# SHARING SPACE, CREATING PLACE

## STUDYING THE IMPACT OF SHARED STREETS ON HUMAN BEHAVIOR AND THE CAPACITY TO CREATE PUBLIC SPACE.

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# Abstract.

Streets represent the majority of the publicly owned space in our cities, but most of the street space is dominated by the movement of motor vehicles with little attention paid to other street users or functions. An alternative approach to vehicle-dominated streets are Shared Streets that intentionally mix vehicles, pedestrians, and bicycles in one continuous street surface, without any curb separation. This design approach has emerged to revitalize the broader social and play functions of our streets, as well as to democratize the allocation of space to allow for greater non-motorized safety and access. This thesis investigates how people behave in shared spaces to learn whether they improve access for non-motorized users and whether they expand the use of the street as a public space. This study had a multifaceted approach to analyzing shared streets including an extensive literature review of current research and studies, as well as site visits to observe and record behavior at two recent shared street projects in Europe: Exhibition Road in London, England and the Mariahilferstrasse in Vienna, Austria. Results show that shared spaces are successful in promoting sharing between different users and creating a sense of public space, but only under the right conditions. Vehicular speed and traffic volumes have the greatest effect on the success of a shared street, but pedestrian volumes, the surrounding building use, and the streetscape design all affect human behavior. However, if the critical qualities and conditions aren't present, shared streets will not function as shared or public spaces and will instead perform as conventional streets.

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# CHAPTER 1 // INTRODUCTION

Streets have a unique capacity to be magnificently magical places that people are drawn to and enjoy being in. They also have the capacity to be spaces for play, social gathering, and exchange, all of which help to broaden our definition of public space and help to foster community. Alternately, streets can be awful places that are devoid of pedestrians and bicyclists because they serve only one role—the movement of the automobile—and ignore the social, cultural, aesthetic and environmental aspects of our public realm. The fact that most streets fail to be desirable places for people, and that those that do become great are such magnets for people and life, has given them much attention and study in urban design and planning literature. As a Landscape Architect, I am interested in how design decisions make some streets such a success and leaves others falling short.

It is interesting to note that modern life has given us a unique fascination with and attachment to pre-industrial towns and cities, of which people spend millions of tourism dollars on visiting every year. What is it that draws us to these places that are so different from most of our modern environment today? Why don't we build cities like we used to and what have we lost? I believe one of the keys lies in the changes to our streets. There is a sense that something has been lost with the improved efficiency in moving automobiles. Whether this is the greatly reduced quality of the street environment, it's once multifunctional purpose reduced a single function, it's disregard for pedestrians and bicyclists, or it's general

Figure 1-1: Washtenaw Avenue is not a place for people. Source: Second Wave Media.

Figure 1-2: Many Medieval streets are wonderful places to explore, such as this one in Siena, Italy. Source: Nowtopian.

lack of humanity, a growing number of people are re-evaluating how our streets are designed, and demanding more from them.

## SUSTAINABILITY

Our streets are part of the public realm of our cities and communities, and the way they are designed has a direct effect on the quality of the built environment and our transportation options. Streets that are not designed with the pedestrian or bicycle in mind are usually unpleasant and unsafe spaces for everyone other than vehicles. This leads to development patterns that create a heavy reliance on the automobile for even the shortest of trips. Consider that per the 2001 National Household Transportation Survey, nearly 50 percent of all road trips are less than 3 miles, and 28 percent of all metropolitan trips are one mile or less. These are distances that are easily traversed by walking or bicycling, therefore giving street design huge potential to help shift people towards sustainable transportation modes and a smaller carbon footprint.

The International Panel on Climate Change (IPCC) recommends walking, bicycling and taking transit as a key climate change mitigation strategy (Working Group III, 2007). While walking and bicycling have zero carbon emissions, even transit has significantly lower emissions than driving a personal vehicle. Studies show that if a commuter switches from driving a personal vehicle to using transit, they could save about 20 pounds of carbon emissions per day (Davis & Hale, 2007). Yet, if our built environment is not designed with pedestrians and bicyclists in mind, the automobile becomes the default mode of transportation with broad implications for fossil fuel dependency, carbon emissions that contribute to climate change, as well as impacts to health and wellbeing in our society.

Figure 1-3: Children enjoy biking in a street in Seattle. Source: Adam Coppola Photography.

## STREETS + WELLBEING

The correlation between a sedentary lifestyle and obesity is well-documented and data shows that 32 percent of adults are obese, (U.S. CDC., 2006) and the number of overweight or obese American children nearly tripled between 1980 and 2004 (U.S. CDC., 2004). Unfortunately, most of our existing street infrastructure does not adequately accommodate

pedestrians and bicyclists and instead people perceive streets to be dangerous or unpleasant places to walk. Even where sidewalks exist, large intersections and speeding traffic may discourage any non-motorized travel. Unfortunately, the safety statistics do not help with these perceptions of danger as on average, 13 people per day were struck and killed by a car while walking in 2014, for a total of 4,884 people killed by a car while walking that year (Smart Growth America, 2017). However, studies have shown that people who have safe places to walk are more likely to meet recommended physical activity levels than those who do not (Powell, 2003).

## RETHINKING STREET DESIGN

While much of urban design theory centers around architecture and planning, street design has seen increased attention with initiatives like Complete Streets that aim to expand our autocentric designs to better accommodate transit, bicyclists and pedestrians. These streets however, still have a primary function of movement or transport and aim to achieve greater user balance by segregating different transportation modes and giving each one its own designated space. By designating sections of the road for specific uses such as walking and biking, the designers and planners are attempting to create a sense of territory that vehicles will respect and that will make them more comfortable places for pedestrians and bikes to inhabit.

However, another approach to street design has recently begun gaining traction: Shared Space or Shared Streets. In a shared street, there are no boundaries between vehicles, pedestrians, bicyclists or transit users and instead, the street is intentionally designed to create a high-quality pedestrian environment that feels and functions more like a public square than a traditional street. By prioritizing pedestrians in design, the sense of territory and street ownership is shifted away from cars and towards people, and requires that all users share the space by carefully navigating and negotiating space. Because people aren't relegated to sidewalks and crosswalks, there is a level of uncertainty for drivers that means vehicles must be more careful. This requires a heightened awareness of the environment around them which is thought to lead to safer driving and fewer accidents.

## RESEARCH MOTIVATION

This paper analyzes human behavior in shared streets to determine how well these streets accommodate pedestrians and bicyclists, as well as how well they function as a public place. This paper aims to answer the following research questions:

1. How do people behave in shared streets? Do pedestrians occupy more of the street space compared to a conventional street? Is there actual sharing of the roadway?

2. Do shared streets perform as public space with functions beyond just movement and transport?

3. What lessons can designers, planners, and citizens learn from Exhibition Road and Mariahilferstrasse?

Figure 1-4: Mariahilferstrasse, a shared street in Vienna, Austria. Source: Bureau B+B.

## RESEARCH METHODOLOGY

This study had a multifaceted approach to analyzing shared streets including an extensive literature review of current research and studies, as well as site visits to observe and record behavior at two shared street sites. Due to the limited number of shared streets in the United States, two sites were selected in Europe and visited in September 2016: Exhibition Road in London, England, and Mariahilferstrasse in Vienna, Austria. These sites were chosen because of their mixed-use, non-residential nature, thus differentiating them from woonerfs and home zones which are typically more residential. Additionally, they are in dense urban areas with a multitude of users that place significant demands on their function.

Each street was visited on multiple days and at multiple times of day to observe, photograph, and record behavior in the space. While handheld counters were used to measure data, the primary intent was to observe and photograph human behavior in the space: both pedestrian, bicycle, and vehicular.

# CHAPTER 2 // OVERVIEW OF SHARED STREETS

## INTRODUCTION TO SHARED SPACE

Shared space is an urban design concept applied to streets that aims to remove conventional traffic controls and the physical separation between vehicles, pedestrians, and bicycles in order to encourage sharing of the street space by all road users. The mixing of different users and lack of defined space is done intentionally to create a sense of uncertainty for drivers, therefore removing their sense of priority and making them more cautious and courteous road users, resulting in a safer street environment. Without formal traffic controls, shared space users must rely on informal social protocols, engaging each other with eye contact in order to navigate the space.

Because this level of social interaction with eye contact cannot be done at fast speeds, it requires that drivers operate at low speeds in order to analyze their environment. The result is a deliberate reduction in the dominance of the motor vehicle, allowing the street to better prioritize pedestrians and bicyclists, as well as expand its functions beyond those of mobility. The lack of specific territories for road users aims to encourage pedestrians and bicyclists to legally occupy the entirety of the road space so that one may freely wander across the space instead of being relegated to sidewalks on the edges, while also providing a safer environment for all road users.

The notion of sharing space is not new, but it is novel after the widespread domination of streets by automobiles that occurred in the 20th century (Karndacharuk, Wilson, & Dunn, 2014). Streets have always had to serve they multifunctional purposes of mobility and access related to transportation, and historically they have also performed the place function of providing a platform for social interaction and civic exchange (Hamilton-Baillie, 2008c). One of the primary goals of shared spaces is placemaking, and these streets are intended to function as public spaces that attract people to spend more time within the street, and also allow for a wider-range of social and civic activities to take place (Karndacharuk, Wilson, & Dunn, 2013). "The renewed interest in the shared space concept..reaffirms the multi-faceted functions of a public street, including the 'place' function as well as the shifting of public demand and expectations away from auto vehicles towards sustainable and safe transport for all users" (Karndacharuk, Wilson, & Dunn, 2014, p. 190-191).

However, the balance between these roles will depend on the unique circumstances of each street and shared space schemes are not applicable to every context. Their success is closely tied to the land uses of surrounding buildings and the ability for both buildings and the street to draw people to the destination (Karndacharuk, Wilson, & Dunn, 2013). Ideally, shared spaces should be implemented in streets

with active building frontages and significant pedestrian traffic. The street should complement building uses such as retail and restaurants by allowing space for cafés and other outdoor extensions of businesses in order to help draw people to spend time in the space. In return, shared space will help contribute to the prosperity of surrounding businesses, while also letting them enhance the range and types of activities that take place in the street space (Karndacharuk, Wilson, & Dunn, 2013).

Another primary goal of shared space is to encourage sustainable forms of transportation, specifically walking and biking. Shared space is part of a larger movement against conventional street design that has prioritized the motor vehicle at the expense of other road users, and resulted in wide-ranging impacts on the environment relating to urban sprawl, fossil-fuel use, and climate change, as well as social impacts on our well-being and sense of community. It has also impacted our health as auto-centric streets and development patterns have led to a dependence on the automobile and more sedentary lifestyles. Additionally, conventional street design has reduced the quality of our built environment by

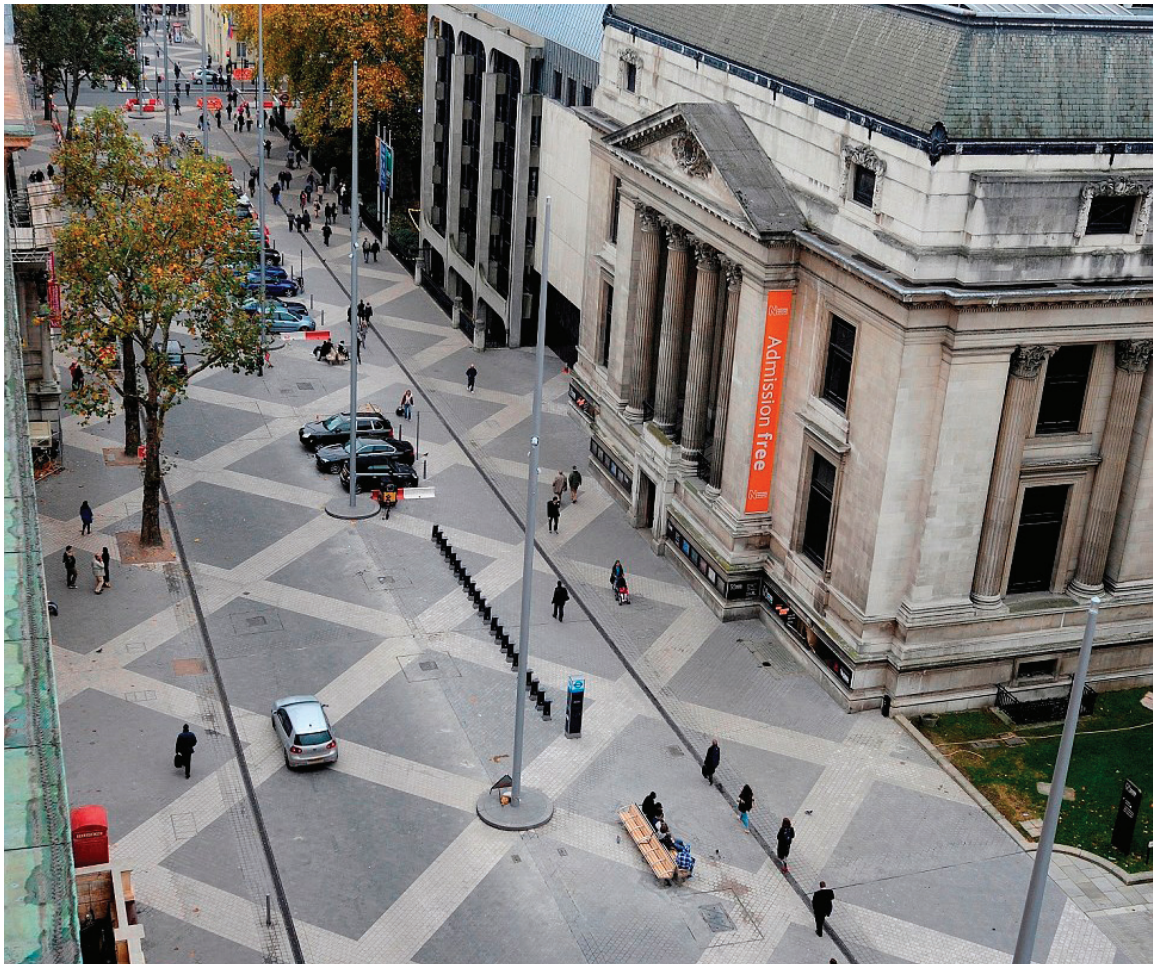


Figure 2-1: Exhibition Road in London is a shared street. Source: Publicspace.org.


Figure 2-2: The Mariahilferstrasse, a shared street in Vienna Austria. Source: Walk 21 Vienna


designing for the scale and visual capacity of vehicular speed, rather than pedestrian, leading to a decline in architectural detail and human scaled structures.

As streets are one of the most accessible components of our public realm, their degradation in quality makes people less inclined to spend time in them for social activities and less willing to choose to walk or bike (Hamilton-Baillie, 2008c). Additionally, as fewer pedestrians and bicyclists use our streets, the "public perceptions of safety decline and activities such as play transfer from the public realm to private space" (Hamilton-Baillie, 2008c, p. 130). This shift affects the social cohesion of our communities and the civic engagement of our towns and cities.

Shared space represents a significant departure from the longstanding conventions of segregating traffic from civic space (Hamilton-Baillie, 2008c), but it is necessary to challenge the assumptions that conventional streets are built on if we are to reclaim the public realm of our cities. Shared space raises "important questions about risk and safety, the role of government in regulating and controlling behavior and the conventional professional boundaries of urban designers and traffic engineers" (Hamilton-Baillie, 2008c, p. 130). To better understand how we got to our conventional street design standards, we will begin with a review of the history of street design and the development of traffic engineering as a discipline.

