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What we learned from Copenhagen and where we went wrong: Changes New York can make in car-parking policy to better promote a bicycle city

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Abstract

In this study, I argue that the oversupplies of parking in New York City promote private car ownership and defeat attempts of accepting cycling as a viable mode of transport. Overabundant parking also actively takes away from public areas and urban aesthetics, often increasing carbon footprint and traffic congestion and denying the city its opportunity to develop into the walkable urban environment envisioned by *PlaNYC2030.* Copenhagen was able to realize the importance of public life early on and, through the implementation of parking policies, was able to reduce demand for the automobile while promoting public life and alternative modes of transportation. But New York has continued to prioritize the car and has been seemingly unable to grasp the fact that the automobile cannot continue to thrive alongside pedestrianized design. With Copenhagen's history in mind, I aim to create a theoretical modification of New York City's existing means of parking management, parking design and parking incentives that will reduce demand for parking and encourage cycling among other modes of transport. Qualitative and quantitative methods were applied and carried out through interviews, archival research, and GIS (Geographic Information Systems) data maps. By addressing the topics of transportation attitudes, bicycle infrastructure, and parking design, this new project will explore the polarization and conflict that exists between New York City's car culture and its competition as a bicycle city by highlighting the effective parking and cycling policies that exist in Copenhagen.

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I. Introduction

I focus my research on bicycle planning, attitudes, and use in two urban environments—New York City and Copenhagen, Denmark. A comparative analysis of the two cities may unveil the reason New York and other American cities seem to trail behind their European counterparts regarding attitudes towards bicycling as a viable mode of transport. I analyze the omnipresence of the private automobile as the deep-rooted reason New York failed to properly execute the policies and strategies it borrowed directly from Copenhagen. In my analysis, I identify car-parking policy as the main demotivator of cycling support and effectiveness.

My research focuses predominantly on New York City while calling upon Copenhagen's success as a major bicycle city in the later half of the 20th century, after the advent of the private automobile. My fieldwork takes place mainly in New York, but I use Copenhagen's history as a backdrop because, as I will discuss later, New York City policymakers and planners toured Copenhagen's streets and directly adopted bicycle policy and bicycle infrastructure from the city. It is also important to know that Copenhagen was not always the cycling Mecca it is today. Like all of America and much of Europe, the city of Copenhagen fell in love with the private automobile and, during the heyday of the car, saw an immense drop in cyclists and bicycle safety. Officeholders were fortunately able to reverse this trend by altering car parking policy and restricting car parking on inner city streets. So, for the purposes of this study, I let Copenhagen serve as an ideal bicycle setting from both a planning and cultural perspective, and I ask where New York went wrong in its attempted imitation of the cycling haven.

Using an interdisciplinary approach to the topic, I continue to investigate this problem from a cultural perspective and assert that American car culture has a relentless impact on the response of New Yorkers to the mere placement of bicycle paths. Is New York too New York

for a bicycle culture? There has been tremendous backlash and a brash hostility towards cyclists from many New York residents, pedestrians and drivers alike, that is creating an increasingly vicious divide between commuters.

I do express admiration for New York's recent strides to increase transportation and land use efficiency by implementing new pedestrian-scale environments and welcoming cyclists to city streets. Although it is true that these steps towards cycling have positive implications for New York City's future welfare and sustainability, it is also true that cars have kept their place and position of power on the road, largely through political avenues and often severely depleting the efficiency of these progressive innovations. Policies that favor the automobile are contradictory to cycling initiatives, and in this paper I argue that New York's parking policies in particular are what substantially restrict the city's growth as a bicycle city.

I seek to evaluate the existing literature behind smart growth of urban mobility and, while considering these sources and the uniqueness of New York, propose a theoretical overhaul of the current policies behind the (1) management, (2) design, and (3) incentives of car parking in New York City. I intend on revamping these three structures in a way that will ultimately persuade against private automobile use while allowing the bicycle and other modes of transport to thrive. The city's already oversized and nevertheless increasing parking requirements are reversing any incentive people may have to abandon their private commute and to turn towards a better alternative, like cycling. Space that could be devoted to public and pedestrian use is instead allotted to parking lots, garages, and on-street spaces along city corridors. Changing parking management practices to encourage efficiency is one of the most beneficial strides we can take to encourage more efficient transportation, proficient land use, and more equitable transportation funding.

It is true that American and European cities differ culturally and economically regarding private automobile use. Many American cities are unfit and unable to completely abolish the private automobile, understandably so considering years of urban sprawl and the vast suburban areas that lie outside the city. Despite New York's attempts at mimicking Copenhagen's use of land, public space and streets, the fact that automobiles simply cannot thrive equally alongside these innovations is often ignored.

Although it is necessary for a place like New York City to accommodate for the automobile to a certain degree, the private car and consequential congestion is becoming more and more of a disadvantage to a city trying to reduce its heavy carbon footprint and increase its overall efficiency. This issue is pressing for a city trying to compete for sustainability in the future. New York must focus on developments to remedy growing congestion while at the same time promoting sustainable, collective modes of transportation, including walking and cycling (Meteyer et al., 2009, p. 45). Although these are seemingly contradicting incentives, they highlight the challenge of New York's urban policy to effectively share public space.

II. Literature Review

a) Background

A brief look at the histories of America and Europe reveal several differences in politics, land distribution and culture that play a role in urban development. Hartz and Horowitz argue that colonizers from Europe brought only a fragment of European culture with them to America—the worldview of liberalism that was emerging at the time—and then proceeded to evolve in their own way without the presence of feudalism and monarchism, which remained in Europe's landscape (1968, as cited in Fichman & Fowler, 2005, p.94). The weakness of

socialism in North America may be explained by the absence of feudalism's collective traditions. Land ownership is more sacred in North America because of the overwhelming abundance of raw land that was readily available to pioneers in the New World (Fichman & Fowler, 2005, p. 94). Such open space and access to fossil fuels was simply unavailable to Europeans and constrained the construction of sprawling, car-oriented suburbs that constituted the "American dream" worldview of owning a large, single-family house on a private lot equipped with a private automobile and multi-car garage.

b) Copenhagen's decline and success

Still, it is true that both Europe and America fell in love with the private automobile, and Copenhagen was not always known as the cycling mecca it is today. Newman and Kenworthy (1999) quote Danish architect and planner Jan Gehl who describes the changes that took over Denmark: "By the 1960s, American values had begun to catch on—separate isolated homes and everyone driving" (p. 204). Copenhagen's downtown streets were often congested with cars and its town squares were used as car parks.

Planners soon realized the negative impacts of car-dependency; Copenhagen was becoming congested with commuter traffic and the city was in danger of losing its residents to outlying suburbs. So, as an experiment, the main downtown shopping corridor *Strøget* was closed to motor vehicle traffic in 1962. Cars were restricted in the center and car parking was gradually reduced in surrounding city thoroughfares. European cities had been pushing for car-free areas by this time, but the closing of *Strøget* was one of the first conversions in all of Europe (Ward & Travlou, 2007, p. 5). However, the pedestrianization of Copenhagen was a controversial process. Danes were not eager to let go of the car and did not picture their city as

one built for public life. Many rejected bicycling, largely because the presence of the automobile made it unsafe, unconventional, and impractical to ride a bike. Shopkeepers expressed some of the strongest objections to car-free zones, as they believed their shops would die off if there were no more cars or cars were unable to park near their shops (Tan, 2006, p. 31).

However, since the closing, Copenhagen experienced many social and economic benefits. People found it interesting and enjoyed exploring their city on foot. Shopkeepers realized it worked to their advantage, as people were now able to walk by and look in store windows. Space for parking in lots and on the street was rendered instead to pedestrians and cyclists, and at the same time, bicycle lanes were extended throughout the city. In due time, bicycling took off because it became the most convenient way of getting around for most people. Gehl evaluates the increase in cycling: "Bicycling is once again a safe and rather uncomplicated mode of transport in Copenhagen, and it is not unusual to see the head of the Royal Theatre or a Minister of Parliament bicycling to work through the streets of the inner city" (1996, as cited in Sloman, 2006, p. 127).

In concurrence with the environmental movement and oil crisis of the 1970s, parking policies helped keep automobiles from clogging inner city streets in Copenhagen, rendering it a successful cycling city in the late 20th century and today (Gehl & Gemzøe, 2000, p. 18). In the first ten years, 600 spaces were removed (Sloman, 2006, p. 127) and 2-3% of parking spaces were removed per year (Mega, 2010, p. 67). Over the course of twenty years, even more parking was removed, high fees were charged for on-street parking, more streets were pedestrianized and more city housing was built. Attractive landscaping, seating, markets and street festivals were introduced gradually each year (Newman & Kenworthy, 1999, p. 204). Gehl emphasized the importance of gradual change in urban redevelopments, in order to make changes sustainable and

to give people time to adapt. "For a while now, Copenhagen has had a policy of taking away three percent of the inner city parking every year, on the theory that if people can't park, they won't drive. If you do it slowly enough, nobody notices" (Gehl, as cited in Grescoe, 2012, p. 148). The gradual introduction and demand for an extended bike lane network allowed cycling to flourish, and Copenhagen continued to enjoy social, environmental, and economic benefits.

c) "Copenhagenisation" of New York City

A review of the literature substantiates that cities gain environmental and social benefits from cycling and pedestrianized design (Jackson, 2003). Growing environmental concerns have prompted planners around the world to look towards bicycle cities as a solution to carbon output. Danish planner Jan Gehl has been consulted by hundreds of these planners about pedestrianized design and its positive effects on society and the environment. Amsterdam too is famous and celebrated for its bicycles, but the Danish capital is where urban planners have been looking for ways to gradually reduce cars and increase cycling, a process known as "Copenhagenisation." Gehl coined the term during his research on the quality of life in Copenhagen where he collected statistical data on urban vitality.

Following the closing of *Strøget*, a young Jan Gehl partnered with Professor Lars Gemzøe to begin research on the changes in public space in Copenhagen. The two counted pedestrians and bicycles in the streets and were the first to systematically study and record pedestrian movements in the same way that every city measured and recorded traffic flow (Tan, 2006, p. 32). Gehl and Gemzøe documented changes in the city and street activity over the next twenty years (Sloman, 2006, p. 128). Research clearly showed a one-to-one relation between the area of pedestrian space in the city and the rise in the number of people using the city center

(Tan, 2006, p. 33). This statistical data was crucial in showing the value of a bicycle city and it was important for future urban revitalization in Copenhagen and in cities around the world. It is true that European cities—in their medieval design—are better equipped to sustain a well-functioning bicycle city (Beatley, 2000, p. 30). Still, Copenhagenisation, Gehl said, was commonsensical and could be implemented anywhere. Perhaps the hardest test for the axioms of Copenhagenisation was the unique city of New York (Turner, 2011). In 2007, after touring in Copenhagen's cycling haven, New York City Department of Transportation Commissioner Janette Sadik-Khan was inspired to change New York City's landscape for a sustainable and successful future. She envisioned New York as a pedestrian-scale bicycle city, and, along with fellow tourist and Department of City Planning Commissioner Amanda Burden, adopted some of Copenhagen's planning strategies and policy initiatives.

