirk of history. The list could go on for pages because the bicycle is such a versatile artefact. Recognition of this versatility has led to cycling becoming an object of serious academic study in a number of disciplines during the past two decades. This collection of essays provides a broad understanding of the scope of this emerging field.

The transformative quality of the bicycle complements the recent growth of interest in interdisciplinary studies, helping this adaptable machine to become a focal point of academic interest. Several developments have influenced this evolution. First, quality of daily life (as opposed

DOI: 10.4324/9781003142041-1

to net income) has become important to people living in affluent consumer societies, with an emphasis on a productive engagement with nature, with the economy, with society, and with politics (Nussbaum and Sen 1993). Research shows that after family incomes reach a comfort level, further improvement in the quality of life results mainly from increasing appreciation of non-monetary considerations, including the dangers of sedentarism, the value of exercise and good health, social engagement in earth-friendly activities, inclusive democracy, comprehensive social support, and engagement with literature, music and the arts, all requiring an interdisciplinary perspective. The World Happiness Report for 2018 found that EU countries with the highest bicycle use are also among the happiest overall (https://thecityfix.com/blog/cyclists-mean-happier-city-yes-no-dario-hidalgo/).

The second development that has raised academic interest in the bicycle results from the priority given to slowing growth of, and reversing the human footprint on planet Earth, with the bicycle repeatedly mentioned as having instrumental powers to lighten human impacts. Human-powered vehicles (HPVs) are playing a significant role, resulting from the development of new cycle technologies, by improvements to cycling infrastructure, by advancing cycling justice, and by creating bikespaces offering an alternative to motorized transport for short trips (which most trips are). Information technology is giving the bicycle more agency in the networks combining humans with cycles, including sensors that automatically select the optimal gear or use continuous gearing, autonomous bicycles that can navigate city streets, and GPS sensors that locate the nearest dockless bicycle.

The third important development that has raised the academic profile of the bicycle results from increased scepticism of the neoliberal mantra stressing privatization, lower taxes, minimal social services, exploitative resource-based development and attacks on labor institutions. The results are not environmentally sustainable; they are socially destructive as wealth becomes highly concentrated even as wages stagnate, and they give energy to populist movements. The new economics stresses cooperative management of production, participatory local democracy, nature as a valued commodity, and people-friendly urban design in which pedestrians and cyclists flourish.

In order to capture the numerous interdisciplinary manifestations of this multipurpose artifact, this book presents 48 chapters and 13 vignettes written by leading researchers in the field of cycling. All of the authors are cyclists who, despite its technical simplicity, view the machine as one of the more useful inventions yet conceived. It is human-powered. A person with a few essential skills can maintain it. Either new or "used," it is affordable for most people on this planet. It enables low-cost mobility for millions of people, worldwide. And with care it will function for up to 100 years. The authors cover many aspects of cycling and the cycles themselves, indeed the diversity of the contributions has led us to organize the chapters into eight main parts that provide the book with a structure.

The **first part** inquires into the associative interactions between society and the bicycle, viewing the bicycle not just as an assemblage of metal, rubber and plastic, but also as the means to engage in cycling as a socially formed and forming activity. The innovative opening chapter on *theorizing cycling*, by the part editor, Peter Cox, provides the framework that the subsequent chapters elaborate. Use of this artefact depends upon the user, the groups with whom the user has social relations, and broader trends in society at large. These relations intersect in the following chapter examining gender (and patriarchy), which has permeated cycling since its origins in the nineteenth century. Also fraught are the precarious jobs of delivery workers employed by platform companies, which do not treat them as employees. Socialization emerges as a key theme in the next chapter, which stresses social movements as key to generating demand for a better bikespace and a culture of cycling. The vignette that follows describes a turning point

for Black athletes, when Major Taylor successfully challenged the reigning world champion in Paris in 1901. Cycling justice is the theme of Chapter 5 proposing a cycling inclusion ladder as a means to making cycling a more inclusive activity. The impossibility of continued automobility and the necessity of sustainable alternatives, especially cycling for shorter trips, is stressed in the penultimate chapter, while the final chapter in this part calls for the incorporation of persons with disability into the cycling mainstream.

Part II, edited by long-time researcher into cycling technology, Tony Hadland, literally addresses the nuts and bolts of the bicycles themselves. Chapters emphasize that the bicycle is not only a social construct, but also a technical one that has evolved rapidly at several points in recent history. The part opens by considering the evolution of the configuration of the bicycle as a whole. This is followed by chapters that disassemble the machine by examining, in turn: the frames and the materials used to make them; the wheels that keep them rolling and the technologies that absorb some of the shocks that all cycles encounter; the transmission that gets a bicycle going, and the brakes that stop it; and the ability of bicycles to carry luggage and passengers. A vignette describes the cargo bicycles designed specifically to transport coffee in Rwanda. The final chapter in this part examines technologies designed to help disabled persons to cycle.

Part III addresses the bicycle trade. The bicycle is a successful innovation that has created a major world industry, the subject of this part's opening chapter authored by Boyang Gao and myself. Because makers and users often live on opposite sides of the world, supply chains have evolved to connect widely separated producers and consumers. The following chapter examines the site where makers and sellers commonly connect, namely the bicycle trade show. At the selling end, traditional forms of retailing have been squeezed out by competition from mass-sellers, specialized sport retail chains, online sales and the novelty of mobile curated collections. The making and selling of cycles are brought together in the following chapter on the world's largest bicycle maker, Giant Cycles of Taiwan, which now also has a global presence as a retailer. From the biggest, the final chapter in Part III turns to the smallest – the micro-economies that use bicycles as a platform for business, especially in the Global South, but also in the rest of the world, followed by an illustrative vignette on a mobile bike shop in Beijing.

Tackling urban cycling in **Part IV**, editor Sheila Hanlon has placed urban design and policy front and center by examining the tensions between cyclists and other users of city roads, and the planners and policy makers who try to resolve disputes between interest groups. Providing bicycle-friendly infrastructure and cycleways is clearly a pressing issue, illustrated by a vignette on infrastructure in Lund, Sweden. The following chapter, in contrast, cautions that current policy can be viewed as a political fix that compromises social justice with a neoliberal growth agenda, and pays shallow attention to the fundamental environmental issues facing the planet. And a key element is space, not just in the material sense, but also in the Lefebvrian sense with imagined spaces, policy spaces and activist spaces all contributing to the inclusiveness of cycling. The vignette that follows returns to the physical spaces required for the bike-to-work campaign in Jakarta. Chapters on bike-share programs and e-bikes capture major elements of the contemporary urban scene, while the closing chapter raises important questions of risk, safety and security for the city rider.

Sport, health and lifestyles are the connected themes developed in **Part V**, edited by Tim Jones. A paired contrast is found in the opening chapters on amateur and professional road cycling, the latter being organized to resemble an industry, the former attracting many enthusiastic amateurs dressed to look like professionals. A vignette on the experience of riding in the peloton in professional road racing links these two opening chapters. Cycling in two other

settings follow: off-road cycling in various forms – mountain bikes, gravel riding, cyclocross and several more; and track racing (with a vignette on keirin races). Health, injuries and (one hopes) recoveries are considered next, these being prominent themes in a world where the lifespans of the most sedentary citizens are starting to decline. The closing chapter of Part V treats the sensitive issue of doping.

In **Part VI** Luis Vivanco takes the perspective of a cultural anthropologist *cum* geographer by focusing on significant *places* of cycling, some of them being iconic, and others mundane. To set the scene, a vignette takes the reader to the Bois de Boulogne in Paris in 1867, the place where the cycling age was effectively launched. The opening chapter examines the view from the handlebars, as seen by landseërs of the late nineteenth-century landscape, followed by a vignette advocating the bicycle as a place of peace. The following chapter examines tourists who, naturally, seek evocative places, often combining a cycle tour with adventure and the exploration of places unknown, followed by a vignette on the special case of winter riding. The next five chapters examine cycling on four different continents: West Africa, where Africanized bicycles occupy a liminal space between African and European culture; India, where they are imbued with colonial and postcolonial meanings; China, which under Mao was indubitably the Kingdom of bicycles; Denmark, which prides itself as one of the world's most cycle-friendly countries; a vignette on Beach Road in Melbourne, and a closing chapter on Bogota in Colombia, where *La Ciclovía* took shape.

In **Part VII**, the culture and art surrounding the bicycle is scrutinized. The editor, Nicholas Oddy, delves into the visual culture of the machine itself, suggesting three distinct machine aesthetics – the roadster, the lightweight and the fat tire. Parallel issues are taken up in the following chapter when applied to the cyclist herself or himself: how does one dress to ride, in fashion, in everyday outfits, or in clothing specifically designed for the ride? In the *belle époque* era, bicycle promoters engaged a number of France's most talented artists to publicise cycles via posters, leaving behind some of the most creative commercial art ever seen. In contrast, as shown in the following chapter, in the salons of France's *beaux arts* the bicycle was not a popular subject with only a few interesting images handed down for posterity. But the vignette that follows shows that bicycles have caught the attention of the noted installation artist, Ai Weiwei. In the cinema, the bicycle has caught on as a recurring theme not merely as part of the setting, but as central to the storyline.

