Obstacles and Potential Improvements to the Experiences of Pedestrians and Bicyclists: A Comparison of Transportation Culture Between the United States and Europe

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

In the United States (US), many roads have been designed to prioritize drivers over other modes of transportation, leading to prevailing attitudes that bicyclists and pedestrians are "second-class citizens" on the road (Laker, 2016, n.p.). This dedication of roadway infrastructure to vehicles has led to a common mindset that drivers have a right to the road, often without a need to share the space with travelers using other modes of transportation. As a result, there are conflicts between groups of roadway users, especially in the US where drivers are highly prioritized over non-motorized travelers. According to the National Highway Traffic Safety Administration (NHTSA), pedestrian and bicyclist deaths in the US rose in 2018, despite overall traffic deaths falling 1%, further indicating a need to address concerns regarding the experiences of these roadway users (Shepardson, 2019, n.p.).

Due to this vehicular bias, pedestrians and cyclists can be considered vulnerable transportation system users and may face difficult travel experiences that reduce their safety and comfort levels. They may be unconsciously blamed for problems on the road by drivers due the preeminence of vehicles in the roadway hierarchy (Laker, 2016, n.p.). Vehicle-oriented environments are increasing segregation between drivers and other modes, which could lead to continued dominance by drivers as new roads are built and existing ones are repaired. As car-centric roadways are typical in most areas, this problem is something that is embedded into the culture of the US transportation framework. This perspective must be addressed to sufficiently resolve the problem behind pedestrian and bicyclist safety and comfort.

Engineers and planners can consider multiple stakeholders with disagreeing viewpoints (including the drivers, pedestrians, and cyclists) when designing a road (Downey, 2005, p. 591). However, infrastructure only solves part of the problem, as there still is a need to increase

cooperation between these roadway user groups. This change will likely continue to be slow in the US when compared to other parts of the world, such as many European cities; nevertheless, this timeline is not due to a lack of "expertise and competence" by American transportation stakeholders (Bijker, 2007, p. 143). In this paper, I argue that the US could undergo a shift to improve the experiences of pedestrians and bicyclists through cultural strategies specific to the country's societal values and past development, rather than simply borrowing tactics from other countries that have prioritized these roadway users in a way that is particular to their unique history.

Part I: Culture Significantly Influences Attitudes Toward Walking and Cycling in Europe and the US

Case Studies of Walking, Cycling, and Driving Culture in European Cities

Throughout the world, countries that have higher rates of walking and cycling have tailored their policies and cultures to adapt to these modes. A paper by Pooley and other academic researchers from the United Kingdom (2013), published in *Transport Policy*, describes a case study of England where policies for promoting active mobility, or transportation that requires human physical activity, have been implemented. The researchers concluded that "strategies that focus only on part of the problem," such as "improved cycle infrastructure," are less likely to create success on their own (Pooley et al., 2013, p. 71). Instead, "legislative, spatial, social and economic change" is needed for walking and cycling to become "the obvious and expected thing to do" (Pooley et al., 2013, p. 71).

A study by Demerath and Levinger (2003), contributors to the American Sociological Association's *City & Community*, notes how "pedestrian activity broadens people's access to cultural meaning-making processes," describing the positive impacts of walking (Demerath &

Levinger, 2003, p. 217). Similarly, a case study of urban transport in Copenhagen, dubbed the "City of Cyclists," was published by Gössling (2013) in the *Journal of Transport Geography* and sought to analyze the city's culture of active mobility and its lifestyle benefits. Gössling, a Swedish professor of sustainable tourism, describes that Copenhagen "has a long-standing cycling tradition dating back to the late 19th century" and has "establish[ed] a common vision of Copenhagen as a bicycle capital" where the bike is treated "as a transport mode equal to the car" (Gössling, 2013, p. 204). In recent years, not only has cycling infrastructure development become commonplace, but "soft policy campaigns" have effectively created "an understanding that bicycling is fun, faster, comfortable and safe, and associated with tangible personal and societal benefits" (Gössling, 2013, p. 204). Due to the implementation of this "clear political vision," Copenhagen has seen an "emergence of social identities favouring bicycling," attesting to the importance of culture in creating a society where non-motorized transportation is prioritized (Gössling, 2013, pp. 204-205).