Sadik-Khan hired Jan Gehl as a consultant of New York City streets, who conducted surveys and assembled an unprecedented array of statistics about New York's urban life (Turner, 2011). New York City Department of Transportation contracted with Gehl Architects (Department of Transportation, 2008) to conduct public life surveys that assessed the quality of public space. Surveyors were hired to measure public areas and to evaluate the allocation of space in key city corridors. New York, Gehl said, had huge potential as a bicycle city because it was already a vibrant walking city—with hundreds of major attractions. It was high density with high volumes of pedestrians. There was an efficient street grid already in place, as well as a fine-grained public transportation network (Department of Transportation, 2008, p. 11).

Why was Copenhagen successful? Gehl described the interactions of people as the revolutionary force behind a successful city (Turner, 2011), and concluded that a cycling culture facilitated such interaction. In the case of New York, so many people spent time in the public

realm due to the high density of the city. "Most New Yorkers are never more than a 20-minute walk from a subway or train station" (Department of Transportation, 2008, p. 12). Gehl said that New Yorkers would take naturally to people-oriented streets and would soon be compelled to embrace the bicycle as a superior way of getting around.

So, in promoting walking, the city would at the same time be promoting cycling. With suggestions and guidance from Gehl Architects, the DOT set up areas that catered to pedestrians and public life. In Summer 2008, NYCDOT transformed Broadway from 42nd to 35th Street (Department of Transportation, 2008, p. 39). The project, known as Broadway Boulevard, created a ribbon of public gathering spaces that encouraged foot traffic and human interaction. Most of the space in these areas was previously allocated to the automobile: 82% of Herald Square and 89% of Times Square were formerly taken up by space for motor vehicles (Department of Transportation, 2008, p. 32).

More public areas were employed in many different parts of the city and were well received by pedestrians. At the same time, the city opened bike lanes throughout these areas to facilitate cycling. However, a successful bicycle city was mutually dependent on how safe the public felt in city streets. So, if people felt safe in city street environments, only then would cycling be able to take off as the preferred means of getting around. For this reason, Gehl believed it was necessary to first solve the problem of public space. He inferred that cycling would follow when pedestrians deemed it best.

NYCDOT took measures to transform a few different areas of the city into pedestrian-oriented environments, complete with protected bicycle lanes. These areas are generally well functioning but not without controversy, which I will expand on in the next few sections. These realms of public space are only currently available to a few New York City neighborhoods. In

any event, it is true that people take naturally to people-oriented space. We watched pedestrians embrace public space, but it is true that bicycle lanes remained underutilized.

In August 2008, NYCDOT introduced cycling to the city by opening a seven-mile car-free route from the Brooklyn Bridge to Central Park to cyclists and pedestrians for three consecutive Saturdays. The program, known as Summer Streets, was well received by many New York residents and newspapers (Department of Transportation, 2008, p. 44). Still, though, bicycling was not a reality to most New Yorkers. The DOT proceeded to promote cycling by installing more and more bicycle lanes throughout the city. But the implementation has led to debate, criticism and brash hostility among many New York residents and public officials towards cyclists and towards cycling design.

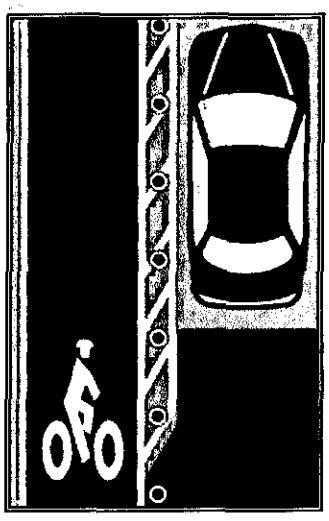
d) Problems with cycling in New York: the clash of cars and bikes

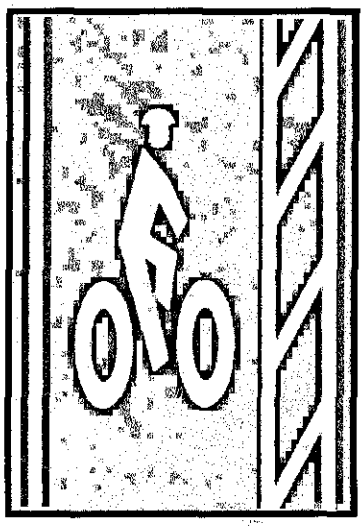
As of 2011, the Bloomberg administration boasted 250 miles of bike lanes. Although it seems impressive, it is important to recall how much space is still used for the automobile. The city consists of 6,200 miles (Department of Transportation, 1992) of roadway, rendering the 250 miles of bike lanes almost meaningless, not to mention, those miles are spread between all five boroughs. When presented with these numbers, it is easier to envision the problems of cycling infrastructure and the bicycle's struggle to thrive. Additionally, only about 50 miles of these lanes are protected lanes (Department of Transportation, 2012). Protected bike lanes enjoyed by certain neighborhoods are, for the most part, successful, safe, and accessible to bikers of all demographics. They are removed from the street by physical barriers that separate spacious lanes from on-street parking, wide enough to create a buffer between bike, car, and pedestrian activity, thereby preventing accidents and injuries. Cycling is able to flourish in these sections of

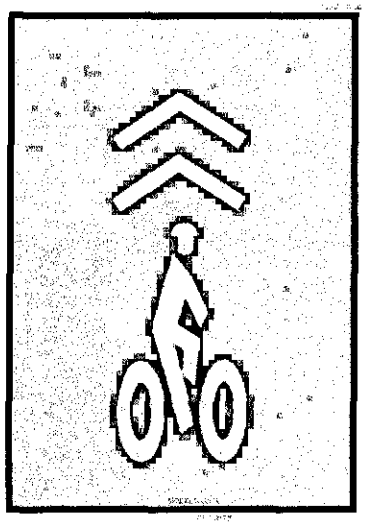
New York, although its growth is somewhat confined to these restricted areas. This seems evident in my casual observation though I aim to prove it through my own research.

In any event, it is crucial to remember that there are no physical buffers protecting the remaining 200 miles of bike lanes that weave through New York. The remaining majority of bike lanes are unprotected and relatively unsafe. In its issuance of the latest *NYC Cycling Map*, the Bloomberg administration distinguishes between three "classes" of bike lane structure. To better visualize the problems of exposed bike lanes and the successes of protected ones, I have included those diagrams here (New York City Government, 2012). The following diagrams help illustrate the variance between different types of lanes:

Class 1 **Class 2** **Class 1**







From here on, I will refer to these lanes by class. Classes II and III are dangerous to bikers but make up the majority of cycling paths available to New Yorkers at this time. Class III situations are extremely hazardous to bikers attempting to share the road with motorists. These types of paths are supposed to signify routes leading to regular lanes. These lanes constitute

most of New York mainly because so much land remains untouched by established bike lanes; but for avid bikers who actively use bike lanes, Class II variations are the most encountered.

Class II bike lanes—situated precariously between parked cars and vehicular traffic—pose a risky threat for cyclists. New York City's leading transportation advocacy organization *Transportation Alternatives* describes design flaws of these bike lanes: These lanes are often inconsistent and dangerously unacknowledged by drivers and pedestrians. Cyclists are defenseless against opening car doors and exiting drivers are vulnerable to passing cyclists. Manhattan Borough President Scott M. Stringer, in his "Respect the Lane-Clear the Path" Survey (2010), cited "dooring" (the act of hitting a cyclist with an open door) as a major cause of cyclist accidents and injuries. His survey counted 77 instances of "dooring" in the course of only three days (Stringer, 2010).

Left-only turning lanes that are placed to the right of bicycle paths leave cyclists susceptible to collisions although they should have the right of way. Pedestrians and drivers alike disregard the fact that bicycle lanes should be bicycle-only lanes, resulting in much double-parking and unloading of trucks in these paths. The problem of bike lane blockages by motor vehicles is worse in New York City than anywhere else in the country (Pucher, Thorwaldson, Buehler, Klein, 2010, p. 25). When vehicles block lanes, cyclists have to merge into traffic, sometimes causing accidents and fatalities (Pucher et al., 2010, p. 27). Cabbies also show concern, as they are hesitant in pulling to the curb over new bike paths and possibly striking cyclists (Transportation Alternatives, 2010).

Automobile traffic discourages high levels of bicycle commuting (Dill & Carr, 2003). A survey of New York City bicyclists conducted by the New York Department of City Planning found that 76% of cyclists preferred riding on off-street bike facilities to on-street facilities,

citing the most common reason as fear of automobiles (Department of City Planning, 2007). It is important to remember this was in 2007 and New York has since then improved and extended bicycle infrastructure. Still, according to the more recent cyclist survey conducted by the New York City Department of Health, 95% of cyclists preferred to ride on protected lanes, and 3 in 4 surveyed reported feeling unsafe riding on New York streets (2011).

Right before our eyes, safe lanes were implemented and we watched as people naturally adapted to them; but the inconsistencies of bike routes kept cyclists grounded to familiar paths. If not that, it's certain that cyclists, at one point or another, would have to take a lengthy, indirect detour to their destinations, chiefly due to their leeriness of unprotected routes. The brave cyclist who does venture from safe, protected lanes often *needs* to use the road at some points in his journey simply because lanes end abruptly or are blocked by vehicles (Pucher et al., 2010, p. 27). The following photographs (Pucher et al., 2010) exhibit the reluctance of motorists to acknowledge space for the bicycle:

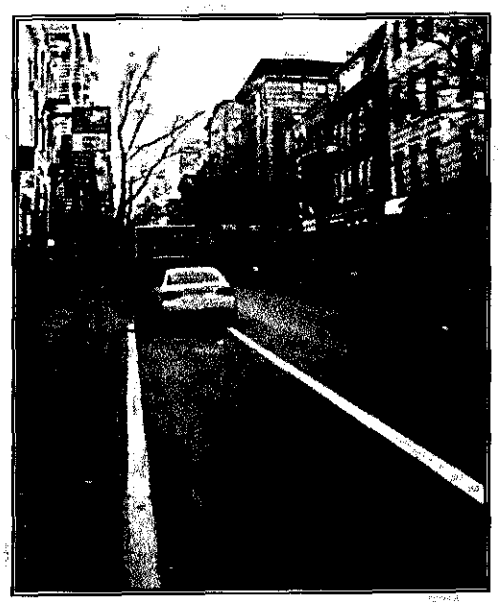


Figure 1: Greenwich Village

Figure 2: Greenpoint Avenue in Brooklyn

It is not to say New York has made insignificant progress. It is true that cycling has increased 102% since 2007 and streets with bicycle lanes became 40% less deadly (Department of Transportation, 2011). By no means do I deem New York a failure here. Automobile-bicycle collisions have remarkably diminished, but my concerns for this project lie in the uniqueness of New York and its comparison to other bicycle cities around the globe. Although protected bike lanes may have been safe in select city enclaves, they are often isolated and not easily connected to other parts of the city. I aim to show that these lanes are severely underused because they are still inaccessible and not a viable means of getting around, seemingly all because of automobile presence and domination. The newly designed streets often place the same amount of traffic in a fewer amount of lanes while isolating a surplus of space used by only a few cyclists daily (Crowley, 2009, p. 11). If cycling was promoted, and cycling design implemented, then why did bicycling fail to reach its desired potential?

