

The Constraints on Bicycle Life in the United States

A Research Paper submitted to the Department of Engineering and Society

Presented to the Faculty of the School of Engineering and Applied Science
University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

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Spring, 2020

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Introduction

The American commute is always associated with cars, highways, country roads, and traffic stretching for miles. Almost every American has seen the stretching scapes of highways, or experienced traffic on their daily commute during rush hour. However, few think about the problems, besides traffic, that arise from the US's dependence on cars. 76% of Americans drive alone to work each day, where the average commute time to work is twenty seven minutes. The cost to buy and maintain a car is the second highest expense Americans face, right behind housing. Comparatively, Europeans, especially the Dutch, utilize bicycles as a more effective alternative to cars. Only 48% of the Dutch even own a car, and 36% use bicycles as their main form of transportation, and cycling in cities is 12% higher than the national figure ("Cycling in the Netherlands" The Netherlands: Ministry of Transport). This is just one of the many countries in Europe that are much less dependent upon cars than the US. Out of all the countries in the EU, the highest car ownership rate is in Luxembourg, at 66%, which is still drastically lower than that of the US (EuroStat Transport statistics). The Netherlands actively demonstrates advantages to using bicycles over cars, such as reducing emissions, and road space rationing. Despite these advantages, the US still relies heavily on cars for commute. There are many actors in US society, geography, politics, and culture that cause Americans to favor cars, all resulting in this different network. Using actor network theory, this paper analyzes the constraints of cycling life in the US.

Research Question and Methods

There has always been a large amount of cultural differences between that of Europe and that of the US, and these differences can have large scale effects on the economy, environment, and everyday life choices that people make. One of the biggest disconnects between European, specifically Dutch, and American culture, is bicycle use. What holds American bicycle culture back from being on the same level as its European counterparts? This question requires multiple sources and research methods to answer, particularly published surveys, economic analyses, and other scholarly articles concerning American culture and its difference to Europe. Statistics concerning commute choices, economics, and environmental data will help shed light on the physical constraints on bicycling in the US, while scholarly articles and published works will focus more on cultural differences engrained in the US society. This documentary research method will provide a sound analysis on the issue.

Background Information

To hypothesize and analyze bicycle culture in both the Netherlands and the US, one needs a sound understanding of the cultures in both countries. Both are first-world, western, wealthy countries, with low unemployment and GDPs within the top 20 in the world. Both have an abundance of consumer products and options available for their population, allowing comfortable standards of living. They also operate under democratic republics, similar forms of government, allowing the populous to choose what direction the country should go in. However, this is where the similarities seem to end.

America is 236 times bigger in land than the Netherlands, and 19 times bigger in terms of population. This results in drastic changes in culture, specifically due to how much larger the US is in square miles. Cars are almost a necessity for traveling long distances, so it is only logical that many rural Americans buy cars over bicycles. However, only twenty percent of Americans actually live in rural settings, while more than 60% live in or within the suburbs of a city.

Despite a majority of Americans living in the suburbs or rural areas, almost all US cities have similar population densities to that of Amsterdam. Despite this, many cities with identical population densities still have low bicycle commute rates compared to that of Amsterdam.

The next difference that factors into the low bicycle use in the US is the difference in climate.

The Netherlands, as mentioned earlier, is much smaller, and thus doesn't consist of dozens of different diverse biomes like the US does. In fact, temperatures throughout the Netherlands are so consistent they can be averaged for the entire country. Winter temperatures float around 3.0°C (37.4°F) while summers are usually 17.1°C (62.8°F). Meanwhile, Miami in the US will barely ever get below 10°C (50°F) in the winter, and New York City will be constantly below freezing temperatures in winter. Temperature highs and lows in the US greatly hinder cycling commute, and many Americans would choose an air conditioned or heated ride over cycling.

Another major issue concerning bicycle commuting in the US may be policy driven. In many US cities, cycling is slowly becoming more popular, but is mostly an afterthought in urban planning or traffic control. Road space rationing has emerged as a large problem in cities all over the world. This problem concerns the amount of vehicle space per passenger on a road. For example, if there were thirty people sharing twenty cars, those thirty people on thirty bicycles would take up only one third of the space on the road. As cities become more and more populated, road space rationing will become more and more important.