Part VIII, edited by Una Brogan, turns to the bicycle in literature. The opening chapter on riding and writing presents a synopsis of selected authors who have introduced cycling in their works, with the following chapter taking up one aspect, namely stories about the way cycles liberate their riders and grant a particular type of mobility. The third chapter takes the reader into the realm of humor, which, in some instances, verges on the absurd, with the bicycle offering rich opportunities to amuse. A number of poets have addressed cycling in their musings, often in fanciful flights of language to which the cycle lends itself. Finally, literary tourism has long been a fertile field occupied by pilgrims, ramblers and adventurers.

Cycling and its discontents

Bicycle advocates tend to accept the virtues of cycling uncritically, and then re-enforce their values by socializing with friends who share similar values. Negative opinions about cycling are usually dismissed as uninformed. Yet the reality is that, even in this era of rising environmental awareness, the bicycle is traduced by many citizens who view it either as unimportant, as a nuisance that should be relegated to the status of children's toy, or even as an instrument for capitalist exploitation. In many jurisdictions, politicians and policy makers willingly dismiss

arguments that cycles are beneficial, and continue to marginalize this form of transportation in favor of motorized vehicles. For these reasons, I will summarize some major criticisms levelled at cycling, and respond to the critics. They deserve our attention, and an informed response. I have chosen the critique cycling has received from one of its more strident critics, Lawrence Solomon. Solomon's article appeared in Toronto's *Financial Post* on December 1, 2017 (see https://financialpost.com/opinion/lawrence-solomon-ban-the-bike-how-cities-made-a-huge-mistake-in-promoting-cycling). Solomon has seven main criticisms, to which a few other common censorious remarks are added.

1 *Bike lanes represent an inefficient use of road space, lowering total utility.*
By definition, all users consume road space, be they pedestrians on sidepaths, motorists in truck lanes, or geese being driven on medieval droving roads to market in the nearest town. For millennia, roads have been a shared space, with the motorist a newcomer given access early in the twentieth century to the Good Roads already created due to pressure in the late nineteenth century from farmers and cyclists. Approximately eight bicycles fit in the space occupied by one motor vehicle when it is in motion. Hence a motor vehicle on an urban street is more efficient if it moves more than eight times quicker than a bicycle, or transports more than eight passengers. But data presented by Trigg (2015) indicate that on arterial roads in the city, cars average at best 18–19 mph (~30 km/h), in New York it is closer to 15 mph (25 km/h) and in Beijing 7.5 mph (12.5 km/h). In cities such as Bangkok and New Delhi it is often faster to walk than to drive! Bicycles average 9–10 mph (15 km/h) or close to the speed of cars that are not on urban expressways. Since surveys show the average number of passengers per car is 1.59, in crude aggregate numbers, a unit of road space with

   1 car @ 25 km/h × 1.59 persons = delivers 39.75 persons
   8 bicycles @ 15 km/h × 1 person = deliver 120 persons.

   So bicycles use road space about three times as efficiently as motor vehicles. However, Will et al. (2020) find that in some cases the figure for bicycles can rise as high as 20 times more space-efficient.
2 *Bikes have higher negative externalities than motorized road users.*
The negative externalities produced by motor vehicles include nitrogen oxide, carbon monoxide, sulfur oxides, volatile organic compounds and particulates. For bicycles, the externalities are minimal (zero tailpipe emissions), although e-bikes do have externalities associated with generating electricity to re-charge batteries. In addition, the "pass-by" noise generated by cars, motorbikes and trucks is normally in the 67 to 75 decibel range (Schreurs et al. 2011), whereas bicycles register below 40 dB, which is the level of background noise in a residential area.
3 *Bike lanes are a drain on the public purse.*
All roadways, including sidewalks, are a drain on the public purse in that they have to be built and maintained, but the cost of constructing bike trails is approximately about one-ninth per kilometer that of urban roads, and annual maintenance costs are substantially less (Collier 2011). Moreover, when London UK introduced a congestion charge in 2003 of $15.40 on each weekday, transit use rose 60%, and bicycle use 90%, while vehicle traffic and pollution counts dropped 25%. So the reverse of what Solomon asserts applies in practice – bike lanes are much less of a drain on public accounts and more cost-efficient than roads built for vehicles.

4 *Bike lanes make cars idle and increase pollution.*
The main cause of cars idling and creating urban traffic congestion is other cars. Cities with the most cars, such as Mumbai, Shanghai, Jakarta and Sao Paolo, also have the worst traffic jams and the slowest average speeds for cars. Adding bike lanes increases traffic flow because they are separated from cars and keep moving in heavy traffic.

5 *Bicycles cause accidents and kill pedestrians.*
All road users, even pedestrians, cause accidents when they are careless or behave aggressively. It is rarely mechanical failure by the vehicle itself, but the driver/rider/pedestrian that is responsible for an accident. So yes, scofflaw cyclists are a menace when they ignore stop signs and red lights, dart between vehicles, and ride fast along sidewalks. But so, too, are scofflaw motorists. In the UK about 400 pedestrians are killed annually, over 99% by motorists and less than 1% by cyclists. The differences relate to weight and speed. "A 1,000 kg car moving at 22 mph will have 50 kJ of energy; a 15 kg bike with a 70 kg rider at the same speed has less than one-tenth of that" (Laker 2018). Also, commuter cyclists tend to ride at about 15 km/h, while motorists travel at 25 or more km/h if traffic conditions permit it, so motorists generally travel faster which increases the force of impact. Motorists kill nearly 100-fold the number of pedestrians.

6 *Motorists user-pay, whereas cyclists don't pay.*
Motor vehicles require licences, so they generate revenues used to offset some of the costs of road construction and maintenance. In most jurisdictions, bicycles do not require licences, and contribute no licence fees. Note, however, that road licences only cover a fraction of the costs of construction and maintenance, and most roads in urban areas are toll-free, so motorists don't pay a fee to use them. But a very different picture emerges when environmental costs and carbon pricing is factored in. Even with a low carbon tax of $100 per metric ton of carbon dioxide, motorists cover only a small fraction of the environmental costs of running their internal combustion vehicles so they are not covering their full user-costs (the transport sector accounts for 28% of US greenhouse gas emissions). Bicycles have negligible greenhouse gas emission and incur minimal environmental costs.

7 *Cyclists further the gentrification of inner cities.*
This may be true, although separating cause and effect is not easy – it is equally possible that gentrification promotes cycling in the city. Either way, the changing location of work within the city inverted the geography of the early-to-mid-twentieth century. Office work, financial services, multi-media, the creative arts, tourism and recreation now cluster in the central city, while manufacturing, warehousing and distribution have long deserted the areas surrounding the central business district for the outer suburbs. When home and work are located in close proximity, cycling becomes a viable means of commuting. From a transport perspective, increased velomobility due to gentrification is a plus.

8 *Distracted and scofflaw cycling causes accidents.*
Reckless motorists, scofflaw cyclists and jaywalkers are all equally guilty of negligent and distracted behavior. All such lawless acts are wrong. It is worth noting – not as an excuse but as a contributing factor – that motorists and pedestrians have their own road space, whereas cyclists often do not.

9 *Bicycles have become a disposable consumer good creating ugly piles of rusting metal.*
Because bicycles in high-income countries are relatively inexpensive to buy, little care is taken of them. Landfills have piles of discarded bicycles that, with a little care, can be put back in working order. Fortunately, in some places this is happening, with bicycles repaired by volunteers and then re-cycled to those with limited disposable income, or passed on by charities to low-income countries to improve the mobility of those who

cannot afford public transportation or a bicycle. In China, station-less bikesharing schemes based on smartphones, such as Ofo, Mobike and Bluegogo, have led to an increase in urban cycling (Wang, Huang and Dunford 2019). But there has been a cost: over-supply, wilful damage to bicycles and hyper-competition has resulted in massive piles of abandoned and broken dockless bikes, as well as smaller piles on street corners in many Western cities where they have also been introduced and trashed. A return to docking bicycles may be the solution.

10 *New bicycle paths cut through green spaces and damage nature.*
The bicycle is not always a green paragon. Cases are reported of bikeways being cut through bush and meadows, destroying ground-nesting birds' habitats and felling mature trees. This is regrettable, and such impacts should obviously be minimized. But new roadways and railways typically have far greater impact on the environment not only because they are wider, but also because their base is dug much deeper.

The conclusion to be drawn is that, despite some locally negative outcomes, bicycles can be compared favorably with motor vehicles in term of space consumption, cost for the public purse, and a range of environmental and urban impacts.

Non-conformist uses of the bicycle

Everyone has seen cycles used for commuting, for shopping, for exercise and for other forms of mobility. These uses are examined in depth in the chapters that follow. Not discussed are obscure uses, some alarmingly destructive, so as to avoid giving the reader the impression that they are simply harmless riding machines, a few of the alternate uses to which the bicycle has been put to will be noted.