However, before we proceed we would like to briefly discuss the terminology of "shared space", which is credited to the urban designer Benjamin

Figure 2-4: Medieval street in Siena, Italy with continuous surface that is a shared street today. Source: Jamie Sinz.

Figure 2-3: Children playing in the street, Newcastle, England, circa 1970. Source: Alamy.

Hamilton-Baillie. Unfortunately, the term 'Shared Space' has broad connotations and is used across various disciplines to mean different things (Karndacharuk, Wilson, & Dunn, 2014). To help clarify the discussion of urban spaces from other applications of the word, we will follow the Urban Street Design Guide (NACTO, 2013) and use the term "Shared Street" which is more suitable in suggesting the sharing behaviors between road users within the physical context of the street (Karndacharuk, Wilson, & Dunn, 2014). However, the concept of shared space/ streets is known under many terms including the following: Living street, Festival street, Encounter zone, Shared zone, and Home zone (Karndacharuk, Wilson, & Dunn, 2013).

## HISTORY OF STREET DESIGN

A city's streets are in essence a framework of public space that provides the structure for a city's urban form, and reveal the history, culture and values of the society they inhabit. They are a cultivation of a various social, political, cultural, design and engineering forces that have affected our urban forms over the ages (Karndacharuk, Wilson, & Dunn, 2014). The history of street design dates back to our earliest human settlements including Ancient Rome and Athens whose citizens placed a strong value on the role of the public realm (the streets, squares and parks) where citizens could come together to engage in civic discourse, social gatherings, and other aspects of urban life (Dover, Massengale, 2014). In ancient and medieval times, streets were designed for pedestrian use and were built to a human scale. Throughout most

Figure 2-5: Mulberry Street in New York City was once a multi-functional street, as shown in this photo from circa 1900. Source: Shorpy Historic Photo Archive.

of our human civilization's history, walking was the primary form of transportation, and the occasional animal-pulled vehicle would simply share the road space with pedestrians. In fact, "much of the art of traditional urban design and town planning consists of…shaping and programming the public realm into a place where pedestrians want to be" (Dover, Massengale, 2014 p. 4). In addition to the role of mobility and transport, streets also provided other functions as places of commerce, social interaction, and exchange. Allan B. Jacobs stresses the important role streets play in fostering a sense of community by promoting face to face contact as "sociability is a large part of why cities exist and streets are a major, if not the only public place for that sociability to develop" (Jacobs, 1993, p. 4).

The first major design shift away from the multifunctional medieval street approach to one whose primary function was the efficient movement of traffic may have been Baron Haussmann's Parisian Boulevards in the latter half of the 19th century (Karndacharuk, Wilson, & Dunn, 2014). However, the rise of the automobile in the 20th century marked a monumental societal shift in our demands and expectations for the functions of streets, as the design and use of urban street space became dominated by the automobile (Karndacharuk, Wilson, & Dunn, 2014). The result was that city

streets were redesigned to accommodate ever greater speeds and volumes of traffic and highways were prioritized as solutions to urban traffic problems (Karndacharuk, Wilson, & Dunn, 2014). Tragically, "the overwhelming majority of the streets in America have been built since World War II, and most of them were built for cars rather than people-like the six-lane arterial road in the middle of nowhere lined with strip malls, shopping malls, big box centers, and the other detritus of modern suburban life" (Dover, Massengale, 2014 p. 3).

## TRAFFIC ENGINEERING AND ROADWAY SEGREGATION

As the ability and desire grew to move vehicles at greater speeds and volumes, a new profession of traffic engineering emerged to develop policies and technologies aimed at increasing safety (Hamilton-Baillie, 2008c). Because this new profession was isolated from the design professions of architecture, landscape architecture, and urban design, it led to the design of streets being primarily controlled by government regulations focused on the efficient movement of vehicular traffic (Hamilton-Baillie, 2008c). Additionally, because public streets are under the jurisdiction of local governments who must protect the health, safety and welfare of the public, it instills a need for regulations to protect governments from safety liabilities and litigation (Karndacharuk, Wilson, & Dunn, 2014). The resulting traffic engineering approach to designing streets requires that road users be segregated, with pedestrians on the sidewalks and vehicles in the roadway in order to minimize the risk of conflicts (Karndacharuk, Wilson, & Dunn, 2014). More recently, bike lanes have been allocated along the curb to provide designated travel space for bicyclists, further demarcating the various territories of the roadway. However, there is a "lack of evidence to support many long-standing assumptions that provided the bedrock for traffic engineering principles and guidance" (Hamilton-Baillie, 2008a).

The results of traffic engineering our streets has had a tremendous impact on the quality of our cities, for in the US, about 80 percent of the urban space between our buildings is defined by the regulations and control of traffic engineers (Hamilton-Baillie, 2008a). The singular focus of moving vehicular traffic has reduced our streets accessibility to other road users such as pedestrians and bicyclists, as well as limited their capacity as a public space (Hamilton-Baillie, 2008a). Placemaking, when done on streets at all, has been limited to the peripheries of the streetscape with small gestures that aim to improve aesthetics without altering the structure of the vehicle-dominated street. These policies have resulted in sprawling land use patterns, a reliance on the automobile, and a rapid decline in walking and bicycling due to isolation, reduced accessibility, and a degraded public realm (Hamilton-Baillie, 2008c).

Empirical research showing how vehicular traffic was degrading the social aspects of the street started as early as the 1970s with Donald Appleyard's Livable Streets Study. He looked at three streets in San Francisco that were comparable in morphology but had different levels of traffic: Low (2,000 vehicles per day), Medium (8,000 vehicles per day), and high (16,000 vehicles per day). What he found was that people on

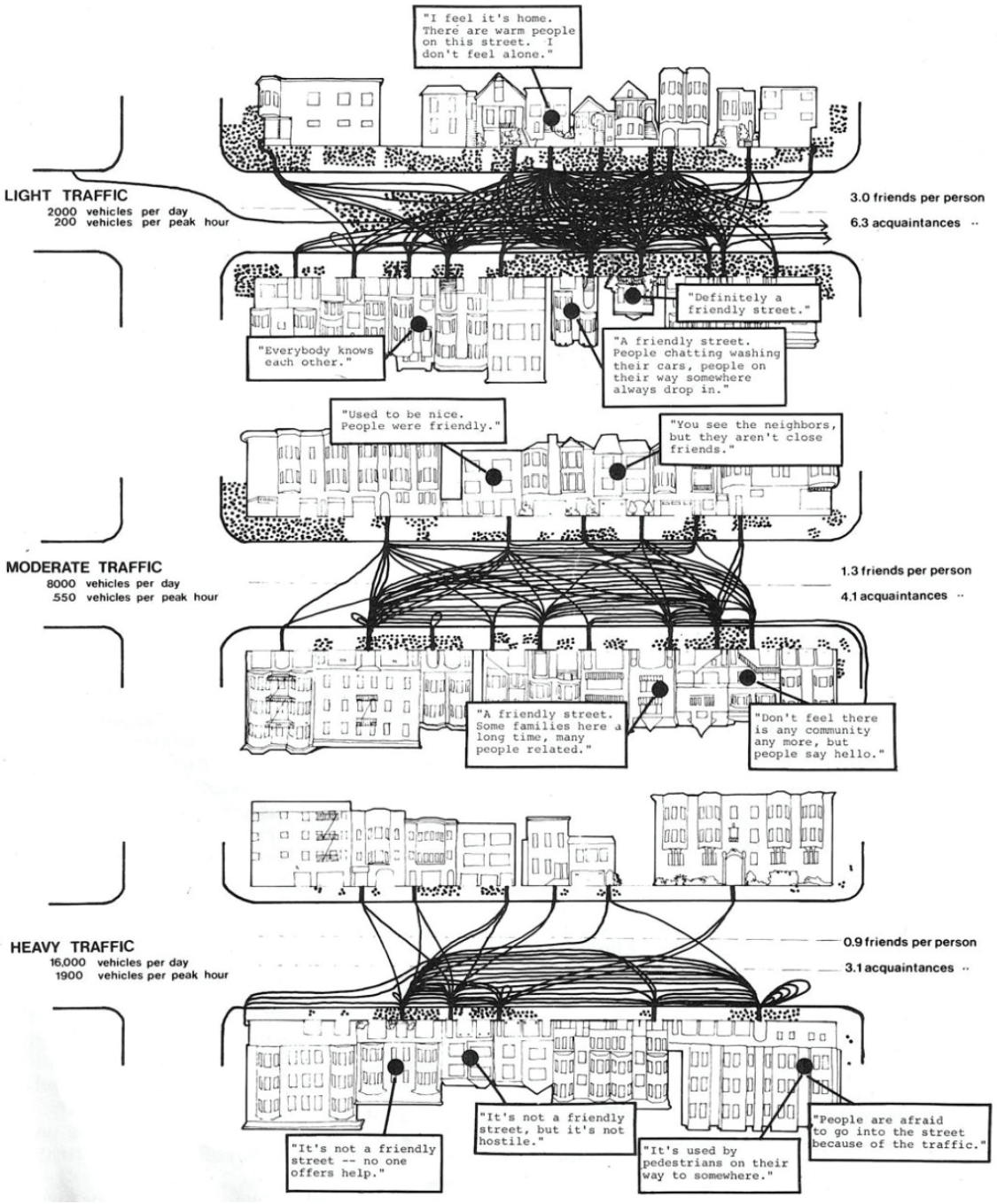


Figure 2-6: Images from Donald Appleyard's Livable Streets study showing relationships (lines) and gathering spaces (dots) on each of the three study streets. Source: Donald Appleyard, Livable Streets

the low traffic street had three times as many friends who lived on the street as the people who lived on the street with high traffic. Additionally, there was far fewer social gathering spaces on the high traffic street compared to the low traffic street. Thus, traffic and the presence of the automobile have a significant effect on the social qualities and relationships of the broader street environment.

Figure 2-9: A dutch woonerf, an early shared street concept.  Source: Canin Associates.


Figure 2-7: A Home Zone residential street in the United Kingdom. Source: Sustrans.

Figure 2-8: One of the first shared space squares in Drachten, Netherlands.  Source: Works That Work.

## ALTERNATIVES TO AUTOCENTRIC STREET DESIGN EMERGE

The shift toward suburban development and a decline in city centers sparked the emergence of alternative street design practices in the second half of the 20th century which led to experiments with shared space. The concept of shared space is not new and it can be argued that this system of social protocols and negotiation were typical of all streets prior to the introduction of roadway segregation (Hamilton-Baillie, 2008b). "Visit any Mediterranean hill town or market square, and one can observe the informal sharing of street space by vehicles and other users, and such arrangements remain commonplace throughout the world" (Hamilton-Baillie, 2008b, p. 166). However, the conscious and deliberate application of shared space principles of street integration can be traced back to innovative pioneers in The Netherlands.

In the late 1960s, Niek de Boer and Joost Váhl developed the woonerf (roughly translated as 'yard for living'), a shared space design concept applied to quieter residential streets (Hamilton-Baillie, 2004; 2008b). The impetus for the creation of the woonerf was to reinstate the social role of the street, and in particular, to encourage children's play which had traditionally occurred in the street but declined with the increased speeds and volumes of traffic. This marked the first time that traffic devices (signage, markings and curbs) were intentionally removed in order to allow for the integration of pedestrians and vehicles, and to encourage social uses of the street (Karndacharuk, Wilson, & Dunn, 2014). The woonerf defined many of the salient features of shared space such as priority for pedestrians and bicyclists, limiting vehicular speeds and through-traffic, a curbless paved surface with little demarcation between pedestrian sidewalks and vehicular roadway, and a clear demarcation of beginning and ending points of the space (Karndacharuk, Wilson, & Dunn, 2014). The success of this street design approach galvanized widespread support and was subsequently codified by the Netherlands government in the mid 1970's, with a legal status and formal guidelines and regulations (Karndacharuk, Wilson, & Dunn, 2014).

Following the success of the woonerf, the UK developed a similar shared space residential street concept called the "Home Zone" in the 1990's (Karndacharuk, Wilson, & Dunn, 2014). More recently, the woonerf concept has been applied to commercial streets, marking a shift beyond its residential roots and an attempt to deal with more complex street environments. The term "shared space" was coined by Ben Hamilton-Baillie in reference to these non-residential applications, which include both intersections and street designs.

It is important to differentiate shared space from the movement towards "traffic calming" which began in the 1990s. Traffic-calming largely relies on manipulations of various traffic devices to encourage slower speeds but it maintains the typical allocation of roadway space with no major gestures to encourage people to linger/dwell there (Karndacharuk, Wilson, & Dunn, 2014). A study by Biddulph of two residential streets in the same neighborhood showed that residents, and particularly children, spent significantly more time

socializing in the shared space street (a UK home zone) than in the traditional street that had been "traffic-calmed" (Biddulph, 2012; Karndacharuk, Wilson, & Dunn, 2014). Therefore, it appears that the structural change of space allocation in shared space is more effective at creating a sense of place than merely slowing down vehicular traffic. While the objectives of traffic calming and shared space have the same overarching goal of reducing the dominance of vehicles in urban public streets, a differentiator is that shared space promotes the idea of a street being a destination in and of itself (Karndacharuk, Wilson, & Dunn, 2014). Additionally, whereas other street design concepts like "Complete Streets" try to integrate various road users by designating space for each user, it is the focus on the street's ability to promote lingering, not just movement, that sets shared space apart in its ideology and functional goals.

Pedestrian malls were another alternative to auto-centric street design that emerged in the United States during the 1960s and 1970s. These were typically traditional main streets that were converted from conventional roads with vehicle traffic to pedestrian-only streets in an attempt to draw consumers back to struggling downtowns. Pedestrian malls were seen as a response to the competition downtown retailers were feeling from shopping malls, but unfortunately most of them were unsuccessful and eventually were converted back to automobile traffic. While there are a few notable exceptions that remain (Charlottesville, Burlington, Boulder, Denver, etc.), most American pedestrian malls failed while their European counterparts thrived. Some reasons for why pedestrian malls have struggled in the U.S. include the lack of public transportation systems to provide connectivity to pedestrian-only spaces and a lack of urban density and mixed-use development to provide the necessary pedestrian traffic volumes to keep a place closed to cars vibrant. There are also the cultural differences between the U.S. and Europe, since Europeans have more of a cultural proclivity to walking and biking (Pojani, 2008). However, shared streets could be an excellent alternative for downtowns who would like to expand the pedestrian realm and create vibrant public space for economic development, but are reluctant to close the street entirely to vehicles. Shared streets, with their continuous paved surface, would also provide a more flexible platform for temporary street closures for special events.