STS Framework

As stated earlier, this problem is best analyzed by using the actor network theory, otherwise known as ANT. ANT is a methodological approach to the social implications and theory surrounding a technology. In this approach, actors, or contributing factors to the situation, are all related. These actors have constant shifting relationships, and can become dependent upon each other within a network. This theory is often used to explore the relational ties between actors within the network, rather than answering how or why they have occurred.

Developed chiefly by science and technology studies (STS) scholars Michel Callon and Bruno Latour, the theory reflects on both material technologies and concepts to give whoever is using the theory a better idea of the topic. Critics of ANT like Stuart Shapiro state that the theory itself is always amoral in its research, until one includes morality as an actor itself. Shapiro also states that research decisions are moral rather than methodological, showing the necessity of a moral actor whenever the theory is used anyway. Another critique is the massive amount of influential actors to complete a network. This causes the theory and network to become so broad and unmanageable that the theory loses all usefulness.

Despite this, this paper will seek to explore the relational ties between American culture, Dutch culture, and the technological use of the bicycle, and use this exploration to understand the roadblocks in the way of a prominent cycling culture in the US.

The bicycle was introduced to both Dutch and American populations at the same time, however, both cultures have seemed to adapt this technology differently (Herlihy, D. V. (2006), Longhurst, James. (2015)). In fact, analyzing America's societal situation regarding all private and public transportation in comparison with that of Europe's may prove just as helpful in this

STS framework analysis. Factors that may take deeper research may include the American ideology and more laissez-faire luxury markets. Recent American developments like U-bike, a bike-sharing system for university students, or Lime/Bird, an electric scooter alternative to U-bike, may have larger impacts on the American bike culture. In total, many actors influence the popularity of cycling in a society, which, as discussed earlier, yields many benefits in terms of traffic efficiency, reduced carbon emissions, and healthier lifestyles.

Results and Discussion

By comparing the successful cycling culture in Amsterdam and other European cities with that of the US cities, major differences can be highlighted in how these societies' cultures, economics, policy, and environments all create favorable or unfavorable situations for cycling culture. Firstly, the US's culture concerning individualism and consumerism play major roles in influencing average Americans in choosing their mode of transportation. This mindset can be linked to almost every other issue concerning the barriers of efficient cycling, specifically economics and policy. However, that is not to say that changing American culture is the solution to this problem. Policy in many US cities have a long way to go in order to catch up with their European counterparts. Many of these policies will be discussed later, with concrete examples and their effects on cycling culture. Geographically, it may seem difficult to compare US cities to those of Europe and Amsterdam. US cities and their surrounding metropolitan areas are larger in population size and in square mileage. It is clearly apparent that geography plays a major role in the efficiency of cycling life in a society. All of these factors act and rest on on each other, and can create troublesome barriers to overcome, which will be analyzed in the following sections.

Geography

Different modes of transportation have allowed Americans to access more parts of the country. Through the creation of the trans-continental railroad, to the booming automobile industry, Americans are more accustomed to traveling longer distances than their European counterparts. According to a survey done by the Department of Transportation, 60% of Americans travel 50 to 74 miles on their average commute. As a result, 86% of all daily commutes in the US are by car, in that it's the only or most effective option. In the Netherlands, however, 40% of the population live and work in the same town/municipality, and live just 14 miles away from their work. It only makes sense that these shorter commute distances can allow or even favor bicycle commuting. However, a second geographic factor is the difference in climate throughout the US. Cities in the Netherlands usually see only minor weather changes in seasons, where summers rarely reach 90°F (32°C) and winters seldom go below freezing. In the US, however, cities vary in climate. Chicago's climate is vastly different to that of Miami's. Even looking at one city's climate, like New York city in particular, temperatures can be 100+°F every summer, and winters usually bring several feet of snow. These environmental differences more greatly constrain the use of cycling in daily life, while cars remain more reliable. Undoubtedly, geography of a country can cause a technological disconnect with a society.