For over a century bicycles have been used in wars, and, more recently, for acts of terrorism. In two world wars, bicycles carried messages, moved troops and ammunition with stealth, served as ambulances to carry the wounded and transported infantry (Fitzpatrick 2011). In World War II, the Japanese army successfully and swiftly invaded former European colonies in South-East Asia with their highly mobile bicycle corps, a tactic subsequently copied by Viet Nam in its anti-colonial war with France, and the Viet Cong, when their 64,000 load-bearing pack-bikes moved largely undetected along jungle paths to defeat American forces (Cheney 2017). On March 6, 2021 *Agence France-Presse* reported that a rickshaw loaded with explosives was detonated by al-Shabaab Islamists outside a popular restaurant in Mogadishu, with 20 people killed and 30 others wounded. This was a case where the "below the radar" character of the weaponized bicycle led to it being infiltrated unnoticed into the city center. These acts of war and terrorism result from the lethal potentials of the bicycle being under-rated by higher authorities.

More commonly, the bicycle is an instrument of peace. Inner peace can be found on a leisurely solo ride, and groups find cycling a convivial activity promoting social cohesion (Illich 1973). On one recent occasion, it has physically promoted peace: after motorcycles were banned in Maiduguri, north-east Nigeria (the birthplace of Boka Haram) in 2011 due to their violent attacks, bicycles became popular and peace returned to the city, triggering an economic boom (https://www.bbc.com/news/av/world-africa-37045314 accessed July 15, 2021). Vignette I explains how the bicycle's developmental role can promote peace.

Bicycles have acquired symbolic meanings not directly related to riding them. Old bicycles have become kitsch garden ornaments, a posy of flowers in their baskets. The semiotics of the bicycle often interpret it as a symbol of a past age, redolent of a person's youth, with (*pace*

Walter Benjamin) a lack of critical distance between the observer and the observed. This use of the bicycle carries over to sentimental greeting cards, pot-boiler book covers, comic books and street scenes in film and television. In Britain, the ordinary (penny farthing) bicycle is widely used to signify an antique shop, such is its symbolic power. In up-market clothing stores, bicycles are used in window-dressing to connote fashionable outdoor styles and a sense of freedom. Some view bicycles as sculptures in their own right or as components of a sculpture, the most widely known being Pablo Picasso's bull's head, made of a bicycle saddle and handlebars, and Ai Weiwei's bicycle sculptures discussed in Vignette M. Some of his bicycle installations are large enough to decorate entire urban neighborhoods.

One of the less obvious uses of the bicycle is as a therapeutic treatment for anxiety and depression, attributable to the beneficial sensory experiences of cycling, and the sense of freedom it produces, particularly, as Ross (2021) notes, for women. It activates the body's proprioceptive system as we balance, pedal and steer, there is continuous visual inspiration, while stimulation of the tactile senses – sun on the skin, wind in your face – all engender a sense of escape from the cares of the world. A bicycle's benefits extend to group therapy, as evinced by meetings of Indonesia's KOSTI (komunitas sepeda Indonesia) which holds annual gatherings with several thousand participants riding colonial-era bicycles wearing remarkable costumes in an uplifting display of cycling designed to alleviate a sense of anxiety and promote a sense of community among participants, very few of whom are prosperous.

There are major contradictions in the way bicycles are used, often by *othering* the non-user of the bicycle. Both in fiction and in real life, they help to build social networks yet have also served in acts of brutality. There is an incongruity between designing bicycles and tricycles to increase the mobility of persons with disability, and *No Fear* mountain bikers riding down precipitous mountainsides at significant risk to life and limb. Sturdy cargo bikes carry children to school in the Global North and farm produce to market in the Global South, whereas minimalists strip their fixie bicycles down to bare bones unable to carry anything but their rider. And while radical environmentalists view motorized transport as a disaster, many leisure cyclists happily drive their SUV with trail bikes hanging from a rack to a nearby bicycle trail.

In recent years, the bicycle has frequently been proclaimed not only as a companionable machine but also as an Earth-friendly device offering unknown possibilities around the corner. Although there are critics who traduce the bicycle and speaking disparagingly both of the machine itself and of its use by riders, the following chapters will demonstrate that the bicycle is one of the most useful artefacts ever invented. It is compellingly egalitarian, overwhelmingly a source of pleasure or convenience, a stimulus to travel, art and literature, rarely boring, and mostly an earth-friendly means of functional mobility. The interdisciplinary nature of cycle studies captures this versatility. In the words of the late Archbishop Desmond Tutu:

> Give a man a **fish** and feed him for a day. Teach a man to **fish** and feed him for a lifetime. Teach a man to cycle and he will realize **fishing is stupid and boring**.

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PART I

Cycling and society

An introduction

Peter Cox

Thinking about an introduction to this part on cycling and society, I am taken back to the genesis of the book of the same name (Horton, Rosen and Cox 2007). Some speculative correspondence between a group of people who had previously known each other through cycle campaign networks and were now working in different fields of social science wondered whether there might be any mileage in getting together to make a conscious and concerted connection between cycling and society. A symposium, a mailing list and, eventually, a book followed, deliberately trying to sketch connections between what we collectively knew of existing academic and enthusiast work on cycling and ideas and problems familiar elsewhere in our studies.

Interdisciplinary in intention, the organization of a network for social scientific cycling studies, the Cycling and Society Research Group (CSRG), took advantage of several developments in social science research that provided opportunity, legitimation and frameworks for study. First, sociological recognition of the importance and relevance studies on everyday and mundane activity. An explicitly social-science-based cycling research network opened the possibility of studies going beyond either the existing remits of historical analysis or transport studies. Pioneering work was already in progress in the fields of the study of technology (Bijker 1995). Another important prompt was the work of Albert de la Bruhèze and Veraart (1999) who, by producing a comparative study of the fortunes of cycling in a number of European cities in the twentieth century, gave shape to a whole line of enquiry. Differential fortunes of cycle technologies for transport were not explicable by reference to technology alone. Where instead might explanation lie?

A second important development was scholarship focused on mobilities research, formalized in 2004 with the Centre for Mobilities Studies (CeMoRe) at Lancaster University (UK). Dissatisfied with conventional models based on the idea of societies as fundamentally stable objects that occasionally move (or are moved) from one state to another, mobilities research started from the idea of a world in constant flux. Mobility – the constant shift and transformation of the world – is put at the centre of study, instead of the lingering nineteenth-century focus on social statics. This paradigm shift reframes the study of physical mobilities. Studies of transport, previously neglected in sociology, became important. Processes of movement, how movement creates mobile subjects, how some are rendered less- or immobile and the effects of power relations between those moved and not moved, all become areas for research

DOI: 10.4324/9781003142041-2

and study. Cycling became an interesting case in mobilities study, not merely for its contribution to debates on sustainable transport or liveable cities (although these remain important) but as a gateway to other discussions such as kinaesthetics or the politics of space and urban design. How power is manifest in public space and the consequences of social justice, inclusion and exclusion have all become major foci of cycling research and allied mobilities research, recognized in ongoing work on mobility justice (Hoffman 2016; Golub et al. 2016; Sheller 2018; Cook and Butz 2019). These topics provide a clear basis for the subsequent chapters in this part in Cycling and Society.

Engaging with mobilities research, academic studies on cycling were released from transport studies concern with the modal split and the management of traffic as an adjunct of policy and opened to a wider social science analysis that did not necessarily have to serve a pre-existent agenda. Early studies such as Smith (1972) had explored the social history of cycling, but the explanations proffered largely explained cycling as a function of other social factors. That is, cycling was either a secondary product, to be explained either as an outcome of other social and technological processes or, conversely, a factor *sui generis*. Cycling is contradictorily depicted as having its own social power, for example, as a force of liberation for women or for working classes but in all other aspects its fate was a reflection of other social changes. These analyses are not invalid but lack the capacity to present a more nuanced picture that might, for example, understand the complexities of gender equalities being entangled with other areas of social difference and inequalities in class and race as explored in the chapters that follow. Similarly, deterministic portrayal of cycling activities lacks any space to explore the interplay of forces that could interact with its place in emancipatory politics. Overall, both approaches are problematic inasmuch as they homogenize cycling to be a 'thing': recognizable and measurable. Instead, applying the approaches of critical social theory to the subject of cycling opens up the complex and contradictory identities and processes bound up. The introduction to *Cycling and Society* (Horton et al. 2007) started out by raising a series of divergent images, all of which could be subsumed under the single title 'cycling', but which demand multiple dimensions of analysis using different disciplines and research methods as found in this volume.

Predictably, researching cycling attracted and continues to attract those who were already interested in cycling as a phenomenon. While this may seem remarkably self-evident, in practice connected those with interests in cycling that extended beyond academia, most notably those connected through networks of advocacy and bike activism. After all, academics pursue topics that interest them within disciplines in which they are invested. Prior to the widespread availability of research funding, enthusiasm could be the only incentive for social science research into cycling. Not unexpectedly, this tied social science research in cycling to the broader world of campaigning networks, already engaged in international connections.