## SHARED SPACE THEORY

Allan B. Jacobs, a professor of Urban Design at the University of California Berkley and an author of many books on street design is a proponent of fostering interactions between road users and asserts that "when cars are more fully aware of and integrated into the pedestrian realm, both pedestrians and drivers are safer" (Project for Public Spaces, 2009). The primary theory behind shared space is that creating a perceived sense of conflict or risk will lead people, particularly drivers, to be more aware of others and act more carefully. "In the absence of rules, predictability and certainty, drivers have to rely on cultural signals and informal social protocols. Speeds reduce, eye contact becomes the norm, and the driver becomes a part of her or his social

Figure 2-12: One of the few successful pedestrian malls is the Downtown Mall in Charlottesville, Virginia. Source: The Long Weekender

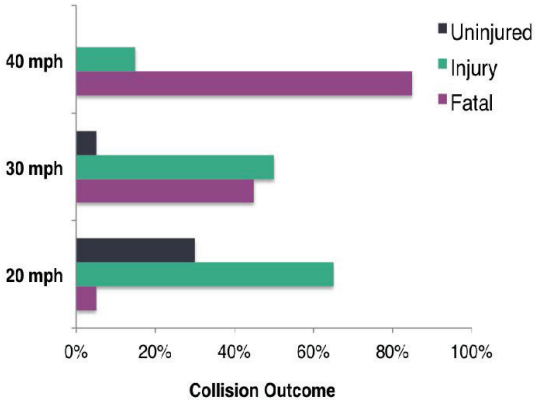


Figure 2-10: Effect of impact speed on pedestrian fatality and injury. Data Source: U.S. Department of Transportation.

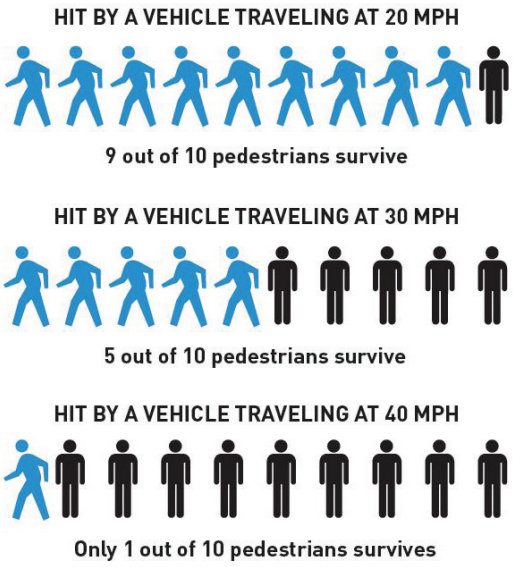


Figure 2-11: Effect o impact speed on pedestrian fatality and injury. Source: Seattle Department of Transportation, Move Seattle Report.

surroundings and context." (Hamilton-Baillie, 2008c, p. 133). A continuous street surface without a curb for vertical separation, or contrasting materials between the road space (asphalt) and sidewalk (concrete) creates uncertainty in priority for drivers and visually sends a message that the space must be shared (Karndacharuk, Wilson, & Dunn, 2014).

While it is a common assumption that risks should be minimized to increase safety, shared space theory asserts that some risk can actually create environments that are more safe. Professor John Adams describes how human nature drives us to compensate for risk by adjusting our behavior to become more cautious in situations of perceived risk, and less careful in situations where we feel safe (Adams, 1995). Therefore, if traditional traffic controls give drivers the perception of safety, it reduces their inclination to be cautious and puts the onus on pedestrians to look out for their own safety. Additionally, the roadway becomes the driver's territory and pedestrians are only permitted to cross at designated crosswalks, leading drivers to be less aware of what is going on beyond the curb and drive less cautiously because of the "safe space" in the roadway. However, one miscalculation or distraction on part of the driver can lead to serious injury for pedestrians. Therefore, it is thought that the inherent risk in shared space promotes more engagement of drivers in being aware of their surroundings and interacting with other road users, which results in fewer accidents.

With talk of accepting risk and de-segregating the street into a more inclusionary space, the needs of vulnerable road users such as the blind, the visually and mobility impaired, the elderly and young children must be considered. In order to accommodate users who cannot accept risk, shared streets must be deliberately designated into two distinct zones: Shared Zones where all users are welcome, and Accessible Routes which are pedestrian only, creating a safe haven for those who are reluctant to share space with vehicles or bicycles (Karndacharuk, Wilson, & Dunn, 2014). Additionally, because of the disparity in size and speed of automobiles in comparison to other road users, shared spaces must clearly put a priority on pedestrians and other non-motorized users, both from a design standpoint and a legal one. It is worth noting that shared space may cause strain for issues of accountability and enforcement because by removing traffic control devices used to define priority, it puts the legal accountability on the individual, rather than the state, to regulate and negotiate priority (Karndacharuk, Wilson, & Dunn, 2014).

In order for all road users to have equal priority in negotiating space, low traffic speeds are essential for maintaining a balanced relationship between people and vehicles. In fact, low traffic speeds are one of the most important design factors in determining the success and safety of a shared space and are required in order to create the type of public space that allows and encourages a multitude of uses. Interestingly, studies have shown that 20 mph is an important speed threshold beyond which the relationship between traffic and pedestrians deteriorates (Hamilton-Baillie, 2008c). Research has shown that this is close to the maximum human evolutionary speed of which our skull thickness is sized for impact at this

Figure 2-13: The shared street New Road in Brighton England. Source: Gehl.

maximum speed threshold (Hamilton-Baillie, 2008). In fact, studies show that increased vehicle speeds drastically increase the likelihood of a pedestrian fatality, from 5 percent fatalities at 20 mph, to 45 percent at 30 mph, and 85 percent at 40 mph (Hamilton-Baillie, 2004). Additionally, "research into driver behavior suggests that eye contact between drivers, and between drivers and pedestrians, decreases rapidly beyond the 20 mph threshold" (Hamilton-Baillie, 2004). Since eye contact is vital to the engagement of drivers and pedestrians in negotiating shared space, lower traffic speeds are essential to its functioning. Rather than using conventional regulations and traffic calming measures to enforce lower speeds, removing these controls to create a shared space appears to allow our innate social behavior to take over. With the removal of formal controls, drivers must rely on their inherent human ability to evaluate a situation and adapt their behavior to the circumstances at hand. In turn, we as citizens resort to standards of behavior and social norms that encourage politeness and sharing of community resources.

Shared streets provide an alternative to conventional, auto-centric street design that has evolved from the Dutch woonerf and pedestrian mall into a new, hybrid approach. Shared streets enhance the pedestrian experience and democratize the public realm of our cities, while still providing access for vehicles. And since they may actually be safer than conventional streets, I hope to see many more cities experiment with this unique street design approach.

# CHAPTER 3 // SHARED STREET PERFORMANCE

## PLACEMAKING

Because designing and managing a street as a place is not straightforward, the movement and mobility aspect of streets has dominated other functions such as social and recreational space (Karndacharuk, Wilson, & Dunn, 2014). When the place function has been considered in street design, it has been with the objective of contributing to the overall function of the abutting land use and surrounding areas rather than to create a destination for social interaction and street activities (Karndacharuk, Wilson, & Dunn, 2014). However, researchers in New Zealand have studied the transformation of several conventional streets into shared spaces and documented their performance and public perceptions.

## PERFORMANCE AS PLACE

The effectiveness of a shared space can be evaluated on the basis of how well it performs as both a public space and a place that promotes pedestrian mobility and access. A 2013 study by Karndacharuk, Wilson & Dunn looked at how well shared spaces in Auckland, New Zealand functioned on pedestrian-related performance measures. They evaluated streets that had transitioned from conventional street design to shared space and evaluated the conditions before and after the transformation on measures related to place functions including pedestrian occupancy ratio (a percentage of space), user dwell time (in minutes), stationary activity pedestrian density ($p/m^2$), and pedestrian trajectory. Their results revealed an "reveals an improved environment where pedestrians are more comfortable walking along and across the whole space, especially in the area allocated for the vehicular travel lane" (Karndacharuk, Wilson, & Dunn, 2013, p. 7)

The study revealed that the shared spaces had an increase in pedestrian activity and dwell time, and thus, outperformed conventional streets in their function as a place. Their results also showed that as pedestrian density increased in shared spaces, average vehicle speeds decreased, suggesting that the uncertainty of shared space design and mixing of road users had contributed to traffic calming. Additionally, there was a correlation between active building frontage and high pedestrian volumes, which implies that building use can have an indirect effect on vehicle speeds, and the success of the space as well. Lastly, although data was limited for the newly redesigned shared spaces, as of their study there had not been any increase in injury-related reported crashes, indicating that shared space was at least as safe as conventional road design, and likely even safer. (Karndacharuk, Wilson, & Dunn, 2013)


Figure 3-1: A long bench runs along the length of New Road in Brighton, England. Source: Gehl.

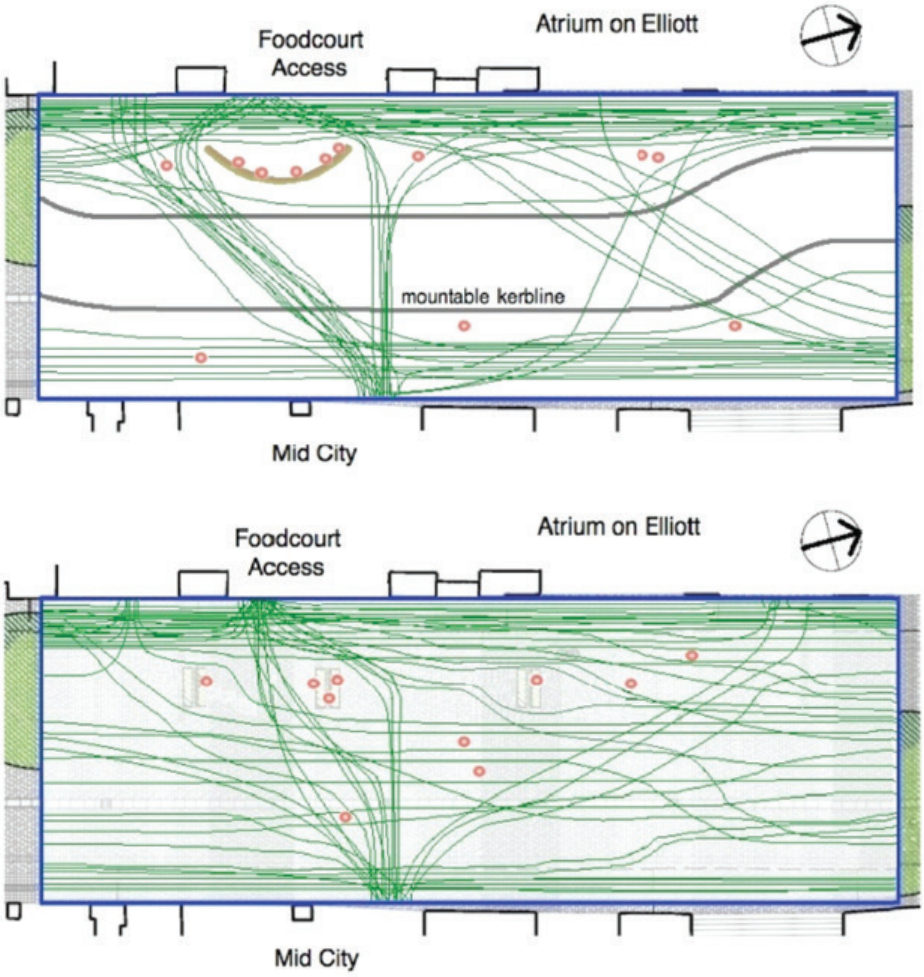


Figure 3-2: Pedestrian movement on Elliott Street in Auckland, New Zealand before and after becoming a shared street. Source: Karndacharuk, A., Wilson, D., & Dunn, R. (2013).

## PERCEPTIONS OF SHARED STREETS

Additionally, the same group of researchers also conducted a study of the perceptions of shared spaces by surveying street users (Karndacharuk, Wilson, & Dunn, 2016). They sought to evaluate the perceived performance of shared space in on measures of placemaking, pedestrian focus, vehicle behavior change, economic impact, and safety for all road users. Their results showed that perceptions of performance measures were interrelated and that success or failure in one measure would impact the performance of others, with the measures related to 'Pedestrian Focus' and 'Safety for All Users' having the greatest influence on overall performance. Additionally, they found that the shared space sites outperformed the control site with conventional street design on measures related to Place, Pedestrian, and Economic. Safety was consistently perceived as the most important criteria for street design, even more important than placemaking and economic goals. However, the survey revealed that there was not a statistically significant difference in the perception of safety between the shared space and the conventional control street. Fortunately, as more shared spaces are implemented and studied, there will be more data to help inform the public during the engagement and decision-making process about the safety of this design typology (Karndacharuk, Wilson, & Dunn, 2016).

## ENVIRONMENTAL PREFERENCE THEORY

Environmental Preference Theory is concerned with creating environments that accommodate the way humans naturally process information. It posits that by maximizing our natural informational processing abilities, "human abilities are more likely to be effective and needs are more likely to be met" (Kaplan & Kaplan, 1978, p. 147). Therefore, a preferred environment is important to our ability to thrive and be successful citizens in society. Some of our most basic cognitive needs are the capacity to understand an environment and the ability to explore it. While elements like coherence and legibility are important in our ability to understand a space, we also crave complexity and mystery to satisfy our need to explore and gain knowledge. Thus, environmental preference theory suggests that an ideal environment successfully balances all four of these basic criteria. By applying these concepts to both conventional streets and shared streets, we can evaluate how these two design typologies impact the information-processing capabilities of pedestrians, bicyclists, and drivers.

### COHERENCE

In order to evaluate how preferable these shared spaces are, I will first analyze how they impact the ability for people to understand them. "For an environment to 'make sense' requires coherence: the parts need to hang together and in some sense 'belong' there" (Kaplan, 148). Coherence helps us to organize and structure our environment in a way that makes sense. Preferred environments have redundancy, a limited number of zones, elements that hang together, and an immediate

Figure 3-3: The Mariahilferstrasse could be considered a preferred environment for pedestrians. Source: Wikipedia.

wayfinding assessment. Traditional street design has many elements of preferred environments: redundant universal traffic control devices such as curbs, signage, crosswalks and signals that are easily recognizable and assist in wayfinding; as well as limited number of clearly demarcated zones (sidewalk and road space separated by a curb, striped bike lanes) that allow users to understand where they should be. Most notably, the curb separation between pedestrians and vehicles allows for the prediction that both road users will stay in their assigned zone and not enter into the other's space. This allows for drivers to relax by assuming that pedestrians will not randomly dart out in front of them, and it allows pedestrians to stroll at ease assuming that a car won't jump the curb and run them over. However, proponents of shared space argue that this creation of separate territories makes drivers less vigilant and less likely to yield to pedestrians and bicyclists, which leads to their dominance of the street environment and creates safety hazards for other road users.

In contrast, shared spaces deliberately minimize demarcations by removing curbs in order to intentionally mix cars, bicycles, and pedestrians in hopes of decreasing

Figure 3-4: Lightpoles and trench drains provide structure and coherence on Exhibition Road. Source: London Living.


Figure 3-5: A flush curb, seating, and street trees all provide structure to define road space on the Mariahilferstrasse Source: Vienna City Government.

the dominance of the vehicle and creating a better environment for pedestrians and bicycles. Here, designers are intentionally reducing the clarity and coherence of the space in order to require road users to utilize more directed attention and become more acutely aware of their surroundings. This theory holds that shared spaces—by creating uncertainty and forcing road users to negotiate space using eye contact—will be safer spaces for pedestrians and bicyclists than traditional streets. However, in my observation of these spaces, when there was not a critical mass of pedestrians present, road users tended to inhabit their traditional zones (pedestrians on the sides of the street and vehicles in the center), with pedestrians yielding to vehicles in order to cross.