Another study out of the *Journal of Transport Geography* also sought to analyze "cycle mobility" in Copenhagen with regard to social identity (Jensen, 2013, p. 220). In this paper, Jensen, a Danish researcher of social science and geography, describes how Copenhagen has effectively created a culture where cycling is appealing to all types of citizens. There has been a "normalization of cycling" in the city, whereby it is commonplace "across social classes" (Jensen, 2013, p. 222). As a result, cycling has become an "integrated cultural marker of daily life," influencing "social encounters, public identity and sustaining family ties" (Jensen, 2013, p. 225).

Furthermore, a paper published in *Transportation Quarterly* by Pucher and Dijkstra (2000), who study urban planning at Rutgers University, describes how the Netherlands and

Germany have adopted many cultural changes to increase pedestrian and cyclist safety, such as "rigorous traffic education of both motorists and non-motorists" (Pucher & Dijkstra, 2000, p. 15). For instance, "driver training…is much more extensive, thorough, and expensive than in the [US]" (Pucher & Dijkstra, 2000, p. 24). Unlike in America, the driver's license exam in these countries tests motorists on their ability to "[avoid] collisions with pedestrians and cyclists" and "anticipate potentially dangerous moves by [these users]" (Pucher & Dijkstra, 2000, p. 24). The incorporation of non-driver behaviors into Dutch and German driver education, a strong determinant of driving culture, allows for roadway user differences to be practically addressed.

A case study presented at the 7th Cycling and Society Symposium by Pelzer (2010), a researcher in metropolitan studies based in Amsterdam, outlines "bicycling as a way of life" in Portland, Oregon (often considered the most bicycle-friendly city in the US) as compared to Amsterdam (Pelzer, 2010, p. 1). In Portland, cycling has not eliminated "a mobility culture in which the car plays a central role, even for bicyclists" while, in Amsterdam, "bicycling is…related to a sense of freedom…rather than an antagonistic relation with automobility" (Pelzer, 2010, p. 9). However, "there was a stronger sense of community…among bicyclists in Portland," attesting to the development of bicycling culture in the US as relatively new "minority position" on the road and as a need out of "the more intense experience of bicycling" when compared to in the Netherlands (Pelzer, 2010, p. 9). In Amsterdam, there is a "perpetually ingrained" cycling mentality developed from a young age, making bicycling naturally part of the " 'national habitus' " of the country (Pelzer, 2010, p. 9).

The Importance of Etiquette for Different Roadway User Groups

In all cultures, etiquette is something that plays an important role in improving the quality of social interactions, and roadway etiquette, or the unwritten rules of the road that increase

safety and unity, is no exception. When all roadway users are vigilant to others and collectively share responsibility for safe travel behavior, everyone is placed on the same playing field instead of in separate systems vying for their own rights-of-way. As a result, some of the problems faced between roadway user groups are alleviated. For pedestrians, having strong roadway etiquette means paying attention visually and audibly to their surroundings and not focusing on distractions such as phones (Pincus, 2015, n.p.). It is important for cyclists to pay attention to their surroundings, but also ride predictably with the flow of traffic (DC Metropoliltan Police Department, n.d., n.p.). As cyclists can behave sporadically, it is their responsibility to use hand signals “to let others know [their] intention to stop or turn” as well as “[do their] best to anticipate hazards and adjust [their] position in traffic accordingly” (DC Metropoliltan Police Department, n.d., n.p.). In other words, it is not simply up to drivers to make way to accommodate cyclists, but it is up to cyclists to help ensure their own safety when riding with vehicular traffic.

On the road, drivers must understand that other roadway users have their same rights while "also [facing] unique safety challenges,” including limitations related to their size and visibility (NHTSA, n.d., n.p.). A report by Goddard (2017), of Portland State University, for the National Institute for Transportation and Communities (NITC), warns that drivers may often feel “pressure to overtake a bicyclist” and must consider “the potential implications” of doing so (Goddard, 2017, p. 136). When interacting with bicyclists, drivers need to practice considerate behaviors such as “safe passing” (Goddard, 2017, p. 136). Furthermore, as Lennon & King, of the Centre for Accident Research and Road Safety at Queensland University of Technology, discussed at the 2015 Australasian Road Safety Conference, conflicts between drivers (such as aggression) are also important to resolve. These disagreements may be presented in the form of a

"conflict in values" between those "who approach driving more from an individualistic perspective versus those who recognize the inherent collective nature of road use and the need for cooperation," with "courteous drivers" recognizing that "everyone is subject to inconvenience" and not "seeking to benefit at the expense of other road users" (Lennon & King, 2015, p. 7).