If all bike lanes were real, continuous routes, instead of scattered inconsistent ones, people would have incentive to bicycle and demand for the car would decrease further. Bike lanes and paths need to connect popular origins and destinations (Dill & Carr, 2003, p. 7). Bike lanes provided positive results but there is still progress to be made. Interfering with progress, however, is an American tinge of hatred among motorists toward bicycle lanes and towards the cyclist himself, and this hatred may be growing.

e) More problems with cycling in New York: attitudes against cyclists

In order to have a safe, consistent, and accessible bicycle infrastructure—one that people will actually use for more than recreation—road space must be taken away from the car. However, there is extreme backlash from motorists and community leaders alike when space for

traffic lanes or car parking is threatened (Goodman, 2010). For example, in the case of Park Slope, the implementation of the Prospect Park West lane was met with extreme hostility from some residents, due to anger over the removal of a lane of traffic and space for parking (de Zeeuw & Flusche, 2011).

Although there exists scattered oases of public spaces, the city is still heavily car-dominated. The omnipresence of the car continues to fence off space to pedestrians and cyclists. The main hostility towards cyclists is rooted in their interference with cars on the road. Motorists and pedestrians alike complain that cyclists do not adhere to the rules of the road and use city streets and sidewalks as their own personal raceways. Cyclists are left in a difficult spot, because in some parts of the city their lifestyle and means of transportation is supported and encouraged by protected bike lanes. In other parts of the city, often just a few blocks away, designated bike areas begin to disappear and space for the bike is diminished to almost nothing—at most to a Class III "lane." In these areas, and even in Class II areas, pedestrians and drivers see cyclists as intrusive. Although bike lanes may exist in many sections of New York City, they are often obstructed or inconsistent and cyclists are forced to ride alongside traffic (Pucher et al., 2010, p. 27). Bicycle and Pedestrian Safety Specialist Lois Chaplin of Cornell University confirms that cycling in traffic is dangerous, and cyclists often seek refuge on sidewalks, where they are in turn unwelcomed by pedestrians (Chaplin, 2010, p. 4).

The reality is that most American adults do not ride a bicycle and have never ridden a bicycle for transportation, to get from point A to point B (Brookings Institute, 2009). Cycling in America is currently most associated with exercise, environmental advocacy, and recreational activity and therefore is not viewed as an appealing alternative to the car. Full bicycle

infrastructure would be the most striking alteration of the city's physical landscape since the days of Moses (Crowley, 2009, p. 15).

Rates of cycling in New York are highest in Lower Manhattan and northwestern Brooklyn and starkly lower everywhere else (Pucher et al., 2010, p. 6). Pucher et al. (2010) also points to demographic and economic changes in northwest Brooklyn and other gentrifying neighborhoods as a reason cycling is taking off: "Gentrification has brought an influx of young professionals, or "hipsters," who view cycling as a fashionable or hip way to get around" (p. 7).

As long as biases, prejudices and stereotypes about cars and cycling persist, they will stand as the "truth," not because they are right but because they will inevitably impact the behaviors of people who believe them and, in their wrath, become real. Stereotypes of cyclists as nonconformist environmentalists or wannabe-Lance Armstrongs bring with them confirmation biases when people do see these types cycling in the streets. They also create a buffer between who does and who does not bike, further alienating cycling from its status as a viable means of commuting. These contradictions show how much the private automobile has penetrated New York and the attitudes of its drivers.

f) How cyclists are losing the battle on New York City streets

The ultimate goal is to establish cycling as a realistic and favorable means of transportation. Many only bike for leisure or recreation, so it is difficult to estimate who is using bikes and how. The Department of Transportation boasts a boom of cyclists in response to new bike lanes. Sadik-Khan estimates bicycling increased 102% since 2007 and data suggests about 200,000 people are cycling daily (Department of Transportation, 2011).

But critics argue that cyclist counts are overestimated since data is collected predominantly at locations with bike-friendly streets (Pucher et al., 2010, p. 45). Be that as it may, the overestimation is arbitrary because at least cycling is growing somewhat. It is true that more people are cycling and utilizing bicycle lanes, reaping the environmental and health benefits of biking. Pucher et al. (2010) goes on to compare the perceived number of cyclists with census data showing how New Yorkers commute to work. The authors discuss the disparity between the perceived amount of cyclists and the amount that are actually using biking for commuting (p. 5). These criticisms point to the problem at large—that people are still reluctant to use the bicycle as a means of commuting to work.

According to environment and public health specialist Russell Lopez, the number one reason people do not bike to work is from fear of being struck by a vehicle (2012, p. 81). In Manhattan Borough President Scott M. Stringer's survey (2010), he examined 1,700 bike lane infractions over the course of only three days on select intersections. Most violations were bike lane blockages by private automobiles, taxis, and commercial vehicles, and sometimes by pedestrians as well (about 1,300 infractions). This is evidence of the burden of the automobile on the bicycle, as it abruptly trespasses on the bicycle's space. While nowhere near these numbers, the remaining infractions were the responsibility of cyclists—such as riding the opposite way on lanes or streets, riding on sidewalks, and running red lights. Councilmember Gale Brewer identifies the lack of enforcement and education regarding bicycles as the main hindrance in New York's success (Stringer, 2010).

Safety is a major issue of many New Yorkers (Gordon & Union of Concerned Scientists, 1991, p. 158) and steps should be taken to increase the safety of cyclists. Although distances navigated by bicycle should be simple, enjoyable, and quick, the inconsistencies and constant

deviations of bike lanes coupled with the aggressive car culture that dominates much of New York roads, are enough reason to keep many people off bicycles—at least as a favored means of commuting.

Cyclist residents and commuters enjoy the benefits that come from well-implemented bike lanes. Like Gehl said, people would freely use space if it were allocated to them and if they had some sense of security there (Lang, 1994, p. 261). It seems that effective bike lanes, or Class I lanes, *are* utilized to their capacity—at least, to the capacities available to them. However, a majority of these bikers fear straying from protected lanes, and as a result, do not constitute the booming bicycle activity that is supposedly so successful in New York.

Protected lanes are especially important for those unable or unwilling to battle with cars for space on streets. Limited experience and unpredictable movements put the elderly and children at special risk on streets. Moreover, regardless of age, many people prefer to avoid the anxiety and tension of cycling in mixed traffic, aside from the safety hazards. Bicycling should not be reserved only for those who are trained, fit, and daring enough to navigate busy traffic on city streets (Pucher, 2001).

To reiterate, it is not possible for a pedestrianized cycling culture to thrive alongside the automobile. The bicycle struggles for space dominated by the car and a New York car-culture scares most cyclists off the streets. Although cycling is taking off in some areas, it remains confined. It cannot truly grow if lanes are not accessible, and therefore it cannot be considered a practical means of getting around (Forester, 1994, p. 159). Lanes remain controversial and opposed because enforcement is lax, which in turn reinforces limited public awareness of cyclists (Stringer, 2010).

People may be commuting by bicycle more because there are more lanes and paths. Alternatively, because people are commuting by bicycle, the city is building more bike lanes and paths. Both relationships may be occurring simultaneously to varying degrees (Dill, 2003, p. 7). But, as Nelson and Allen (1997) state, "At least some, but perhaps not an inconsequential number, of commuters will be responsive to the bicycling option if only it were made available" (p. 82).

I identify what I think is the conflict underlying the unique case of New York: New Yorkers are reluctant to latch on to cycling because New Yorkers do not know New York without the car (Crowley, 2009, p. 15). The car continues to dominate, and sharing of the road has not been easy for cyclists. The conflict is as divided as the split between motorists and cyclists on the road. It is clear that cycling is imperative for future sustainability, so the automobile must be reduced to achieve cycling success.

g) Where New York went wrong: the issue of car parking

Traditionally, New York City streets have been designed primarily for motor vehicle traffic. This policy attracted an increasing number of vehicles and had negative effects on congestion and public health (Department of Transportation, 2008, p. 11). The bicycle cannot flourish alongside the car, and as of now the car stifles the bicycle's presence and efficiency.

So where did New York go wrong? The city has developed a long-term sustainable growth plan, *PlaNYC2030* (The City of New York, 2007), that is to meet the goals of: increasing overall efficiency; encouraging mass transit; promoting pedestrianization and bicycle use; and reducing carbon footprint. The recent implementation of bicycle lanes, pedestrian areas and bus-only lanes were tactics that would presumably decrease demand for the automobile. However,

running alongside these related goals are the longstanding requirements in New York City's zoning code (Department of City Planning, 2011) that enforce new residential construction in most neighborhoods to be accompanied by a minimum number of off-street parking spaces (McDonnell, Madar & Been, 2010, p. 2). Mayor Michael Bloomberg proposed congestion taxes but these strategies were not effective and ultimately failed (Owen, 2009). According to Gehl's research with the DOT in New York, an average 73% of road space was allocated to *parked* cars alone (Department of Transportation, 2008, p. 29).

Current literature suggests that policies and political elites shape public opinion by influencing both what issues capture the public's attention and how those issues are debated and decided (Zaller, 1992). So while some policies are pushing people towards cycling, other policies are influencing people to continue driving. Congestion taxes, high tolls, and increasing gas prices were not enough to dissuade driving in New York (Davidson, 2012), although cycling has been promoted more and more each year. Pucher, Dill, and Handy (2010b) analyze the research of bicycle infrastructure and public policy and conclude that public policy plays a crucial role in encouraging bicycling. They reason that substantial increases in cycling require changes in public policy including bicycle infrastructure provisions and restrictions on car use (p. 121).

As long as parking is readily available, cars will continue to come (and stay) in the city. Researchers confirm that New York City parking requirements are overestimated and are responsible for giving people the incentive to drive and create more traffic (Weinberger, 2008). Because of these oversupplies, the presence of the car has not decreased; in fact, it has only increased (Furman Center for Real Estate and Urban Policy, 2012).