While some may argue that not having a curb reduces the coherence of shared spaces, these streets retain a sense of organization and structure. Exhibition Road uses the placement of lightpoles and linear trench drains in the pavement to suggest where vehicles might be allowed, signifying that some delineation is desired to help drivers to understand where they should and should not be. Additionally, there are textured tactical warning pavers along either end of the vehicular road space, which communicate to the visually impaired that they are moving from a pedestrian safe zone into one that could be shared with vehicles and/or bicycles. The Mariahilferstrasse in Vienna uses a flush curb that subtly defines the vehicular road space in the center, as well as tactical strips closer to the building edge that suggest a pedestrian safe zone. More apparent though are street trees, cafes, and seating that act as a buffer zone between the primarily pedestrian "sidewalk" space adjacent to storefronts and the shared space of the roadway that can include cars and bicycles as well as pedestrians. While these two shared streets work to encourage the mixing of road users, they still maintain some structure and characteristics of traditional street design that add coherence to the space and aid in understanding.

## LEGIBILITY

The other environmental preference element that contributes to understanding is the concept of legibility. Whereas coherence allows someone to understand their immediate surroundings, legibility allows them to feel that they will continue to understand the space as they explore it further and not get lost. Legibility is usually associated with wayfinding and the sense that what one is experiencing now will be typical of what is to come. Distinctive paving used on both streets—although most boldly on Exhibition Road—let users know that they are entering a unique space and signal a change in street typology. The consistency of this distinctive pavement acts as a landmark letting users know that the shared space continues to the extents of the pavement. The Mariahilferstrasse actually changes from a traditional street to a shared space, and then to a pedestrian-only space. Here, the different zones are demarcated with signage and a slight change in pavement, moving from concrete pavers in the shared space to higher-quality granite pavers in the pedestrian only zone. However, the contrast between shared space and pedestrian only space is not visually distinctive, and results in vehicles mistakenly entering the pedestrian-only zone. This occurs despite the visual contrast between traditional streets and the shared/pedestrian-only street having very high contrast and legibility.

## COMPLEXITY

Environmental Preference Theory posits that there is an innate human desire to explore in order to gather new information that expands our understanding of the world. In order to facilitate exploration, we require complexity in our environment that provides enough variety and stimulation to keep us occupied and make it worth exploring. Complexity relates to both the quantity and diversity of elements in a given area, and it is highly correlated with the concept of coherence, in that greater complexity can be accommodated with increased coherence. If both traditional and shared space streets have the same diversity of street users (i.e. pedestrians, bicyclists and cars), then one may assume they have the same perceived level of complexity. However, the inherent order of a traditional curb-delineated street adds more coherence to the street, so that it appears less complex and visually stimulating than the rich intermixture of users in a shared space. One can then assume that the complexity of a shared space, balanced by a level of coherence in its design features, would make it more desirable to explore than a traditional street, and therefore a more preferred environment.

Additionally, a street's perceived complexity seems to be highly related to the types and uses of the buildings that face the street. A greater variety of façade types is visually more complex and interesting, and is preferable as long as they remain coherent and hang together in scale or character. Also, a variety of building uses (retail, restaurant, residential, museum, workplace, etc.) draws a greater variety of people and fosters a greater variety of activities than a single building use does. For example, the southern section of Exhibition Road is retail in nature has numerous small restaurants that break up the expanse of the street wall with their varying facades and provide café space that spills out onto the street. The building façades are highly transparent, allowing people walking by to peer in at the activity inside. The mixture of people who moving through the space and people who are staying and lingering in it creates a complex environment with enough activity and richness to make it interesting to explore.

In contrast, the northern end of Exhibition Road is more institutional with several museums that have large building facades that do not change as frequently and are not permeable, which prevents one from seeing what is happening inside. Additionally, there are no cafes that line the street, and while there are a few street performers who contrast and punctuate the otherwise continuous flow of tourists, the result is still a less complex and less interesting street experience than the retail end of the street. The human preference for coherent complexity is revealed by the larger number of people who choose to linger in the retail end than in the institutional end of the street. Thus, the perceived complexity of a street is heavily impacted by the design and uses of the surrounding buildings, which have a large impact on the behavior of the people in the street.

## MYSTERY

Mystery is the other aspect of environmental preference that enhances our desire for exploration. It draws one into a space by giving a partial-glimpse or hint of information to come and is a very powerful predictor of preference. Both Mariahilferstrasse and Exhibition


Figure 3-6: Short, active building facades at the southern end of Exhibition Road create complexity with variety and visual interest. Source: Google Streetview.

Figure 3-7: In contrast, the northern end of Exhibition Road has longer facades with less variety and visual interest at the pedestrian scale, giving it less complexity. Source: Google Streetview.


Figure 3-8: The winding curves of the Mariahilferstrasse create a sense of mystery through disappearing views. Source: Top: Wikipedia; Bottom: Everyday life in Vienna.

Road possess elements of mystery, such as the curving nature of the Mariahilferstrasse creating disappearing views, and the partially blocked view of the Exhibition Road as viewed from the South Kensington Underground Station, where one can catch a glimpse of the bold diamond paving pattern. However, neither of these examples of mystery are universally inherent to the nature of shared space as they are more related to individual site characteristics and design, so we must examine this element of mystery in shared spaces more abstractly.

I argue that the uniqueness of shared space when compared to traditional streets creates a sense of mystery as the pedestrian and bicyclist is invited to inhabit and explore the entirety of the street space. Because there is no segregation of uses or defined crosswalks, a pedestrian is able to cross the streetscape diagonally following their sight lines rather than walking to a prescribed crossing. This enables one to see a hint of information, such as a storefront display, and quickly access additional information by crossing the street directly rather than having to find a crosswalk (which may be out of the way) and wait for a traffic signal. This allows for a more natural and uninterrupted exploration of space, giving the pedestrian control over where she would like to go and respecting her ability to problem-solve and navigate between other users to get there. Additionally, the essence of shared space is a mystery in that it only gives you partial information about whom you are sharing the space with, as a bicycle or car could join you at any time, lending the street a dynamic and ephemeral quality.

## ENVIRONMENTAL PREFERENCE SUMMARY

This discussion shows that while shared space may demand more directed attention from its users, particularly drivers, it is balanced in several ways and can still be considered a preferred environment. From the perspective of pedestrians, shared spaces create street environments that are richer in their complexity and mystery, inviting them to explore the entirety of the street in a more natural way. When balanced with subtle design elements that add coherence and legibility, shared space is a more preferred environment for pedestrians than traditional streets. Bicyclists likely prefer these spaces as well because shared space provides them with more room to maneuver and more flexible routes.

Arguably those who would be least likely to prefer shared spaces are drivers, who must use more directed attention to navigate the space and keep a more vigilant look out for the movements of pedestrians and bicyclists than they would on a traditional street design. Because of the need to process information, vehicles are forced to slow down and be more deferential and respectful of other road users. However, their increased efforts are rewarded with a more vibrant experience of the urban environment, one that invites them to witness the complexity and mystery of the city. Shared space is the very definition of the city: a place where the full richness and diversity of humanity is mixed and pushed together in a great cacophony that must somehow work together.

# CHAPTER 4 // SHARED STREET CASE STUDY OF EXHIBITION ROAD

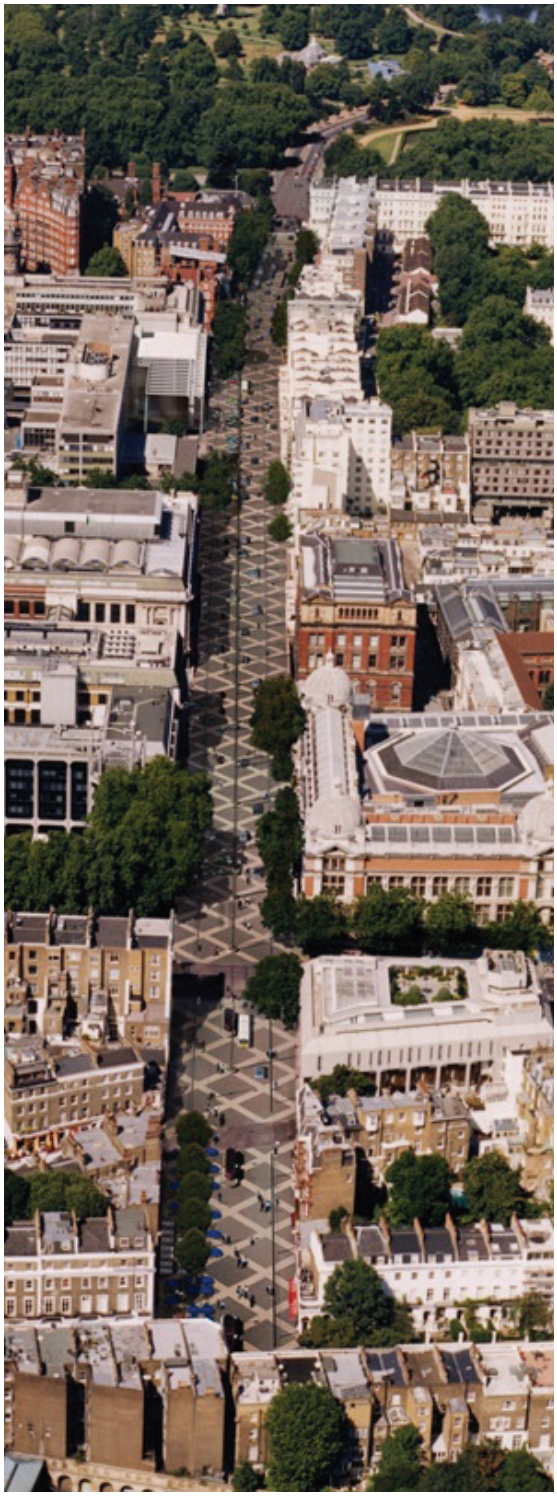

Figure 4-1: Aerial photo of Exhibition Road, looking north toward Kensington Gardens. Source: Dixon Jones.

## PROJECT OVERVIEW

Exhibition Road is a main street in the central London borough of South Kensington, and is lined with many important cultural and educational institutions. Though only a half-mile in length, it attracts approximately eleven million visitors each year (CCCB, 2016). The street was redesigned in 2011 in an effort to improve facilities and crossings for pedestrians, provide a more flexible space to accommodate various events, as well as to create an attractive streetscape that would reflect the prestige of institutions along it. A design competition was held and the architectural firm of Dixon Jones won the project with their design scheme for a shared street. Construction of the shared street design was completed in 2011 at a cost of $41.3 million (£29 m). Exhibition Road still accommodates vehicular traffic and some segments can carry up to 1,000 vehicles per hour (CD+A 2013).

## STUDY AREAS

For the purposes of this study, we have divided the street into three distinct zones to study:

### ZONE 1:

Zone 1 of Exhibition Road is the area between Thurloe Street and Thurloe Place. It is the southernmost portion of Exhibition Road and is in close proximity to the London Underground South Kensington Station on Thurloe Street. It is

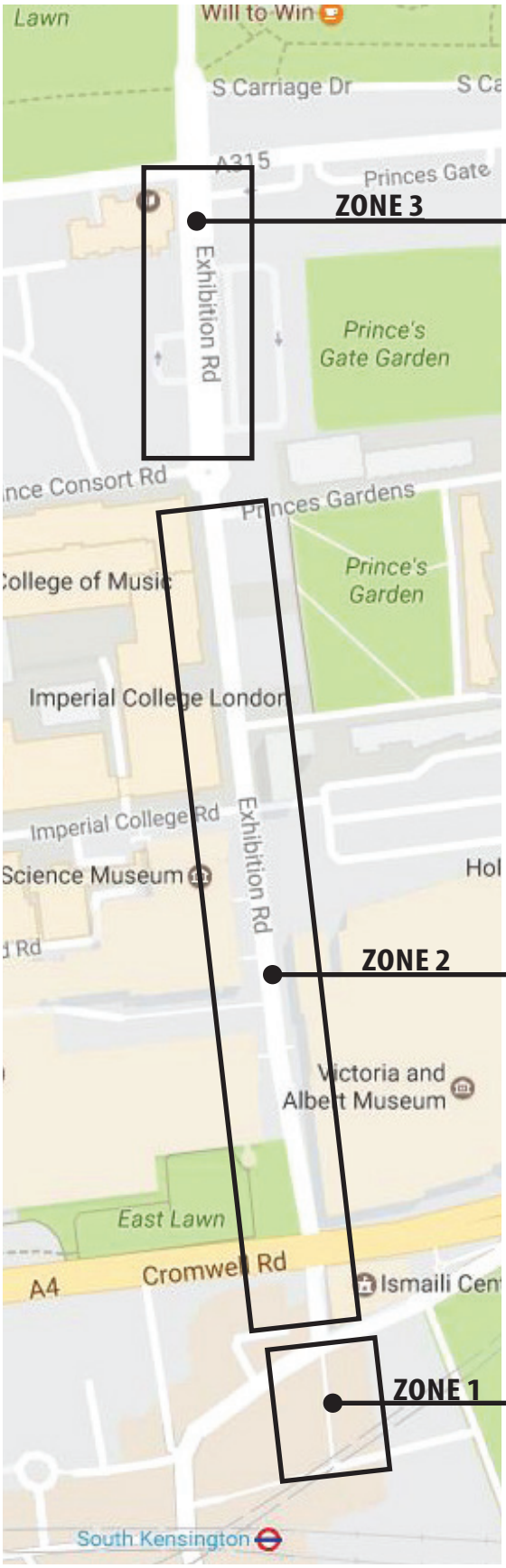


Figure 4-2: Map of Exhibition Road study zones.

Figure 4-3: Exhibition Road Zone 3 looking north.

Figure 4-4: Exhibition Road Zone 2 looking north.

Figure 4-5: Exhibition Road Zone 1 looking north.

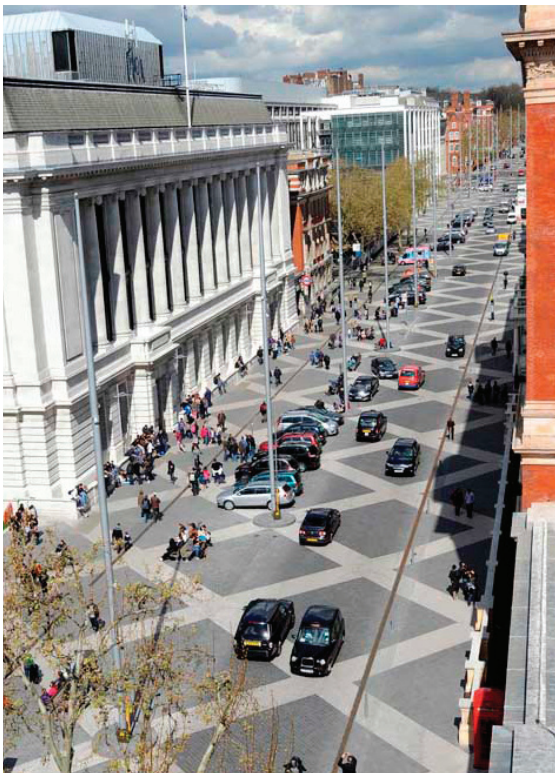

Figure 4-6: A view of Zone 2, with the Science Museum on the left. Source: E-Architect, Olivia Woodhouse.