The mentalities of roadway users, especially those of drivers, can be improved to increase the safety and comfort of all users, and—universally—driving etiquette can allow for better roadway operations and improved on-street relations. Based on these conditions, transportation culture in the US can be more conducive to pedestrians and bicyclists through changes in infrastructure, policies, and values. However, as a result of differences between the US and European countries, a unique combination of cultural factors must be present for active mobility to become as accepted in the US as it is in other parts of the world.

Part II: Sociotechnical Models Emphasize Differences in Technological Cultures Between Europe and the US

Model of Risk Conception and Technological Culture

In order to analyze how the US can more holistically improve the safety and comfort of pedestrians and bicyclists, and whether it could effectively apply the cultural strategies used by the European countries previously discussed, it is important to analyze the problem using sociotechnical system (STS) models. One such framework is derived from the 2007 article "American and Dutch Coastal Engineering: Differences in Risk Conception and Differences in Technological Culture," published in *Social Studies of Science* by Bijker, a Dutch professor of social science and technology. Using the example of the US's preparation for coasting flooding after the destruction of Hurricane Katrina, compared to how the Netherlands prepares for similar

natural disasters, Bijker describes that the way each country approaches flooding mitigation is reflective of their overall approach behind the purpose of technology (Bijker, 2007, p. 149). This cross-cultural comparison is outlined in Table 1, below.

Table 1: *Approaches to Risk Conception and Technological Culture in American and Dutch Societies*. American and Dutch cultures prioritize different methods for identifying and responding to risks using technology. The roles of the government and the public, as they are related to technological development, are also different in the two societies (Bijker, 2007, pp. 147-149) *(created by author)*.

	Approaches to Risk Conception and Technological Culture	
	American	**Dutch**
Time of Intervention	**After risks occur** ("predicting disasters and mediating the effects once they have happened" (p. 147))	**Before risks occur** (preventing them from occurring in the first place (pp. 146-147))
Political Culture (Role of the State)	**More privately-oriented** ("neo-liberal, without belief in the common good as something that the government should define and protect…inclination to privatize and individualize public functions, rather than to defend their value" (p. 149))	**More publicly-oriented** ("much more accepted central role for the national state in all sectors of society" (p. 149))
Technical Literacy of the General Public	**Low** (lack of "active engagement of civil society" (p. 149))	**High** ("active role that citizens…play in public debates, hearings, or on the discussion pages of national newspapers" (p. 149))

From this comparison of American and Dutch methods, it is important to note the stark contrast in how the two countries identify and respond to risks using technology. Overall, the US has taken a more a passive approach to addressing risks and the Netherlands a more active one. Bijker's analysis of "risk conception" and "technological culture" can be applied directly to an analysis of how transportation culture in the US is notably different from that of many parts of

Europe (Bijker, 2007, p. 143). This difference can be demonstrated by the "rigorous traffic education of both motorists and non-motorists" in the Netherlands and Germany to prepare travelers to respond to unexpected circumstances, and the lack thereof in the US, reflecting a difference in societal preparations for roadway accidents (Pucher & Dijkstra, 2000, p. 15). Because of differences in cultural values and the prioritization of technology to address problems, the contrast in American and Dutch coastal engineering is comparable to that of the American and European approaches to non-motorized transportation development, including measures to improve safety and comfort.

Model of Problem Definition and Solution

Ultimately, these differences in technological culture are related to how different countries define the needs of individual roadway user groups. To understand this, Downey's (2005) model of problem definition and solution (PDS), described in his paper "Are Engineers Losing Control of Technology? From 'Problem Solving' to 'Problem Definition and Solution' in Engineering Education," can be used. In his model, Downey, a professor of STS at Virginia Tech, argues that engineering practice must shift away from focusing on problem definition and, instead, focus on both problem definition and solution. The characteristics of the PDS model are described in Figure 1, below.

