An Analysis of Cycling Infrastructure Decisions in Montréal, Canada

by

Isobel Cully

A Thesis Submitted in Partial Fulfillment of the Requirements for the B.A. Degree in Honours Geography (Urban Systems)

Department of Geography

McGill University

Montréal (Québec) Canada

April 2015

Acknowledgments

First and foremost, I would like to thank my supervisor, Prof. Kevin Manaugh, for his endless support during the past year and for dealing with my neurosis. I also thank my reader, Prof. Ahmed El-Geneidy for giving me an interest in cycling research in the first place. And of course, I thank my family and friends for being there for me and for being my uncredited editors.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF MAPS

LIST OF FIGURES

ABSTRACT

Cycling as a mode of transportation is gaining popularity in Montreal. With expanded ridership has come a need for more facilities, which has created headaches for policymakers and cycling advocates alike. Empirical studies on bicycle facilities have been shown to produce conflicting results. This study analyses the perception different stakeholders have of cycling and bicycle infrastructure in Montreal. A case study of the De Maisonneuve Boulevard bicycle path highlights the dissonance between stakeholders' interests and the cycling projects conceived by the City of Montreal. This study uses data from key-informant interviews, online cycling surveys and a media analysis. The main findings are that there is a lack of dialogue and education on the topic of cycling.

CHAPTER 1: INTRODUCTION

Cycling as a mode of transportation is gaining popularity in Montreal. Between 2008 and 2010, the city saw an increase of up to 40 percent in bicycle use (Miranda--Moreno & Nosal, 2011). The number of people cycling for transport increased from 25 percent in 2000 to 53 percent in 2010 (Vélo Québec, 2010: 7). Bixi, Montreal's bicycle sharing program, was launched in 2009 and attracts over four million riders annually. Montreal, considered North America's most bicycle-friendly city and one of the high-ranking cyclable cities worldwide, boasts 650 kilometres of cycling facilities (Copenhagenize, 2013; and Walker, 8 October 2014). Henceforth, cycling facilities will refer to road infrastructure created explicitly for the use of cyclists, including on-street segregated bicycle paths, bicycle lanes, shared-lane arrows, etc. With expanded ridership has come a need for more facilities, which has created headaches for policymakers and cycling advocates alike.

In 2008, in its first ever Transportation Plan, the City of Montreal announced a project to increase the length of the existing bike path network from 400 kilometres to 800 kilometres, over a period of five to seven years. The ambitious plan was estimated to cost $50 million. Although the city only managed to create 250 kilometres of new bike facilities over this period, the city's executive committee adopted a revised plan in January 2015, promising to once again double the size of the network over the next twelve to fifteen years. The budget for the new plan to add 680 kilometres of bicycle facilities is $150 million. While this is a sizable investment, it remains affordable when compared with motorized vehicle infrastructure. For example, the plan to revamp the Bonaventure Expressway, which was announced around the same time, is expected to cost $141.6 million (Muise, 19 December 2014). The Bonaventure project, which includes four

car lanes in each direction with a park in the middle, will cover less than one kilometre. Table 1.1 shows some of the results from a study by Buschell et al (2013) which examined the cost of cycling and pedestrian infrastructure in cities in the United States.

TABLE 1.1: COST OF CYCLING INFRASTRUCTURE (BUSCHELL ET AL, 2013)

Infrastructure	Description	Median	Average	Minimum	Maximum Cost	Unit
Pavement Marking Symbol	Shared Lane/Bicycle Marking	$160	$180	$22	$600	Each
Path	Multi-Use Trail - Paved	$261,000	$481,140	$64,710	$4,288,520	Mile
Bikeway	Bicycle Lane	$89,470	$133,170	$5,360	$536,680	Mile
Bikeway	Signed Bicycle Route	$27,240	$25,070	$5,360	$64,330	Mile
Bikeway	Signed Bicycle Route with Improvements	$241,230	$239,440	$42,890	$536,070	Mile

Buschell et al's objective was to encourage the creation of non-motorized infrastructure by giving policy-makers the resources to make informed decisions. They also wanted to contrast the cost of motorized and non-motorized infrastructure: "[b]uilding a new roadway for automobiles can cost tens of millions of dollars to construct, and many of the pedestrian and bicycle infrastructure projects and facilities are extremely low-cost in comparison" (Buschell et al, 2013: 5). The Washington State Department of Transportation survey estimated that the cost to construct a single lane mile of highway ranged from $1.03 million to $8.46 million with an average cost of $2.3 million (WSDOT, 2002). As Table 1.1 shows, the average price point of every kind of cycling infrastructure is cheaper than roadway construction. Yet, while cycling infrastructure tends to be cheaper than building highways for motorized vehicles, there is a large variance in costs per mile for different types of cycling facilities. It is much cheaper, for example, to integrate a shared lane into existing roadways than to build off-road paths. This variance

highlights the importance of understanding which types of cycling infrastructure meet the desired goals and objectives of various stakeholders.

Research on most aspects of bicycle paths has produced diverging results. Studies have not been able to conclusively determine which type works best, whether they are safe, are considered convenient, whether they encourage beginner riders to take on cycling, whether experienced riders use them, etc. As demonstrated in books like *How to Lie with Statistics* (1964) and *How to Lie with Maps* (1991), it has become recognised that data can often be modified to produce any desired results. For this reason, it is important to keep a critical outlook on cycling research.

This study highlights the positions of different stakeholders on cycling infrastructure in Montreal. Given that there exist vast quantities of literature on the effects of bicycle paths, without there being any consensus on the actual outcomes, I find that empirical studies may not be the appropriate approach for determining cycling policy and urban planning. Furthermore, most quantitative techniques (modelling, mapping, GIS) would not be able to capture and analyse the main variables of interest in this study, namely the thoughts, preoccupations, and justifications of planners, activists, and politicians, and how these issues are reported by the media.

Chapter two presents a review of the literature on bicycle paths. In this section, the different types of cycling facilities in Montreal are described, followed by an overview of literature studying the effects of bicycle paths on safety and on ridership. Overall, research on bicycle infrastructure has produced conflicting results. Some studies have found that bicycle paths are safe (Lusk et al, 2011; and Pucher, 2001), while others found they were more dangerous than sharing the road with motorized vehicles (Moritz, 1996; Wachtel & Lewinson, 1994; and Forester, 2001). Likewise, some studies found that some cyclists will rarely use off-

street facilities (Larsen & El--Geneidy, 2011; and Aultman-Hall et al, 1998), while others found cyclists will significantly increase the length of their trip to include off-street bicycle paths (Krizek et al, 2007; and Tilahun et al, 2006). It is no surprise that these incompatible results have not yielded efficient policy decisions.

Chapter three describes the methods used for this research project. The three data sources are described: semi-structured interviews, a media analysis and two online surveys about cycling and transportation. The methods for the discourse analysis follow.

Chapter four describes the perceived state of cycling and cycling infrastructure in Montreal. In the first section, the characteristics of Montreal cyclists and those who wish to become cyclists is analysed. The following sections show the lack of dialogue and education between the various stakeholders and the issues of politics. The final section proposes four approaches to creating a better environment for cycling in the city.

Chapter five is a case study of the segregated bicycle path on De Maisonneuve Boulevard. Since its creation in 2007, the bicycle path has garnered a lot of attention, both positive and negative. This section aims to understand the issues facing cyclists and other stakeholders by analysing one specific project. The views of cyclists, experts and the media are used to gain insight on current state of the bicycle path, and on possible solutions to improve it.

CHAPTER 2: LITERATURE REVIEW

2.1 CYCLING INFRASTRUCTURE

Montreal is commended for its 650 kilometres of cycling facilities, but little attention is paid to the types of facilities the city has to offer (Copenhagenize, 2013; and Walker, 8 October 2014). Montreal has six different types of cycling infrastructure, which are presented in Table 2.1. Although off-street bicycle paths are the most prominent, they mostly cater to leisure or fitness cyclists, not commuters. These paths tend to be located in parks or along the riverbanks, and entirely bypass the downtown area, which is the destination of most commuters. Figure 2.1 shows the location of bicycle facilities, by type. As shown in Figure 2.1, most of the off-street facilities, which include off-street bicycle paths, bicycle paths on sidewalks and multi-use paths, are situated in the West Island and along the Lachine Canal, the Aqueduct Canal and the St-Lawrence River. Bicycle lanes and sharrows are types of cycling facilities where cyclists share the road with motorists. Together, they represent close to half the total length of bicycle facilities in Montreal. They allow cyclists to move into the road to avoid obstacles or pass other cyclists. Finally, on-street segregated bicycle lanes are built on the same level as the road, but are separated from motor vehicle traffic by cement curbs, bollards or barriers.

TABLE 2.1: TYPES OF CYCLING FACILITIES IN MONTREAL (SOURCE: VILLE DE MONTRÉAL, 2014)

Infrastructurey	Description	Total length
Sharrow	Shared-lane marking placed in the center of a travel lane to indicate that a cyclist may use the full lane.	145 km
Bicycle Lane	Lane bounded by a line of separation or color coating, and identified by a sign and a lane marking. Forbidden to cars.	162 km
On-Street Segregated Bicycle Path	On the same level as the street, but physically separated from motor vehicle traffic by cement curb, bollards, barriers, etc.	62 km
Bicycle Path on Sidewalk	On the same level as the sidewalk, separated from pedestrians by lane markings and signs.	11 km
Off-Street Bicycle Path	Built on a separate site from the street and inaccessible to motor vehicles.	184 km
Multi-Use Path	Off-street path used both by cyclists and pedestrians.	85 km

MAP 2.3: CYCLING FACILITIES IN MONTREAL, BY TYPE (SOURCE: VILLE DE MONTRÉAL, 2014)

2.2 Bicycle Paths and Safety

Bicycle path proponents suggest that segregated cycling infrastructure is necessary for safety reasons (Lusk et al, 2011). Just as sidewalks are built for the safety of pedestrians, they argue, bike paths ought to be built to keep cyclists safe from cars. Most fatal accidents involving cyclists and motorists happen when cars are overtaking bicycles (Lusk et al, 2011: 134). However, when cyclists and motorists are physically separated, the opportunities for these types of accidents to happen are limited. Cycling advocates who oppose bicycle paths argue that the majority of incidents happen in and around intersections, and therefore bicycle paths do little to prevent danger (Forester, 2001). Despite these conflicting findings, ninety percent of the province's population believe that bicycle paths are a good measure to ensure the safety of cyclists (Vélo Québec, 2010: 17). Should safety decisions be taken democratically? In 2006, only 1.4 percent of all trips were carried out by bicycle in Quebec (Vélo Québec, 2010: 7). In 2010, approximately 35 percent of adults in the province cycled once a week (3). Therefore, the data collected by Vélo Québec includes the opinion of a large majority who rarely or never cycle. Should policy decisions take into account everyone's opinion on the subject, or only those that can be considered experts? Moreover, as most people are not basing their responses on empirical data, they are describing their sense of security and not the actual level of safety. It has often been argued that an increased sense of security can induce risk-taking, which can have negative repercussions (Chong, 2014; and Adams, 1983).