Figure 4-7: Texture, tactile warning pavement strip.

characterized by active retail storefronts, outdoor dining, and two raised curbed areas that house ventilation from the Underground.

**ZONE 2:**

Zone 2 of Exhibition Road is the area between Thurloe Place and Prince Consort Road. This area is north of Zone 1 and has many institutional uses such as the Embassy Of Venezuela, the V&A Museum, Natural History Museum, and the South Kensington Campus of the Imperial College of London. It also includes an underground pedestrian connection to the London Underground.

**ZONE 3:**

Zone 3 of Exhibition Road is the northernmost section of the street between Prince Consort Road and Kensington Road at the border of Kensington Gardens. It is characterized by mostly residential land uses as well as a few institutional uses such as the Royal Geographical Society, and Embassies. This section of the street acts as a major gateway for traffic entering South Kensington from the Park. It includes a transition from the conventional West Carriage Drive street to the shared street of Exhibition Road.

## DESIGN

The most iconic design element of Exhibition Road is it's criss-crossing diamond pavement pattern, meant to represent the freedom of movement across the street space. It also has monumental light masts that march down the center of the street and help to define space and give the street structure. The street pavement is a continuous surface from building face to building face,

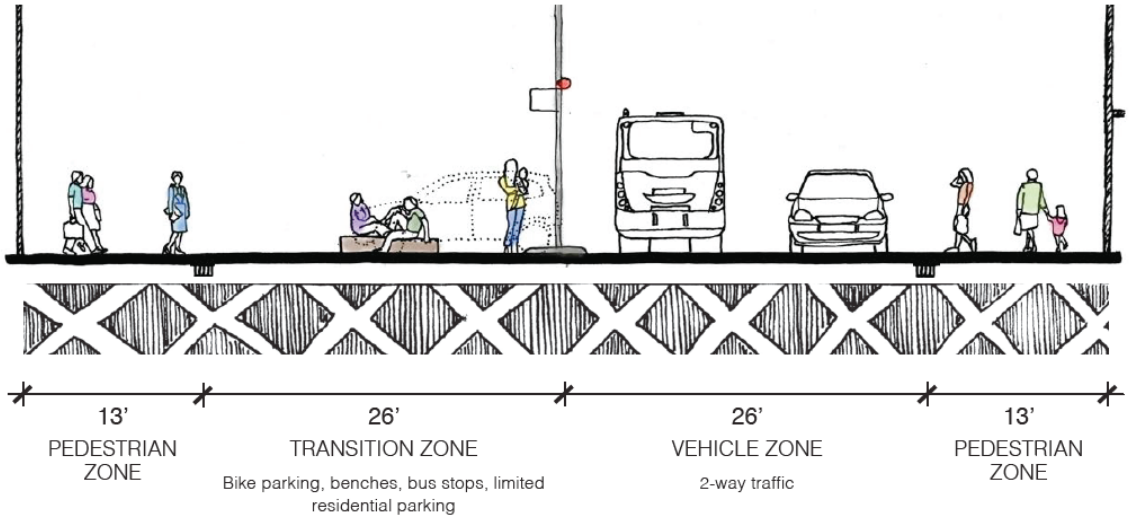


Figure 4-8: Typical Zone 2 roadway section. Source: Sarah Saviskas, Taking Back Our Streets.

with an approximate street dimension of 78'. Along the building facades there is a pedestrian-only safe zone of approximately 13' that is separated from the travel way that allows vehicles and bicycles. This is intended to be a haven for those who are visually impaired, have mobility limitations, the elderly and those with children who may not want to mingle with traffic. While there isn't a conventional curb separating this safe zone from the roadway, it does contain a linear trench drain with a textured tactile warning strip in the pavement to provide both a visual and tactile signal that one is moving from a safe zone into a space with increased risk.

The vehicle travelway is approximately 26' wide and accommodates two-way traffic in Zones 2 & 3, and only one-way traffic in Zone 1. Zones 1 & 2 also have an approximately 26' wide Transition Zone which accommodates 90-degree on-street parking, site furnishings and café space. Zone 3 is unique in that the allocation of space changes to have parallel parking on either side and vehicular travel lanes on either side of center light poles.

## METHODOLOGY

I visited Exhibition Road during a two-day period from Sunday, August 28th, 2016 to Monday, August, 29th, 2016 which was a bank holiday in London. My methodology included taking notes and photographs of human behavior. Additionally, I used a handheld counter to tally the number of people participating in various activities during 10-minute intervals. Behaviors counted included the total number of people walking, the number of people walking within the area of the street that vehicles were permitted to travel in, the number of bicyclists, the number of vehicles, and the number of people that moved across the street in a diagonal way.

The intent was to provide brief snapshots of a random sample of activity in order to compare the different design zones of the street. However, as a single individual my ability to count large quantities of people was strained.

## ZONE 1 OBSERVATIONS

**Success as a public space.**

Site observations found that Zone 1 was a huge success as a public place. There were lots of staying or lingering activities with people dining in the outdoor café's, enjoying temporary respite in the informal seating areas and even standing for brief periods to take in the setting. People appeared relaxed and enjoying mingling and strolling about the entirety of the street space. Additionally, children playing were observed at several points, and street performers further activated the space.

**Pedestrians occupying space.**

This zone was noteworthy in that pedestrians freely occupied the entirety of the street, including the area where vehicles traveled. Whether pedestrians walked down the center of the vehicle travel way or freely traversed the space following diagonal desire lines, this space was not treated like a conventional street with pedestrians relegated to the edges. Additionally, this behavior was unique to Zone 1 and was not observed in other zones of the street. It is hypothesized that several factors led to this unique condition including surrounding land uses, design elements, traffic patterns & flows, as well as a sense of pedestrian territory.

**Pedestrian Domain.**

First, this zone successfully developed a sense of pedestrian community or territory that created a unique set of behavioral standards for it's occupants. In essence, it fostered a general understanding that the space was primarily the territory of pedestrians but that other users would


Figure 4-9: Zone 1 functions as a great public space, with people gathering and children playing.

Figure 4-11: People freely inhabit the travelway in Zone 1.


Figure 4-10: People and vehicles negotiate space in Zone 1.


Figure 4-12: Cafe seating along the travelway helps to further calm traffic in Zone 1.

Figure 4-13: Bicycles and vehicles share space.

Figure 4-16: People appear relaxed and secure sharing space with vehicles.

Figure 4-17: No curb, no problem: vehicles move at pedestrian speed in Zone 1.

Figure 4-14: A low curb around ventilation for the London Underground provides informal seating in Zone 1.

Figure 4-15: The sense of Pedestrian Domain in Zone 1 means that vehicles proceed with extreme caution. Therefore, these people with children appear unconcerned about sharing the street.

be accepted as long as they adjusted their behavior to follow the established standards of a pedestrians-first space which included reduced speeds and yielding to pedestrians. This sense of pedestrian territory, which I will refer to as Pedestrian Domain, was created through an informal sense of community that developed around shared values, norms, and expectations for behavior that this was first and foremost a social gathering space for people. This helped to form a conceptual boundary around Zone 1 where vehicles who were traveling at greater speeds in other zones, were observed to change their behavior when entering Zone 1: slowing their speed and proceeding with additional caution and deference to pedestrians.

Other behaviors that were observed include the fact that pedestrians generally seemed relaxed and unconcerned about potential vehicle collisions. Examples include pedestrians not looking both ways when entering or nearing the vehicular travel way, casually strolling while distracted by a cell phone, and allowing children to play in the street. These behaviors all belied a shared confidence that pedestrians were not in danger and that drivers would be alert and cautious. Indeed, vehicles appeared to drive very slowly and yield to pedestrians. However, this was not the case in Zones 2 or 3.

**The role of building use.**

So how did this sense of pedestrian territory form and why did it form here and not in other zones of the street? First, this zone had retail land uses (mostly restaurants and cafes) that activated the street with outdoor dining. This provided both additional human presence and surveillance in the area, as well as generated additional pedestrian footfalls in the area. Human presence is important because drivers subconsciously change their behavior when in places with more people about, in which they become more alert. Additionally, the retail activity was located on both sides of the street which promoted crossing of the space as well as general strolling about to people-watch and enjoy the vitality.

Figure 4-18: Active retail storefronts with cafes that spill out into the street provide a complimentary building use for a shared street scheme and help to create a sense of place.

**Design details.**
In addition to the land uses, the design of the space helped to contribute to the feeling of Pedestrian Domain. Unlike other areas of the street, this space had trees and seating that were located approximately a third of the way into the street. By bringing seated people in closer proximity to vehicles, it helped to visually narrow the space which made drivers become more aware of the surrounding activity and the combination of seating and trees helped to visually narrow the space. The visual width, or perceived width, of a street is important, as narrower roadways are associated with slower vehicle speeds and more cautious driving (USDOT, 2014).

## ZONE 2 OBSERVATIONS

**Building Use:**
Zone 2 is markedly different from Zone 1. First, the building uses differ in that there is no retail or cafés that spill out onto the street, and instead it is lined with institutional uses: The Natural History Museum, the Victoria and Albert Museum, and the Imperial College of London. In addition to the building uses, their height, density and facades greatly differ from Zone 1, which is marked by one to four story buildings but with very short facades approximately 10-15' wide. These short facades allow for subtle change and variety in the street wall, as well as provide lots of openings such as windows or doors that give the building wall a sense of permeability that helps to visually engage people walking by. In contrast, Zone 2 consists of large building footprints with long consistent facades that don't have the same level of variety and change that characterize Zone 1. Additionally, while some of the buildings have windows, they are not at the first floor, and instead pedestrians either walk at a half level or windows are covered so that one cannot see inside, such as with the Victoria & Albert Museum. These buildings do not engage with people in the same way that the small retail facades of zone 1 do, and they also result in less vibrancy and less diversity of pedestrian behavior.

**Not quite a public space**
While these uses generate pedestrian footfalls it is mostly in walking or queuing activities and much less of the staying or lingering activities (gathering, sitting, standing, or dining) associated with public spaces. However, the presence of high volumes of pedestrians that the museums generate draws street performers or "buskers" which help to add vibrancy to the street and counteract the lack of retail in this zone. Yet, even with the ephemeral activity of the street performances, this section of Exhibition Road does not have the same sense of functioning as a quality public space that Zone 1 has. Whereas Zone 1 would appear to be a destination even if one was not patronizing the retail establishments, Zone 2 does not appear to draw people to enjoy it's space unless they are already in the area to visit one of the institutions.

**Lack of Sharing**
The most notable difference between Zones 1 & 2 is that in Zone 2 there are no pedestrians occupying the vehicle travel way except when crossing, so essentially there is no sharing of the street. Where in Zone 1 pedestrians feel comfortable and safe milling about the entirety of the street with vehicles yielding to pedestrians,


Figure 4-21: In Zone 2, people avoid walking in the travelway and instead stay in the safe zones along building edges.


Figure 4-20: The institutional building uses and lack of seating do not create a sense of the street acting as a public space in Zone 2.

Figure 4-19: Buskers help to activate the street, but their performances do not make up for the lack of retail in Zone 2.

Figure 4-22: High traffic volumes and speeds in Zone 2 create vehicle dominance of the travelway resulting in a lack of sharing so that pedestrians are forced to the edges of the street.

Figure 4-23: While pedestrians are unwilling to compete with vehicles in Zone 2, bicyclists do share the travelway and the flat, continuous surface of the shared street design gives them additional room for maneuvering.

Zone 2 functions more like a conventional street, with pedestrians traveling in the safe space edges of the road, with vehicles claiming the territory of the travel way.

It appears that the higher quantity and speed of vehicles in this zone changes the balance of power from a Pedestrian Domain to an Automobile Domain. This is revealed in behavior such as: increased vehicle speeds, lack of vehicles yielding to pedestrians, a lack of presence of pedestrians in the travelway, pedestrians self-organizing onto the "sidewalk" safe zone sides of the street, and pedestrians looking both ways before entering the travelway and only using it to cross to the other safe zone.

**Non-motorized benefits**

While the street design here may not have been successful in promoting a true "shared space", it does appear to have some benefits for pedestrians and bicyclists. First, it promotes barrier-free crossing of the street at any location, furthering access for those with mobility limitations, as well as allowing for a greater freedom of movement for pedestrians. Additionally, many bicyclists were observed in this space and the lack of a curb gave them additional space to inhabit on the road way. This additional space gave them more room where they could yield to other cyclists, vehicles, and pedestrians. While this does not give cyclists the specific designated space and sense of territory of a bike lane, it does allow for more freedom of movement across the entirety of the streetscape, possibly preventing scenarios where bicyclists are caught between a vehicle and the curb with no room to yield in an emergency.

Figure 4-24: A family scrambles across the street to avoid being struck by vehicles (Zone 2).

Figure 4-25: A man and woman look both ways before crossing the travelway in Zone 2.

Figure 4-26: Bicyclists share the travelway with vehicles in Zone 2.

Figure 4-29: Zone 3 has the highest vehicular volumes observed.

Figure 4-27: On-street parking in Zone 3 discourages crossing and works to segregate pedestrians and vehicles.

Figure 4-28: Bicyclists share the street with vehicles in Zone 3.

# ZONE 3 OBSERVATIONS

**Building Use**

Zone 3 is notably different from Zones 1 & 2 in it's building use and this is reflected in its low pedestrian volumes. It is characterized by mostly residential land uses as well as a few institutional uses such as the Royal Geographical Society, and Embassies, but unlike the museums in zone 2 or retail in zone 1, these do not generate high levels of pedestrian traffic. Thus, this section of the street feels sleepy and lacks vibrancy and a sense of place.

**Traffic**

Also, because this section of the street acts as a major gateway along South Kensington Road, it has some of the heaviest vehicular traffic. This makes it so that vehicles take over the territory of the travelway, deterring people from using the entirety of the street space. Additionally, one can hear and see heavy traffic, which detracts from the quality of walking in this zone.

**Street Structure**

While the street lacks a curb, Zone 3 has a more conventional street structure with the travelway centered in the space and buffered from pedestrians by rows of on-street parking and street trees, creating the sense that this space should function more like a conventional street and lessening the sense that it might be shared. While bicyclists share the travelway with vehicles, the trees and on-street parking work to segregate pedestrians to the safe zones at the edges and discourage them from entering the travelway. Lastly, there are no formal or informal seating areas here so there is not an opportunity to create lingering or staying activities that would start to

| ZONE | DATE | TIME | WEATHER | TOTAL WALKING | WALK IN STREET | BICYCLING | CARS | DIAGONAL CROSSING OF STREET |
|---|---|---|---|---|---|---|---|---|
| 1 | 8/28/2016 | 10:00am | Cloudy, 72 | 184 | 37 | 2 | 2 | 31 |
| 1 | 8/29/2016 | 11:15am | Partly sunny, 69 | 259 | 62 | 4 | 3 | 11 |
| 1 | 8/29/2016 | 1:50PM | Sunny, 72 | 534 | 232 | 3 | 7 | N/A |
| 2 | 8/28/2016 | 10:36am | Cloudy, slight drizzle, 71 | 362 | 0 | 5 | 61 | 13 |
| 2 | 8/29/2016 | 12:40pm | Cool, cloudy | 420 | 0 | 24 | 73 | 42 |
| 2 | 8/29/2016 | 3:00pm | Cloudy, 75 | 490 | 0 | 9 | 95 | 55 |
| 3 | 8/29/2016 | 1:50PM | Sunny, 72 | 232 | 0 | 18 | 97 | 3 |

Figure 4-30: Random samples collected of pedestrian, vehicle, and bicycle behavior in the three study zones of Exhibition Road.

create a sense of place. The result is that this section of the street looks, feels, and functions like a conventional street and does not feel at all like a public space.