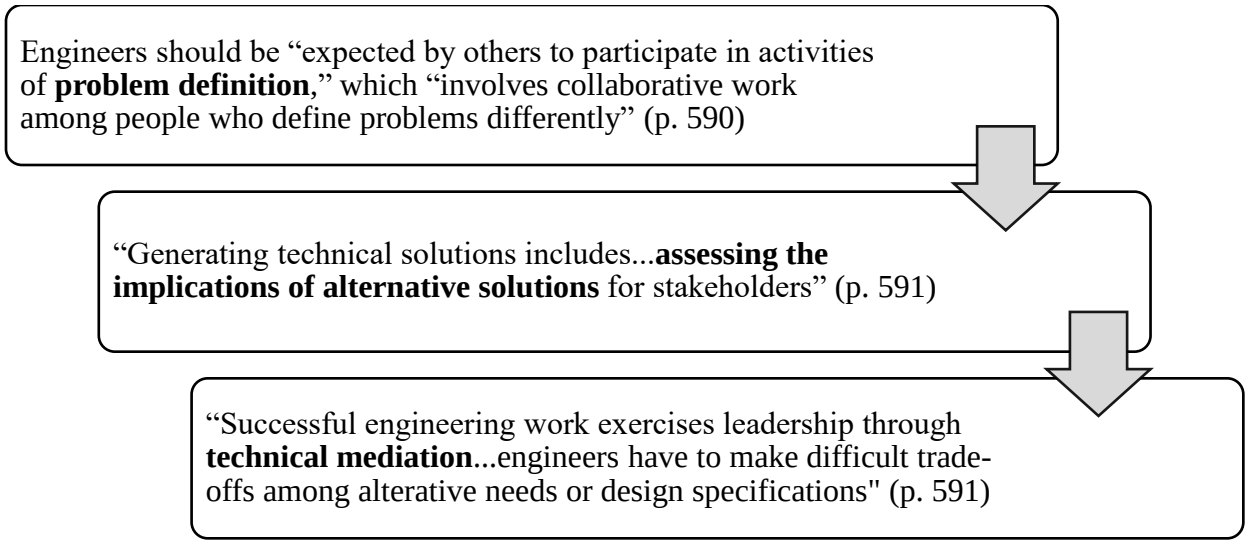

Figure 1: *Model of Problem Definition and Solution (PDS).* To adequately address problems, engineers must take part in problem definition, consider the needs of multiple stakeholders, and practice technical mediation (Downey, 2005, pp. 590-591) *(created by author)*.

Downey's model emphasizes that the development of technology involves effective collaboration between decision makers and a diverse range of stakeholders through a process of defining a problem, identifying the needs of the stakeholders, and exercising "technical mediation" (Downey, 2005, p. 591). The model can enhance how transportation engineers view roadway planning and design, but also help roadway users realize the collaborative nature of their travel experiences. It is important to understand that, for technological innovation, engineers, but also policy-makers and citizens, must consider multiple stakeholders (roadway users) with possibly disagreeing viewpoints when collectively problem-solving.

However, the problem of safety and comfort for non-motorized transportation users is defined differently in other countries where pedestrians and bicyclists are heavily integrated into the transportation network. A consideration of "the implications of alternative solutions for stakeholders" is more naturally ingrained into the culture of many European countries, while it is still slowly developing in the US (Downey, 2005, p. 591). This discrepancy is described, for instance, by Copenhagen's political vision to "treat the bicycle as a transport mode equal to the

car," compared to many US cities' focus on improving car-oriented travel (Gössling, 2013, p. 204). In many ways, "technical mediation" is favored toward pedestrians and bicyclists in a considerable number of cities throughout Europe, and less so toward drivers, while in the US, it is often the other way around (Downey, 2005, p. 591). Due to differences in how the problem of safety and comfort for those who walk and bike is defined, culture is important to consider when recommending solutions to improve travel experiences for transportation systems users in the US.

Part III: Technological Culture Models Can be Applied to Recommend Improvements for Walking and Bicycling Conditions in the US

Based on high rates of traffic-related crashes and often-conflicting on-street relations, the US can and should adopt cultural changes to improve safety and comfort for non-motorized roadway users. As seen from Bijker's comparison of technological culture in the US compared to the Netherlands, there are many differences between the two societies that warrant different approaches to improving the experiences of pedestrian and bicyclists (Bijker, 2007, pp. 147-149). Because of this, the US could apply similar approaches that other countries have used in areas where the current transportation climate is likely conducive to growth and change, but should modify these methods to fit its current technological culture. Bijker and Downey's generalized models provide such methods to tailor transportation improvements to US society.

The Impact of Risk Prediction and Mediation on US Transportation Culture

From Table 1, one of Bijker's points of comparison is the difference in the time of intervention in which countries respond to risks—primarily safety concerns in the case of roadway user relations (Bijker, 2007, p. 147). As Jensen describes, Copenhagen has long-since established as society that "[normalizes]…cycling" (Jensen, 2013, p. 222). With this early

prioritization of cycling that took place before today's fast-paced urbanization, bicyclists are supported with the infrastructure and necessary resources to feel safe and comfortable on the road. As a result, the Netherlands has been able to intervene and prevent many traffic-related risks from taking place as the country's cycling culture has continued to grow.