In a study comparing six separated bicycle paths with similar nearby streets in Montreal, Lusk et al (2011) found that all of the bicycle paths had a lower relative risk (RR) than their reference streets — four of which had statistically significant results. Overall, cycle tracks had a twenty-

eight percent lower injury rate than their reference streets (133). The study was inspired by an opposition to the "longstanding, and yet not rigorously proved, philosophy in the USA (…) that 'bicyclists fare best when they behave as, and are treated as, operators of vehicles' " (131). Their study shows that cyclists on bicycle paths have, at worst, the same injury rates as if they were in the street without cycling infrastructure.

These findings contradict those of a study conducted in 1994 in Palo Alto, California, which found that cyclists on bicycle paths or sidewalks incur a risk 1.8 times greater than those on the road (Wachtel & Lewiston, 1994: 8). In this case, the researchers analyzed police-reported accidents over a four-year period (July 1984 to June 1989) and bicycle counts for May 1987. During this period, seventy-four percent of bicycle-motor vehicle collisions happened at an intersection. They observed that the direction of travel affected the risk for accidents: "all categories of bicyclists traveling against the direction of traffic flow are at a greatly increased risk for accidents — on average 3.6 times the risk of those traveling with traffic, and as high as 6.6 times for those 17 and under" (5). Wachtel & Lewiston conclude that the "separation of bicycles and motor vehicles leads to blind conflicts at these intersections" (9). Because most bicycle paths in Montreal are bidirectional on one side of the street, there is often one lane going against the direction of motorized traffic. Future research on cycling in Montreal should examine if there is a correlation between accidents and the direction of travel of the cyclist.

Of course, it is not possible to directly compare these studies, as they were conducted in different locations and were observing different factors. Namely, the study from Palo Alto only looked at accidents in intersections, whereas the one in Montreal collected data for the whole of the street. Because of the scales of the studies, it is possible that the different findings can coexist without contradicting each other. A fault in the Montreal study is that it aggregates all of the accidents to

the largest scale; therefore it does not take into account the variations between the locations of accidents. If bicycle paths are indeed safer overall, but their weakness lies in intersections, it is important not to ignore either of these findings. A new study should aim to observe more than six bicycle paths, and perhaps more reference streets for each of them.

Other studies have found similar results to those of Wachtel & Lewinson. In 1976, Jerrold Kaplan conducted a study showing that "off-street bicycle facilities (that do not allow motor vehicle traffic) showed the highest overall accident rate, and also an extremely high serious accident rate" (75). His study shows that off-street bicycle facilities have a rate of accidents per million miles of 79.6, compared to 34.9 for major streets, 26.7 for minor streets and 24.8 for on-street facilities (76). He attributes this high number to a false sense of security that cyclists get on off-street facilities, which leads them to pay less attention to the road.

William Moritz found that, in 1996, off-road paths and sidewalk cycling (which is comparable to side paths) had Relative Danger Indexes of 4.49 and 16.34, respectively, compared to 0.66 for major roads without bicycle facilities and 0.94 for minor roads without bicycle facilities. Although this study is older, it shows that the disparity between the findings from bicycle infrastructure research deserves a more in depth analysis.

In "The Bicycle Transportation Controversy", John Forester (2001) — the father of vehicular cycling — argues that bikeways account for 1.2 percent of all accidents involving cyclists. Vehicular cycling, also known as bicycle driving, was coined in the 1970s by Forester to describe the practice of riding bicycles on the road and in the same way as motor vehicles. Forester found that car-bicycle collisions represent seventeen percent of all accidents involving cyclists, of which twelve percent are either motorists overtaking cyclists or other parallel path incidents.

Given that about 0.2 percent of all bicycle accidents, and one percent of car-bicycle collisions, are fatal for cyclists, Forester believes more attention should be paid to collisions causing non-fatal injuries to cyclists, and asks, "how many more injury accidents are worth one fewer fatal accident [?]" (Forester, 2011: online). During his study, he rode on the sidepath in Palo Alto to estimate its safety. In five miles, cycling at the same speed as he would have on the road, he encountered seven dangerous situations, which were only avoided by "expert understanding of traffic with expert bicycle handling skill" (Forester, 2011: online). When compared to the zero incipient collisions he had experienced over hundreds of days of use of the roadways, he concluded that the sidepath was at least one thousand times more dangerous.

In his reply to Forester, Pucher asks why The Netherlands, Denmark and Germany — countries that prioritize cycling infrastructure — have such high bicycle mode shares (28 percent, 20 percent and 12 percent, respectively) and low fatality rates (Pucher, 2001: 1). Forester had argued that these relationships only denote correlation, and not causation: "for example, the presence of many cyclists, as in many college towns, provides the political incentive to provide bikeways, rather than the bikeways attracting the cyclists who would have been there in any case" (Forester, 2011: online). However, Pucher points out that he does not advocate for bicycle paths only, and recommended a wide range of improvements in his summer 2001 Transportation Quarterly article. These include the following: traffic calming of residential neighborhoods; urban design oriented to people and not cars; restrictions on motor vehicle use; better traffic education of both motorists and non-motorists; and enforcement of traffic regulations protecting cyclists. With so much conflicting data, it seems that a mixed approach to planning for cycling is necessary.

2.3 BICYCLE PATHS & RIDERSHIP

Research on the social effects of bicycle paths is as conflicting as research on the relationship between bicycle paths and safety. Who uses bicycle paths? Will bicycle paths encourage people to start cycling? Will cyclists go out of their way to use bicycle paths? Many have attempted to provide answers to these questions, but no consensus has yet been found. Aultman-Hall et al (1998) found that commuter cyclists closely followed the shortest path to their destination, and infrequently use off-road paths. Yet, in similar studies, cyclists were found to travel 67 percent longer distances (Krizek et al, 2007), or 20 minutes longer (Tilahun et al, 2006) to include an off-street cycling facility in their commute. However, Larsen & El--Geneidy's (2011) findings show that frequent cyclists are less likely to use bicycle facilities.

Aultman-Hall et al (1998) used a geographic information system (GIS) to model 397 commuter cyclist routes and their characteristics, in Guelph, Ontario. They were compared with the shortest- path routes for the same trip to provide an understanding of the factors influencing cyclists' behaviour. The most relevant results show that most commuter trips will only diverge by 400 metres from the minimum route, with high--quality direct off--road paths being used infrequently by commuter cyclists, and the lower quality ones even less. An interesting finding was that even when a bicycle path figured in the shortest route, it was not necessarily used. "However, even with a reasonable length of extended river and creek recreational paths, only 27 percent of the commuter routes analyzed from this survey reported any travel along off-road segments. This is more interesting when one considers that 49 percent of the shortest-path routes generated in the GIS contain some off-road segments" (Aultman-Hall et al, 1998: 107). The authors suggest that improvements should be made on the road network (wider curb lanes, traffic signals detecting the presence of cyclists, etc) to accommodate bicycle commuters. They

conclude by saying that future cycling infrastructure planning should depend on the preferences of potential cyclists:

> If the majority of potential cyclists have bicycle-travel preferences similar to the majority of existing bicycle commuters, then efforts to attract new utilitarian cyclists of the sort this study suggests should be made to further accommodate current commuter cyclists. These efforts should be focused on improving the road network and not on providing pathways. (…) However, if the potential cyclists are more similar in bicycle travel preferences to the minority of commuter cyclists in this sample who prefer to avoid motor vehicular-traffic, then efforts to attract new cyclists should be different. (Aultman-Hall et al, 1998: 107)

Tilahun et al (2006) analysed the value cyclists attached to different cycling facilities. They found that "on average subjects are willing to travel about 23 additional minutes if an off-road bicycle-lane was available if the alternative was to bicycle in traffic with side parking". Moreover, cyclists were found to prefer designated bicycle-lanes, followed by the absence of parking on the street and by taking a bicycle-lane facility off-road.

Krizek et al (2007) studied the effects of urban cycling trails in Minneapolis, Minnesota, USA. They found that "many bicyclists are in fact willing to travel substantially out of their way in order to use a high-quality off-street bicycle facility, on average a distance of about 4.21 km (2.6 miles), which represents a 67% increase over the shortest distance" (Krizek et al, 2007: 622). An interesting finding is that cyclists did not appear to be affected by the presence of intersections. Given that intersections are where the majority of accidents happen (as seen in the previous section), one would expect cyclists to be somewhat wary of them.

In their typology of the cyclist, Damant-Sirois et al (2014) found that different types of cyclists were affected differently by the presence or absence of cycling facilities. *Dedicated cyclists* were the least affected by bicycle route infrastructure, and were said "not [to] mind, and sometimes even prefer, riding in car traffic" (13). *Path-using cyclists* were, as their name suggests, most

affected by the presence of cycling facilities. “They prefer to use a continuous bicycle route that is separated from car traffic by a physical barrier with specific signalization” (13). These results indicate that there is no unique solution to urban cycling, as not all cyclists have the same needs.

Larsen and El Geneidy’s (2011) analysis of cyclists’ behaviour in Montreal also shows the diversity of cyclist types. One of their main findings is that “more cyclists will travel farther to use off-street facilities than all other facility types; likewise, cyclists travel farther to use separated on-street facilities than those delineated by road paint alone” (2). However, when looking at the respondents’ personal characteristics, the results are more varied. In fact, those who cycle for utilitarian purposes were 64 percent less likely to use cycling facilities, and those who cycle frequently in all conditions were 69 percent less likely to use cycling facilities. This raises questions about who is cycling, and how cyclists’ characteristics determine cycle path usage.

Cycling infrastructure has been researched using qualitative and quantitative data. In both cases, the results depend on the context and the argument the researcher is trying to prove. The way questions are phrased and the people who are surveyed will affect the outcome of a study. Strategic choices in the selection of a study zone or its scale can also alter the results. For these reasons, it is important to look at the motivations of various actors responsible for cycling decisions in a city.

CHAPTER 3: METHODOLOGY AND DATA

Following the analysis of studies on safety and use of bicycle paths, it is clear that there is no consensus on the topic. The methods used in this study aim to uncover the goals of cycling infrastructure and policy in Montreal, and how they are perceived by various stakeholders. This research project will employ data from three types of data sources.