## QUANTITATIVE SAMPLING:

A few random samples quantifying various activities were taken during my visit, and while I was limited in time and capacity, they provide snapshots of activity on various zones of the street. These findings show the following:

- On average, about 30% of pedestrians in Zone 1 walked in the travelway. No pedestrians were spotted walking consistently in the travelway for Zones 2 or 3, although they were observed crossing the road.

- I also measured how many people walked diagonally across the road, as I saw this represented a clear departure in pedestrian movement patterns from conventional streets where pedestrians typically only cross at designated intersections and move in 90-degree turns. The measure of diagonal crossings conveyed the freedom of being able to follow desire lines and occupy more space in the street. This was generally high in both Zones 1 & 2, but was low in Zone 3 where the road has a more conventional layout and there are fewer destinations on either side to promote crossing.

- Zones 2 & 3 had a higher average number of bicyclists than Zone 1, but this is likely due to the fact that those zones have greater connectivity to other streets, whereas Zone 1 simply loops back to where one started. These patterns with Zone 1 having markedly lower bicycle volumes were also verified in other reports (Systra, 2014).

- Zones 2 & 3 had significantly higher vehicle volumes than what was observed in Zone 1. This has also been observed in other studies done on the road, and suggests that this is a pattern. Again, this is likely a function of larger traffic patterns as the traffic in Zone 1 only accommodates a one-way travel and loops from Thurloe Street, to Thurloe Square, and back to Thurloe Place. Thus, it really only leads to the residences on these two short streets

and therefore creates much lower traffic demands.

While these small random samplings of quantitative analysis provide some insight, the fluctuations in how space is used over time should be taken into consideration, and studies that encompass a longer period of time should be undertaken.

## PREVIOUS STUDIES:

A transportation planning consulting firm, MVA Consultancy, was hired by the Royal Borough of Kensington and Chelsea to study human behavior on Exhibition Road to understand how different road users (defined as motor vehicles, bicycles, and pedestrians) interacted with one another. Additionally, they were hired to study whether people tripped over the raised curb at the bus stops.

Their methodology consisted of collecting observational data of pedestrian and driver movement, and assessing it both qualitatively and quantitatively through a statistical analysis. In order to study Exhibition Road, they broke the street into eight different sections to study and compare how the different areas functioned. Their data collection methods consisted of video recordings, speed radar, and manual observations. These studies were conducted annually for a period of four years following implementation: 2011, 2012, 2013, and 2014. Changes were made based on data and observations from these studies, such as installing bollards at select locations to prevent vehicles from entering pedestrian areas, as well as installing traffic islands and a tactile map.

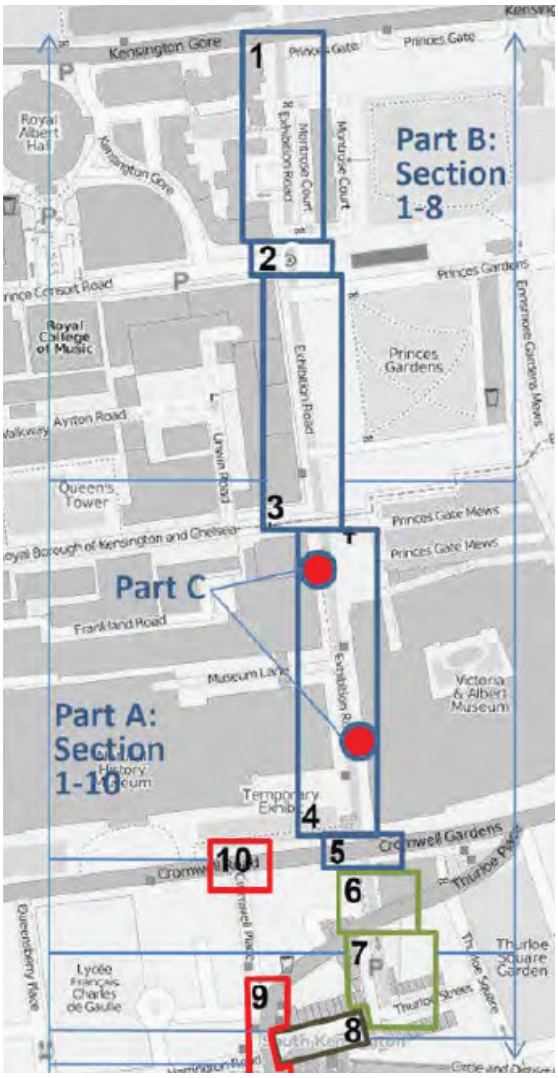

Figure 4-31: The study zones for the studies conducted by MVA Consultancy.

Results from the studies show that vehicle speeds are higher in certain sections where there was less pedestrian activity and a more traditional street layout such as the area between Kensington Road and Imperial College Road which includes Zone 3 and the northern part of Zone 2 (Evaluating Performance, 2012). The authors also stated that traffic flow was "relatively low" and that pedestrians would have frequent breaks in traffic in which to cross the road as well as having freedom in their choice of crossing location (Evaluating Performance, 2012).

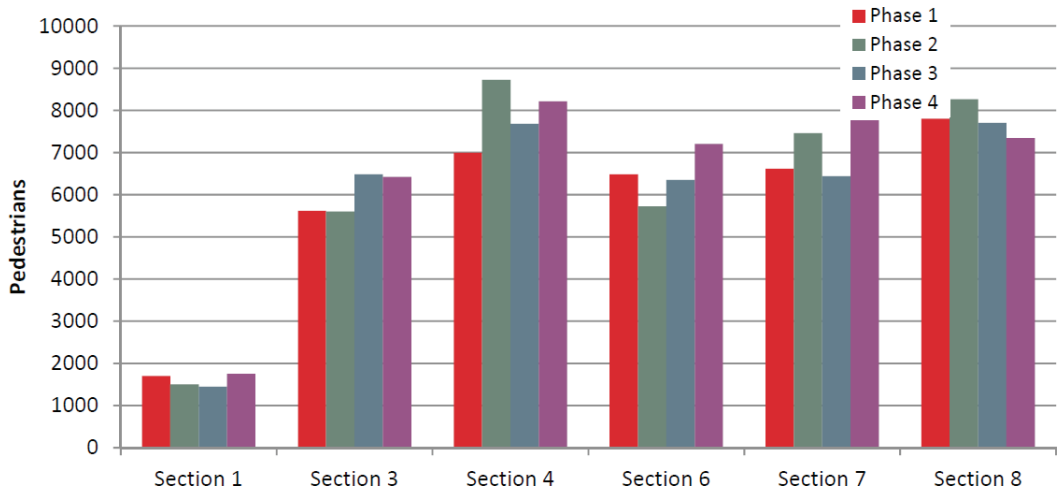


Figure 4-32: Average daily pedestrian counts by study section over the four phases of data collection (2011-2014). Source: Exhibition Road Monitoring Report, Phase 4, MVA Consultancy.

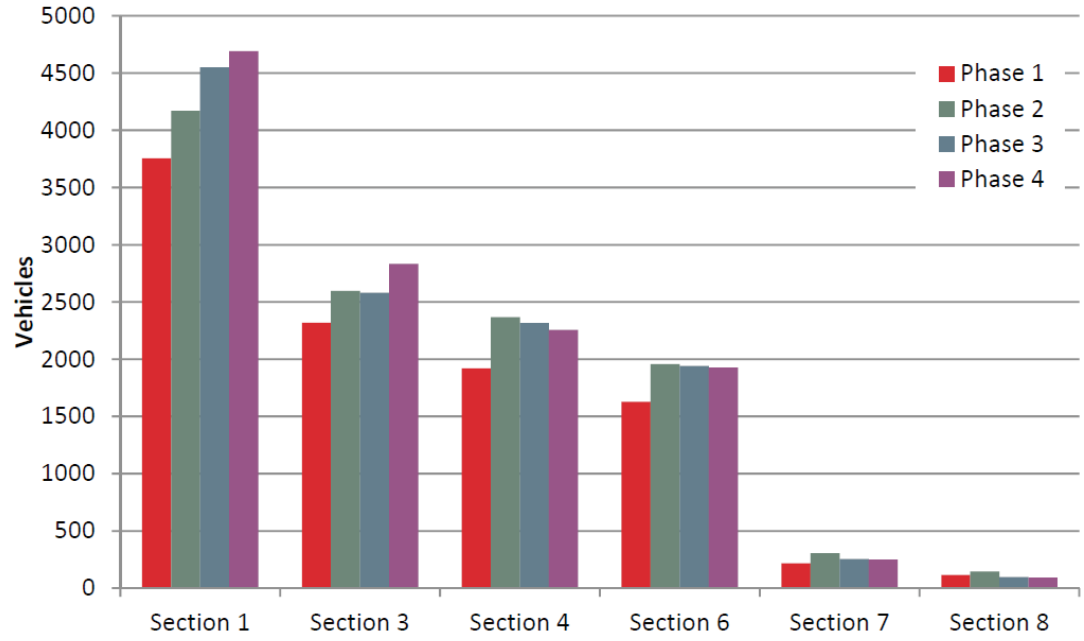


Figure 4-33: Average daily vehicle counts by study section over the four phases of data collection (2011-2014). Source: Exhibition Road Monitoring Report, Phase 4, MVA Consultancy.

They suggested that this is why "there appears to be a low incidence of vehicles giving way to pedestrians" and that the "low number of users stopping abruptly indicates that drivers have few surprises from pedestrians taking risks to cross the road" (Evaluating Performance, 2012). From a pedestrian movement standpoint, the authors said that it appears that pedestrians utilize more of the street surface than in conventional roads, but that the extent that they spread into the vehicular travelway is dictated by pedestrian density and the need to release crowding pressure. Lastly, the authors conclude that "pedestrians can read and adapt well to the changing conditions within Exhibition Road and that driver behavior is influenced by the street design" (Evaluating Performance, 2012).

Additionally, quantitative data of pedestrian counts and total vehicle flows for the various sections of road begin to paint a picture as to how the two are related in shared street schemes. First, figure 4 shows that pedestrian volumes are lowest in Section 1 (Zone 3 for the purposes of this study) which also has the highest total vehicle flows. Additionally, Section 7 (Zone 1 for the purposes of this study) has high pedestrian counts but very low vehicle flows. As Zone 1 was observed to be a successful public space and well-functioning shared street, whereas Zone 3 was lacking in both capacities, we can deduce that pedestrian and vehicle counts have an effect on the success of a shared space. Here, low vehicle counts in Section 7 (Zone 1) create a pleasant, pedestrian-oriented space, whereas high vehicle counts and low pedestrians in Section 1 (Zone 3) create a condition that functions like a conventional street.

## CONCLUSIONS:

Exhibition Road is an excellent case study because it has areas like Zone 1 that are great successes and function as shared streets should, as well as areas that are not successful and do not function as intended (Zones 2 & 3). It shows us that removing the curb barrier and creating a continuous surface is not enough on its own to create a shared space. Instead, a street must have low vehicular volumes and speeds in addition to high pedestrian volumes in order to shift the balance of power toward creating a Pedestrian Domain and promote sharing of the roadway.

Additionally, to be successful as a public place there must be 1) a reason to linger whether dining, people-watching, or resting, 2) it must have adequate seating options, and 3) it must be a comfortable place for people to stay. There are many factors that contribute to creating a comfortable place for people, but shade, a sense of enclosure, and buffer from loud and busy traffic all contribute. Zone 1 has these qualities and shows us how simple design elements such as informal seating and street trees, combined with the right building uses and facades, combine to create a setting that people are drawn to and offers the potential for a variety of activities to occur.

Figure 4-34: Opposite page source: Architect's Journal, Olivia Woodhouse.


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# CHAPTER 5 // SHARED STREET CASE STUDY OF MARIAHILFERSTRASSE

Figure 5-1: Aerial photo of the Mariahilferstrasse looking east toward the Museum Quarter. Source: Christian Fürthner

## PROJECT OVERVIEW:

The Mariahilferstrasse is a main shopping street in Vienna, Austria, that was recently converted from a conventional street focused on the movement of cars, into a combination of a shared street and pedestrian street. The motivations for the redesign were to provide better pedestrian facilities, calm street traffic, and create a sense of place by providing more options to stay and linger. The mile-long street has a pedestrian-only zone at it's core between Kichengasse and Andreasgasse where the highest density of retail lies, and then transitions to shared street conditions for the road sections directly adjacent to the pedestrian zone: from Getreidemarkt to Kirchengasse and from Kaiserstraße to Andreasgasse.

Mariahilferstrasse is a heavily traveled street with daily pedestrian volumes between 25-70,000 (Vienna City Administration). The shared streets have a speed limit for both vehicles and bicycles of 20 km/h (12.5 mph) and the pedestrian zone limits bicycle speed to "walking speed". Additionally, the U-Bahn subway system runs directly below the Mariahilferstrasse with several stations located along the way and providing transit access. Construction was completed for the project in July, 2015 and the designers (selected via a design competition) were Amsterdam-based Bureau B+B Urbanism and Landscape Architecture in conjunction with Vienna-based architects Orso Pitro.

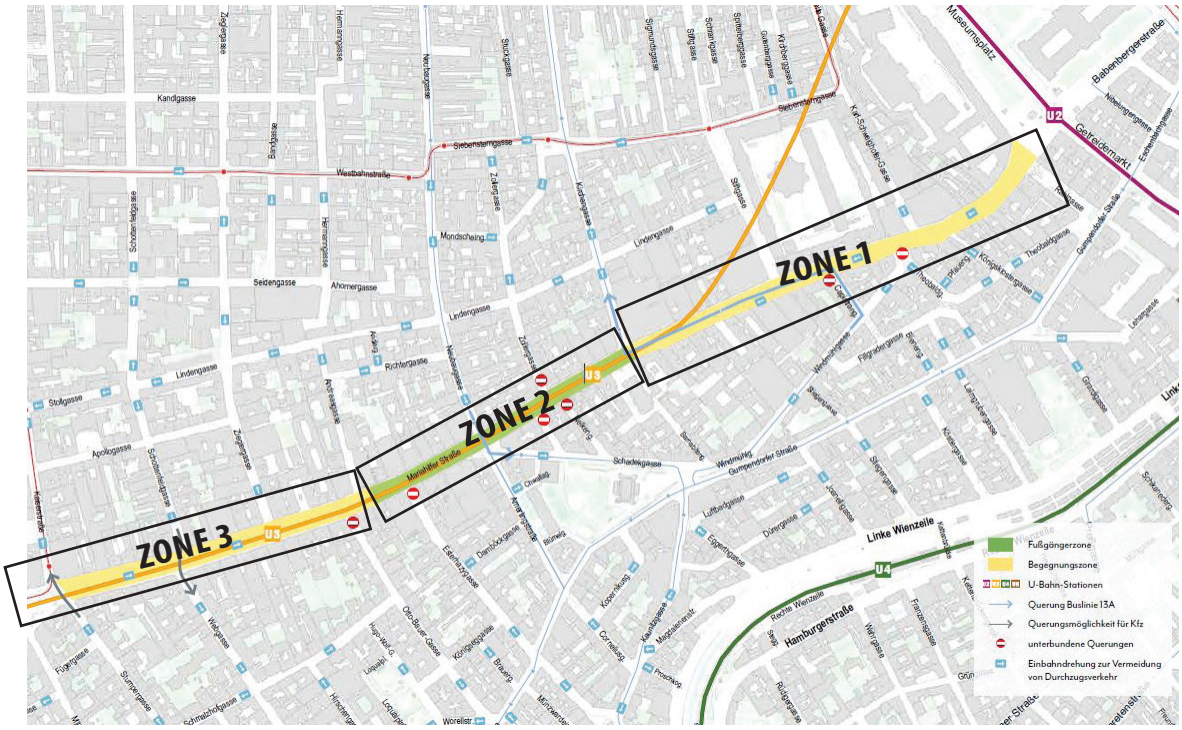

Figure 5-2: Map of the Mariahilferstrasse showing the study area zones. Source: Magistrate of the City of Vienna.