Policy

One of the fastest ways for a society to change is to be persuaded or mandated by its government to. Policy surrounding lifestyle choices have always existed in both European and American cities. These can be outright laws forbidding certain actions or choices, or policy makers can choose more indirect approaches. One of the simplest methods are tax-breaks or financial rewards for choosing favorable choices. The province of Brabant in the Netherlands has created a useful app that allows new cycling riders to track their kilometers cycled during peak commuting hours and can thus receive rewards. Studies done by the Dutch government have shown that even when the rewards cease, users continue using bicycles. Providing tax breaks for companies that create favorable facilities for storing bicycles is another method the Netherlands have used. Lastly, the creation of cycling superhighways has been a main focus for the Dutch government. Twenty-five 15 kilometer long bicycle only highways have been created or are under construction as of 2020, allowing easy transportation in and between cities. Much of the US could easily adapt some of these programs to US tax codes, or incorporate more cycling highways in future urban planning projects like bicycle highways to be used in suburbs and cities. Currently, US cities are struggling with these adaptations. Many cities or suburbs are in the process of creating bike lanes on roads, but many cities still have no financial incentives for average Americans or businesses to switch. Many paths are being created, but are mainly being used for parks. Cycling paths and trails are common across countless cities in the US, but they are hardly used or created for practical purposes. Similar to the geographic living choices as Americans, culture also effects the policy surrounding the bicycle as well.

Culture

Looking at the past two sections, both have come down to the cultural view and treatment of the bicycle as a technology. American ideas concerning wealth, luxury, individualism, privacy and consumerism all play a role in hindering the benefits of bicycle commuting. Consumerism refers to the theory that spending money and consuming goods is good for the economy. This theory is sound, until sustainability of that economy and system come into effect. Individualism, or one could say objectivism, is also prominent in American society. Bluntly put, objectivism is the idea that self-interest is moral, and individual rights are absolute. When these two key aspects of American culture are mixed, it can be easy for producers to push consumers towards excessively luxurious or even selfish lifestyles, despite the sustainability of the consumers actions. Another aspect of culture worth analyzing the American suburb. Europe doesn't have anything quite like it, and modern suburbs are something unique to America and its culture (Jackson, Kenneth T.). This status quo of suburban life may be something that's necessary to change, or require adaptation if cycling is to become as popular as in the Netherlands.

Framework

Looking at these factors, they all end up acting upon each other, falling in line with an actor network theory framework. Geography, policy and culture of the US all influence each other to create a system not capable of utilizing the bicycle. Ultimately, culture divides these two countries, but picking out the specific aspects that have lead to this disconnect over the bicycle is important. Policy influences culture, and vice versa. Geography influences culture, and in turn, that culture can affect the geography of future city planning. If the US wishes to become

sustainable in transportation technology, these main aspects discussed are the chief constraints stopping bicycling from becoming a possible solution.

This research may serve as a sufficient introduction to the problems the US faces, but future analysis on other factors may prove to be necessary. Factors like growing native populations and immigration may be affecting the geographic spread of city-scapes and increasing commute distances, decreasing cycling commute feasibility. Aspects like competing green or sustainable methods of transportation may also influence cycling as a transportation option. These factors may be newer or are less impactful than the main factors discussed earlier, but they undoubtedly help shape the bicycle's future.

Conclusion

After analyzing the physical, environmental, economic, political, and cultural aspects in the US that keep cycling from becoming successful, there seem to be several central issues that can solve issues like road-space rationing, carbon emission rates, and economic troubles for Americans. Firstly, public policy concerning cycling in the US still has a long way to go to match that of the Dutch. Tax breaks, setting aside road space for cycling, and other laws discussed when looking at Amsterdam policy can all be beneficial in fostering a US cycling culture. Next, dissecting the cultural attitudes in the US around consumerism, luxury, and individualism is another step in solving this problem. No direct solution to the American population's culture exists, but educating Americans on the benefits of cycling over car dependence is a step forward. Lastly, conquering the physical barriers in the US like its size of its cities and diverse climates may require adaptations to the bicycle, such as improved comfort for long distance treks, or full fairings for aerodynamics and protection from the elements. These

problems discussed in this essay are not meant to be solved in total, but ideally, the analysis of key factors constraining cycling life in the US can be used in other works to find solutions.