3.1 DATA SOURCES

3.1.1 SEMI-STRUCTURED INTERVIEWS

The first source of data is a set of interviews with key informants. The informants ranged from informal cycling activists to policy makers. Interviews were conducted with a politician for the city of Montreal, researchers from Vélo Québec, a transportation engineering professor from an American university, a spokesperson for the Montreal Bike Coalition and a bicycle mechanic from Right to Move, a do-it-yourself bicycle shop at Concordia University. Vélo Québec is a non-profit organisation with the goal of promoting cycling in Quebec. The informants were contacted by email and their participation was completely voluntary. The interviews were conducted between November 2014 and February 2015. The location of the interview was chosen by the interviewee, and was mostly in public spaces — cafes, offices, etc. The interviews lasted on average thirty minutes, and were recorded using an in-phone application. The recording was later transcribed either using Inqscribe, a free downloadable software, or Transcribe, an online software that has a free one-week trial period.

Informants were asked about their role in their organisation, its vision for the future of cycling in Montreal and how they were working towards this vision. They were also asked about their personal impression of cycling in Montreal, about the best approach to planning for cycling and how they felt Montreal was doing in terms of infrastructure and policy. Open questions and a

flexible structure allowed the interview subjects to discuss in more depth and reflect on various relevant issues. The thoughts, perceptions, and experiences of the subjects were important aspects of the research.

Several primary themes were of interest in the key-informant interviews. What is the respondent's opinion towards building and maintaining cycle paths in the city of Montreal? What justification is given for this position? Are different stakeholders relying on different sources of information? Who do they think is using the bicycle facility network? Do they justify it as a safety concern, a way to increase ridership?

3.1.1.1 Positionality

Although my positionality comes into play throughout this research, I especially had to acknowledge it during the interviews. I was meeting with older people, most of whom were men, whose work is related to cycling. As a 22-year-old woman working on an undergraduate thesis, I appear non-threatening, which can have positive or negative repercussions. It might lead the interviewers to take me less seriously or it might allow them to share more than they would with someone who appeared to be a position of authority. Moreover, I am an experienced cyclist and most people in my social circle cycle regularly. I grew up in the Montreal area and have lived in the city for over five years. My previous research on transportation and my experience living in the city make me an expert on the theoretical and practical aspects of cycling in Montreal.

During the interviews, I tried to remain as neutral as possible, but the format made objectivity impossible. First of all, because the interviews were semi-structured, I did not have a firm list of questions to follow. The questions would vary depending on the person's occupation, and my follow-up questions were based on their answers. I did not have time to reflect on the ideal way

of phrasing questions, which sometimes highlighted my positionality. Secondly, people like receiving feedback when they are talking; especially if they are telling stories they judge to be shocking, exciting or funny. Stories would regularly be punctuated with "you know?" and "right?". In those moments, out of politeness or genuine enjoyment, I would react to their anecdotes. However, I tried to remain as neutral as possible and not to share my opinion during the interviews.

3.1.2 Media analysis

An in-depth analysis of Montreal media was also carried out in support of this project. Data were collected from online and print media, as well as audio and video sources, both in English and in French. The most important sources were: *The Montreal Gazette, CBC News, CTV News, La Presse, Le Devoir, Radio-Canada* and *TVA.* Articles were selected on the basis of their subject matter. If cycling, biking, bicycle paths, bicycle infrastructure, or similar keywords were used, the article was added to a spreadsheet and its content was coded. A summary of each article was written in the spreadsheet. The position and tone of the article was recorded (whether it took a position for or against cycling or cycling infrastructure), as well as the tone and position of the article's informants. Relevant quotes were selected for further study. Moreover, user comments – if there were any – were also analysed. Quotes were taken from the commentary for later coding. The number of commenters taking position for or against cycling and cycling development was recorded.

3.1.3 Cycling Survey

This research also utilized data from two surveys conducted in 2013 and 2014. Both of the surveys were designed and administered under the direction of Prof. Ahmed El-Geneidy and Transportation Research at McGill (TRAM). One survey targeted current cyclists throughout the Montreal region. The dataset contains information from 2004 respondents. Respondents were asked questions separated into seven sections: "general information, cycling behavior, cycling history, motivations and habits, infrastructure, route and investment, BIXI (Montreal bicycle-sharing system), and personal profile" (Damant-Sirois et al, 2014: 10). Out of the 92 questions in the survey, the most relevant for this research project is the open-ended question at the end of the survey, asking respondents for "any further comments". This section provides a fertile ground for recommendations and criticism on the status of cycling in Montreal. As it turns out, cyclists are a very vocal group. This will hereafter be referred to as the "2013 Montreal Cycling Survey".

The second survey collected data from over 5,000 members of McGill University faculty, students and staff on usual modes of travel as well as barriers that prevent respondents from taking desired modes. I focus on data from respondents who express an interest in cycling but are currently using other modes. For the rest of this thesis I will refer to this source of data as the "2014 McGill Commuter survey".

Because these surveys are secondary sources, they have limitations. Namely, they were created by other researchers and do not respond to the exact needs of the current research.

3.2 Discourse Analysis

Discourse can be analyzed to gain insight into social and political issues. Discourse analyses start "from a social, urban or political problem and try to understand this societal problem better through a focus on language use" (Hastings, 2013: 87). This discourse analysis will use a

constructivist approach to the relationship between reality and the way different people understand it. As observed in the literature review, researchers have found contrasting results when observing similar issues. The point of view from which the research starts affects the outcome. In the same way, different people can describe the same phenomenon but the language they use will affect how it is understood. This questions the idea that there exists an objective reality.

In this research project, many actors, sources and positions are analysed. A special attention was paid to the use of language for all of them. There are different implications for the different types of sources. For example, text in the media tends to be edited to serve a specific purpose or to persuade the readers of a position. On the other hand, the transcripts of the interviews show a more instinctive use of language, as the interviewees did not have time to reflect deeply on their answers.

Both choice of words and narratives will be taken into account. "A key argument is that human actors are constantly engaged in storytelling both as to aid their own understanding of an aspect of social reality, but also to other actors form an understanding of it —usually in line with their own view of it" (Wagenaar, 2011 in Hastings, 2013: 94). How are different actors being depicted, which elements stand out? Which elements are being opposed? Are there heroes and villains, successes and failures?

CHAPTER 4: CYCLING IN MONTREAL

4.1 WHO CYCLES IN MONTREAL

According to the 2013 Cycling Survey, the average age of regular cyclists in Montreal is 37 years old (35.5 for women and 39 for men). Women represent 40 percent of regular cyclists. While men are more likely to cycle to work or school, and for groceries, women are more likely to cycle to go shopping or to a restaurant, café or bar. Cyclists identified the most important factors for creating a good bicycle route as having continuous bicycle facilities, having a direct route and cars being driven at low speeds. Out of the respondents who chose to leave comments, eleven percent noted that more bicycle paths were needed in Montreal, while seventeen percent commented that the paths were bad or dangerous. When compared to people who only sometimes cycled to work or school, regular cyclists were found to be twenty-one percent less likely to use separated bicycle paths and twenty-three percent more likely to use arterial roads with no infrastructure.

An important group for cycling advocacy is the people who do not currently cycle, but would like to start. To get people cycling, it is important to understand what barriers they are facing, and what they believe could prompt them to change their habits. In the 2014 McGill Commuter Survey, respondents were asked if they currently cycled, and if the answer was no, they were asked if they had cycled in the past and if they wished to start cycling. They were then asked which factors were stopping them cycling. In the final section, they were asked two open-ended questions about their comments and suggestions for cycling in Montreal. Table 4.1 presents the main comments and suggestions given by non-cyclists on why they did not cycle and what the city and McGill University could do to encourage them to start cycling.

TABLE 3 4.1: COMMENTS AND SUGGESTIONS FROM NON-CYCLISTS WHO WISH TO START CYCLING

Comment/Suggestion	Never cycled	Have cycled before
Distance (too far)	10.88%	0.73%
Parking (more bicycle racks, more secure)	14.30%	20.70%
Connect to transit	2.27%	20.07%
Showers and lockers at school or work	6.80%	15.69%
More Bixi stations	6.48%	11.39%
Safer routes or more bicycle facilities	12.45%	7.66%

Those who had never cycled were more likely to justify their mode choice by the distance between their home and their destination. Those who had previously cycled from their home to work were more likely to request better bicycle parking, connections to transit and shower and locker facilities. These are missing services that would most likely only be noticed by people who with knowledge of the present conditions. However, more people who had never cycled before required safer routes and more bicycle facilities than those who had previous experiences cycling. This indicates that new cyclists can be more influenced by the presence or absence of cycling infrastructure. Even among people who do not presently cycle, there are notable differences in their needs and preferences depending on their previous experiences.

4.2 LACK OF DIALOGUE AND EDUCATION

The interviews conducted for this project revealed that there is a lack of dialogue between different stakeholders and within the government. According to Marianne Giguère, the borough councillor for Projet Montreal in charge of cycling issues, there is a lack of goodwill in the municipal government: "[the government] presents itself as being favourable to cycling, but they stick to timid interventions that cause the least disturbances possible". This is in part because the municipal government fears displeasing car drivers and because of the bureaucratic process. She believes city planners conceive innovative cycling plans, but these get watered down because of the nature of bureaucratic collaborative decision-making. Quality projects will go through

different departments, getting altered along the way, she says, “and then, oops, a project becomes amputated of so many of its interesting characteristics that it becomes average”.[1] [2] Although she believes a mayor convinced of the importance of cycling infrastructure could make changes, city leadership will not act without a clear mandate from the electorate.

In April 2013, the city of Montreal created an advisory cycling committee tasked with assessing the needs of stakeholders and drafting a plan for Montreal’s cycling network. Its mandate is:

- To decide on the planning and programming in relation to the needs expressed by the various stakeholders of the Montreal cycling network;
- To strive for the best possible cooperation of all stakeholders in the implementation of the Montreal cycling network;
- To propose appropriate measures to enhance the safety of Montreal cycling network;
- To promote cycling in Montreal in a context of sustainable development and active transportation;
- To report to the Executive Committee in March of each year, on the state of the cycling network, its use, improvements to be made and the achievement of the goals set in the 2008 Transportation Plan. (Ville de Montréal, 22 April 2013)

The committee has members from the Active and Public Transportation division of the city, Vélo Québec, the Montreal Bicycle Coalition, the Ministry of Transport, the Montreal police service (SPVM), the public transit society (STM) and BIXI. However, Giguère maintains that so far, the city has not taken into account its recommendations. Although the majority of committee members are proactive about finding cycling solutions, Giguère notes that the SPVM’s contributions tend to be negative: “they seem to be there to cut corners and say ‘oh no, we can’t do this, we can’t do that’, it’s an odd approach”.[3]

[1] All French translations by author

[2] Original text in French: “Pis là, oops, un projet devient comme, il se retrouve amputé de tellement de ses caractéristiques intéressantes que la il devient, c'est ça qui est ça, il devient ordinaire.”