Figure 5-3: The Mariahilferstrasse redesigned streetscape, a vibrant and active public space. Source: Christian Fürthner


Figure 5-8: Aerial photo of Exhibition Road, looking north toward Kensington Gardens. Source: Bureau B+B

## STUDY AREAS:

For the purposes of this study, we have divided the street into three distinct zones to study:

### ZONE 1:

Zone 1 is the eastern shared street zone from the Museumsquartier at Getreidemarkt west to the pedestrian zone that begins at Kirchengasse. There is an U-Bahn station at the Museumsquartier end, and a small square in front of the Church of Mariahilf at the western end of this section. This section of the street has a graceful curve to it as the street descends to meet Getreidemarkt.

### ZONE 2:

Zone 2 is the pedestrian zone of between Kichengasse and Andreasgasse. The Neubaugasse U-Bahn station is located in the center of this section and it has the densest concentration of shopping.

### ZONE 3:

The western shared street zone from Kaiserstraße to Andreasgasse that ends at the Christian Broda Platz on the west end, near the regional Westbahnhof train station.

## DESIGN:

While the Mariahilferstrasse lacks the bold graphic pavement design of Exhibition Road, it nevertheless has a high quality continuous pavement surface that extends from building face to building face. The pavement surface consists of granite pavers in the areas for pedestrians and concrete pavers in the vehicle lanes of the shared street zones. This was intended to provide a visual cue as to which part of the street you are in (Pedestrian vs Shared) but the materials are not distinct enough to really draw attention to themselves. Instead, they seemingly blend together in a continuation of the streetscape. However, the pavers do extend a ways down the alleys and side streets that intersect Mariahilferstrasse, providing a sort of transition zone and sense of gateway to those entering the street.

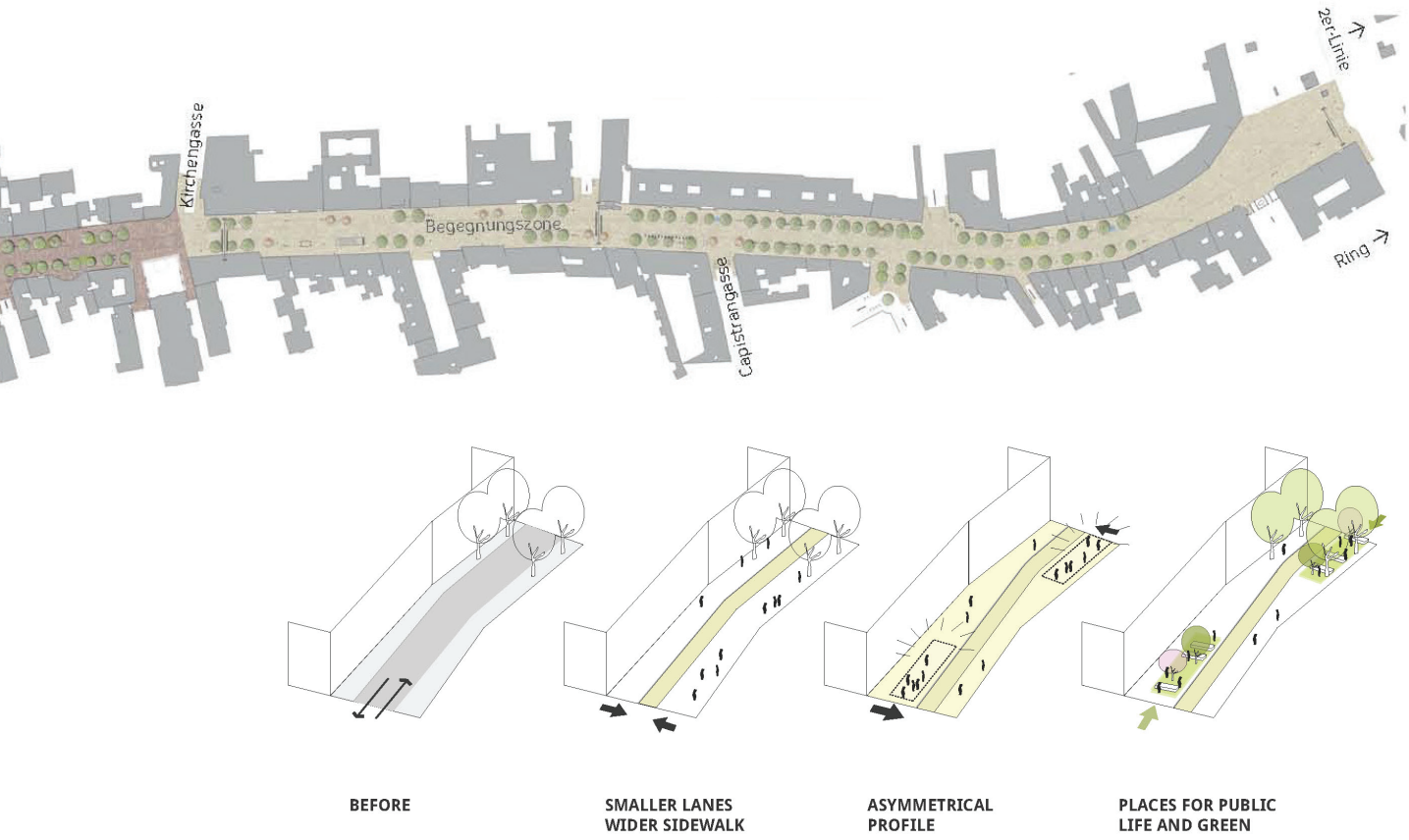


Figure 5-9: These schematic design concept diagrams show that the priority is on designing for the pedestrian and creating comfortable gathering spaces. Source: Bureau B+B.

Figure 5-10: This schematic axonometric section shows the structure of the street, with an asymmetric travelway, amble transitional seating areas, and a wide pedestrian safe zone along the building facade. Source: Bureau B+B.

The street width varies from approximately 75′ up to about 115′ from building to building. The driving lane was designed to be only as wide as necessary at approximately 21′ wide with a flush curb on either side, one of which is wider and contains drains. Additionally, there are subtle pavement markings indicating parking lanes, signaled crosswalks at intersections, and other traffic guidance, as it only allows for one-way traffic for the majority of the street. There is also judicious use of traffic signage at the gateways between each area, providing instructions as to who is allowed as well as the speed limit of 20kph (12.5 mph). The 21′ driving lane or travelway is marked through the pedestrian zone as well, since taxis and buses still are permitted access to this route, as well as deliveries which are permitted at certain times.

The travelway is buffered by an area that acts as a "Staying Zone" on either side with street trees and spaces for cafe seating and other site furnishings such as benches, bike racks, and kiosks nestled in between. Then, along the building faces there are wide pedestrian safe zone areas with a tactical pavement strip to indicate the safe zone to the visually impaired. There are also Euro-Key kiosks that allow the visually impaired to activate a traffic signal to allow them to cross the vehicle travel lane. Other design elements included new lightpoles, modular site furnishings, a few water features, and free wifi in order to promote lingering activity. There was a deliberate attempt to include "consumption-free" seating that wasn't tied to cafes but still allowed people to lounge on the street.

## METHODOLOGY:

I visited Mariahilferstrasse during a four-day period from Wednesday, August 31st, 2016 to Saturday, September 3rd, 2016. My methodology included taking notes and photographs of human behavior. Additionally, I used a handheld counter to tally the number of people participating

Figure 5-11: The pavement extends into adjacent streets and open spaces, with the Church of Mariahilf square shown here. Source: Bureau B+B.


Figure 5-12: Modular site furniture allows for conversations, gatherings, as well as private space. Source: Christian Fürthner

Figure 5-13: Textured tactile pavement communicates safe zones to the visually impaired. Source: FCP


Figure 5-14: The Euro-Key allows the visually impaired to activate a cross walk in the shared street zones. Source: Christian Fürthner


Figure 5-15: A weekend day in Zone 1 shows people sitting on every available surface, enjoying the respite and watching the promenade of people go by.

Figure 5-16: People rest on the modular seating while children play in the water feature. The seating allows people to face a variety of directions and accommodate many different groups. Source: Christian Fürthner

in various activities during 10-minute intervals. Behaviors counted included the total number of people walking, the number of people walking within the area of the street that vehicles were permitted to travel in, the number of bicyclists, the number of vehicles, and the number of people that moved across the street in a diagonal way. The intent was to provide brief snapshots of a random sample of activity in order to compare the different design zones of the street. However, as a single individual my ability to count large quantities of people was strained.

While in Vienna, I was also able to connect with Clarissa Knehs who was the city planner involved in the design of the project. She provided invaluable insight into design decisions, the planning process, and outcome of the street redesign.

Figure 5-17: The modular seating allows opportunities for conversation or to keep to oneself.

## ZONES 1 & 3 (SHARED STREETS) OBSERVATIONS:

**Success as a public space.**

In general, behavior in the shared street sections in Zones 1 and 3 were very similar so I will combine these observations into one section. First, these sections of shared street were very successful as a public space. Many people were observed to be lingering in the ample seating provided by the outdoor cafes as well as on the public benches. Additionally, it appeared to be a place where people went to stroll recreationally, whether window shopping or just observing other pedestrians. The lines of street trees provided comfort by shading both the seating areas and parts of the walkway, which increased the likelihood that people would stay longer. Additionally, the tree canopy provided a sense of enclosure that helped to break the street into a more human canopy, as well as provide structure to how the street is organized.

**Pedestrians occupying space and creating Pedestrian Domain.**

During weekdays when pedestrian volumes weren't very high and people had plenty of space in the "sidewalk" safe zones along the building, people were observed to walk mostly in these areas. When people did walk in the travelway, it was usually along the edges of it rather than inhabiting the middle space. However, it was observed during the weekend that when pedestrian volumes were higher, people were willing

Figure 5-19: Pedestrians appear relaxed and unconcerned about the proximity of motor vehicles.


Figure 5-20: Signage indicates one is entering the shared street zone.

Figure 5-18: Bicyclists freely share the travelway with vehicles and pedestrians.

to inhabit more of the travelway. This is likely due to several reasons:

1. Higher pedestrian volumes help to create a sense of Pedestrian Domain, where the balance of power is shifted to pedestrians, creating a sense of territory where vehicles must follow their rules.

2. Higher pedestrian volumes can make the safe zones feel crowded, and thus the travelway provides a release valve where people can walk with more space.

3. People likely have a natural inclination to walk along the edges of spaces. Not only is it how conventional streets are laid out, therefore having this typical behavior pattern ingrained in our subconscious, but it is also likely more interesting since there is more visual interest as one may look into storefront windows. Additionally, there is a well-known "edge effect" where people have a natural preference to stay towards the edges of a space where they can look out over the entirety of the space, but not feel exposed. The edges of any space, whether it is a street or square, tend to be inhabited first and it is only once the edge spaces have been filled that people tend to move towards the center.

In general, people were observed freely crossing the street diagonally along desire lines and since vehicular speeds and volumes were relatively low, people appeared at ease and in general did not appear to rush out of the way of traffic. People were observed crossing the travelway with strollers and children in tow, and appeared at ease walking alongside vehicles, freely distracted checking their cell phones.



Figure 5-21: During the weekday, pedestrian volumes are lighter and they are less inclined to inhabit the travelway, and when they do, they tend to stay toward the edges.


Figure 5-22: On the weekends, pedestrian volumes are higher and they feel more empowered to walk in the travelway.


Figure 5-23: Increased pedestrian volumes on the weekends help to foster a sense of Pedestrian Domain where people feel free to occupy the entirety of the street space.

Figure 5-24: Bicycles, scooters, and even a segway share the road in Zone 1.

**Bicycle Behavior.**
Mariahilferstrasse has much higher quantities of bicyclists than Exhibition Road and they were consistently observed in the street and almost always in the vehicle travelway. Bicycles must follow the traffic speeds but are not limited to the one-way traffic flow, so counter-flows were observed several times although they would often be pushed to the edges of the travelway. While the bicycles had adequate space to move freely during the weekdays, the increased pedestrian volumes on weekends pushed more people into the travelway and made it more difficult for the bicycles to navigate this space.


Figure 5-26: Bicyclists and cars share the street.

**Building Use.**
Since Mariahilferstrasse is a shopping street, the entire streetwall is filled with active retail storefronts which generates a lot of pedestrian traffic to the street and also promotes many street crossings as people move from store to store. Additionally, the retail facades are short in length and have a high level of transparency and permeability which makes them interesting to pedestrians passing by.


Figure 5-25: Bicyclists and pedestrians coexist in the travelway.

## ZONE 2 (PEDESTRIAN ONLY) OBSERVATIONS:

**Success as a public space.**
Zone 2 is the segment of Mariahilferstrasse that is Pedestrian Only zone, but while most cars are prohibited it still allows delivery vehicles, taxis, and buses to enter as well as bicycles, making it function more like a shared space. Like Zones 1 & 3, Zone 2 also functions as a successful public place, with many people lingering


Figure 5-27: Children play on sculptures intended for their use in Zone 2.

in the seating zones and enjoying strolling through the space.

**Pedestrians occupying space and creating Pedestrian Domain.**
In Zone 2 pedestrians were observed occupying the vehicle travelway more frequently and in greater numbers than in the shared spaces of Zones 1 & 3. Here, vehicular traffic was further reduced from the other zones which heightened the sense of Pedestrian Domain that formed here.

**Bicycle Behavior.**
In general, bicycles behaved similarly in Zone 2 to Zones 1 & 3.

**Building Use.**
The building uses in Zone 2 was the same as Zones 1 & 3, with the street lined with active retail storefronts.

## QUANTITATIVE SAMPLING:

A few random samples quantifying various activities were taken during my visit, and while I was limited in time and capacity, they provide snapshots of activity on various zones of the street. These findings show the following:

- Pedestrian volumes were on average similar between the shared street segments (Zones 1 & 3) and the pedestrian only segment (Zone 2).
- On average, pedestrians were more willing to walk in the travelway in the pedestrian zone 2, than in the shared segments.
- Bicycle volumes were consistent across all zones of the street and much

Figure 5-28: Skateboards and pedestrians share space on the Mariahilferstrasse.