Although it is unreasonable for New York to abandon the car completely, it is true that the automobile and the bicycle cannot equally succeed on the same roads, and New York, in its best interests as a sustainable city of the future, should reevaluate the problem of the private automobile's pervasive presence in city streets. The city has made some great progress in promoting cycling, but the omnipresence of the car places a heavy burden on the safety and accessibility of cycling as a viable mode of transport. Gehl and the NYCDOT did a good job paving the way for pedestrians and bicycles, but did little to decrease the amount of cars and the demand for driving in New York. New York continues to embrace the car and old parking policies persist. Minimum parking requirements remain the norm for developers although they are grossly overestimated (Shoup, 1999, p. 557). A review of the literature surrounding this topic substantiates that cities gain environmental benefits from pedestrian-friendly urban design and that the automobile's excessive presence in these environments is what limits such beneficial developments. Parking reforms in European cities are becoming more popular than congestion pricing (Barter, 2012). Many studies call for a reform in parking strategies to better control and restrict vehicles impeding on what could be valuable public space.

III. Hypotheses

I propose three distinct hypotheses that I aim to confirm through my research. I then conclude this study with a suggested solution to New York's problem. My central theory is that alterations in car parking policy could reduce driving and increase cycling. In the process of developing this theory, however, I encountered some obstacles concerning (1) oversupplies of parking; (2) New York car-culture and negative attitudes towards cycling; and (3) the perceived success of New York as a bicycle city.

a) The existence and significance of parking oversupply:

I put forward the notion of an "oversupply" of parking in New York. First, I'd like to define this "oversupply" that to many seems invisible in New York. It is often thought parking is very limited in the city, and many motorists cruise nearby streets for long periods of time, looking out for on-street parking space. "Most car-owning New Yorkers live by the dictates of alternate-side parking, anxiously circling for a spot or double-parking until the sweeper passes" (Smerd, 2011).

But it is here that parking needs to be closely examined. Parking, especially on street, is not a cheap resource. Parking expert Dr. Donald Shoup of UCLA declares that, although parking is cheap to the driver, it is costly to the city and to the cyclist. Drivers cruise city blocks looking for parking and create more congestion. Cruising adds to congestion and is responsible for significant amounts of traffic. "Our streets are congested, in part, by people who have gotten where they want to be but are cruising around looking for a place to park" (Shoup, 2007). Off-street parking is exceedingly available but expensive, so drivers choose to cruise for curbside parking (Shoup, 2007, p. 497). I go into much greater detail of Shoup and his positions on parking in Section VII of this paper, but his main theory is that, by requiring minimum parking, New York is oversupplying parking; thus inducing more traffic and inviting more cars into the city.

The seeming insufficiency of on-street parking reinforces this "necessity" for off-street parking. But off-street parking, due to zoning and outdated minimum parking requirements, is often severely overestimated with some structures never more than half full (Smerd, 2011). Garages near Yankee Stadium turn out never to be more than 60% full, even on game days

(Kimmelman, 2012). Lots and garages take away from public space and ultimately support the persisting and growing presence of the automobile. There is a significant amount of research supporting the notion that minimum parking requirements give drivers incentive to drive, and growing requirements increase the amount of cars in the city.

Much of the data on which parking standards are based comes from low-density, single-use developments with limited transportation choices. Therefore, the generic parking rates fail to take into account the mix of context-sensitive, community-specific variables—density, demographics, availability of transportation choices, or the surrounding land-use mix—all of which influence demand for parking and should be reflected in parking requirements (Forinash, Millard-Ball, Dougherty & Tumlin, 2003, p. 2). New York City's Department of City Planning continues to require most new developments to provide a minimum number of off-street parking for residents. It is estimated that residents of new developments are 40-50% more likely to own cars than typical New Yorkers (Barwick et al., 2008) and will presumably bring thousands of cars into the city core.

My hypothesis is centered on the significance of parking oversupply. I think it is one of the main forces behind New York's biking problem. I want to establish the reality of oversupplied parking because I understand why people would refuse to believe New York had surplus parking space. I also want to tie together parking oversupplies with increased automobile use. I intend to show evidence of this in my research.

b) New York car-culture and attitudes towards bicycles and bicycle design:

The conflict in New York lies in the fight for space allocated to the car and bicycle. This battle for space is accompanied by—and partly fueled by—the clashing attitudes of cyclists and

motorists. This conflict is what makes New York so unique, and I propose it is the reason New York lags behind its European counterparts in successes as a bicycle city.

I needed to examine the problem not only from a planning perspective but from a cultural one as well. The main complication I faced in beginning this study was the uncertainty that surrounded my proposition—could changes in parking policy and infrastructure have such a far-reaching effect on cycling? I also disputed with myself that I was perhaps placing the cart before the horse in assuming policy changes could have any effect on *attitudes* toward driving and cycling. This was the greatest threat to my proposal, that the car is so deep-rooted in New York culture that even steady, gradual changes in policy and infrastructure will bring unsuccessful results solely due to headstrong, pro-car attitudes.

Attitudes about the car are reinforced by the enormous amounts of space allocated to it. On the other hand, the bicycle is reminded of its inferiority through constant oppression by the automobile. Bicyclists are sometimes forced to break rules because of vehicle obstructions in bike lanes. This is necessary a great deal of the time, but only serves to further infuriate motorists and pedestrians.

Attitudes towards cycling and poor safety conditions are governed by the omnipresence of the automobile in both the streets and in policy. In my theory, however, I propose that these cultural attitudes that exist within an urban fabric are responses to accustomed environment and habitual obstacles. I reason that these attitudes can change, albeit gradually, if planning is properly established and enforced. Literature also suggests that policies effect mass opinion and public attitudes. Urban planning and transportation attitudes clash especially in the controversial topics of car-parking and bike lanes. For this reason, I was careful in evaluating my research from a cultural perspective as well as a planning perspective to project both human-scale and

city-scale results. Although it concerns city planning, ignoring the impacts of design on a human scale is unwise and can result in ineffective outcomes; for this reason I cross the paths of planning strategies with attitudes to best illustrate the entire picture.

c) The misconception of success in New York and how people use the bicycle:

Another puzzling feature encountered in my research concerned the opposing impressions of success in New York. Even in my own observations as a New York resident, *sometimes* the bike lanes look successful, but other times they look extremely inadequate. New York City government data was overall positive and presented booming increases in cycling. City surveys showed increased ridership and increased safety as a result of bike lanes. While the City celebrated successes and looked forward to expanding infrastructure, opposing parties presented conflicting data, citing that roads were now less safe and more congested due to cyclists. It, in a way, complements the aforementioned notion of conflicting attitudes about cycling. I was torn between what general direction New York was headed and closely examined both claims.

The core theory of this study places substantial responsibility on the automobile and its omnipresence in New York. The car, in its overuse, actively takes space from the bicycle and in turn poses a great threat to cyclist safety when sharing the road. The outcome of this situation is that a majority of cyclists, though they do use and enjoy protected bike lanes, are often contained to one or a few fragmentary networks where their safety is ensured. I aim to show evidence of this in GIS (Geographic Information Systems) research of bike lane use in different parts of the city. There is some GIS ridership data available through the Department of Transportation, but there is surprisingly very little research surrounding it. Data consists mainly of cyclist quantities,

which had critically increased, but I found nothing concerning the extreme concentration of ridership in certain areas.

I developed a hypothesis on the subject of cycling success. What did it mean for a bicycle city to be a successful bicycle city? When people are able to accept the bicycle as a regular means of transportation, cycling can finally thrive successfully. The New York City Government cited huge increases in ridership and booming success of bicycle infrastructure. I believed the City data was a bit overstated because it failed to take into account the actions of cyclists. Surveyors counted passing cyclists at different times of the day and assumed immediate success.

No matter how faulty the data or methodology may be, City data shows some form of bicycle growth and that is a good step forward for New York. However, I was interested in *how* these people were biking and *where* they were doing it. Although New York does not have a bicycle culture comparable to European cities, it is still true that people enjoy biking as a recreational activity and they always have. The opening of Class I bike paths did not quite change the average New Yorker's choice of transportation. Protected lanes separated bikes from cars and, in my opinion, made it safe enough for New Yorkers to enjoy bicycling without fear of the car.

Gehl was not incorrect in his assumption of people taking well to pedestrianized space. But, in the unique case of New York, the presence of the car continues to dominate public space. Safety is a huge concern for cyclists and the successes of Class I lanes are, for a lot of people, restricted places due of fear of the automobile.

I hypothesize that the majority of cyclists who remain confined to certain areas do so because of safety concerns. On-street cycling (Class II and III lanes) is extremely dangerous and

unpredictable. I think it is true that people are adapting to bicycle-oriented space (primarily Class I bike lanes) but the average person is leery of unprotected lanes and fears sharing the road with motorists. For now, people are enjoying the bicycle-oriented space because it is safely removed from vehicles and a pleasant activity. It is not to say that cyclists never use the paths for more than recreation. However, if they do have a purposeful destination, it is usually someplace nearby, or within confines of the lane's extent.

Reports of growing numbers of bicycle use may give a false impression of New York's success as a bicycle city because those numbers include the masses of people enjoying Class I lanes. I aim to show that the heavy use of Class I lanes is, for the most part, confined to these areas and therefore does not accurately reflect bicycle success in New York as a whole. In doing so, I hope to justify what I mean when I say New York is lagging behind Copenhagen and other bicycle cities. It is behind because so many people do not see it as a viable mode of transport. It is true that some New Yorkers want to embrace the bike, but as long as cars dominate roads, it will not be a safe option for them. I am generally referring to average residents, though. By this I mean families and New Yorkers who do not possess the daring spirit to test their luck on Class II or III streets.

If these people are staying in and around protected bicycle lanes, then they are not going much further than where the lane ends. If I can prove a majority of cyclists keep to these off-street, protected lanes, I can infer they are using those lanes for purposes that do not include embracing the bicycle as a regular means of transportation. I do not wish to say New York is miserably failing. It is not. These enclaves are saying something about the progress of New York: that bike lanes can work well and be safe if implemented properly. But as long as they are scattered and unconnected, they do not reflect the success of New York as a bicycle city. It is

true that some lanes connect to others by bike routes (Class III routes), but this is often an unsafe option for many people. To avoid them, bicyclists must take lengthy and often out-of-the-way detours to stay safe.

d) Parking policy changes as a solution to New York's bicycle problem:

After investigating all three of the aforementioned obstacles and developing theories about them, I was satisfied enough to put forward the focal hypothesis of my study. This hypothesis is the core of my research, and it was necessary to resolve all three of my previous uncertainties in order to construct and strengthen my ideas for parking policy reform.

The bottom line is that cycling is necessary for future urban sustainability, so New York *should implement and embrace it as a practical means of transportation.* A well-connected (and safe) bike lane network infrastructure needs to be implemented to accommodate bicycles. This can only be done through the removal of automobile space. I hypothesize that the car can be reduced through gradual changes in parking policy. This concept is thoroughly supported by my review of the literature. But, it is also true that alterations to parking—or anything to do with cars for that matter—are not easily achieved. Motorists are aggressively against losing their place on the road, but through gradual changes in parking, the demand to even drive at all can be reduced.