[3] Original quote in French: "le SPVM lui il est comme là pour, lui aussi, pour découper des coins et dire "ah ben non, on pourra pas faire ça, on pourra pas faire ça". C’est comme une drôle d'approche. "

In fact, the SPVM's role in urban cycling has been a point of contention for cyclists and non-cyclists alike. In 2013, cyclists received three times more tickets than in 2009 (SPVM Annual Report, 2013). One officer reported that the increased ticketing was motivated by three factors: complaints from pedestrians, particular incidents and the desire to raise awareness (Marchal, 16 October 2014). Table 4.2 presents some user comments from news articles on the ticketing of cyclists in Montreal. Some cyclists encourage the ticketing because reckless cyclists give them a bad image, while others believe ticketing is the only solution to dangerous behaviour: "[Adding bicycle paths] will create a false sense of security and encourage more people to get on a bicycle and therefore increase accidents. (…) The only solution is a ruthless ticketing campaign of cyclists and careless motorists" (User comment on CTV News, 24 November 2014). Moreover, Table 4.2 shows that there is a popular feeling that cyclists are creating dangerous situations and should be held accountable.

TABLE 4.2: USER COMMENTS ON NEWS ARTICLES ABOUT TICKETING CYCLISTS

Source	Comment
«Trappes à Tickets», Port du Casque et Autres Constatations Cyclistes. *Journal Métro*.	"According to the SPVM, in 2013, cyclists caused 8 times more accidents per ticket than drivers. For things to be fair and equitable for drivers, cyclists should be getting 8 times more tickets (or drivers 8 times less)."[4]
Plateau announces plan for safer roads. (2014, May 22). *CTV News Montreal*.	"There was a study done a number of years ago by the SAAQ the result of which concluded that about 80% of cyclist/pedestrian automobile encounters are the fault of the cyclist/pedestrian. (…) Time to fine particularly adult cyclists for traffic violations at the same dollar and demerit point amounts as it is for vehicle drivers."
	"[Adding bicycle paths] will create a false sense of security and encourage more people to get on a bicycle and therefore increase accidents. (…) The only solution is a ruthless ticketing campaign of cyclists and careless motorists."
City of Montreal unveils Bike Safety Plan. *CJAD*	"I'll bet if they investigated the recent bicycle accidents they would find it was the cyclists at fault (not always I'm sure but.....)."
Des « Pièges à Tickets » pour attraper les Cyclistes ? *Le Devoir*	"There are cyclists who deserve tickets because they ride like mad people and don't care about anything. I have no pity for this kind of cyclist. Unfortunately, the police operations of the SPVM are like a group of old maids on a street corner, too often stopping cyclists for trifles."[5]
	"Yes, I am FOR ticketing cyclists. I am a cyclist and a driver. On both sides, laws aren't being respected. Maybe if they were, the police wouldn't need to be ticketing and could be helping. I don't care if the SPVM is making money off of this, but one thing is certain, most cyclists will change their travel behaviour."[6]
494$ de tickets et des menottes pour un arrêt mal effectué à vélo. *Journal De Montréal*	"If there were more cops like this, there would be less cycling deaths. Many cyclists think they can do anything. Well done! It's the only way these idiots can understand!!"[7]

[4] Original quote in French: "selon les chiffres disponibles sur le site du SPVM: en 2013, les cyclistes ont créés 8 fois plus d'accidents par contravention donnée que les automobilistes. Pour que ce soit juste et équitable avec les automobilistes, les cyclistes devraient recevoir 8 fois plus de contraventions (ou les automobilistes 8 fois moins)."

[5] Original quote in French: "Il y a des cyclistes qui méritent des contravention parce qu'ils roulent en fous et ne se préoccupent de rien. Je n'ai aucune pitié pour ce genre de cyclistes. Malheureusement, les opérations policières du SPVM c'est comme une gang de matantes sur le coin de la rue qui arrêtent des cyclistes trop souvent pour des pécadilles."

[6] Original quote in French: "Mais oui je suis POUR les contraventions aux cyclistes. Je suis cycliste et automobilistes [sic]. Et oui autant l'un que l'autre les règles ne sont pas respecté [sic]. Mais peut-être que si les gens les respectaient il y aurait moins de police [sic] qui donnent des tickets et plus dans la population ! Je me fou [sic] de savoir s'il [sic] remplissent leurs de [sic] coffre, mais une chose qui est sur c'est qu'une bonne partie des cyclistes vont changer leurs modes de circulation."

[7] Original quote in French: " S'il y avait plus de policier comme ça il y aurait moins de morts en vélo! Beaucoup de cyclistes se croient tout permis (…). Bravo à ce policier! C'est le seul moyen pour que ces fêlés comprennent!!"

Moreover, Giguère believes many police officers for the SPVM do not live in Montreal and are not familiar with life in the city. They might view cycling as a leisure activity, which is mostly done in parks in the suburbs. Because of their personal experiences, she says "it is difficult for them as much as for most people to change their perception of cycling as a weekend leisure activity and not a super efficient urban mode of transportation".[8]

4.2.1 Highway Safety Code

However, police officers' individual perspective on cycling often isn't the issue, because they are restricted by the Quebec Highway Safety Code. The Quebec Highway Safety Code governs all public highways in Quebec, which are defined as the land or structure "over part of which one or more roadways open to public vehicular traffic and, where such is the case, one or more cycle lanes are laid out" (Highway Safety Code, c C-24.2, s. 4.). Therefore, both city roads and freeways are regulated by the same code. Moreover, bicycles and cars are considered equal before the law. In fact, in March 2014, a cyclist was fined $1000 for crossing the street on a red light, in accordance with article 327, stating: "any rate of speed or any action that can endanger human life and safety or property is prohibited"(c C-327). The superior Court judge on this case concluded that a bicycle is a "vehicle" in the eyes of the law, as the Highway Safety Code does not specifically exclude cyclists from the article (Paré, 13 March 2014). Marc Jolicoeur, head researcher for Vélo Québec, worried about the precedent this created for future altercations involving cyclists: "this judgment opens the door to infractions passing suddenly from $40 to $1000, without gradation. (…) Infractions that often have serious consequences, like texting

[8] Original text in French: "c'est difficile pour eux autant que pour la plupart des gens de changer la perception qu'on a du vélo comme étant un loisir de fin de semaine par rapport [à] … un moyen de transport urbain super efficace."

while driving or opening the car door, remain liable to laughable fines for drivers" (Paré, 14 March 2014). In fact, the fine for opening a car door without taking precautions is $30.

While cyclists share the same responsibilities as drivers, there are separate articles defining legal behaviour for cyclists, for example:

- Article 477: "A person riding a bicycle must sit astride the bicycle and keep hold of the handlebars";
- Article 486: "When riding in groups of two or more, cyclists must keep in single file; in no case may such a file be composed of more than 15 cyclists"; and
- Article 487: "Every person on a bicycle must ride on the extreme right-hand side of the roadway in the same direction as traffic, except when about to make a left turn, when travel against the traffic is authorized or in cases of necessity".

Giguère and many other cycling advocates believe the code is outdated and doesn't represent today's reality. She says "it's okay if a cyclist doesn't put his foot on the ground at every stop, he can simply slow down and continue" and that it makes no sense that cyclists must remain on the extreme right-hand side of the road.[9]

The code also defines the requirements for bicycles on the highway. Bicycles must have a minimum of six reflectors during the day, as well as one white headlight and one red taillight at night (Highway Safety Code, c C-232, 233). Moreover, all bicycles must be equipped with at least one brake system acting on the rear wheel (c C-247). Zvi Leve, spokesperson for the Montreal Bike Coalition, believes it is not necessary to worry about "the details of what constitutes a vehicle or not, it's more about negotiating relationships between people".

Following the death of Mathilde Blais in April 2014, the minister of Transportation Robert Poëti vowed to review the code to better protect cyclists in urban areas. Blais was run over by a crane truck while cycling under a viaduct with no designated space for cyclists. The coroner found that her death was accidental, but could have been avoided if the driver had chosen to share the road

[9] Original text in French: "c'est correct qu'un cycliste ne mette pas son pied à terre à chaque stop, il peut juste ralentir et continuer."

with the cyclist as advertised by the Société d'Assurance Automobile du Québec (SAAQ), or if the truck had encroached on the left lane to pass the cyclist (Bureau du Coroner du Québec, 2014). In fact, in accordance with Article 344 of the Highway Safety Code, "[the] driver of a road vehicle may cross a line (…) providing that he can do so in safety, to pass (…) a bicycle". The coroner recommended that the SAAQ and the Ministry of Transportation rewrite the Highway Safety Code to include a minimum distance between cars and bicycles. The review promised by Poëti follows multiple fatal accidents in Montreal, many of which involved car doors being opened in front of oncoming cyclists. Demands for the Highway Safety Code review include tougher penalties for motorists illegally opening their doors and the right to cycle on the sidewalk where infrastructure is inhospitable or dangerous, such as under overpasses (Auger, 5 May 2014). While the review is a move in the right direction, Giguère does not have too much hope that it will properly reflect the true reality of urban cyclists.

For Zvi Leve, reviewing the current Highway Safety Code is not the solution, because there needs to be an entirely different code for roads in urban areas: "we need to have a street based code, which is basically: rework the hierarchy. Who has the priority? How we allocate that space, how we negotiate the interactions between those things. We really need to fundamentally shift that".

4.3 POLITICS

Cycling issues in Montreal are dependent on the central government's willingness to invest time and resources on making cycling safer and better. The mayor's office has expressed its intention to improve cycling in the city but has yet to make significant changes, leading Projet Montreal borough councillor Giguère to believe the administration is disingenuous. The lack of will from the central city to take action on cycling issues is worrisome for Projet Montréal. In December

2014, an arterial road review gave 38 percent of local roads the title of artery (Bouchard, 23 December 2014). The central municipal government is considered the owner of arterial roads and has decision power over it, while the boroughs can develop cycling infrastructure on their local roads without getting approval from the City of Montreal (An Act Respecting the Exercise of Certain Municipal Powers in Certain Urban Agglomerations, s. 24.1). The restructuring of the road network increased the proportion of arterial roads from thirty to sixty percent. Giguère believes the boroughs lost "a lot, a lot, a lot of power to intervene on [their] territory".[10] While Giguère believes a centralized body overseeing cycling decisions could be beneficial if Projet Montréal were in power, it is currently complicating advances for cycling. "When streets have the title of artery, then it's the central city that can intervene, finance and accept projects. That means the borough must make a demand, and then we're part of a machine. It'll go through different offices with different people evaluating it, deciding of its feasibility, deciding of the budget we could allocate it".[11] Having to pass through the different levels of government means there are more opportunities for a project to get cut or altered, especially if creating more space for cyclists is perceived as encroaching on car territory.