Studies addressing cycling as a social phenomenon naturally and obviously draw from sociological framings of social relationships and social problems. However, rather than divide the chapters in this part up into the obvious thematic headings as if presenting an undergraduate introductory volume, the topic headings and approaches here highlight instead the breadth of styles and contribution in current work on cycling and society. Opening with a focus on theory, Cox considers the purpose of thinking abstractly and the legacy of different approaches that are visible in social studies across a number of disciplines. The subsequent chapters range widely in topic and approach. Bonham and Jungnickel address issues of gender and cycling but move us away from simplistic accounts of women's cycling to explore how it is that gendered identities are produced and how this production is entwined with cycling, how cycles and cycling practices become part of the (re)production of gender. In highlighting selected aspects of the social dimensions of cycling, Batterbury and Manga use the term "bikespace" to

describe the way that cycling creates new forms of interaction, often intensified. These need not rely on actual movement on the bike but are also visible in the networks created around repair and replenishment of both cycles and riders. Contrasting issues of injustice and inclusion take up the next chapters. Krizek highlights how cycling is not immune from the structural inequalities of wider society. Conversely, van der Kloof daws our attention towards the huge diversity of programmes and activities using cycling as a means to overcome exclusions, or that serve to make cycling provision itself more inclusive. Importantly, this chapter also highlights the location of much knowledge of cycling as existing beyond academia. This theme is also taken up in Inckle's chapter, in which practical everyday experiences are brought to the fore. She ends by reiterating the potential that cycling has to be beneficial, but also the distance that current provisions still have to go in most locations.

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1
THEORIZING CYCLING

Peter Cox

To talk about theory in relation to an activity that appears to be simple, straightforward and self-evident might, at first, seem an odd choice. Surely, cycling simply requires a cycle, someone to ride it, and a space in which the riding can take place? However, when this simple equation is unpacked, it rapidly becomes obvious that this single description covers a multitude of activities. Cycling has a global history. It involves, as this volume demonstrates, a huge variety of stories, perspectives, participants and meanings. A lifetime could be spent in recording the multiple stories and events involved. The emergence of cycling studies as a distinct area of academic and popular research has shown that it also involves different ways of looking at the phenomenon and some radically contradictory ways of thinking about its current significance, its future, and even its past. Acts of interpretation inevitably and ineluctably engage us in the process of theorizing, of creating ways of knowing the events and processes under scrutiny.

Much of the rise in cycling studies in the last two decades has been coupled with a simultaneous interest in theory in order to understand better why cycling phenomenon occur. Theories of change, for example, cast light on why certain societies' attitudes toward cycling have developed differently. Explanatory accounts differ, drawing on a range of disciplines and analytical frameworks. Apparently contradictory at a surface level, multiple explanations develop multilayered explanations to overcome simple linear narratives struggling with complex realities. Further, they allow us to compare the relative importance of given factors in particular locations. Transport studies and cycle historians have naturally paid attention to these questions: the focus here is on the emergence of studies on, and theorization of, cycling in the social sciences.

Why theorize?

The point of social theory is to go beyond immediate observation and to make sense of the observable. Social theories provide means of interpretation to answer the "so what" dimension that arises whenever we are confronted by information. They go beyond data collection and ask, "why is this so?," "what is significant about it being so?," allowing social scientists not only to explore the presence of different variables, but also to assess their relative significance in relation to other processes. Theoretical models reveal underlying processes. They allow us to move beyond the particulars of the immediate to show how a given example might be generalized.

DOI: 10.4324/9781003142041-3

Beyond this function, at a more abstract level, social theory can have a more philosophical role to play. It can be used in speculative mode to suggest (or posit) a novel way of looking at phenomena. This may include underlying processes not obvious from data alone; for example, contrasting monetarist and Marxist interpretations of bikesharing. Theory allows the building of hypotheses that can be tested to determine whether models proposed have validity, and, if so, what the reach of that validity is, even though the subject matter might be entirely abstract. Speculative thought provides further insights to show other ways of seeing events; explanations that can cast light on other allied, but not similar phenomena. Social scientists of all persuasions can bring pre-existing ways of theorizing sociality, social relations and social phenomena to bear upon cycling. The relation between cycling and social theory has been a fruitful one.

This chapter explores some of the ways in which theorizing cycling has developed and examines some of the key ideas. It also shows some of the functions that they have had in cycling studies, and how abstract conceptualizations may serve practical purposes. Links between theory, research, and policy are not direct. Testing theory and exploring ideas requires research and cycling studies have been notable in utilizing novel methods, including, for example, digital methods to explore experiences and perceptions (see, for example Brown and Spinney 2010, Spinney 2011).

Studies of cycling and society reflect the divergent trends in social science research. On the one hand, studies record (apparently) straightforward empirical measurement, telling us who does (or did) what, and where. Measurements of the identities of cyclists (according to factors such as gender, age, ethnicity or other social variables), of ride or trip lengths and purpose, of frequency, or of modal shift, all serve to enable basic understanding of what is going on. The "why?" needed to explain distributions requires different forms of analysis. Data collection and collation, recording, chronicling, and statistical analysis preserve information on what happens, and what relation it bears to other data. In transport studies, we might, for example, explore user information to determine modal shift or rises and declines in journey frequency or length, or even journey purposes. We can measure who rides, activity distribution and how it relates to social inclusion or exclusion, to the maintenance and reinforcement of social privilege, or to its challenge in pursuit of more just and sustainable societies. Studying cycle sport we might explore participation rates, distributions by gender and the interaction between amateur sports organizations, participation and physical and mental health. As we see in other chapters in the volume, these correlations are vital dimensions of the bigger pictures of cycling studies. However, to go beyond the measurement inevitably engages us with social theory.

Data collection and empirical work is most obviously valued in the application of research to public policy and has led to a rapidly growing body of literature (Pucher and Buehler 2017) as this volume shows. The form, mode and techniques of analysis to interpret data, depend on underpinning theories of how the world is and how it works. Even before the analysis, the very things researched and the questions that seek to be answered depend on underlying presuppositions not only about how things are, but also often on desires and expectations of how things could be, or how things ought to be. These normative questions are, as Oosterhuis (2014, 2016) has observed, very visible in cycling studies as they have emerged over the past twenty years. Persons electing to study cycling through an academic lens frequently reflect prior interests in cycling promotion outside academia.

Whether related to sport, transport, leisure or health, data on cycling and its comparison with other data sets allow deeper investigation into the nature of these relationships. Statistical analysis allows us insight into the relative significance of data correlations and to propose

which relations might be causal, and what further research agendas are required to allow us to demonstrate the direction of effect between two (or more) variables. These ways of thinking about researching cycling are the keystones of research design and shape cycling studies.

There is, however, a second dimension of social science research that on immediate inspection might appear a little more esoteric. It might even be assumed to be less valuable in terms of its impact on policy and practice. As we shall see, this assessment is not entirely accurate. It addresses the logical consequence of data analysis by focusing on the 'so what?' factor. It asks why something matters (or not), why should it be of concern or worth further reflection? What might information be useful for?

Knowledge and theory

While investigations of cycling may appear to be self-evident explorations of fact, meanings and interpretations are subject to analysis and construction. As shown by recent work on knowledge production in other areas of social theory, knowledge is never neutral. "Who produces knowledge, what is produced and what is 'left out' are central questions of enquiry within the politics of knowledge" (Jansen 2019: 2). Consequently, cycling research, generating knowledge about cycling has its own politics, especially in relation to what is, and what is not, researched. Different theoretical perspectives shape the form and direction of research. Distinct positions require and pose different sorts of research questions. In cycling studies, as Johnson and Bonham (2012) succinctly point out, a primary divide has emerged between realist and non-realist perspectives, reflecting different basic starting points in general philosophy. Non-realist analyses can be further divided between constructivist and social constructionist approaches. This is necessarily a simplification of a complex set of arguments and the categories are far from impermeable, but as a way of understanding the different directions and research questions taken in cycling studies, it is a useful guide.

Realist approaches, more properly, realist ontologies, view reality as existing independent of the individual. Objective knowledge of that reality is possible. This positive knowledge can then be used to inform decision-making, either by individuals or in policy. These positions provide the foundation for the majority of cycling studies, especially as related to health and to most policy analysis. Focusing on measurable problems and factors, a broad range of tools for research, data gathering, and analysis can be brought to bear from the conventions of existing and familiar social science practice. Critical realist approaches (typified by Melia 2016, 2020) present a valuable departure from straightforward realism, rejecting the positivism sometimes associated with realist ontologies. Applied as a way of understanding policy, particularly cycling polices, they show how deep and often-hidden structures affect decision-making in ways not easily accounted for in straightforward measurement.