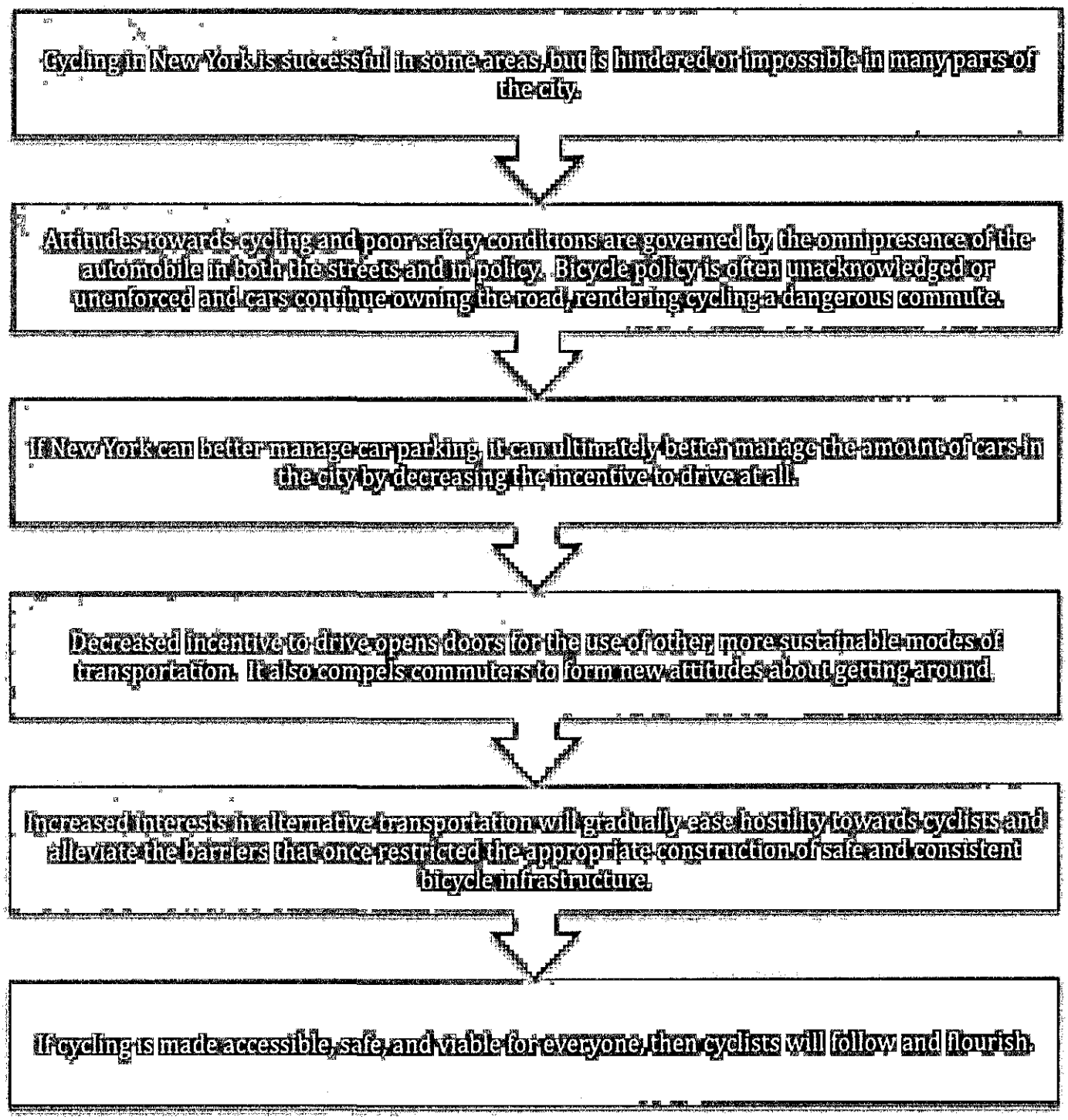
With less demand for the automobile, fewer cars will be present in the city. As this change occurs, bicycle infrastructure can be expanded and lanes properly implemented. I believe the problem with cycling lies in the difficulties of change. Space and attitudes of motorists must be altered for the bicycle to flourish. Policy clearly favors the automobile when it should be pushing to service the bicycle because the bicycle as a viable means of transportation is

absolutely crucial in New York's survival as a sustainable city. Policy is changing slowly under Sadik-Khan's leadership and New York has made some progress in promoting the bicycle. But until the demand to drive is reduced, cars will continue to impede on bicycle success.

To come to the point, I regard New York City as a society where the bicycle is undervalued and underutilized while the car is overvalued and overabundant. The value of the car is evident in its presence, so if we can increase the value of the bicycle, its presence would be able to increase as well. Then, bicycle lanes could grow and space for cars diminish. In the case of New York, it seems the value of the automobile must first be reduced to allow the growth of cycling. So, the question I propose for this study is: *How can we decrease the value of the automobile?*

I theorize that parking changes may very well be the answer to New York's unique conflict. The next sections contain the methods and results of my research. I plan to support my claims about bicycles and cars in New York through my collection of archival, GIS, and researcher participation information. In Section VII, I propose some parking policy ideas that may facilitate the necessary change in driving demand.

I summarize my entire hypothesis and thought process in the chart on the following page:


Cycling in New York is successful in some areas, but is hindered or impossible in many parts of the city.
Attitudes towards cycling and poor safety conditions are governed by the omnipresence of the automobile in both the streets and in policy. Bicycle policy is often unacknowledged or unenforced and cars continue owning the road, rendering cycling a dangerous commute.
If New York can better manage car parking, it can ultimately better manage the amount of cars in the city by decreasing the incentive to drive at all.
Decreased incentive to drive opens doors for the use of other, more sustainable modes of transportation. It also compels commuters to form new attitudes about getting around.
Increased interests in alternative transportation will gradually ease hostility towards cyclists and alleviate the barriers that once restricted the appropriate construction of safe and consistent bicycle infrastructure.
If cycling is made accessible, safe, and viable for everyone, then cyclists will follow and flourish.

IV. Methodology

This project employs quantitative and qualitative data. I used a variety of methods to round out my own biases so I could better substantiate my claims. I exercised three distinct methods to support my thesis: (1) GIS *(Geographic Information Systems)* data; (2) archival research; and (3) covert participant observation.

a) GIS data collection:

I have gathered some of my quantitative research from a GIS project I am part of at the Department of Transportation where I am employed. The Department of Transportation collaborated with the Department of Planning and Sustainability to conduct a study on car parking in all five boroughs. The GIS data is available to the public via the New York City Government website, but as view-only. Data sets are collected by all city agencies and shared between them. Data is collected and updated to respective data sets monthly if not weekly by New York City employees from all agencies.

The project I am part of is a comprehensive analysis of parking in New York City. We gather information on both on-street (curbside) and off-street (garage/lot) parking. This information consists of the particular facilities location, capacity, availability, and usage. I am responsible for updating the GIS data maps and my team's ultimate goal in the project is to evaluate parking pricing and curbside management. This data will be helpful in establishing the reality of parking oversupply (Department of Planning and Sustainability, 2012).

In the program (ArcGIS 10) I am able to overlap data sets to visualize relationships between different city infrastructure and activities. I can also visualize some data of bicycle

lanes, including where Class I, II, and III lanes exist. There is also some information about ridership and lane usage that I plan to apply partially to my hypotheses of bike lane usage.

b) Archival research

I gathered Copenhagen's parking requirements and policy history from the comprehensive city planning website and from books on the subject of the Danish city's successful strides toward smart growth. Traffic planning, environmental, and municipal plans can also be accessed through the City of Copenhagen website: www.kk.dk.

The New York City Department of City Planning has Zoning Handbooks and Parking Manuals readily available on the web. Parking regulations are also made available along with presentations and upcoming plans that are part of *PlaNYC2030.*

I also collected recent literature from the library that included studies on car parking and bicycles and bicycle infrastructure. I also reviewed numerous surveys and studies about New York and Copenhagen planning strategies. I was most influenced by a combination of theories from Robin Zimbler, Donald Shoup, Todd Litman, and Jan Gehl.

c) Covert participant observation:

I wanted to seriously consider why some groups expressed such opposition to bicyclists and bicycle-friendly streets. The statistic of 6,200 road miles vs. 250 bike lane miles shocked me enough to the point I was sure I lacked the complete understanding of New York as a bicycle city, so I rode my own bike around a few different neighborhoods. I'm not new to biking, but I'm not a regular cyclist by any means. I had little experience of cycling on bike-unfriendly streets and wanted to become more familiar with them, so I ventured to a few different

neighborhoods to explore various bike lanes. These methods of participation and observation are useful because they separate statistics from the realities of cycling in New York.

I did not only wish to investigate the troubles of bike-unfriendly areas. I also cared to observe bike-friendly lanes up close. In my opinion, The Department of Transportation's statistics on bike lanes may have been overstated (because of how and where they were surveyed), but it was the only data available to me. For this reason, I was concerned of my own bias and wished to separate the facts and figures from the reality of cycling. During my cycling adventure, I visited four distinct areas, two of which I identify as bike-friendly and two of which I identify as bike-unfriendly. I decided on the bike-friendly lanes based on statistical successes and chose bike-unfriendly areas based on statistical failures (Stringer, 2011) and because of their general Class II categorization:

Bike-friendly areas	**Bike-unfriendly areas**
9th Avenue (Chelsea)	6th Avenue
Prospect Park West	Fordham Road
Hudson River Greenway	Prince Street

This fieldwork began in June 2011 and was completed in April 2012

V. Results

a) GIS

First, I attempted to prove the oversupply of parking in New York. An oversupply of parking is disputed because of the observations of on-street parking. The common impression is cars cruising for curbside parking that often cannot be found nearby, so I was determined to

visualize what the oversupply actually is and where it is hidden. I collected GIS data that highlights the location of New York City's parking facilities. Existing theory suggests parking demand is overestimated because parking requirements currently rely on density. This explains the high amounts of parking in New York. I layered a GIS map to highlight the location of parking garages and their proximity to subway entrances:

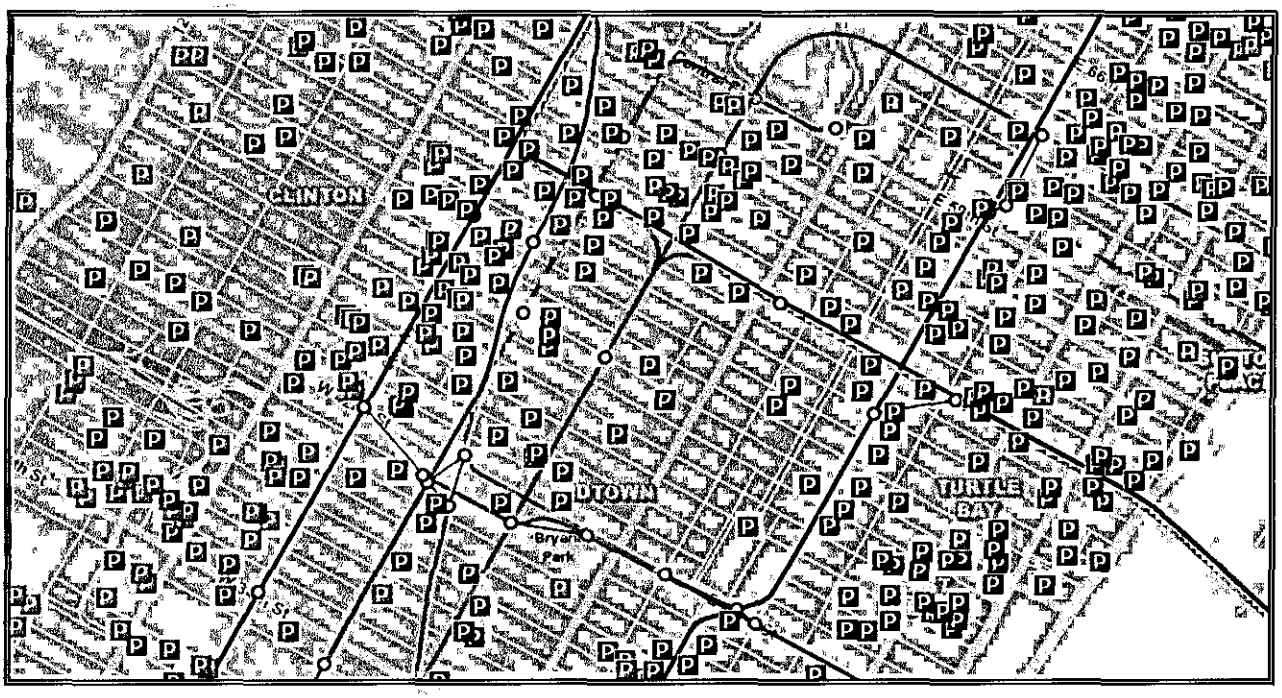


Figure 3: Parking garages and subway locations in a section of Manhattan.

According to Article I: Chapter 3 of New York's Zoning Laws, parking requirements are dependent on zone density (Department of City Planning, 2012). My theory is that, since the location of subway hubs is related to the density of the surrounding area (King, 2011), parking garages around those areas are more likely to be built for high-density populations. My data shows the concentration of parking garages near subway entrances. New York City's parking requirements are not directly tied to transit proximity, so lots near subway stations are often zoned for relatively high building density (McDonnell, Madar & Been, 2011, p. 8).

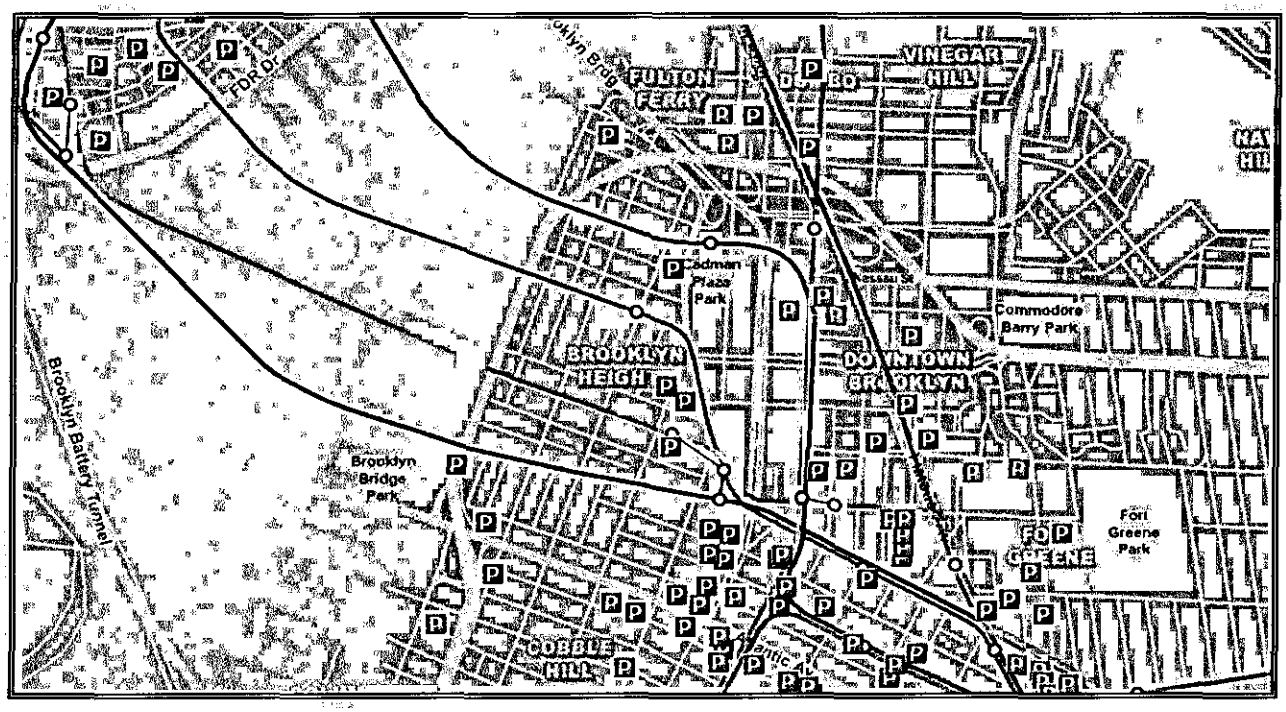


Figure 4: Parking garages and subway locations in northwestern Brooklyn

I was able to click each parking symbol to collect more information on that particular lot: number of spaces and average occupation. Many of these lots are underused and only about 25% ever exceeded the required minimum. This shows the conflict between perceived demand and actual demand for parking; and existing research by *Transportation Alternatives* indicates that oversupplies of parking promote driving to work and car-ownership (Weinberger, 2008). I use this information to develop my core theory later on, but here I mostly wished to define the reality of parking oversupply since it is hidden from casual observation. This data should at the very least establish the inaccuracies of minimum parking requirements.

Next, I used GIS to map bicycle lane locations and their popularity among cyclists. In the design of a heat map, GIS displays the utilization of lanes around the city. All existing lanes are mapped in red, and the most popular lanes are mapped in green (over 1,000 cyclists daily):

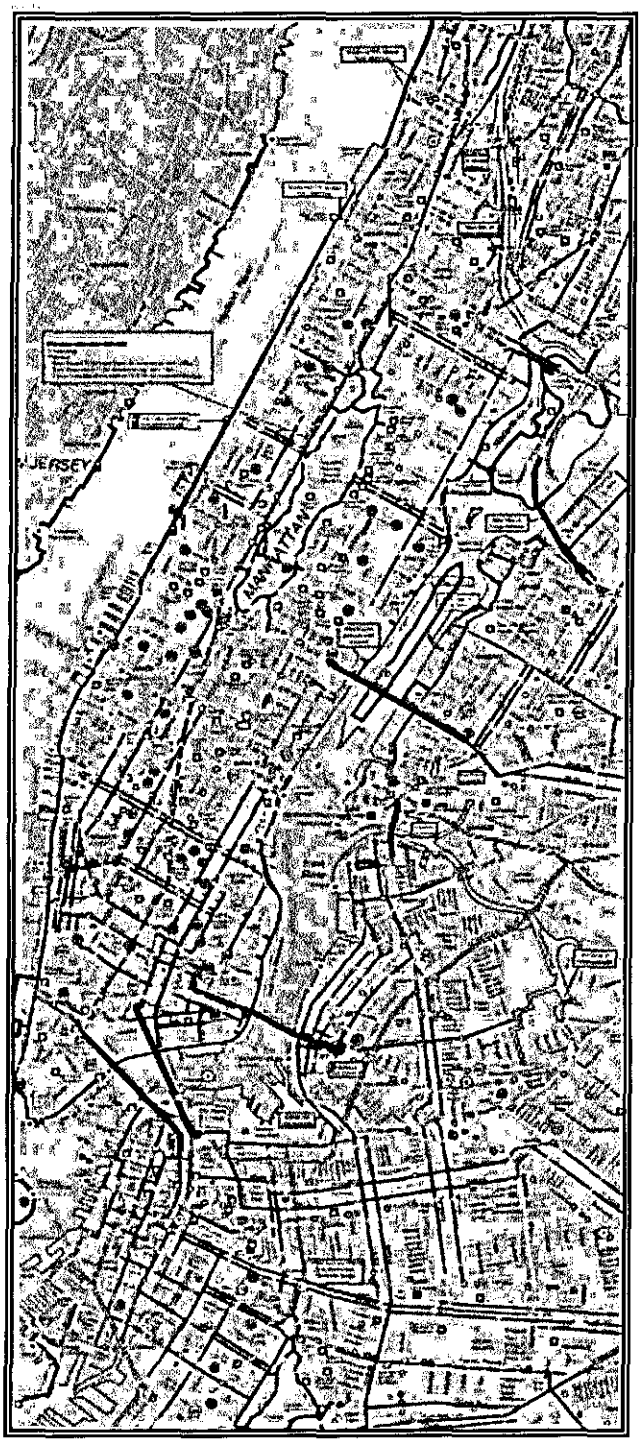


Figure 5: A view of New York City's bike lanes and most biked areas

This data, when placed on a map, clearly validates my concerns that cyclists are misrepresented in New York. The most "popular" bike lanes are, not surprisingly, the few lanes that are protected by physical barriers. Notice the green lanes on the bridges and along the West Side (Hudson River Greenway). This popularity may seem obvious, but I wanted to review the most biked areas of New York to refute the counterhypotheses that do not see the problem with cycling. It also exhibits the boom of cycling in areas where cars are not permitted. So although DOT data is not necessarily wrong, it does misrepresent the number of cyclists and the success of New York as a bicycle city.

This data also reveals how cyclists are using bike lanes. DOT statistics were quick to imply success in New York but did not account for commuters. I define the success of a bicycle city as one where people view the bicycle as the most convenient and viable form of transit. Another inference that can be drawn from the GIS data is the success of bike lanes that are separated from the automobile. It is clear cyclists prefer

protected lanes because they are safer. If a majority of bikers are only using protected lanes, then they are more than likely not using them to get to work, which is the important factor in what constitutes a successful bicycle city.