Giguère noted that the municipal government would not take a firm stand supporting cycling unless voters expressed this need. Leve disagrees, noting that it is up to the elected officials to show voters what is beneficial to them. For example, removing parking along arterial streets to create cycling infrastructure would, at first, be an unpopular decision, but, he believes, one that would benefit everyone: "[i]t's going to be hard. Obviously the merchant association are going to

[10] Original quote in French: "on a perdu beaucoup, beaucoup, beaucoup de pouvoir d'intervention sur notre territoire."

[11] Original text in French : « Quand il s'agit de rues qui ont le titre d'artère, là c'est que la ville centre qui peut intervenir, qui peut financer, et concevoir, et bon, accepter des projets. Ça veut dire que l'arrondissement doit en faire la demande pis là, on est dans une espèce de machine, nous. Ça va passer à travers différents bureaux avec différentes personnes qui vont l'évaluer, qui vont décider de sa faisabilité, décider du budget qu'on pourrait allouer à ça. »

scream bloody murder. (…) We need to find a way to make them understand that it's actually in their best interest".

Moreover, many people view the creation of bicycle paths as an easy method for the government to show its support for cycling, without addressing issues such as reckless behaviour and conflict at intersections: "[b]ut of course, building a bike path is much better PR, you can even have a ribbon cutting ceremony! In the end, it's all about image, not results, so don't expect the situation to improve. Expect it to get worse" (User comment on CTV Montreal, 22 May 2014). Bartek Komorowski, a researcher for Vélo Québec, believes cycling advocates are also to blame for the government's approach to cycling: "in the way the media talks about bicycle paths (…), there isn't a great deal of literacy. Including (…) a lot of the bike advocates in Montreal [who] think that we should build separated paths everywhere". He believes this approach is unnecessary and impossible to implement.

4.3.1 Cars

In large part, the lack of political will to support cycling in Montreal is thought to be caused by a fear of upsetting car drivers, and losing their votes. According to Leve, drivers represent the demographic that politicians depend on the most to get elected.

> None of the political parties want to talk about [cycling] in public. They're all afraid. From their point of view, everyone drives a car so this is the one public that we don't want to make mad. Everyone else, like students, (…) we can deal with that. Young families, we can deal with that. The unions, we can deal with that. But, as far as the government is concerned, everyone drives a car, so that's too big of an issue to put on the table. (Zvi Leve)

Cyclists are often seen as competing with cars for space on streets. Therefore, by supporting projects to give cyclists more space and rights, politicians can be perceived as opposing car drivers. Drivers opposed to cycling are very vocal on social media, in editorials and in online

comments about their opinion on the place of cycling in cities. Table 4.3 shows some examples of comments left on news articles about cycling in Montreal.

TABLE 4.2 5: USER COMMENTS ON NEWS ARTICLES ABOUT CYCLING AND CARS

Source	Comment
City of Montreal unveils Bike Safety Plan. *CJAD.*	"Oh goody more wasted tax dollars that we don't have. How about teaching the cyclists how to ride safely and obey the laws that apply equally to them as they do the motorists???? How about they have to take a safety course and road test like the rest of the road users. That is the best way to improve road safety."
	"The fix is simple, introduce a bicycle safety course *mandatory* which issues a permit for a bicycle."
	"And how will I identify them on the roads when they commit crimes or cause accidents? (...) So force them to have a license plate and make them have a mandatory course on safety. Then we can start thinking about real safety and prevention, and not just paying cops to ticket people after the facts."
Plateau announces plan for safer roads. *CTV News Montreal*	"would this new speed limit apply to cyclists as well, and if yes, how exactly it would be enforced? (My suggestion: impound the bicycle on the spot, and let citizens do it themselves)."
How Montreal tracks Cyclists. *CTV News Montreal*	"I welcome this "street sharing". In keeping with this theme, when will the SAAQ start charging registration to cyclist?? If they "share" the road, only fair that they should "share" the cost."
Deadly Bike Crashes: Coroners want Drivers to look before opening Doors. *CTV News Montreal.*	"I think this is what happens when you encourage cyclists to share the roads with 5,000 lb motor vehicles. Reality check !!"
	"Im sorry but cyclist have no place on the road. period. sidewalks or bicyclepaths only. they are just endangering their lives and scratching up my car! Plus, they don't pay a cent to use our roads!!!!!!"
City proposing ambitious expansion of bike path network. *Montreal Gazette*.	"While their paying the usual taxes seems to cover anything bike related, those who drive those nasty cars or take busses still are charged extra in licenses and fees to use the roadways. Perhaps because Velo Quebec has determined the smaller roads will be primarily for bikes not cars they might be asked nicely to make a small contribution."
	"Just wondering, will all bikers taking advantage of all these new bike paths be paying for anything?"
	"What about outlawing cars, bringing back the horse and buggy and advise all business that they are not welcome unless they ride a bike including all deliveries. Montreal is a pathetic city run by fanatics, it's no wonder the city us bankrupt."

Some people feel that cyclists simply should not be in the city while others wish they remained in their dedicated cycling infrastructure and did not interact with motor vehicles. Moreover, many people think cyclists and cycling infrastructure cost a lot of money to taxpayers, and that the

users aren't paying their fair share. A recurring suggestion is that cyclists should have a license and bicycle registrations. These comments imply that drivers are paying their "fair share" through vehicular registration fees. However, more than three quarters of the vehicle registration cost goes toward the insurance premium and the registration, with the remainder going toward the public transit network. None of the $200 million collected through vehicle registration pays for road maintenance. In 2011 and 2012, a 17.2¢ per liter gasoline tax generated $1.97 billion for roadwork and public transit and a separate 3¢ per liter tax in the Montreal region generated $95 million for the AMT. While vehicle registration and gasoline taxes amounted to $2.3 billion in 2012, the Province of Quebec and the City of Montreal spent $4.45 billion on roadwork the same year, over $2 billion more than what was paid by motor vehicle users.

Despite the public appearance of driver-cyclist relations, Peter Furth, a transportation engineering professor at an American university, disagrees that there is any significant conflict: "All this conflict stuff, (…) it's just the newspapers trying to make a story. (…) And, yes, some angry people want to vent. There are sometimes crashes but when the crash happened I mean the bicyclist didn't want it to happen, and the motorist didn't want to happen. So, I just don't think it's such a big deal". Whether Furth is correct or not, those who believe road infrastructure is a zero sum game, and that improvements for cycling mean taking something away from drivers, are being vocal and are making the most noise, and Montreal cycling advocates believe politicians are listening to them.

4.3.2 PLANNING

Although the quality of bicycle infrastructure in Montreal is affected by systemic problems within the government, there is a reported lack of understanding and education within the planning department on what makes a good bike path.

> The city is clearly making efforts to make bike infrastructure, unfortunately it seems like the people who are designing this infrastructure don't ride bicycles. Like they're traffic engineers, they know the highway safety code (…) and they're basically making everything smaller. Like, they are taking a road and they make it smaller. And they make the lines, like right down to the solid yellow line, dashed white line, and they clearly don't quite understand. (Zvi Leve)

Although there is a division of the transportation department devoted to active transportation, Marianne Giguère claims it is not up to the task of coordinating the cycling network. While she believes it is because of a lack of financial and human resources, others doubt the planners' competence: "bicycle paths are not designed by people who bicycle regularly. They should be consulting bicycle transport advocates and specialists" (User comment on Magder, 3 April 2015). Others believe that, while planners have experience with cycling, they are approaching it from a singular point of view and are not taking into account the needs of various types of cyclists. Giguère believes they are planning based on their own preferences, which doesn't represent the needs of less experienced cyclists: "I can imagine that many of the engineers planning infrastructure do bike around the city, but maybe they're in their thirties or forties and very athletic, and they feel comfortable riding the St. Urbain bike path, for example, which is not the case for a mother with her kids" (Sparks, 16 March 2015).

4.4 PROPOSED SOLUTIONS

This study revealed four general methods to improve cycling in Montreal. First, traffic-calming measures should be implemented over the entire region. Second, a network of bicycle paths should be created on arterial roads. Third, the city's plans for cycling infrastructure should take

into account the needs of different types of cyclists. Fourth, cycling facilities should be integrated in all new constructions.

Overall, the informants interviewed for this project agree that traffic-calming measures are necessary to ensure safe and efficient cycling in Montreal. On arterial roads, this can be accomplished by integrating separated cycling facilities, which in turn make the road narrower for cars. Other infrastructure changes can also influence driving behaviour: adding curb extensions at corners, adding speed bumps, planting trees along the road, etc. In fact, Komorowski believes that narrowing the visual field on a street affects how fast people go: "you can have two streets that have exactly the same [width], (…) but if one is planted with trees on both sides and the other one isn't, on the one with the trees, people will go slower. They can't see as far ahead, they don't have as wide a field of vision".

Green waves at cycling speeds can also be used to slow down traffic and make cycling more enjoyable. A green wave occurs when traffic lights are coordinated to allow continuous traffic flow over several intersections. This would have the dual effect of allowing cyclists to stop less often and getting cars to drive slower, as this would also allow them to get more green lights. It has been shown that drivers will reduce their speeds if they are warned of the speed at which they must drive to get a green wave (Duivenvoorden et al, 2013). Furth agrees with this finding: "[c]ar drivers going through downtown, they're not interested in high speed, they're interested in green lights. (…) If they can get green lights by moving along at a moderate speed, they're really happy, they don't need high speed to be happy". Moreover, the reduced speeds would cause less damage in case of conflict.

While cyclists and motorists can share the road on traffic-calmed residential streets, cycling experts believe arteries with high motor vehicle traffic necessitate specific infrastructure for cyclists. The need for separation of cyclists and motorists depends on the volume and the speed of cars, but Komorowski warns that it isn't necessarily for safety reasons, because "accidents happen at intersections and building a separated path doesn't necessarily eliminate problems at intersections, but it does make cyclists feel a lot more comfortable". Giguère agrees with this point of view, but the sense of security of cyclists remains an important factor in getting them on the road. "If motorists were more aware and respectful, we wouldn't need to cage cyclists in expensive facilities, but while we are waiting, it's better to build many facilities to encourage more people to cycle, and then the cultural change will happen". [12]

Moreover, the city needs to plan its infrastructure in a more user-friendly way. Cycling advocates agree that people of all ages and experience levels should be able to comfortably navigate the streets of Montreal. "I would lean more towards infrastructure [over awareness campaigns], because I think that cities don't come with user manuals, they just have to be built in such a way that it should be obvious how they should be used. (…) You should control behaviour through the shape of a street," says Komorowski. Nevertheless, there is no single type of facility that will suit every cyclist. In this case, Leve believes cycling planners should follow the vehicular model: "just like the car network, you have highways, you have different levels of infrastructure. We need similar in different levels of (…) cycling infrastructure".