Constructivist positions, by contrast, suggest that people are "born into an already interpreted world, they and their interpretations of the world are necessarily shaped by socially available understandings" (Bonham and Johnson 2012: 2). Such positions push toward explorations of how people make sense of the world, how meaning is constructed and how events are interpreted. For cycling research, constructivist approaches allow us to interrogate how certain images and ideas around cycling emerge (Aldred 2010). Exploring worlds of mutable meanings does not preclude policy engagement. Instead, it can open up new ways of thinking about cycling policy, not as an arena of pre-determined optimal solutions but of conflict. Rather than searching for best-practice solutions, questions posed from this perspective recognise and consider how different solutions might address different ways of understanding what cycling is for and for whom (Hoffman and Lugo 2014; Pugh 2019). Again, constructivist analysis has

a broad base and legitimacy in current social science, although its precepts are perhaps less self-evident than realist ontologies.

A second line of non-realist approach is in social constructionism, which foregrounds concern with cyclists and cycling as products of different sets of relations. In other words, a cyclist may be literally described as a person on a bicycle (physical reality is not being denied), but what that label 'cyclist' means for the person cycling and for any number of different onlookers, may be very different and mutable things, often contradictory, changing over time, and contested. From a constructionist perspective, it is also legitimate to ask 'when is a cycle a cycle?'; in other words, to deconstruct the very category (Cox and Van de Walle 2007). How many wheels? How is it propelled? Is an e-bike still a bike? At what level of power augmentation can it still be considered as such (conceptually rather than legally)? Constructionist approaches require unpacking the categories of objects and activities under examination, not assuming that there are pre-existent, uncontested shared understandings of cycling practices and persons (Cox 2019).

A notable example of this approach in practice is Horton's (2007) paper on the social construction of fear. Without denying people's very real fears about cycling, he demonstrated how safety campaigns and regulations, ostensibly intended to allay fears, serve instead to create a field of images, narratives and conversations (that is, a discourse), in which cycling is depicted as an intrinsically unsafe activity. Through this discourse, the language of unsafety becomes embedded (inherent) in the public image of cycling. Thus, individual apprehension is disconnected from risk and fed by the discourse. Rational analysis of fear as a response to risk becomes impossible in such circumstances.

Constructionist and constructivist approaches to thinking about cycling have led to greater dialogue with other areas of contemporary social theory. There are geographical variations in the prominence with which these positions appear in cycling studies, reflecting localized traditions in wider social science research, and marking different academic disciplinary sympathies or hostilities. While the debates over fundamental positions and theories of knowledge may seem obscure and arcane, even irrelevant, by entering these debates in wider social science research and thought, new directions in cycling studies have emerged.

Varieties of thinking and theorizing

Directions in which cycling can be theorized fall into a number of interrelated but distinct streams. Different disciplines, as this volume illustrates, bring different concerns and methodological norms with implicit theoretical presumptions. That is, different ways of looking are rooted in different explanatory models. Historical accounts might seek explanation for the changing fortunes of cycling in business organization and manufacturing histories (Epperson 2000), in the legal regulation of cycling (Longhurst 2015), or the agency of cyclists themselves (Reid 2017). Each is enriched by theoretical explanations grounded in disciplinary sensitivities. For example, examining the destructive impact of colonialism, Boal (2001) also noted the relationship between crop failures caused by volcanic eruption and Karl von Drais' construction of his laufmaschine. While controversial, his analysis provides a different way of thinking through events. Similarly, Kat Jungnickel's (2018) use of feminist theory to re-examine the use of patent innovations among Victorian cyclists allows us not just to record and reflect on their actions, but also to rethink the agency of early women cyclists and what this has to contribute to wider narratives of gender and social roles (see Chapter 2).

Social theorizing on cycling loosely divides between approaches concerned with the social construction of technology and those that place cycles and cycling within broader social

analysis. Theories of technology deal with the machinery and mechanics of bicycles and tricycles and expand this to include users and geographies (Norcliffe 2009). Cycles have to be ridden and so further questions need to be asked in relations to who rides and why? What factors and processes ensure the distributions of technologies, their acceptability (or not) to different groups of users? Explanations are sought for the different distributions of cycling across geographical territories and between social groups divided by gender, class, race and other markers of distinction within the same location.

Cycling as a sociotechnology

In their ground-breaking work on the social construction of technological systems [SCOT] (1987), Bijker, Hughes and Pinch demonstrated that technologies do not develop or progress purely in response to technical imperatives, nor necessarily in a rational manner or direction. Rather, by considering the relationships between technologies and society, they showed how technological development is the outcome of a complex interaction of forces, often unexpected and rarely rational. Technological artefacts – sociotechnologies – are not comprehensible without consideration of their social origins. This means that sociotechnologies not only reflect but embody and, at least in part, reproduce the divisions, stratifications, and exclusions of the societies in which they are formed (Leonard 2003; Norcliffe 2009). Bijker (1995) examined the transition from high bicycle to safety bicycle as one of three case studies to show how this works. While his depiction of the details of historical events was sharply criticized by specialist cycle historians, the basic argument remained sound (Shrivastava 2005).

SCOT analyses show the role of the social in technological development. Initially, technologies can be understood in many ways. Through familiarity and common practice in the actions of users, flexibility of interpretation gives way to obduracy: further innovation and redefinition become difficult. Examining changing patterns in the 20th-century cycle industry, especially the flurry of innovation and change occurring from the 1970s with the development of BMX and mountain biking, Rosen (1993, 2002) investigated how previously obdurate conditions may once again become fluid through the impact of broader social changes.

Oudshorn and Pinch (2003) further argued that technologies are effectively co-constructed by their users. In use, artefacts become repurposed in often-unexpected ways. This renewed emphasis on users also helps highlight how innovation in cycling since the 1960s has largely come from outside the cycle industry. Where users pioneer new ideas and new uses, industry follows, not always successfully (Stoffers 2016). Significant developments in cycle technologies of sustainable transport, for new uses and new users, are actually produced as users become manufacturers (Cox and Rzewnicki, 2015; see also Chapter 9).

Seeing cycles as technological artefacts inseparable from the societies in which they are used and developed, situates cycle use and users within broader social contexts. For example, gendered conventional bicycle designs embody particular expectations of gendered social roles and behaviours. Beyond cycle technology, we need also to examine use and users, ways in which cycling behaviours and practices are mixed up with other concerns about social equity and inequality. This requires engagement with other dimensions of social analysis.

Cycling as a cyborg activity

Haraway's' influential 1985 essay "A Cyborg Manifesto: Science, Technology, and Socialist-feminism" made a constructionist approach to feminist thought widespread. Lupton (1999) applied her image of the cyborg to illuminate the transformations of vehicular road users.

Even without engaging Haraway's wider philosophico-political project of boundary dissolution, Butryn and Masucci (2003) used the cyborg to explore how cyclists emerge as an interplay of human body and technology. The basic imagery is not new, as Brogan (2016) points out, but the cyborg imagery and its constructionist basis provided a means by which to develop further thought on the ways in which the persons, technologies and spaces are connected in the act of cycling.

Still thinking about the interactions of humans and machines, Akrich and Latour (1992) and Latour (2005) explored the ways in which technologies (such as cycles) are bound up in networks of action (hence Actor–Network Theory, or ANT). Technologies are not inert objects within these networks: differences in technology afford (and, conversely, constrain) different possibilities of action for different users. While not having wilful agency in the same way as human participants, technologies are 'actants' not neutral objects. Applied to cycling, this opens up new ways of thinking, for example, about how cycle use can shape cities and social relations of spaces within them; or the historic effects of cycle mobility to open opportunities for autonomous travel in sections of the community previously denied through class, gender or race. Cycling is also almost always a public act, so how these actions are performed also matters. Without theory, we may observe patterns of change but be unable to use those observations.

Deleuze and Guattari's (1988) concept of an assemblage allows further progression. Machines and humans are intertwined, but these relations take place in a broader network of connections that give meaning to the technologies and their usage. Cycles (when used in mobility and not just as items of display) are meaningless without the spaces in which they are used. Just as different cycle designs provide different opportunities of action (to different users), different spaces of use afford different possibilities to various combinations of user/machine (Norcliffe 2009). Cycling is thus a hybrid assemblage of cycle, user and space, and complex interactions between these (Cox 2019). One obvious implication of this is that policy needs to take account of the multiple 'cyclings' that emerge from different combinations of elements.