I also hope to define with this data the lack of connectivity of bike lanes. These enclaves are saying something about the progress of New York: that bike lanes can work well and be safe if implemented properly. But as long as they are scattered and unconnected, they do not reflect the success of New York as a bicycle city.

b) Experiences

I'm not new to biking, but cycling in the streets of New York is not always an easy task. I rode my bike during morning rush hours through both popular bike-friendly (Hudson River Greenway, Prospect Park West, and 9th Avenue) and notoriously bike-unfriendly (6th Avenue, Fordham Road, 4th Avenue in Brooklyn) areas and took notes on: accessibility of bike lanes; continuity of bike lanes; safety of bike lanes; and changing perceptions of me as a cyclist.

My exploration of the protected and successful lanes was mainly to observe the cyclists. Cycling in these areas was a very pleasant experience and I was able to enjoy the city from a human-scale. I noticed that most cyclists on the Prospect Park West lane continued into the lanes inside Prospect Park when the lane terminated. This confirmed at least some of my concerns that cyclists were using the paths recreationally and not for utilitarian use. The Hudson Greenway as well consisted of I noticed that 9th Avenue and Columbus was not nearly as crowded. It was a beautiful ride down 9th Avenue when I began on West 23rd Street, but then at 16th Street the lane ends abruptly. Perhaps this is why there were no masses, because I too felt scared at that abrupt ending of the lane and personally did not enjoy the haste in which I had to

find a place to ride on now unprotected 9th Avenue. There is a "connection" at West 16th Street but it was not easily accessible.

My cycling experience around Fordham Road was horrendous to say the least. Not only was there no room to bike safely, I felt intimidated by drivers as well. I was almost struck by a vehicle more than once. Riding in traffic is unpredictable and extremely unsafe. My experiences with Prince Street were similar. I assumed the Lower East Side would have some quality bike lanes, but the tight space allotted to the bicycle there was not comfortable or consistent. Cars often pulled into the lanes suddenly and I had to make quick and apprehensive decisions on where to go. 6th Avenue showed similar inconsistencies. The bike lane was barely visible about 75% of the time, predominantly because of double-parked cars and delivery trucks. This ride, too, was extremely dangerous and stressful to navigate, and I can see why the average New Yorker would decide against it. I include two photographs of my experiences:

Figure 6: 6th Avenue

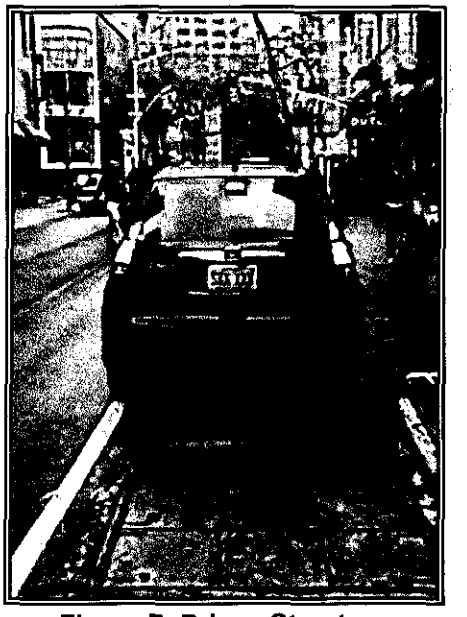


Figure 7: Prince Street

I used my experience as a means of observing cycling environments and in my research found that double-parked cars and delivery trucks obstructed many lanes, voiding their

presence and car parking being the main deterrent of cycling success in New York. Little has been studied on the relationship between parking requirements and bicycles. But I propose the connection through these results. I identify the oversupply of parking as the problem of cars, which are the problem of cyclists.

I think efficient planning is powerful enough to, albeit slowly, change the attitudes of New Yorkers who are hostile towards cyclists and bicycle paths. To do so, the city must realize what is has ignored in recent years, that the bicycle and the automobile cannot thrive together in the inner city and that the bicycle deserves increased attention, as it will guarantee New York's future sustainability. As long as streets are car-dominated, cycling will be restrained in many parts of New York, and as long as overabundant parking welcomes cars to visit and stay in the city, cycling will continue to be stifled by automobiles. Until all New Yorkers render bicycling safe, consistent, and accessible, it will not be utilized to its full capacity.

One way to make bike lanes safer would be to remove the congestion of motor vehicles. The core theory of this study is that parking policy change could be used in New York to decrease driving demand, which in turn will help bicycles. Fewer cars will allow the bicycle to thrive. I compile my final propositions for New York in the next chapter.

VI. Proposition

The next question New York faces is how to get people out of cars and onto bicycles. The solution is complex, as we have seen, but it begins in the reduction of demand to drive. I insist that cars cannot be abolished in New York, at least not in the near future, but contend that there are better ways to manage how we can all use the road. I identify three areas of parking planning strategy that I think should be optimized for the best possible outcome in New York:

(1) Parking management, which ultimately controls the supply and demand for parking, in means of regulation and financing; **(2) parking design**, in which I propose strategies to improve parking locations and to decrease the aesthetic and environmental impacts of parking facilities; and **(3) parking incentives**, which include different ways to encourage people to steer towards other modes of transportation instead of commuting by automobile, thus reducing the demand for parking and promoting cycling.

New York's strong car culture will ensure I receive much backlash for my proposals of parking modification, but I am prepared to defend them as fair and manageable strategies that will have an overall positive influence on New York's future. I do not wish to rid New York of the automobile for I am aware of its surviving necessity to the city, but I stand by the belief that it is used in extreme overabundance. New York is aiming to reduce its carbon footprint and become more sustainable but at the same time continues to employ outdated parking requirements that invite more cars into the city and give commuters greater incentive to drive. In the following three parts, I propose some ideas that, through proper enforcement, can evoke gradual, positive change for New York City and the people who live in it.

a) Parking Management:

My goal of managing parking is to decrease the demand for it within the inner city, ultimately restricting cars to some degree but still allowing for easy mobility of other modes of transportation. Analysis by Begon & Gantelet at the 2008 European Transport Conference showed that people choose their mode of transportation for urban trips based on the parking conditions at their origin and destination and that the mere existence of car parking supply constitutes a direct incentive of car usage, therefore contributing to greenhouse gas emissions. In

her study of smart parking practices, Robin Zimbler claims parking has become part of American culture: an office perk, a selling point for retailers, a display case for a household's cars and a requirement for financing development projects (2002, p. 1). And it is true that many projects are cancelled or must be heavily redesigned due to unmet parking requirements. Managing parking to better meet the needs of communities is the best way to take steps in reducing parking demand and ultimately car use.

Conventional parking standards require the maximum amount of parking supply that may ever be needed for the facility, which results in an oversupply of parking (Litman, 2006a, p. 1). Planning practices tend to favor these generous parking rations and minimal parking prices, which have unintended and undesirable consequences: they increase development costs, reduce housing affordability, cause dispersed land use patterns, and increase automobile travel which exacerbates various problems including traffic congestion, roadway costs, crashes and pollution emissions. (Litman, 2006b, p. 2).

Where do these standards come from? Planners consult the Institute of Transportation Engineers, which reports the "parking generation rate," defined as the peak parking occupancy observed in surveys by transportation engineers (ITE, 1987). Much of the data on which these standards are based comes from low-density, single-use developments with limited transportation choices. Therefore, the generic parking rates fail to take into account the mix of context-sensitive, community-specific variables—density, demographics, availability of transportation choices, or the surrounding land-use mix—all of which influence demand for parking and should be reflected in parking requirements (Forinash, Millard-Ball, Dougherty & Tumlin, 2003, p. 2). New York City's Department of City Planning continues to require most new developments to provide a minimum number of off-street parking for residents. It is

estimated that residents of new developments are 40-50% more likely to own cars than typical New Yorkers (Barwick et al., 2008) and will presumably bring thousands of cars into the city core.

Dr. Donald Shoup, a widely regarded expert of parking economics at the University of California, Los Angeles, is quoted describing the trouble with minimum parking requirements: "These minimum parking requirements increase the supply and reduce the price—but not the cost—of parking. They bundle the cost of parking spaces into the cost of all the goods and services sold at sites that offer free parking" (1999, p. 549). The most effective parking policy reform would be to eliminate these minimum off-street parking regulations, allowing developers and owners to decide how many spaces to provide (Weinberger, Kaehny & Rufo, 2010, p. 44). Instead of arbitrary requirements that base little to no context on the community or development itself, developers should be allowed to, and are the ones who are most qualified to, make case-by-case decisions of how much parking should be provided in a certain development for a certain community.

Maximum parking requirements, on the other hand, are a superior alternative that I propose will, over time, ease the number of cars in the inner city. There would be no oversupply of parking spaces if maximum requirements were thoroughly employed, and they could potentially improve the urban environment by preserving open space and limiting impervious surfaces. They also effectively calm congestion and encourage attractive, pedestrianized urban design (Forinash et al., 2003, p. 6).

However, when the supply of parking is limited, spillover into neighboring areas can occur. Many neighborhood residents oppose parking supply strategies because they fear their neighborhoods will become prime space for spillover parking, bringing more and more

congestion to their communities. These concerns are used to justify excessive parking requirements (Zimbler, 2002, p. 8). But a potential solution to this problem is the implementation of residential parking-permit districts (Litman, 2006a, p. 13) that exist in Copenhagen and many other European cities. Here, residents are designated areas in which they are allowed to park while others are restricted from parking during certain hours. Residential parking permits will give residents priority parking near their New York City homes while reducing impacts caused by employees, customers and students during certain hours. Copenhagen employs a similar strategy that enables residents to purchase parking permits that allow them priority parking in their neighborhoods and excuse them from having to buy tickets at meters (City of Copenhagen, 2011).

Another way to successfully manage parking is to share and regulate it. Parking can be shared efficiently by land uses that have different peaks. For example, an office building can share with a restaurant or theater since the peak demand for offices is on weekdays while peak demand for dining and entertainment is on weekend evenings (Litman, 2006a, p. 13). Parking can be regulated by time period restrictions that prohibit occupancy at certain times. Restrictions before 10am can discourage employee use while restrictions between 10pm-5am, for example, can discourage resident use.

+ ***PARKING FINANCING:***

Included in my assessment of parking management, I explore the financing of parking. Efficient financing of parking is an excellent form of local revenue (Litman, 2006b, p. 1). Motorists pay so little for parking because parking requirements bundle the cost of parking into the cost of development, meaning it is automatically included with building purchases and rents. So this parking is free for most automobile trips only because its cost has been shifted to higher

prices for everything else (Shoup, 2006a, p. 19). Efficient financing of parking and analysis of peak times is crucial not only to generate revenue that can be invested in other modes of transport, but also to ultimately reduce the overall demand for parking.