Finally, Komorowski and Giguère believe the city hasn't been taking advantage of new infrastructure projects and construction to integrate cycling facilities. Giguère gives the example

[12] Original quote in French : « Si l'automobiliste était plus conscientisé et plus respectueux, on aurait ben moins besoin d'encager les cyclistes dans des aménagements couteux, mais bon, en attendant, (…) on est mieux de construire plusieurs aménagements pour emmener plus de monde à bicyclette pour que le changement de culture se fasse, je pense. »

of the $141.6-million revamp of the Bonaventure Expressway. The project includes a large urban boulevard with four lanes in each direction and a park in the middle, yet makes no place specifically for cycling (Muise, 19 December 2014). She believes the integration of cycling in the city is not where it should be: "if we're creating an important facility, de facto, there should be a space reserved for active transportation, for cycling".[13] Komorowski believes the reconstruction of Montreal's sewage and underground infrastructure should be seen as an opportunity to build more interesting cycling infrastructure. "When you dig a whole street up and you rebuild it, don't put it back to the way it was before, (…) use that as an opportunity to build infrastructure, and (…) particularly if you want to do fancier infrastructure, things that we don't have yet".

[13] Original quote in French : « Si on fait un aménagement important, il va y avoir de facto un espace réservé aux déplacements actifs, au vélo. »

CHAPTER 5: DE MAISONNEUVE BICYCLE PATH CASE STUDY

The bicycle path on the boulevard De Maisonneuve leaves very few people indifferent. Since the elaboration of its plan in 2005, it has attracted strong reactions, both positive and negative. During the key-informant interviews, more often than not, the interviewee brought up this specific bicycle path. If not, I would ask them their opinion, and they always had a lot to say about it. In the 2013 Cycling Survey, the last question asked to the respondent was: "[d]o you have any other comments or concerns about traveling by bicycle in Montreal?". This open-ended question prompted close to nine percent of regular cyclists to comment on the De Maisonneuve bicycle path. This case study presents some of the weaknesses and strengths of this cycling infrastructure project, while also exhibiting how differently various parties view the same venture. This section will first cover the history of the bicycle path. Different views of its effectiveness and safety will be observed. Finally, proposed solutions will be presented.

5.1 HISTORY

The bicycle path was inaugurated in 2007. It was the first project from the city's transportation plan to be implemented. From its creation, it was to be open year-round, to allow for winter cycling (Ville de Montréal, 2008: 20). Vélo Québec described it as the first step towards a downtown cycle network. In fact, the bicycle path connects four university campuses (Université du Québec à Montréal, McGill University and Concordia University's downtown and Loyola campuses), crosses the entire downtown area and links to other bicycle paths. The network would give workers and students a useful and accessible alternative to using a personal motor vehicle, which Vélo Québec calls "auto-solo" (Vélo Québec, 2007).

In 2005, Vélo Québec recommended the creation of a bicycle path on De Maisonneuve, as part of their work as consultants on the transportation plan (Vélo Québec, 2005: 3). The initial plan included a westbound bicycle lane on the north side of the street, moving in the same direction as motor vehicle traffic, and an eastbound sidewalk-level path on the south side (Figure 5.1). The plan intended for curb extensions and concrete pedestrian crosswalks to "facilitate pedestrian traffic and minimize conflicts at intersections". An alternative plan included reinstating two-way traffic on De Maisonneuve and having bicycle lanes on both sides of the street, moving in the same direction as the cars.

FIGURE 5.2: PROPOSED PLAN FOR THE DE MAISONNEUVE BIKE PATH (VÉLO QUÉBEC, 2005)

In 2007, the bicycle path was established between Atwater Street and Berri Street, covering 3.4 kilometres. The construction cost $3.5 million dollars (CBC News, 7 July 2011). It consists of a bi-directional bicycle path, on the south side of the street, while the car traffic moves one-way, westbound. The finalized bicycle path runs from West Broadway Street in Notre-Dame-de-Grâce to Berri Street, in Ville-Marie, covering 9.5 kilometres. It was the first

bicycle path to be cleared of snow during the winter, as part of the White Network. The White Network is the name given to the the bicycle facilities which are open year-round.

The bicycle path was built as part of the 2005 *Plan d'accessibilité et de mobilité à vélo au centre-ville*, the plan for bicycle accessibility and mobility in downtown Montreal. It aimed to create 26 kilometres of new bikeways.

5.2 How cyclists view the De Maisonneuve bike path

Cyclists were found to be very opinionated when it comes to the De Maisonneuve bicycle path. When asked to comment about any subject related to cycling in Montreal, nine percent of the 2013 Cycling Survey respondents chose to write about De Maisonneuve. Table 5.1 presents the most discussed issues in the survey. Out of the 67 comments referencing the De Maisonneuve bicycle path, only three were positive. Danger and intersections were the most reported issues: forty-two percent of respondents found the bicycle path dangerous and forty percent of them highlighted intersections as being the most problematic areas. Eighteen percent of respondents said that they actively avoided the bicycle path, favouring sharing the street with motor vehicles on parallel streets. Twenty-one percent found that the bicycle path was too crowded or that the speeds were too slow, with fifteen percent of respondents saying that the path was too narrow and the cement curb prevented them from passing slow cyclists. Eighteen percent of respondents found that the bi-directional bicycle lane was problematic, advocating for a westbound bicycle path on a parallel street, or two unidirectional bicycle paths on a two-way street. Finally, thirteen percent of respondent found that pedestrians posed a danger by cutting across the bicycle path or standing on it.

TABLE 5.1 6: REPORTED ISSUES WITH THE DE MAISONNEUVE BICYCLE PATH (2013 CYCLING SURVEY)

Issue	Percentage of respondents
Dangerous	42%
Problems with intersections	40%
Actively avoid bicycle path	18%
Too crowded and/or too slow	20%
Problems with cement curb (can't pass cyclists, can't avoid obstacles on path, cars pay less attention, etc.)	15%
Bidirectional bicycle lanes are problematic	18%
Pedestrians (cutting across, walking or standing on bicycle path)	13%
Positive feelings toward bicycle path	4%

5.2 EFFECTIVENESS AND EFFICIENCY

Zvi Leve, a transportation economist and spokesperson for the Montreal Bicycle Coalition, described his commute from the Olympic Stadium to Westmount as stressful and slow when traveling on the separated bicycle paths on Rachel and De Maisonneuve. The overall commute took over an hour, compared to 20 or 25 minutes when biking on Sherbrooke Street.

The traffic on the bicycle path forces certain cyclists to choose alternative routes: "Cycling during rush hour is a nightmare right now, especially along high-traffic bicycle lanes such as the De Maisonneuve corridor. (I actively choose to cycle on Sherbrooke with less-safe conditions to avoid the bicycle traffic, but to guarantee timeliness. This really shouldn't be a choice any cyclist has to make.)". In this case, the cyclist was put in a situation where he chose to decrease his sense of security to increase his overall travel time.

For other cyclists, taking another route also allows them to take a stand: "I much prefer to take my place in regular traffic, for speed and flow, and also to demonstrate to car traffic that it's my road too". Many feel that the concrete barrier between the cars and the cyclists allows drivers to disregard cyclists.

A recurrent opinion in the survey responses and in the key-informant interviews is that the bicycle path is not suited for experienced cyclists. According to Zvi Leve, “for someone who's remotely competent riding a bicycle, it is actually very stressful to ride on a crowded bicycle lane and there are people at different speeds, there is not enough space”. Because of this, the number of people riding on Sherbrooke Street is increasing. Another survey respondent, who prefers cycling along cars on Sherbrooke, maintains that people need to learn how to cycle in a city and that for regular cyclists, the De Maisonneuve bicycle path is useless.

However, Marc Jolicoeur feels that it is up to cyclists to adapt their behaviour. Cyclists who want to cycle at 35 kilometres per hour will face many obstacles. Because of sidewalk improvements, there are increasing pedestrians on De Maisonneuve. “There are pedestrians crossing the street, with all the circulation, all the cars turning. (...) I ride slower on Maisonneuve than Brébeuf most of the time, because it is congested, and I live with it”. Despite the slow speeds, he maintains that cycling remains about twice as fast as driving, when taking into account parking time. “It remains effective. Yes, there is a limit, but still”.

According to Marianne Giguère, borough councillor for De Lorimier, the *gros fail* with the bicycle path is “the extent to which we are always, always, always stopped at each street corner and how even when the light is green for cyclists, there are perpetual conflicts with all those who want to turn south”[14].

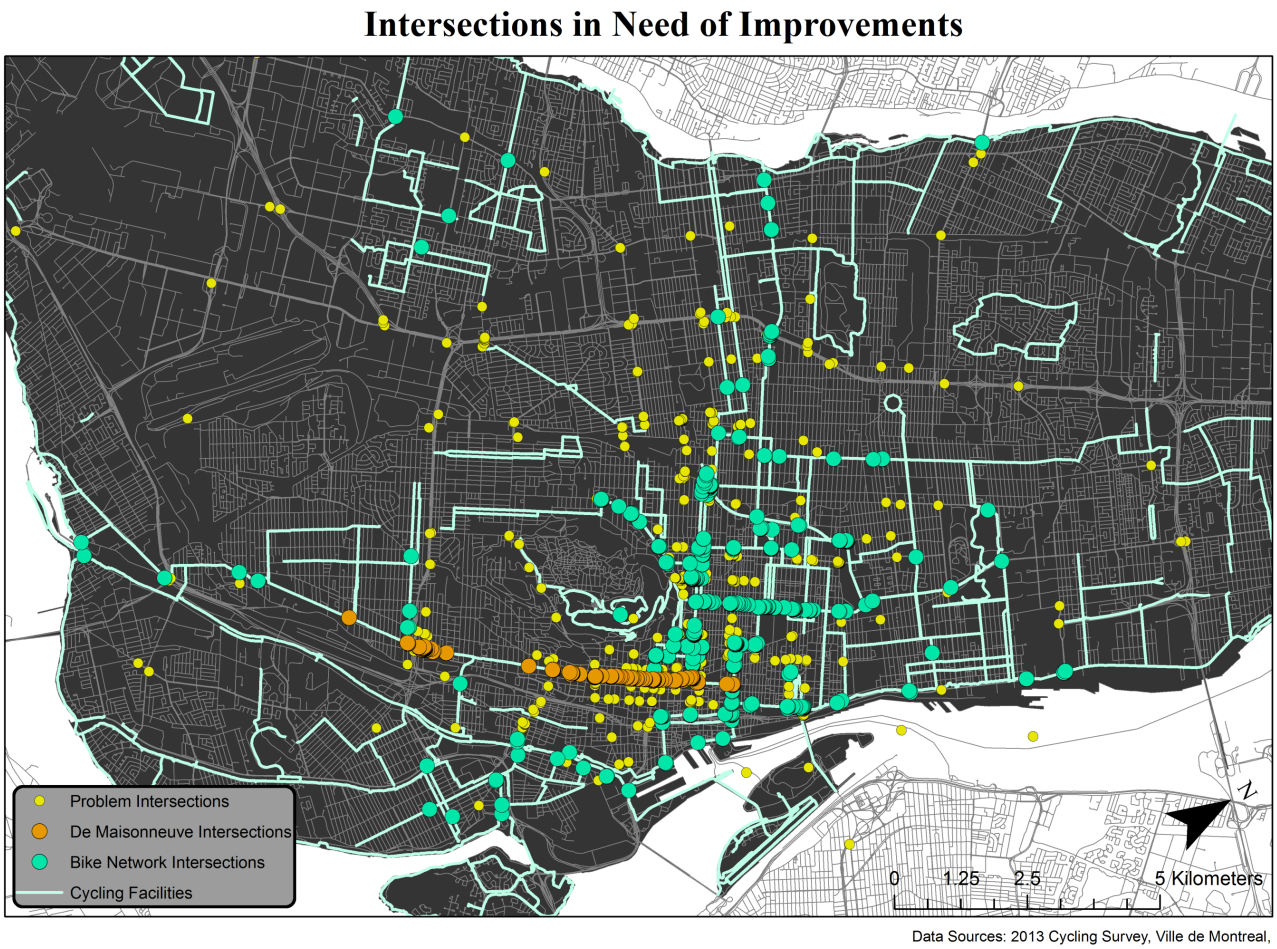
Over eighteen percent of respondents reported that they purposely avoided the bicycle path because of danger, travel times or discomfort, indicating that it has flaws, which must not be overlooked.