References

- Cahill, M. (2001). The Implications of Consumerism for the Transition to a Sustainable Society. *Social Policy & Administration*, 35(5), 627 - 639.
- Cerutti, P.S., Martins, R. D., Macke, J., & Sarate, J. A. (2019). "Green, but not as green as that": An analysis of a Brazilian bike-sharing system. *Journal of Cleaner Production*, 217, 185-193. doi:10.1016/j.jclepro.2019.01.240
- Chunli, Z., Carstensen, T. (2018) (Bicycle-friendly infrastructure planning in Beijing and Copenhagen - between adapting design solutions and learning local planning cultures. *Journal of Transport Geography*, 149. <https://doi.org/10.1016/j.jtrangeo.2018.03.003>
- <https://doi.org/10.1016/j.jtrangeo.2018.03.003>
- "Cycling in the Netherlands" (PDF) (Press release). The Netherlands: Ministry of Transport, Public Works and Water Management. Fietsberaad (Expertise Centre for Cycling Policy). 2009. Archived from the original (PDF) on 2009-05-14. Retrieved 2014-07-09.
- Fenner, P., (2010) On The Golden Rule of Trike Design. Retrieved from www.deferredprocrastination.co.uk
- Gossling, S. (2013). Urban transport transitions: Copenhagen, City of Cyclists. *Journal of Transport Geography*, 33, 196-206. doi:10.1016/j.jtrangeo.2013.10.013
- Hemme, D. Velo. Exploring Zurich's Bicycle Culture, *Zeitschrift Fur Volkskunde*; 2018, 114 1, p114-p115, 2p
- Herlihy, D. V. (2006). *Bicycle: the history*. New Haven, Conn.; London: Yale University Press.
- Hertel, Ole (2008) A proper choice of route significantly reduces air pollution exposure ? A study on bicycle and bus trips in urban streets. (n.d.). Retrieved from <https://www.sciencedirect.com/science/article/pii/S004896970700933>

- Jackson, Kenneth T. (1985), *Crabgrass Frontier: The Suburbanization of the United States*, New York: Oxford University Press, ISBN 0-19-504983-7
- Longhurst, James. (2015). *Bike Battles: A History of Sharing the American Road*. University of Washington Press.
- Nankervis, M. (1999) The effect of weather and climate on bicycle commuting. (n.d.). Retrieved from <https://www.sciencedirect.com/science/article/pii/S0965856498000226>
- Norcliffe, G. (2016). *Critical Geographies of Cycling*. doi: 10.4324/9781315574998
- Oosterhuis, H. (2016). Cycling, modernity and national culture. *Social History*, 41(3), 233–248. <https://doi.org/10.1080/03071022.2016.1180897>
- Sigurdardottir, S (2013) Understanding Adolescents intentions to commute by car or bicycle as adults. (n.d.). Retrieved from <https://www.sciencedirect.com/science/article/pii/S1361920913000710>
- Statline, (2019) Jobs of employees by home and work region (n.d.). Retrieved from <https://opendata.cbs.nl/statline/#/CBS/nl/dataset/83628NED/table?fromstatweb>
- Turpin, R. (2015). Bicycles and Juvenile Masculinity During World War I. *Women's Studies Quarterly*, 43(1/2), 51–65. <https://doi.org/10.1353/wsq.2015.0016>
- Wang, J. J. (2019). First Taste of Freedom: A Cultural History of Bicycle Marketing in the United States. *Journal of Sport Management*, 33(3), 244–245. Retrieved from <https://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=136074521&site=eds-live>
- Wray, J. H. (2015). *Pedal Power: The Quiet Rise of the Bicycle in American Public Life*. London, England: Routledge