Denmark is one of the most expensive countries to buy a privately owned vehicle due to taxes and registration fees, but automobiles in Copenhagen are still a reality that warrants regulation and proper financing. Copenhagen employs solar powered Pay & Display machines that vend tickets valid for the zone in which they are purchased for. The rates of these permits decrease the farther one parks his or her car from the city center, while the rates of tickets for inner-city parking for peak times are exceptionally expensive (DKr 29/hr, about equal to US$5.00/hr), encouraging drivers to use alternative transit modes to reach their destinations. Disabled drivers and drivers of electric vehicles, however, can ordinarily park for free in all zones (City of Copenhagen, 2011). In 2006, parking charges were raised about 50% on average, resulting in a fall in car traffic to and from the inner city of about 18,000 cars a day (City of Copenhagen Traffic Department, 2009, p. 3).

Currently, most parking in New York is insufficiently priced. Motorists often only pay a flat annual or monthly fee, providing little to no incentive to at least occasionally use an alternative mode of transportation. Free parking, on the other hand, is the greatest incentive for people to travel by car. Dr. Donald Shoup suggests that parking rates should be set to optimize parking facility use, called "performance-based pricing," meaning about 15% of parking spaces are vacant and available at any given time (2008, p. 136-37). Performance-based prices can balance the varying demand for parking with the limited supply of on-street spaces. Shoup goes on to question why we pay market price for off-street parking and not for on-street parking. On-street parking can be optimized if it is effectively priced at a market cost. Shoup suggests

charging a market-based price for curbside parking to eliminate cruising and its harmful side effects (2007, p. 506).

PARK Smart is a pilot program implemented by the New York City Department of Transportation that aims to ease parking and reduce congestion by encouraging motorists to park no longer than necessary. In 2008, New York City increased Greenwich Village parking meter rates from $2.00 an hour to $3.00 an hour and then to $5.00 an hour during peak periods (Bernstein, 2010). As a result, parking availability increased and double-parking significantly decreased. The program generated great success and 71 muni-meters in the West Village were permanently programmed to the *PARK Smart* rate structure (Department of Transportation, 2009). The pilot was also successful in Park Slope and the city is currently expanding this price structure to other areas (Litman, 2010, p. 11).

Parking management reduces the amount of land required for parking facilities by reducing automobile use. Lessened demand for parking can effectively reduce parking requirements, and appropriate management of parking allows more sharing of parking facilities, shifts to alternative modes, and various types of parking pricing (Litman, 2006a, p. 16). It is important to address problematic parking policies as they may inaccurately portray the demand for parking and inefficiently exploit parking resources.

b) Parking Design:

This category backs the notion that, again, we simply cannot rid New York of the automobile and demolish all space for it to park. I will examine different ways to both improve the aesthetic landscape and reduce the environmental impact of parking while placing value on public life.

Parking design has a major impact on pedestrian and cyclist safety and is one of the strongest motives behind the bicycle's restrained development.

The invention of the automobile prompted many shortsighted construction projects and alterations to New York City. The American landscape became a habitat for cars, complete with highways rolling for miles and miles across the country, suburban landscapes with spread out homes equipped with driveways built for more than one vehicle, streets that give ultimate preference to the vehicle by squeezing pedestrians and traffic signs on small sidewalks, expanses of large, impervious surfaces used for car parking, and inadequate transportation availability and investment across the country.

I will differentiate between two kinds of parking in this area of my study: on-street and off-street parking. On-street parking describes the usually parallel spaces that lie along corridors while off-street parking includes both surface parking lots and parking structures (i.e. garages).

On-street parking is one of the most efficient ways to allocate parking as it takes up much less land area than off-street parking. Each space serves for several destinations, meaning drivers park once and walk to several destinations rather than making multiple short vehicle trips (Litman, 2006a, p. 17). This means that fewer spaces are used, resulting in more compact development. On-street parking can be hazardous, however, especially when adjacent to bicycle paths, and it shapes a psychological and physical buffer between pedestrians on a sidewalk and cars on a busy street (Zimbler, 2002, p. 24).

To further optimize on-street parking, curbside parking can be changed to angled parking where there is available street width and traffic is slow moving. This allows for the prime and compact use of land and is a healthier alternative to the ominous, foreboding parking structures that are scattered around New York City streets. Copenhagen has recently modified its parking

policy to increase on-street parking by allowing angled parking and rebuilding street corners in areas where there is a documented need for more parking (City of Copenhagen Traffic Department, 2009, p. 6).

Off-street surface parking is present in many of New York's outer boroughs. These impervious lots often blight city streets and are responsible for runoff and degrading water quality while creating a dark and dangerous area during the evening hours. Copenhagen changed off-street surface parking lots into public squares in the 1960s, reallocating space to pedestrians and bicyclists. But in New York, drivers are not prepared for the total demolition of these lots, for the car culture in American cities renders nearly impenetrable. Until automobile use can be better managed, these lots will need to exist and, in the meantime, should be made safer and more suitable for pedestrians and the environment. Lighting can be used to create a safer environment for cars, bicycles, and people and can add aesthetic quality to the lot as well. Clear-cut, multicolored sidewalks and crosswalks should be constructed to improve pedestrian and cyclist safety and landscape treatments can guide rows of parking spaces to enhance the environment and scenery.

The final model of parking I will evaluate is the parking structure. Parking facilities in particular have become an omnipresent feature of the American landscape, consuming land and resources, inhibiting the functioning of natural systems, and creating dead gaps in what could otherwise be used for vibrant, walkable commercial areas (Zimbler, 2002, p. 19). In order to be easily visible and accessible, these large structures are often placed in front of retail centers where they create a barrier between people and buildings on the street. Colossal garages encroach on city space and would be preferable behind buildings and out of view where they do

not dominate street frontage and can be easily located by convenient signs or maps (Mukhija & Shoup, 2006, p. 305).

Parking considerations should be secondary to the design and placement of buildings on site (Zimbler, 2002, p. 19), but it does seem that automobiles dominate city streets and the urban habitat, prohibiting mixed-use districts and pedestrianization. With little to no room for pedestrian areas in a city, communities are unable to spawn the vibrant, mixed-use areas that are essential for smart development strategies. Although these garages are car-specific habitats, they can be beautified and integrated for mixed-use. Storefronts along the first story of garages are found in some corners of New York--a viable alternative to large, blank, imposing walls.

The problem with much of America is that it was built for the car while the automobile had to make itself fit into Europe's already established cities and squares. Car travel has become the most preferred and prioritized means of transportation in many American cities, but allowing the automobile to dominate our landscape is a mistake in the progressive development of urban areas and of other modes of transport. A difficulty in American transportation planning is that planners and politicians have yet to realize that they cannot progress environmentally while still making it easier and more convenient to drive oversized private automobiles (Handy, 2006, p. 275). Integrating vehicle parking spaces into mixed-use areas harmonizes people with their communities and is an important step in preserving open space, limiting impervious surfaces, and creating more attractive and pedestrian-friendly urban design.

c) Parking Incentives:

There are various types of incentives that can promote healthier travel alternatives while simultaneously reducing parking demand. Employers can implement parking cash-out programs

that reward cash to commuters if they choose to opt out of subsidized parking. Employees can also receive a subsidized transit pass to promote public transportation. More and more office and residential buildings are offering free, indoor bicycle parking, an incentive to bike to work instead of drive. Another common employer incentive is to provide discounted or preferential parking for employees who travel in shared vehicles (carpools or vanpools). Positive rewards for consumers who reduce vehicle trips are successful in making people reconsider their selected mode of travel. Financial incentives such as the cash-out programs and transit vouchers normally reduce automobile travel by 10-30% depending on the value of the incentive (Litman, 2006a, p. 20).

Living in the outer boroughs and suburbs of New York can dampen any employee's consideration of alternative transportation into the city for work. Carpool and vanpool incentives are most helpful and persuasive in these areas, while cycling and transit incentives may only reach those who live in closer proximity to the city. Ridesharing is a gradual step in reducing the automobile's priority in New York, as many progressive planners wish to eventually extend mass transit into these less accessible areas.

New York should not only take steps to reduce driving but should also improve and promote cycling and walking. The automobile does have many advantages over the bicycle. It is private, comfortable, and insulated from the weather. But the bicycle, too, has many advantages—it is easier to travel long distances individually and it does not have to rely on hardly any schedules or timetables. But cycling in New York City is certainly not the prioritized means of travel it is in Copenhagen. Ways to prioritize the bicycle include physical improvements, such as programming traffic lights so they are timed according to bicycle instead

of vehicular movement, reducing travel speeds for vehicles, or creating wider bicycle lanes and providing more place for bicycles on the street. (Nelson & Scholar, 2006, p. 53).

In 1983, the Danish Road Traffic Act was passed and provided the groundwork for legislation that promoted streets as livable spaces available to everyone (Lawlor, 1992). Current planning efforts are still promoting cycling as a sustainable alternative mode of transportation and the city is continuing to work on improving the cycling landscape (Nelson & Scholar, 2006, p. 10). New York is also taking steps to improve its cycling infrastructure, but it will be difficult to reach these goals while still prioritizing the automobile and its required space for parking. Parking policies centered on management, design and incentives are a step in the right direction to reduce parking demand—thus reducing incentive to drive and ultimately reducing the presence of the automobile—and to better meet the needs of communities in their embracement of the bicycle as a realistic mode of transport.

VII. Discussion

The parking requirements for New York have only grown to accommodate more cars instead of downsizing to alleviate the demand for parking in the city; and the increased number of spaces in rezoned residential neighborhoods will likely add even more cars to the city. Free and available parking is a major incentive for people to use cars instead of transit or cycling. The automobile's omnipresence in America is the deep-rooted reason that New York failed to properly execute the policies and strategies it borrowed from Copenhagen. We learned a lot from Copenhagen and hopefully we can find ways to make our city greener and more efficient, but it was decades and decades ago that American planners made a wrong turn. Shortsighted

developments that prioritized the car have hindered New York's ability to move forward as a bicycle city.

In short, bicycle lanes cannot be constructed or safe without the removal of a lane of traffic or at least some road space for cars. Bicycle lane implementation is not enough to encourage bicycling. Deficient planning and safety concerns regarding automobiles hinder bicycle growth among many demographics, as it is not a safe, accessible, or acceptable alternative for many people. This, in turn, causes misconceptions about who uses bicycles and what bicycles and bicycle design can be used for. Both planning and policy changes should be implemented to promote bicycle use. When families and people of all ages are confident that cycling is both a practical and safe mode of transport, New York will be able to flourish as a sustainable city in the future.

The parking dilemma is challenging because it is still very much indispensible in New York and other American cities, and we must identify new ways to address the need for parking while still developing it in a smart way. Parking consumes a large amount of land that could be used for pedestrian developments and it provides more incentive to drive, especially as parking supply continues to increase for rezoned neighborhoods. Allowing more cars into the city will produce only the opposite of *PlaNYC2030*'s goals.

New York City needs parking, but we need to re-think parking design, parking financing, parking supply and demand, and parking incentives to make meaningful strides in the smart growth of our communities. Placing more value on sustainability, the environment, and healthier modes of transportation is essential for the future of New York.

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