[14] Original quote in French: “le gros *fail* avec cette piste-là, c'est à quel point on est tout le temps, tout le temps, tout le temps arrêté à chaque coin de rue, puis à quel point même quand la lumière est verte pour les cyclistes il y a des conflits perpétuels avec tous ceux qui veulent tourner vers le sud.”

5.3 SAFETY

The language used to describe the bicycle path indicates that people are genuinely scared of using it. “Death trap”, “downright dangerous”, “nightmare”, “frightens me”, “suicidal”, “hyper dangerous” and “extremely dangerous” are some examples of descriptors used by survey respondents. The danger lies in three main elements: pedestrians walking onto the bicycle path, cyclists using the bicycle path incorrectly or recklessly, and cars turning left at intersections and crossing the bicycle path.

5.3.1 INTERSECTIONS



MAP 5.4: INTERSECTIONS IN NEED OF IMPROVEMENTS, AS REPORTED BY THE MONTREAL CYCLING SURVEY RESPONDENTS

Twenty-one percent of intersections reported as needing improvements in the Montreal Cycling Survey were located on the De Maisonneuve bicycle path (see Map 5.1). Intersections were the second most discussed topic in the survey comments, after general safety issues. Intersections set the stage for many possible conflicts, whether between cyclists, cars or pedestrians. According to Zvi Leve, the bicycle path is "not a very good design, (…) every single intersection is a battle. There's a light there, there's pedestrians crossing, there are trucks turning".

Although Peter Furth acknowledges that there can be conflict at intersections, he doesn't think anything needs to be done about it:

> it's tricky, I know, and I think it's just that's just the way it's going to be. … Those cars turning left, just like the cars turning right … they have to kind of, they have to plough through a bunch of pedestrians … so they have to wait and then try to go. It's tricky, yeah. I think it's always going to be tricky. But as long as speeds are low, people aren't going to get hurt. And the cars turning left there, they go at low speeds and people don't get hurt by low speed cars.

The cyclists who responded to the Cycling Survey were more adamant about the intersections on De Maisonneuve being unsafe, often citing first-hand experience for accidents or close calls: "I've had way too many close calls due to motorists not paying attention during left-hand turns"; "all of the collisions I've witnessed were when cars turn left and don't see [a] bicycle in the blind spot"[15]; "the bicycle path (…) is suicidal because drivers aren't used to cutting across a path when turning left".[16]

[15] Original quote in French: "Je pense à celle sur de Maisonneuve, où tous les accrochages dont je suis témoin sont lorsque des voitures tournent à gauche et ne voient pas les vélos dans leur angle mort."
[16] Original quote in French: "La piste sur de Maisonneuve à l'ouest de la Place des festivals est suicidaire car les automobilistes ne sont pas habitués à couper une piste en tournant vers la gauche."

5.4 Possible Solutions

For most informants, the solution to the issues with the bicycle path would be to convert it into a one-way westbound bicycle path, and move the eastbound track either to the north side of De Maisonneuve, as suggested by Vélo Québec in the 2005 plan, or to another parallel street, e.g. Ste-Catherine Street. The location of the eastbound track did not have a unanimous response because of different understandings of cyclist behaviour. If the paths were located on separate streets, using them would become a detour for some cyclists, which, according to Jolicoeur, could deter them from using it. Moreover, because De Maisonneuve is a one-way street, there is a lower risk of conflict between cars and cyclists. In fact, cars aren't concerned with oncoming traffic and can pay more attention to cyclists and pedestrians.

Since most of the conflict happens when drivers turn left at intersections, a solution would be to prohibit left turns for cars, at least for some intersections. Drivers would either have to go around the block or continue until they find an intersection where left turns were permitted.

CHAPTER 6: CONCLUSION

In this study, the attitudes of different stakeholders were compared with the outcomes to show that there is a lack of dialogue and education on the topic of cycling and bicycle facilities in Montreal. As demonstrated in the literature review, empirical studies have produced no consensus on the implications of bicycle paths. Some studies have found that bicycle paths are safe (Lusk et al, 2011; and Pucher, 2001), while others found they were more dangerous than sharing the road with motorized vehicles (Moritz, 1996; Wachtel & Lewinson, 1994; and Forester, 2001). Likewise, some studies found that cyclists will rarely use off-street facilities (Larsen & El--Geneidy, 2011; and Aultman-Hall et al, 1998), while others found cyclists will significantly increase the length of their trip to include off-street bicycle paths (Krizek et al, 2007; and Tilahun et al, 2006). Moreover, empirical research is not always backed up by real life experience. For example, Peter Furth's research showed that the De Maisonneuve bicycle path was safer for cyclists than alternative routes. Yet, the case study of the bicycle path in Chapter 5 demonstrates that cyclists and experts have many issues with its design and functionality. For these reasons, this study did not focus on empirical facts, but on how cycling and bicycle facilities are perceived by various stakeholders,.

The way cycling facilities are analyzed can influence the outcome of a study. For example, Peter Furth, an adamant proponent of separated bicycle paths, created a research model seemingly to prove the superiority of this type of infrastructure. He defends the methods used in his study: "(...) the street we compare [the bicycle path] with was always (...) the most likely alternative (...). So it wasn't (...) a random alternative, a random choice. And (...) in two cases, we compare

that with two streets, not one, and then there were six different comparison". Yet, this doesn't take into account that most cyclists have more than one, or two, alternative routes to a bicycle path. Therefore, it is unsurprising to find that a street with facilities specifically built for cyclists would have a higher ridership than a single parallel street. Furth's research approach is similar to his vision of his opposition: if it is not acknowledged, it does not exist. When asked about cyclists resisting his research, he described the opposition as "irrelevant", when asked about how to treat conflict at intersections on bicycle paths, he answered "it's tricky, (...) that's just the way it's going to be", and when asked about hostility between cyclists and motorists, he answered "all this conflict stuff, it's just the newspapers trying to make a story".

However, Furth is not the only researcher who appears to devise research methods with a preconceived goal. Following the same logic, one can design a research model to prove that cycle tracks are dangerous. By comparing collisions at intersections on local streets with those on streets with bicycle paths, which have higher bicycle and motorized traffic, one can expect to find that there is a higher collision rate on cycle paths.

The main issues are the lack of dialogue and education. It is not widely acknowledged that there exist different types of cyclists and that they require different facilities (Larsen & El--Geneidy, 2011; and Damant-Sirois et al, 2014). Experienced cyclists have different needs than potential cyclists (i.e. people who do not cycle but might under the right circumstances). The long term role of bicycle paths still remains unclear. Komorowski and Giguère believe separated bicycle paths do not necessarily make things safer for cyclists, but they make cyclists feel more comfortable. For now, cycling facilities are necessary to encourage people to start cycling. Moreover, until there is a change in the dominance of cars on the street, cyclists will continue requesting separation from motorized traffic. Cycling experts believe bicycle paths can also

change motorists' behaviour. Bicycle paths might encourage less-adventurous would-be cyclists to take up cycling, though new facilities might not attract established cyclists. Policy makers should be aware of this distinction and realistically understand how many people are likely to take up cycling. While the city should aim to increase ridership, it is important not to ignore the needs of experienced cyclists. A study by Mirando-Moreno & Nosal (2011) found that utilitarian bicycle commuters represent the majority of Montreal cyclists, with weekend ridership being 65 to 89 percent lower than on Mondays, the weekday with the lowest ridership.

This study has found that people's perceptions of cycling and cycling decisions rely heavily on their personal experiences. Peter Furth has a very positive opinion of cycling in Montreal, because his experience is purely academic and he is comparing it to less bicycle-friendly American cities: "[the best thing about cycling infrastructure in Montreal is] cycle tracks. You've got the best cycle track network in North America". He did not consider the ways these cycle tracks might hinder experienced riders. On the other hand, police officers working in Montreal were criticized of not understanding the implications of urban cycling, because many of them live in suburbs and view cycling as a leisure activity. The biases of decision-makers, be they academics or the SPVM, have to be acknowledged for policy to be effective.

However, the problem is also institutional. The Highway Safety Code, which governs all roads in Quebec, is centred on motorized vehicles. The Code has not been updated since the seventies and does not reflect today's urban reality. Moreover, the municipal government's unwillingness to take action in support of cycling is induced by a fear of upsetting motorist voters, thus creating a vicious circle. Until cycling is considered a mainstream activity, people will continue to view it as an unconventional mode of transportation which is paid for by taxpayer money, while motorists must pay their fair share through vehicle registrations.

This study has some limitations. First of all, the key-informants who were interviewed were either cycling advocates or researchers, creating a biased point of view. A more impartial research project would include politicians for Équipe Denis Coderre pour Montréal, the party in power. Planners and transportation engineers for the city would also have been able to bring some insight about the current situation. Unfortunately, although these people were contacted, only those interviewed were available at the time of the study. Moreover, the media analysis does not include the position of all stakeholders and only includes the more vocal motorists, who tend to oppose cycling. Future research should follow the process behind infrastructure or policy decisions, to examine which stakeholders are considered and which ones are ignored.

BIBLIOGRAPHY

Adams, J. G. U. (1983). Public safety legislation and the risk compensation hypothesis: the example of motorcycle helmet legislation. *Environment and Planning C: Government and Policy, 1*(2), 193-203.

An Act Respecting the Exercise of Certain Municipal Powers in Certain Urban Agglomerations, CQLR c E-20.001, s. 24.1.