Cycling as a social practice

Social practice theory (Shove, Pantzar and Watson 2012; Watson 2012), uses cycling as an illustrative example. Social practices are those actions in society undertaken by many people, often on a mundane basis (cycling, doing the laundry, brushing one's teeth, recycling). However, rather than thinking about social practices as the sum of individual actions, Shove and her colleagues have examined how they can be depicted as the conjunctions of materials (physical things involved), competencies (skills and knowledge of participants) and meanings (values and discourses attached to the action). Social practices therefore take on an existence beyond the participation of individuals: the relationship between action and practice is inverted. Social practices can be said to recruit people, to offer potential participants rewards (real and/or symbolic) or, conversely, to dissuade participation by constructing barriers, depending on the arrangements of the elements. Further, social practices do not exist in isolation, they are interlinked with one another. Thinking through cycling in this way exposes cycling practices as more than the sum of individual behavioural choices (Spotswood 2016). Infrastructures and machines, the skills and knowledge required to use them, and the acquisitions processes, social reputation, all interact to shape cycling practices. This has clear implications for policy thinking (Shove 2011, 2015), especially considering changes required for greater sustainability: a situation in which cycling has much to offer (Parkin 2012).

Automobility and vélomobility

Perhaps the most important contribution to theorizing cycling and society (from the perspective of this writer's particular concern with cycling and sustainability), are those ways of thinking prompted by Urry's work on *mobilities*, specifically his analysis of *automobility*. (Urry 2005). His innovation was to move from examining the car either as an object or through its use, and to adopt a systems analysis of the sets of social, economic and political relations that are bound up with car use. As Cass and Manderscheid (2019) summarize, beyond the car lies a tangle of relations comprising "its production, fuel and infrastructure industries, the policies that create automobile landscapes that separate work, residence and other activities in space, as well as the discursive and cultural association of cars with freedom and autonomy. Modern lifestyles that archetypally centre on one-family-houses in suburbia, shopping centres and leisure facilities on the edge of cities represent the ideal of the 'good life' under automobility." Urry also notes the way this system also serves as the 20th century's archetype of a growth-oriented carbon economy, in what he later called carbon capitalism (Urry 2011).

Although not directly concerned with cycling, the system of automobility Urry describes has nevertheless provided the context for most of cycling's history. Even when cycling was numerically greater, political decision-making and planning was designed to favor the car, and popular discourse held motoring as the most desirable from of personal mobility (Carter 2021). In the light of dramatic changes in carbon emissions required to address the climate crisis (WMO 2020), especially in the transport sector, cycling for transport has the potential to make significant contributions to future low-carbon transport scenarios. As the systemic analysis shows, however, the problem of automobility is not just an issue of the internal combustion engine. Electrification of the auto fleet will not address the energy-intensive requirements of the system. Consequently, authors such as Koglin (2013) have adopted vélomobility as a term to explore the parameters and possibilities of a system of mobility predicated not on private motoring but on human scaled mobilities based on active travel forms (see Chapter 21).

Conclusions

This is far from a comprehensive analysis of theoretical perspectives on cycling. Instead, it suggests social theory as necessary to comprehend cycling and society. Cycling activities are not separated from the rest of the social world. As we address the interaction of cycling with issues of work, of gender relations and roles, inequalities of class and race or of the social exclusion of people with impairments (and the ways in which these may be alleviated or exacerbated by the ways in which we think about and act on cycling), we are encountering issues of knowledge. Here we come back to the quotation from Jansen: that knowledge is always political – whose knowledge counts, and who is and is not included as having valid knowledge, is a political decision. Theorizing cycling, the choice of ontological positions made in designing research and writing about cycling matters. There is always a temptation in social science research to identify problems and immediately focus on ways of solving them. Cycling researchers are not immune from this. However, by reflecting on the underlying bases of thinking and the ways in which these have the potential to define problems in particular ways, this chapter is an attempt to assist better research design.

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2
CYCLING AND GENDER
Past, present and paths ahead

Jennifer Bonham and Kat Jungnickel

Introduction

Cycling's possibilities and also its problems are not equally distributed or experienced. Discussions, reflections and questions of gender have formed an integral part of cycling inquiry for more than a century or for as long as the bicycle has been popularized, practiced and pilloried. The who, along with the what, where, when and why of cycling, has been a primary topic of debate. Since the 1990s, this debate has often started with the observation that in low-cycling countries, including Australia, Brazil, Canada, Chile, the UK and the USA, men are much more likely to cycle than women. By contrast, women in high-cycling countries like The Netherlands and Denmark are as, if not more, likely to cycle than men (e.g. Aldred et al. 2017). These national differences, along with historical accounts of women cycling (e.g. Jungnickel 2018), counter arguments that women have a 'natural' aversion to riding a bike (Garrard, Handy & Dill 2012). Much of the gender and cycling literature is concerned with examining how and why cycling is or isn't available to diverse populations and the barriers in place that impede its uptake.

This chapter focuses on why intersections of gender and cycling have long been, and continue to be, critical subjects attracting the attention of interdisciplinary and international writers, practitioners and researchers. This covers work in fields such as sociology, geography, cultural studies, and history amongst others attempting to diversify and broaden the spectrums of cycling. While it is not possible to delve deeply into all of these rich debates, in the following we present the "state of the art" overview of gender and cycling to provide a map of sorts.

We start with a discussion of gender and gendering practices, review historical underpinnings, consider present-day themes in everyday cycling (understood as cycling to a destination such as work, shops, education, social and other activities), and conclude with some of the future challenges to broadening cycling reach.

From gender to gendering

Gender is used in cycling literature in various ways. At times it refers to a person's biological sex as one attribute among many. In other instances, it refers to the sets of attributes acquired by biologically sexed bodies (women and men) in the process of socialization. The biological

 DOI: 10.4324/9781003142041-4

body is presumed to pre-exist and serve as the material basis for the socially constructed gender norms anticipated of it.

Alternatively, gender refers to the qualities, characteristics, behaviours and functions constituted as biologically sexed bodies (Butler 1990). In this understanding, biological sex and gender do not align with a nature/culture divide but are co-constituted within practices (research, policymaking, legal proceedings, industrial design etc.) referred to as gendering. These 'gendering practices' produce 'women' and 'men' as specific kinds of unequal political subjects (Bacchi 2017) and operate toward regulating populations (Butler 1990). However, because 'women' and 'men' are produced within practices (including a variety of scientific practices, Mol 2015) their production is ongoing, incomplete and open to change. Bringing this conceptualization of 'gendering' into cycling (Bonham & Bacchi 2017) responds, in part, to calls for a more detailed and systematic examination of the relation between gender and mobility (Ravensbergen, Buliung & Laliberté 2019).

Recent scholarship is providing insights into how gender identities are produced and how they are claimed, consolidated, contested and reconfigured through entanglements both on and off the bicycle. The proliferation of identities – trans, queer, non-binary – demonstrates the possibilities for reconstituting gender. These identities are being produced in cycling literature with researchers enabling respondents to claim different gender statuses. Importantly, we expect research on gender and cycling to open up new ways of doing bicycling beyond the dichotomous female/risk-averse/slow/defensive and male/risk-taking/fast/aggressive that often populates the cycling literature. Our review of the current state of gender and cycling research points to opportunities for disruption as a way of re-shaping bicycling and making it available to diverse populations.

We begin with an overview of cycling in the late 19th century where research has focused on how mobility reconfigured gender in Australia, Europe, New Zealand and North America.

Recovering cycling histories

One of the primary reasons cycling is intertwined with gender relates to the social and cultural contexts of its invention. In 1895, Frances E. Willard wrote *A Wheel Within a Wheel* during the cycling craze that swept England. She took up cycling at the age of 53 and evangelized bike riding for people of maturing years and for women in general. Willard believed bicycling held the power to mitigate some of the many restrictions on Victorian women's freedom of movement in relation to clothing, social lives, physical health and political expression. To Willard, the bicycle was a 'new implement of power' that held 'special value for women' and would 'help women to a wider world' (1895, p. 73).

Women have long been enthusiastic cyclists, yet there are far fewer records documenting their interest and achievements. From the advent of popular cycling in the 1890s to today, this blindness lingers. Researchers are recovering the history of women's engagement with cycling and using it to argue for the importance of representational equality and diversity. At the end of the 19th century, women embraced bicycle racing (Simpson 2007), were early adopters of popular 'Bike Portraits', a fusion of new technologies (Kinsey 2012), and inventors of radical new forms of early cycle clothing (Jungnickel 2015, 2018: see, also, Chapter 40). Then, through to the mid-20th century women took up endurance cycling (Bootcov 2019) and utility cycling as enthusiastically as men (Carstensen & Ebert 2012). Remarkably, this engagement persisted despite many social, political, physical and institutional barriers to women's cycling.

Bicycling provided a means for women to challenge a life anchored to the domestic sphere. It gave middle- and upper-class women especially 'a taste of independence… and physical

freedoms' (The Sketch 1896: 311). Changes in bicycle and clothing designs afforded opportunities for women to take up cycling in different ways. In contrast to many accepted accounts, women also drove many of these shifts, as keen consumers and also as actively engaged inventors.