On the contrary, crashes must often first take place on a corridor before US government officials and policy-makers consider the implementation of strategies to improve pedestrian and bicyclist safety (Laker, 2016, n.p.). As a result, transportation engineers, planners, and citizens must emphasize to government officials and policy-makers the frequency of these crashes if the US wants to adequately address the high number of accidents involving drivers and vulnerable roadway users. As discussed by Bijker, preventative measures that the Netherlands has been taking to reduce disasters provide applicable examples that the US can follow to more readily prevent and mediate risks (Bijker, 2007, p. 147). Paying close attention to "mediating the effects" of pedestrian and cyclist injuries and fatalities is something that the US should be able to willingly face through applying a predictive and preventive approach toward improving roadway safety and comfort (Bijker, 2007, p. 147).

The Impact of Civil Society on US Transportation Culture

Similarly, Bijker's discussion of political culture of the US compared to the Netherlands plays a large role in determining the extent of public and private involvement in improving the experiences of vulnerable roadway users (Bijker, 2007, p. 149). In Copenhagen, the government has had a much more active and purposeful role through the implementation of "soft policy campaigns" that have effectively created "an understanding that bicycling is…associated with tangible…benefits" (Gössling, 2013, p. 204). With its public sector purposefully and intentionally playing a direct part in cultivating a society that seeks to maximize the value of

active mobility for its citizens, the City of Copenhagen itself has had much more of a "central role" in developing transportation culture (Bijker, 2007, p. 149).

In the US, the government has taken on much more of a back-seat role in supporting a culture of walking and cycling. Instead, in cities such as Portland, "privatize[d] and individualize[d]" communities have formed among cyclists dedicated to sharing experiences and collectively improving their current place as a "minority position" on the road (Bijker, 2007, p. 149; Pelzer, 2010, p. 9). These organizations are part of civil society, which is defined by Jezard, a writer for the World Economic Forum, as the organizations, including "community groups." that are "identified with non-state movements" and have "the power to influence the actions of elected policy-makers" (Jezard, 2018, n.p.). Because of this grassroots development of a cycling culture, the private sector and, specifically, civil society, may be the appropriate place to continue to bring awareness to active mobility culture in the US. As American public agencies are less likely to prioritize this issue, policy-makers may not as readily adopt large-scale transportation cultural shifts like it has in cities such as Copenhagen unless civil society brings more awareness to the needs of pedestrians and bicyclists.

The Impact of Low Public Technical Literacy on US Transportation Culture

Bijker also concluded there is less of a prioritization on the public's technical literacy in the US compared to in the Netherlands (Bijker, 2007, p. 149). This is perhaps most clearly exemplified through differences in driver education between the US and some European countries, with driver's license exams in the Netherlands and Germany testing drivers' responses to other roadway users' actions while, in the US, these topics are rarely addressed in driver training (Pucher & Dijkstra, 2000, p. 24).

While it would be ideal to bring more awareness to pedestrian and cyclist behaviors as a part of US driving exams, it may not be realistic to implement this change immediately across the country. The first step, however, is to ensure that all roadway users have an understanding of their behavior in relation to others. For instance, paying attention to one's etiquette when traveling (no matter what mode) instead of "seeking to benefit at the expense of other road users" is something that should be emphasized more during driver training (Lennon & King, 2015, p. 7). This form of literacy regarding the rules of the road could go a long way to improve transportation users' awareness of their surroundings, especially for drivers who may see themselves at a level above other travelers.

The Impact of Roadway User Prioritization on US Transportation Culture

Finally, as Downey describes is necessary for technological innovation, engineers, but also policy-makers and citizens, must consider multiple stakeholders with possibly disagreeing viewpoints (including drivers, pedestrians, and bicyclists) when collaboratively defining and solving a problem (in this case, allocating roadway space) (Downey, 2005, p. 591). To adequately address this issue of varying needs, it is not enough to simply redesign roadway infrastructure to provided dedicated spaces for walking and cycling, as different users have different priorities. Drivers see the need for a corridor to provide them with uninterrupted thoroughfare travel, typically viewing slower modes as impediments to their destinations, whereas bicyclists and pedestrians more often see the need for safety, comfort, and right-of-way. In other words, drivers often seek mobility (how fast they can travel), while pedestrians and cyclists are more likely to be concerned with accessibility (where they can go). To better technically mediate between these often-conflicting roadway users, drivers must be aware of

their counterparts and be encouraged to share the road to support pedestrians and bicyclists in utilizing a space where they feel they belong (Downey, 2005, p. 591).