Auger, S. (2014, May 5). Mort d'une Cycliste: Le Code de la Sécurité Routière sera révisé. *La Presse.* Retrieved April 5, 2015, from http://www.lapresse.ca/lesoleil/actualites/transports /201405/04/01-4763548-mort-dune-cycliste-le-code-de-la-securite-routiere-sera-revise.php

Aultman-Hall, L., Hall, F. L., & Baetz, B. B. (1997). Analysis of bicycle commuter routes using geographic information systems: implications for bicycle planning. *Transportation Research Record: Journal of the Transportation Research Board, 1578*(1), 102-110.

Bouchard, C. (2014, December 23). Rues Locales en Rues Artérielles: Un Changement qui inquiète Projet Montréal. *Journal Métro*. Retrieved April 7, 2015, from http://journalmetro.com/local/le-plateau-mont-royal/actualites/687692/rues-locales-en-rues-arterielles-n-changement-inquietant-pour-projet-montreal/

Bureau du Coroner du Québec. (2014). *Rapport d'Investigation du Coroner*. (Case No. 322964). Gatineau, QC.

Bushell, M.A., Poole, B.W., Zegeer, C.V., & Rodriguez, D.A. (2013). Costs for Pedestrian and Bicyclist Infrastructure Improvements: A Resource for Researchers, Engineers, Planners, and the General Public. Chapel Hill, NC: University of North Carolina, Chapel Hill, Highway Safety Research Center.

Chong, H. (2014, February 24). Why it makes Sense to bike without a Helmet [Web log post]. Retrieved from http://www.howiechong.com/journal/2014/2/bike-helmets

Copenhagenize Design Co. (2013) The Copenhagenize Index 2013: Bicycle friendly cities. 2013. Retrieved from http://copenhagenize.eu/index/14.html

Cyclist wants de Maisonneuve Bike Path changed. (2011, July 07). *CBC News*. Retrieved April 10, 2015, from http://www.cbc.ca/news/canada/montreal/cyclist-wants-de-maisonneuve-bike-path-changed-1.1043721

Damant-Sirois, G., Grimsrud, M., & El-Geneidy, A. (2014). What's your type: A multidimensional cyclist typology. Paper to be presented at the 93rd Annual Meeting of the Transportation Research Board, Washington, D.C., USA.

Deadly Bike Crashes: Coroners want Drivers to look before opening Doors. (2014, November 13). *CTV News Montreal.* Retrieved December 6, 2014, from http://montreal.ctvnews.ca/deadly-bike-crashes-coroners-want-drivers-to-look-before-opening-doors-1.1541270#ixzz3JkrVqY3h

Duivenvoorden, K., Schaap, N., van der Horst, R., Feenstra, P., & van Arem, B. (2007). Roadside versus in-car speed support for a green wave: a driving simulator study. Master's Thesis, University of Twente.

Forester, J. (2001). The bicycle transportation controversy. *Transportation Quarterly, 55*(2).

Fortier, M. (2013, June 5). Des « Pièges à Tickets » pour attraper les Cyclistes ? *Le Devoir*. Retrieved April 10, 2015, from http://www.ledevoir.com/opinion/blogues/le-blogue-urbain/379934/des-pieges-a-tickets-pour-attraper-les-cyclistes

Garrard, J., Rose, G., Lo, S.K. (2008) Promoting transportation cycling for women: The role of bicycle infrastructure. *Preventive Medicine, 46*, 55-59.

Gonthier, V. (2014, July 12). 494$ de tickets et des menottes pour un arrêt mal effectué à vélo. *Journal De Montréal*. Retrieved April 10, 2015, from http://www.journaldemontreal.com/2014/07/11/494-de-tickets-et-des-menottes-pour-un-arret-mal-effectue-a-velo

How Montreal tracks Cyclists. (2014, January 1). *CTV News Montreal*. Retrieved December 3, 2014, from http://montreal.ctvnews.ca/how-montreal-tracks-cyclists-1.1619553

Jacobsen, P.L. (2003). Safety in numbers: more walkers and bicyclists, safer walking and bicycling. *Injury Prevention. 9*, 205–209.

Kaplan, J. A. (1975). Characteristics of the regular adult bicycle user (No. FWHA/R9-76/7 Final Rpt.).

Jolicoeur, M. (2005). Bicycle Access to Downtown Montreal: Investing in a Better Future. *Conference of the Transportation Association of Canada*. Retrieved April 10, 2015, from http://conf.tacatc.ca/english/resourcecentre/readingroom/conference/conf2005/docs/s9/Jolicoeur.pdf

Krizek, K. J., El-Geneidy, A., & Thompson, K. (2007). A detailed analysis of how an urban trail system affects cyclists' travel. *Transportation, 34*(5), 611-624.

Larsen, J., & El-Geneidy, A. (2011). A travel behavior analysis of urban cycling facilities in Montréal, Canada. *Transportation research part D: transport and environment, 16*(2), 172-177.

Lau, R. (2014, September 30). Cyclist's underpass death was avoidable, says coroner. *Global News*. Retrieved April 06, 2015, from http://globalnews.ca/news/1590395/cyclists-underpass-death-was-avoidable-says-coroner/

Lusk, A. C., Furth, P. G., Morency, P., Miranda-Moreno, L. F., Willett, W. C., & Dennerlein, J. T. (2011). Risk of injury for bicycling on cycle tracks versus in the street. *Injury Prevention, 17*(2), 131-135.

Magder, J. (2015, January 22). City proposing ambitious expansion of bike path network. *Montreal Gazette*. Retrieved April 9, 2015, from http://montrealgazette.com/news/local-news/city-proposing-ambitious-expansion-of-bike-path-network

Magder, J. (2015, April 03). Cyclists say City has Much Work to do to improve Safety. *Montreal Gazette*. Retrieved April 03, 2015, from http://montrealgazette.com/news/local-news/cyclists-say-city-has-much-work-to-do-to-improve-safety

Marchal, M. (2014, October 16). «Trappes à Tickets», Port du Casque et Autres Constatations Cyclistes. *Journal Métro*. Retrieved March 15, 2015, from http://journalmetro.com/opinions/montreal-sous-observation/576160/trappes-a-tickets-port-du-casque-et-autres-constatations-cyclistes/

Miranda-Moreno, L. F., & Nosal, T. (2011). Weather or not to cycle: whether or not cyclist ridership has grown: a look at weather's impact on cycling facilities and temporal trends in an urban environment. In *US Transportation Research Board Annual Conference*.

Moritz, W. E. (1998). Adult bicyclists in the United States: characteristics and riding experience in 1996. *Transportation Research Record: Journal of the Transportation Research Board, 1636*(1), 1-7.

Muise, M. (2014, December 19). Montreal unveils new Plans for Urban Boulevard to replace Bonaventure Expressway. *Montreal Gazette*. Retrieved April 8, 2015, from http://montrealgazette.com/news/local-news/montreal-unveils-new-plans-for-bonaventure-expressway

Paré, I. (2014, March 13). Un jugement de la Cour supérieure étend aux cyclistes plusieurs infractions prévues au Code de la route. *Le Devoir*. Retrieved April 06, 2015, from http://www.ledevoir.com/societe/actualites-en-societe/402470/un-jugement-de-la-cour-superieure-etend-aux-cyclistes-plusieurs-infractions-prevues-au-code-de-la-route

Paré, I. (2014, March 14). Infractions à vélo: Amendes salées ou cacahuètes? *Le Devoir*. Retrieved April 6, 2015, from http://www.ledevoir.com/opinion/blogues/le-blogue-urbain/402689/infractions-a-velo-amendes-grillees-ou-cacahuetes

Plateau announces plan for safer roads. (2014, May 22). *CTV News Montreal*. Retrieved December 4, 2014, from http://montreal.ctvnews.ca/plateau-announces-plan-for-safer-roads-1.1834455

Pucher, J. (2001). Cycling safety on bikeways vs. roads. *Transportation Quarterly, 55*(4), 9-11.

Pucher, J., & Buehler, R. (2006). Why Canadians cycle more than Americans: a comparative analysis of bicycling trends and policies. *Transport Policy, 13*(3), 265-279.

Pucher, J., & Buehler, R. (2007). At the frontiers of cycling: policy innovations in the Netherlands, Denmark, and Germany. *World Transport Policy and Practice, 13*(3), 8-57.

Pucher, J. R., & Buehler, R. (2011). Analysis of bicycling trends and policies in large North American cities: Lessons for New York. *University Transportation Research Center Region 2.*

Sparks, E. (2015, March 16). Healing the Appeal of Two Wheels | News. *The Link Newspaper*. Retrieved April 10, 2015, from http://thelinknewspaper.ca/article/6882

Tenneriello, T. (2014, May 29). City of Montreal unveils Bike Safety Plan. *CJAD*. Retrieved November 10, 2014, from http://www.cjad.com/cjad-news/2014/05/29/city-of-montreal-unveils-bike-safety-plan

Tilahun, N. Y., Levinson, D. M., & Krizek, K. J. (2007). Trails, lanes, or traffic: Valuing bicycle facilities with an adaptive stated preference survey. *Transportation Research Part A: Policy and Practice, 41*(4), 287-301.

Vélo Québec. (2005, April). À Vélo au Centre-Ville de Montréal: la Proposition de Vélo Québec.

Vélo Québec. (2007, November 1). La Piste Cyclable du Boul. de Maisonneuve, Premier Geste Concret du Plan de Transport de la Ville de Montréal [Press release]. Retrieved April 10, 2015, from http://www.velo.qc.ca/fr/salledepresse/La-piste-cyclable-du-boul.-de-Maisonneuve-premier-geste-concret-du-Plan-de-transport-de-la-Ville-de-Montreal

Vélo Québec. (2011). L'État du Vélo au Québec en 2010.

Ville de Montréal. (2008). Transportation Plan. Retrieved from http://ville.montreal.qc.ca/pls/portal/docs/page/transport_v2_en/media/documents/transportation_plan_2008.pdf

Ville de Montréal. (2013, April 22). Montréal crée un comité consultatif sur le vélo [Press release]. Retrieved from http://ville.montreal.qc.ca/portal/page?_pageid=5798,42657625&_dad=portal&_schema=PORTAL&id=20676

Ville de Montréal. (April 2014). Pistes Cyclables. Portail Données Ouvertes. Retrieved from http://donnees.ville.montreal.qc.ca/dataset/pistes-cyclables

Wachtel, A., & Lewiston, D. (1994). Risk factors for bicycle-motor vehicle collisions at intersections. *ITE Journal (Institute of Transportation Engineers), 64*(9), 30-35.

Washington State Department of Transportation. (April 2002). Highway construction cost comparison survey: Final report.

Walker, P. (2014, October 8). World's Best Cycling Cities. *CNN*. Retrieved April 9, 2015, from http://edition.cnn.com/2014/08/17/travel/best-cycling-cities/index.html