'What' a person cycled, and cycled in, was shaped and regulated in terms of gender. Victorian society was highly differentiated by class, race and gender. How a person spoke, what they wore and the places they inhabited determined their course in life and how they were treated. By the mid-1890s, bicycles with a lowered top-tube featured in bicycle manuals and marketing materials as 'ladies' safety bicycles (Bonham, Bacchi & Wanner 2015). In creating the ladies' safety bicycle, engineering, design, metals, clothing, biology and class were brought together in a gendering practice. Differentiating safety bikes into ladies' (and necessarily men's) 'safeties' – rather than 'safety with'/'safety without' a top-tube – produced bicycles as gendered objects (ibid.). Gender was being co-constituted with the vehicle itself. Ladies' bicycles both consolidated femininity as a performance of 'modesty' and began reconfiguring it by opening the possibility of more vigorous exercise and greater travel distances.

Bicycle designs were also a response to what became known as the 'dress problem'. While men's clothes were more oriented toward physical activity, women's were not. Middle- and upper-class women's fashions, with tightly bound and heavy cumbersome layers, were perilously problematic on bicycles. The Rational Dress movement recognised the bicycle boom sweeping the nation as another way to continue their campaigning for lighter, looser layers to enable women to lead more active lives. Some pioneering women even patented radical new forms of cycle wear (Jungnickel 2015, 2018). However, while shorter skirts and bloomers or knickerbockers were safer and more comfortable to cycle in, they potentially exposed wearers to harassment from shocked onlookers who viewed wearers as masculine and threatening the status quo.

One reason cycling has been so political through the centuries is related to the public spaces it inhabited. Located outside, often in highly populated streets and parks, meant cycling garnered much more attention than other popular sports such as horse riding and swimming. Cycling was far less controlled by sporting's rules and young women could occasionally 'lose' their chaperones and experience personal private time. This was problematic in Victorian society, as upper-class women appearing unaccompanied in public were vulnerable to social disgrace. In contrast, swimming was considered acceptable for women because bodies were concealed within the confines of swimming enclosures.

'How' a person cycled was shaped by the bicycle they had access to, the advice available and the accumulated development of their capacities. Like bikes and clothing, advice on riding a bike was gendered, thereby making cycling available to women at the same time as altering the content of gender categories. Cycling catalyzed new periodicals and newspapers, which provided a visual imaginary and encouragement to cycle. While men's media were often oriented to racing, speed records and new technologies, women's titles implored riders to maintain ladylike decorum while cycling.

Highwheel Bicycles were first available to men and they established clubs to support their cycling participation. Cycling was one of many Victorian sports considered the 'natural domain of men and that to be good at them was to be essentially "masculine"' (Hargreaves 1994: 43). Men's cycling progressed rapidly, and attracted much media attention, because the advancements made in racing trickled down into ordinary men's cycling cultures. This meant it was more fitting for men to exert themselves on bicycles and also enter in bicycle retailers and claim expert consumer identities.

Club activities included staging bike races and fostering bicycle knowledge, but perhaps more importantly providing advice on how to conduct oneself on the roads (Mackintosh and

Norcliffe 2007: 153). Clubs rejected the practice of 'scorching' (riding recklessly fast) that involved young men and has been regarded as an assertion of masculinity especially with the 'domestication' of cycling by women (2007: 163). This point on domestication deserves further research attention. It flags how qualities constituted as 'feminine' might have modified the performance of cycling, thereby ensuring streets continued to be available for leisure, recreation and, eventually, utility cycling.

Women's engagement with bicycles continued into the twentieth century. Female athletes rode the post-war bicycle boom of 1930s Australia, with women's clubs emerging to focus on endurance racing (Bootcov 2019). Despite discrimination and resistance, women persisted and, in the process, challenged 'fears of "fast women", and the notion that strenuous exercise had deleterious consequences' (2019: 1448).

Recovering bicycling histories demonstrates that women's 'lack' of participation in cycling is a relatively recent phenomenon. While past practices suggest future potential, these histories focus on leisure, recreation and sport cycling in countries of the global north. More work from South America, Africa and Asia will enrich these stories. We also need to flesh out histories of gender and everyday cycling. While much has been written about the highs and lows of everyday cycling through the 20th century more attention on gender is needed. Many of the themes flagged in historical research provide insights into the gendering of everyday cycling in the present day.

Gendering cycling today

Over the past 30 years, activists, researchers and policymakers have promoted bicycling as a healthy and sustainable mode of transport (Chapter 30). Gender has been a key theme in developing the discourse on everyday cycling with women (and girls) consistently reported as less likely to ride than men (<30% and >70% respectively). Examining differences in cycling rates and recommending policies to facilitate participation is important in highlighting inequalities and it is also risky when women are produced as 'lacking' – lacking assertiveness, lacking speed, lacking skill, lacking knowledge, lacking time and lacking courage (being fearful or risk-averse). Research into *how* women engage with bicycling can challenge the concept of 'lack' and provide new ways of thinking about both gender and cycling. The following discussion is organized around conventional themes of 'challenges to cycling' and 'enabling cycling'. However, we have paid attention to gender attributions and how attributes are claimed, consolidated, contested or reconfigured by both researchers and their research subjects.

Challenges to cycling

Riding a bike in public space can be as fraught today as in the late 19th century. Cultural heritage and local cultural context – what cycling means and how it is 'done' – influences engagement with cycling (Aldred & Jungnickel 2014). As cyclists are in full public view, they can be observed, objectified and judged in that local context. At the heart of this surveillance is the regulation of presence, appearance and conduct in public space. Four issues related to 'public scrutiny' and self-regulation are often raised in cycling studies: physical exercise, maturity, sociality and personal safety.

Physical exercise, exertion and associated bodily secretions are often given as reasons for girls and women not cycling. This concern has been widely discussed in the gender and health literatures with representations of femininity and masculinity in popular culture often called out as the problem. However, we have barely considered how norms in present-day preventive

health and related literatures, such as 'women walk and men ride bikes', encourage people identifying as girls/women and boys/men to regulate their mobility. We laugh at 19th-century health warnings about women cycling yet Davara Bennet (2017) demonstrates how ambiguous medical advice given to pregnant women can regulate their cycling.

In low-cycling countries, physical activity and the bicycle itself have been linked to childhood and immaturity (Frater & Kingham 2018). Migrants in Toronto reported bike riding in their home countries was acceptable for young boys but it was unacceptable in adulthood (Ravensbergen 2020). Similarly, boys and men who cycle have been infantilized in US popular culture (Furness 2010) and Australian anti-drink-driving advertising (Nielsen & Bonham 2015). This representation resonates with views among some teenage girls in New Zealand that cycling is not 'cool' and adults do not ride bicycles. We return to this below.

The third aspect of self-regulation is sociality. Frater and Kingham (2018) reported girls feared rejection as friends would laugh at them and the bicycle was an awkward object when accompanying friends who chose to walk (the 'norm' for women). Yet for boys the bicycle served as a vehicle for social engagement which resonates with the participation of men in fitness bunch rides. By contrast, girls and boys in The Netherlands appreciated the social interaction provided by cycling (Frater & Kingham 2020). Exploring this link between gender, cycling, sociality and local context could open up new ways to make cycling available to teenagers.

Concern for personal safety, such as being sexually assaulted, mugged or harassed, is often cited by women as a reason for not cycling or limiting their cycling to particular times and certain places (Ravensbergen, Buliung, & Laliberté 2020). Targeting women via sexual assault and harassment produces public space as masculine and fosters women's self-regulation. However, in some contexts, bikes are preferred at night as women can travel more quickly (Montoya-Robledoa & Escovar-Álvarez 2020). Women cyclists in Bogotá, Columbia, reported property theft as their biggest concern with some running red lights to avoid or minimize targeting by thieves (Montoya-Robledoa et al. 2020). But harassment and threats to personal safety in Bogotá also came from male cyclists who challenged women's competence and admonished them for how they dressed (Chapter 38). The issue of harassment significantly shapes the journeys of minority women (and men) who are as concerned about the conduct of law enforcement officers as other citizens (Lubitow, Tompkins & Feldman 2019). While cycling in these contexts is fraught, it participates in contesting the masculinization (and, in some contexts, whiteness) of public space.

Related to public space is the issue of motor vehicle traffic. Traffic and potential for traffic-related injuries are frequently given as the reason women don't cycle or are selective about where and when they ride. This concern is explained as the different 'risk' tolerance of men and women. Rather than risk aversion, some are 'fed up' with the hypervigilance required to safely negotiate traffic (Bonham & Wilson 2012). Women are characterized as either 'naturally' more risk-averse than men or socialized as potential mothers and carers into risk aversion (see Garrard et al. 2012). Alternatively, traffic-related concerns have recently been explained in terms of differences in childhood cycling. Based on their Canadian research, Sersli et al. (2021) argue when girls are forbidden or discouraged from cycling, they do not have an opportunity to develop the necessary skills, knowledge and capacities. However, as they acquire knowledge and practice cycling in their new country, they became more confident in negotiating road environments (ibid.).

In the 19th century women celebrated the bicycle for the escape it offered from the domestic sphere. In the 21st century heterosexual households, women's greater share of domestic and carer responsibilities account for their lower rates of cycling (Emond, Tang & Handy 2009).