Because of disparities how the US and many European countries prioritize transportation modes, different approaches are necessary to facilitate shared roadway spaces. In many ways, the US and Europe have defined the problem of improving roadway safety and comfort based on the opposing priorities of technological development, or transportation infrastructure changes, and cultural change, leading to variations in how technological change occurs. This dichotomy is described in Figure 2, below.

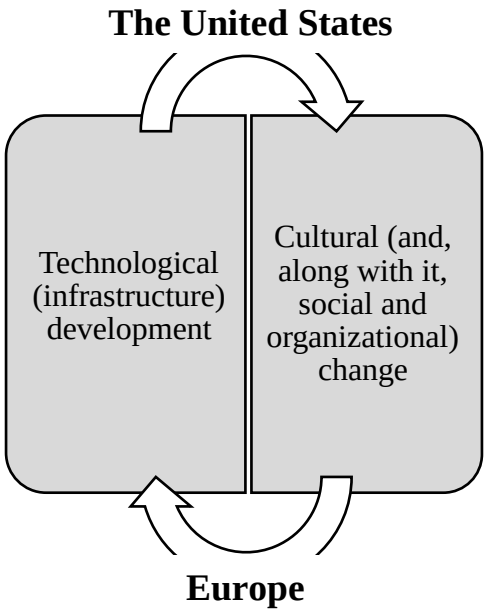

Figure 2: *Technological Change in the United States vs. Europe*. In the US, technological development frequently creates societal changes. On the other hand, cultural, social, and organizational changes often lead to an effort to improve technology in European countries *(created by author)*.

In the area of transportation, technological change in the US often starts with the development of infrastructure, whereby the creation of sidewalks and bicycle lanes lead to a culture where more people choose to walk and bike, as well as where they feel safer doing so. As a result, cultural change is created in locations where these modes become more common, such as in Portland (Pelzer, 2010, n.p.). However, in European cities such as Copenhagen, actions that

purposefully seek to create cultures of active mobility are usually followed by infrastructure developments to make these societal values a reality. Because of this difference in approach, it is important for US policy-makers to keep the implications of this dichotomy of technical and societal change in mind as the problem of roadway safety and comfort is continually being addressed.

Conclusion

Because of differences in technological culture between the US and many parts of Europe, it is clear that the US has not prioritized the needs of vulnerable transportation users as favorably as it should despite high rates of traffic accidents and roadway safety concerns. A failure to decrease the prioritization of vehicles on the road will only lead to continued auto-oriented development in the future. To fully address this problem, the US must shift its perspective from a cultural standpoint to redefine the country's transportation goals. Policy-makers must become more aware of and responsive to the high risk of pedestrian and cyclist injuries and fatalities, and civil society must increase its role in promoting the needs of these transportation user groups. Roadway etiquette and the rules of the road must continue to be communicated and upheld, while engineers and citizens should continue to advocate for the prioritization of active mobility in transportation infrastructure development.

As Pucher and Dijkstra describe, "[i]t is important to package and market [these] policies in a way…[that] benefits…everyone" where, "[i]nstead of being viewed as punitive measures aimed against motorists, they should be presented as new opportunities for all segments of the population" (Pucher & Dijkstra, 2000, p. 30). Improvements to US transportation culture need to be recognized as something that collectively furthers safety and comfort for all roadway users. These changes will not take place overnight, or even systematically across all areas of the

country, and a culture that is highly auto-oriented may be slow to fade. Moreover, stakeholders need to recognize that these changes must take place in a manner specific to the nation's values and history, rather than comparing their technological competence to that of others throughout the world or seeking a one-size-fits-all development formula. Persistence by those who seek to reshape transportation systems in the US will very likely be rewarded by a growing number of cities that place walking and cycling at the same level as driving, rather than below it.

European cities have not provided American cities with the "right way" to approach this problem, but have shed light onto the positive impacts of approaching shifts in transportation climate with culture in mind. As can be seen in many parts of Europe, a culture that promotes improvements to the experiences of pedestrians and bicyclists can lead to a society where citizens are happier and healthier, and where roads are primarily places of harmony instead of conflict.

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