These complex journeys often requiring trip chaining, accompanying others (children, elderly parents, relatives with disabilities), and carrying goods, all of which make riding a difficult option, particularly in car-oriented cities. By contrast, research from The Netherlands comparing women with (n = 20) and without (n = 17) children reported all respondents felt very positive about cycling. The analysis noted variations in when and where women cycled and only marginal differences in distances travelled (Eyer & Ferreira 2015). Unlike many of their counterparts in low-cycling countries, having children did not spell the end of cycling for mothers.

Partners that share household and caring tasks more equitably can enable each partner to ride. Bonham and Wilson (2012) noted that for some women, carer responsibilities provided an opportunity for women to cycle. Accompanying children to school by bike was relationship building and allowed mothers to model personal health and environmental sustainability. We need more research on how men perform the journey-to-childcare and/or the journey-to-school with their children. Research from Bogotá on father's accompanying children suggests the persistence of 'toxic masculinity' with men performing aggressive, fast, risk-taking riding (Montoya-Robledoa et al. 2020). Research across different countries and cultures will provide alternative productions of masculinity.

Enabling participation

Provision of infrastructure and developing cycling skills and capacities are two key policy recommendations aimed at increasing women's cycling participation and reducing the disparities between women and men (Chapter 22). Surveys, interviews and observation studies consistently report women prefer or are more often observed using separated cycling facilities (Aldred et al. 2017). This raises questions about the very possibility of designing, constructing and regulating streets and roads that do not ensure the safety of *all* users, including cyclists. We might ask: what knowledge (data collection, travel surveys) has informed the exclusion of cyclists?; does catering to cyclists constitute them as a 'special needs' group that can be ignored in tight budgets?; and do infrastructure 'preference' studies participate in gendering cycling spaces? With the latter question, we might add: what are the effects of this gendering practice?

Over the past decade, attention has turned to developing cycling knowledge, skills and capacities that address people's (but especially women's) 'lack' and, arguably, prepare them for 'fitting into' existing conditions. These courses range from checking and maintaining bike components and learning about bike-handling to moderate or advanced riding skills.

School-based bicycle education and training is widespread in The Netherlands and Denmark, but it is variable in most other countries. Courses are usually conducted by private companies or bike advocacy organizations with the latter also catering to adults. There have been surprisingly few evaluations of the impact of these programs on increasing participation in cycling (Sersli et al. 2019). Importantly in the current context, Transport for London found the disparity in cycling rates of women and men reduced after training. However, studies among migrant women have been mixed (van der Kloof, Bastiaanssen & Martens 2014). Many women develop the skills necessary to riding independently; whether they actually commence cycling is another matter, especially if they have children.

Taking a different approach, alley cat races initiated by the women's collective Carishina en Bici (Bad Housewives that Bicycle) in Quito, Ecuador, develop cycling knowledge, skills and capacities (Gamble 2019). Deep play is used strategically to shift the physical and emotional experience of cycling in public space. In place of violence and aggression, alley cat creates public space as entertaining, playful and safe. It produces women as funny, fun-loving, courageous

and determined, although these qualities are not emphasized by Gamble. In Gamble's analysis, women continue to be constituted as caring and relationship-oriented but, importantly, these characteristics become a positive attribute of bicycling. Rather than women being problematized for their risk aversion, lack of speed and lack of assertiveness, cycling is constituted as a site of care and joy.

Working on the cycling body via formal programs, informal groups or individually has been critically examined for the production of gender itself. Using Butler's theorization of performativity, Ravensbergen (2020) has examined the translation of gender performance into cycling. Based on interviews with mainly migrant women and men completing a cycle training program, she reports on how participants regulate themselves toward gender norms when riding a bike. As noted above, bicycling in itself contests gender norms of some cultures. Participants' selection of clothing, times and places of travel, and practices of the journey begin to reconfigure gender performances.

Indeed, this links to the discussion of violence and aggression as performances of 'toxic masculinity' (Montoya-Robledoa et al. 2020) and raises questions as to how this version of masculinity became possible and what other versions are being produced within and beyond the academic literature. Addressing the first question, we can look more closely at the cultural context in which cycling takes place. In Australia and the USA, adulthood has become closely associated with getting a driver's licence. Representing the driver licensing process as a 'rite of passage' demonstrates the significance of driving in these societies, but how it has become a 'rite of passage' is rarely interrogated (see Nielsen & Bonham 2015). Driving replaces rather than adds to mobility options so that men, in particular, who continue to ride can be characterized as 'lacking'.

How then can men who ride bicycles in car-oriented cities perform masculinity? The behaviour directed at female cyclists in Quito and Bogota is an assertion that a certain type of physical strength and willingness to fight are qualities necessary to cycling in these cities. Only strong, aggressive men (not women) can cycle. Alternatively, in Australia and North America performances of masculinity involve fast speeds, risk taking and competition. Barrie et al. (2019) examine how sport cyclists located within virtual, material and social networks work on themselves to foster these 'masculine' attributes. Sersli et al. (2021) argue that John Forester's 'vehicular cycling' (cyclists riding like they are driving a car) is a performance of masculinity. We might ask whether 'vehicular cycling' made bike riding available to men at a time when driving a car was entrenched as the transport norm. Further, in constituting speed, competition and risk taking as masculine, men are encouraged to ride or speak of their riding in this way (Steinbach et al. 2011). Research by Barrie et al. (2019) directs attention toward men doing cycling differently, thereby reconfiguring or providing alternative masculinities.

It is in the enactment of networks of relations that bikes, bicycling and bicyclists are gendered. Tracing these relations, we can see how gendering happens and how it can be disrupted. We previously noted, entanglements that produced the 'ladies safety bicycle' in the 19th century. Today, bicycles without a top-tube are differentiated by the action in mounting/dismounting (step-through) or the places they are likely to be ridden (town bikes) rather than the body of the rider. But 'road' bikes, previously referred to as men's bikes, are being gendered in new ways. 'Women's (and consequently men's) specific' road bikes are produced within relations of engineering, biomechanics, anatomy, materials and design. Height, reach and hand size (to name a few) are used in differentiating both people and bikes. This new gendering practice produces 'women' as engaged in vigorous physical exercise. It has implications for bodies within and between populations that don't fit 'women' and 'men' constituted in this way (Bonham, Bacchi & Wanner 2015).

Conclusion

While many things have changed since the first cycle boom swept much of the world at the turn of the last century, a number of challenges remain remarkably similar. This chapter has attempted to map intersections of gender and cycling from the 1890s through to today and into the near future. We approached this ambitious task by marking how gender is claimed, consolidated, contested and reconfigured in the process of interacting with the bicycle. We journeyed through the why, what, where, and how of historic cycling and more contemporary discussions of cycling cultures around themes of 'challenging' and 'enabling' cycling. Throughout, we reiterated the potential for further research, inviting deeper investigation of ideas.

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3

THE PRECARIOUS WORK OF PLATFORM CYCLE DELIVERY WORKERS

Cosmin Popan and Esther Anaya-Boig

Introduction: from cycle work to gig work. A brief history

'As easy as riding a bicycle'. While this is easier said than done, the aphorism remains a powerful claim that cycling is a straightforward skill, which produces normative assumptions regarding individual body capabilities. This overoptimistic assertion may also imply that the bicycle is the most basic vehicle to navigate contemporary urban agglomerations, often associated with a desired "sustainability", while often disregarding the overwhelming hostility of automobile-dominated road environments. Similar postulations are also found in contemporary discourses about work, where flexibility and easy access have come to dominate the narrative of the last four decades. Neoliberalism has dramatically reconfigured jobs away from the security of decent full employment, recasting them as malleable while at the same time obscuring the increasingly precarious nature of work. The gig economy, a labor market characterized by independent contacting that takes place via and on digital platforms, represents the most recent attempt to legitimize this flexibility as both normal and desirable.

These strong beliefs that cycling and entrepreneurship are accessible to everyone have come together to explain the popularity that platform food deliveries such as Deliveroo, Uber Eats or Glovo have gained in recent years in urban environments across the world. One only needs a functional bicycle, undertake a summary selection process, install an app on one's smartphone, and one can become 'one's own boss'. The bicycle is seen, within this logic, both as a basic requirement and as a simple working tool that anyone can ride and afford, which facilitates access to a flexible job. Yet the reality is quite different. Contrary to the mainstream appraisal of cycling as empowering and liberating and of the gig economy as flexible and entrepreneurial, we observe the opposite situation. Namely, we argue that platform work adds an extra level of precarity to the already precarious practice of riding a bicycle in the city. And gender, ethnicity and migrant status all further compromise the already fragile living and working conditions of these workers (Chapter 19). We echo here as well the concept of intersectionality coined by Kimberlé Crenshaw (1989) to account for how cycling, race, class, gender, and other individual characteristics "intersect" with one another and overlap. In doing so, Crenshaw addresses not merely questions of identity and representation, but instead tackles deep structural and systemic questions about discrimination and inequality.

DOI: 10.4324/9781003142041-5