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| ZONE | DATE | TIME | WEATHER | TOTAL WALKING | WALK IN STREET | BICYCLING | CARS | DIAGONAL CROSSING OF STREET |
|---|---|---|---|---|---|---|---|---|
| 1 | 9/1/2016 | 1:20pm | Sunny, 75 | 283 | N/A | 47 | 17 | 13 |
| 2 | 9/1/2016 | 12:20pm | Sunny, 78 | 420 | 152 | 55 | 4 | 288 |
| 3 | 9/1/2016 | 4:15pm | Sunny | 500 | 124 | 64 | 6 | 29 |
| 3 | 9/1/2016 | 2:20pm | Sunny, 78 | 446 | 68 | 37 | 25 | 38 |

Figure 5-29: Random samples collected of pedestrian, vehicle, and bicycle behavior in the three study zones of Mariahilferstrasse.

higher than Exhibition Road.

- Higher vehicle volumes were observed in the shared street segments (Zones 1 & 3) than in the pedestrian only segment (Zone 2), but overall the volumes were low, especially compared with what was observed in Exhibition Road.
- I also measured how many people walked diagonally across the road, as I saw this represented a clear departure in pedestrian movement patterns from conventional streets where pedestrians typically only cross at designated intersections and move in 90-degree turns. The measure of diagonal crossings conveyed the freedom of being able to follow desire lines and occupy more space in the street. Diagonal pedestrian crossings were much higher in the pedestrian segment (Zone 2) likely due to the reduced traffic volumes and high density of retail.

While these small random samplings of quantitative analysis provide some insight, the fluctuations in how space is used over time should be taken into consideration, and studies that encompass a longer period of time should be undertaken.

## CONCLUSIONS:

Mariahilferstrasse is a great example of shared street with a sense of place and various levels of vehicle volumes to study. By comparing the shared segments with the pedestrian-only one, we can see that vehicle volumes impact the willingness for people to inhabit the travelway and their frequency of crossing and following desire lines. Thus, if more freedom of movement is desired for pedestrians, keeping vehicle volumes low is essential.

Additionally, the Mariahilferstrasse shows us how shared streets can become great public places through design. By structuring the street to provide places for staying, as well as providing a variety of seating options, people are invited to linger and watch the theater of street life passby. Comfortable seating areas are an essential component of any great public space, and Mariahilferstrasse is clearly a place that puts people's needs first and foremost.

Figure 5-30: Opposite: The Mariahilferstrasse is vibrant even in winter. Source: Christian Fürthner


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# CHAPTER 6 // CONCLUSIONS

The case studies of Exhibition Road and Mariahilferstrasse show us that there is a wide spectrum of results in shared streets, and that their efficacy is dependent on many variables. While designers and planners can control certain aspects of the structure of the streetscape including the allocation of space as well as the selection of materials, furniture and plantings, there are many other factors that affect the success of these streets, including larger traffic patterns and surrounding land uses. Through the observations of these two case studies, I've concluded that some factors are more essential to the basic functioning of a shared space than others. These I have listed below as **Critical Qualities**, while others play an important role and are strongly **Recommended Qualities**, but are less essential to the overall performance of the street.

## CRITICAL QUALITIES FOR A SHARED STREET

### 1. LOW VEHICLE VOLUMES AND SPEEDS:

- Low vehicle volumes and speeds are essential for creating an environment where pedestrians feel safe and secure. They are also important in creating a sense of Pedestrian Domain, as lower speeds create the sense that everything is moving at a pedestrian pace and on equal terrain.

- Additionally, low vehicle volumes are important in fostering pedestrian occupancy of the travel way, for when there are too many vehicles, even at low speeds, it makes it difficult to consistently occupy this space. It is suggested that if "vehicle flows are greater than 100 per hour, pedestrians will not use the vehicle zone as a shared space, but will simply cross it" (RBKC, 2009).

- As Donald Appleyard's Livable Streets study showed, vehicle traffic volumes also impact the liklihood people will gather along the street, as well as their ability to form social connections in public space.

- Vehicle speeds should also be kept low (preferably below 20 mph) in order for drivers to be able to engage with pedestrians in their surroundings, have adequate time to yield, and reduce the chance of collisions.

### 2. HIGH PEDESTRIAN VOLUMES:

- Having building uses or other conditions that already generate high pedestrian volumes is an essential ingredient in creating a pedestrian domain. There must be enough pedestrians present in the street to make vehicles feel that it is primarily a place for people and that they can only enter on their terms.

- Creating a shared street will not automatically generate pedestrian volumes, so it is important that pedestrian volumes already be present or anticipated before a shared street is designed.

Figure 6-1: Opposite: The Mariahilferstrasse is a vibrant place at all hours.. Source: Christian Fürthner


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### 3. ACTIVE USES ON BOTH SIDES OF STREET (PREFERABLY RETAIL):

- It is important that people occupy the entirety of the street space in order to active it and mitigate the presence and sense of ownership by vehicles. Having multiple desirable destinations such as retail on both sides of the street will create more reasons for people to both cross and occupy the travel way.

### 4. DESIGN FEATURES THAT ADD TO COHERENCE AND LEGIBILITY TO FACILITATE UNDERSTANDING AND INCLUSIVE ACCESS:

- A design approach that makes the unique street environment easily understood by all (RBKC, 2009).

- Gateways and other visual cues such as unique, pedestrian-oriented paving that signals to drivers that they are entering a special place and to drive cautiously.

- Considerations for the visually impaired, such as tactile pavement, that communicates safe areas from those with increased risk.

## RECOMMENDED QUALITIES FOR A MORE SUCCESSFUL SHARED STREET:

### 5. A VISUALLY NARROW VEHICULAR TRAVEL WAY:

- The actual and perceived width of a street has been shown to affect vehicular speeds and driver caution, with narrower travel ways having a traffic calming effect.

Figure 6-2: Opposite: Aerial photo of the Mariahilferstrasse looking east toward the Museum Quarter. Source: Christian Fürthner

### 6. SEATING + TREES:

- In order to activate the street and create sense of place, opportunities for people to sit, linger, and even dine have a tremendous effect on the vibrancy of a place. When more people are present and staying in a space, it changes the feeling of a street from a place of mobility and "passing-through" to one that feels like a public space and a destination in and of itself.

- Having both formal seating (benches, tables & chairs) and informal seating (curbs or other low elements that may be sat on intermittinently) provide options for people to rest for even brief periods, thereby increasing the occupancy of the space. Additionally, it is important to have public "consumption-free" seating that is open and free to anyone.

- Trees provide shade, a sense of enclosure, and a rejuvenating connection to nature, all of which add to pedestrian comfort and desirability to stay and linger.

### 7. SHORT, ACTIVE, AND PERMEABLE BUILDING FACADES:

- Building facades should be short in length so as to provide visual interest and variety along the street wall, both in architectural detail as well as in building use and function.

- Facades should have active retail that generates pedestrian activity and creates interest and activity for people passing by.

- Facades should have a level of both implied and visual permeability through frequent openings such as

doors and windows that allow people to either enter or just peer in from the outside. This provides a connection to the place and makes for a more interesting pedestrian experience.

- Building facades should be reasonable in height so as to allow for sufficient natural light into the space (2-4 stories seems to be ideal but it depends on the ratio of open space to height).

- Facades should have a level of detail, character, and ornamentation so as to be a visually engaging backdrop, but also relate to one another in a way that fosters a sense of cohension and place.

## BENEFITS:

Shared streets have incredible potential to enhance the pedestrian experience as well as create public space in our streets. They can improve urban livability by increasing the social space in our cities that allow people to connect with one another, as well as improve conditions for pedestrians and bicyclists to help promote alternative & sustainable forms of transportation. Lastly, by allowing pedestrians to follow desire lines and criss-cross the streetscape, they can also help to increase economic activity for retailers located along a shared street.

## CHALLENGES FOR SHARED SPACE IN AMERICA:

In recent years, shared street projects (often called Woonerfs in the U.S.) have gained traction in the United States, with a few projects implemented and many more planned for the near future. They are seen as a way to design flexible and programmable space into our cities for use during street festivals and other temporary events. They are also viewed as a compromise between those who would like to see pedestrian-only spaces in our cities, and those who remember the many failures of the 1960s pedestrian malls and want to maintain vehicle access. Thus, they allocate additional space to the pedestrian and can become vibrant public spaces while also permitting some vehicle access and parking.

However, there are still challenges to their implementation both political, legal, and cultural. People are resistant to change, and because shared streets are not typical, the public is often concerned about their perceived safety. More data is needed to show how these streets improve safety, as well as provide public space and economic benefits, in order to galvanize support for their implementation.

There is also a barrier for traffic engineers who are reluctant to go against conventional street design methods because of a fear of liability and litigation. There have been efforts to bring legitimacy to the shared street design typology, such as when the National Association of City Transportation Officials (NACTO) released an Urban Street Design Guide in 2013 that included 13 street design types, including both commercial and residential shared streets, as well as green alleys and commercial alleys which include aspects of shared street design. However, codifying this street design type within the American Association of State Highway and Transportation Officials (AASHTO) "Green Book" and Federal Highway Administration's (FHWA) Manual on Uniform Traffic Control Devices (MUTCD) would bring more legitimacy to shared streets and provide legal standing

shared streets and provide legal standing for traffic engineers and other designers who are looking to implement these projects. Additionally, creating local ordinances that allow for shared streets would also "give engineers, planners, and designers increased legal protection, encourage more experimentation, advocate for documenting assumptions and reasons for various design decisions, and encourage periodic monitoring" (Saviskas, 2016).

## CONCLUSIONS:

American cities are complex places and there is no one-size-fits-all solution to issues surrounding urban public space and streets. Shared streets represent one approach for improving the quality of the public realm and pedestrian safety and experience, as well as infusing public space into our cities. Under the right circumstances with the Critical Qualities present, shared streets are capable of creating the sort of magical street experiences that become magnets within the community, drawing people together and strengthening our cities.

As the architect Daniel Burnham famously said "make no little plans; they have no magic to stir men's blood and probably themselves will not be realized." Our American streets have been sorely ignored and the time has come for big, bold ideas for transforming our cities, and shared streets represent one innovative approach for accomplishing many of our placemaking, pedestrian, and non-motorized goals within a beautifully simple framework.

Figure 6-3: Bell Street Park in Seattle is a shared street that aims to infuse public space in a densly built area of the city. Source: SvR Design

Figure 6-4: Batavia, Illinois' River Street has been converted to a shared street and resulted in increased pedestrian traffic and business revenues. Source: Chicago Tribune.


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# Bibliography.


1. Biddulph, M. (2012). Street Design and Street Use: Comparing traffic calmed and home zone streets. Journal of Urban Design, 17(2), 213–232.

2. Davis, D., & Lindinger, A. (2015, January 16). A Tale of Two Cities (1): Vienna's Mariahilferstraße combines Pedestrian Zone and Shared Space. Retrieved March 20, 2017, from http://www.vienncouver.com/2015/01/viennas-begegnungszone-shared-space-program/

3. Davis & Hale. (2007). Public Transportation's Contribution to U.S. Greenhouse Gas Reduction. SAIC.

4. Dover, V., & Massengale, J. M. (2014). Street Design: The Secret to Great Cities and Towns. Hoboken, NJ: John Wiley & Sons, Inc.

5. Hamilton-Baillie, B. (2004). Why don't we do it in the road? Modifying traffic behavior through legible urban design. Journal of Urban Technology, 11(1), 43-62. doi:10.1080/1063073042000341970

6. Hamilton-Baillie, B. (2008a). Challenging Assumptions. Urban Design, (105), 26-28.

7. Hamilton-Baillie, B. (2008b). Shared Space: Reconciling People, Places and Traffic. Built Environment, 34(2), 161-181. doi:10.2148/benv.34.2.161

8. Hamilton-Baillie, B. (2008c). Towards Shared Space. URBAN DESIGN International, 13(2), 130-138. doi:10.1057/udi.2008.13

9. Hammond, V., & Musselwhite, C. (2013). The Attitudes, Perceptions and Concerns of Pedestrians and Vulnerable Road Users to Shared Space: A Case Study from the UK. Journal of Urban Design, 18(1), 78-97. doi:10.1080/13574809.2012.739549

10. Jacobs, A. B. (1993). Great Streets. Cambridge, MA: MIT Press.

11. Kaparias, I., Bell, M., Biagioli, T., Bellezza, L., & Mount, B. (2015). Behavioural analysis of interactions between pedestrians and vehicles in street designs with elements of shared space. Transportation Research Part F: Traffic Psychology and Behaviour, 30, 115-127. doi:10.1016/j.trf.2015.02.009

12. Kaplan, S., & Kaplan, R. (1978). Humanscape: Environments for People. North Scituate, MA: Duxbury Press.

13. Karndacharuk, A., Wilson, D., & Dunn, R. (2013). Analysis of Pedestrian Performance in Shared-Space Environments. Transportation Research Record: Journal of the Transportation Research Board, 2393, 1-11. doi:10.3141/2393-01

14. Karndacharuk, A., Wilson, D. J., & Dunn, R. (2014). A Review of the Evolution of Shared (Street) Space Concepts in Urban Environments. Transport Reviews, 34(2), 190-220. doi :10.1080/01441647.2014.893038


Figure 6-5: Opposite: Pedestrians, bicycilists, and local transit all shared the travelway at the Mariahilferstrasse. Source: Christian Fürthner

15. Karndacharuk, A., Wilson, D. J., & Dunn, R. C. (2016). Qualitative evaluation study of urban shared spaces in New Zealand. Transportation Research Part D: Transport and Environment, 42, 119-134. doi:10.1016/j.trd.2015.10.020

16. Pojani, D. (2008). American downtown pedestrian "malls": rise, fall, and rebirth. Territorio 46, 173-190. Polytechnic Uniersity of Milan, Italy.

17. Powell, K.E., Martin, L., & Chowdhury, P.P. (2003). Places to walk: convenience and regular physical activity. American Journal of Public Health, 93, 1519-1521

18. Project for Public Spaces (2009) Placemaker Profiles. Available at http://www.pps.org/info/placemakingtools/placemakers/ajacobs. Accessed 19 December 2016.

19. Saviskas, S. (2016). Taking back our streets: demystifying shared space streets in America ; (Unpublished master's thesis). University of California, Berkeley, Spring.

20. Smart Growth America (2017). Dangerous By Design 2016. www.smartgrowthamerica.org/dangerous-by-design.

21. Systra (2014). Exhibition road phase 4 report. Royal Borough of Kensington and Chelsea. https://www.rbkc.gov.uk/exhibitionroad/sites/default/files/atoms/files/Monitoring%20Report%20January%202014.pdf

22. The Royal Borough of Kensington and Chelsea. (2009). [Exhibition Road] Equality Impact Assessment. Planning and Borough Development.

23. U.S. CDC. (2006). Physical Activity and Good Nutrition: Essential Elements to Prevent Chronic Disease and Obesity.

24. U.S. CDC. (2004). Physical Activity and the Health of Young People.

25. U.S. Department of Transportation (2014). National Highway Traffic Safety Administration. Road Diet Informational Guide, Report # FHWA-SA-028. Washington, DC. https://safety.fhwa.dot.gov/road_diets/info_guide/rdig.pdf

26. Vienna City Administration, Department of Transportation & Planning. Redesigning Mariahilfer Straße. Retrieved March 20, 2017, from https://www.wien.gv.at/english/transportation-urbanplanning/mariahilfer-strasse-new.html

27. Working Group III. (2007). Climate Change 2007: Mitigation of Climate Change Summary for Policymakers. Intergovernmental Panel on Climate Change

Figure 6-6: Pedestrians and bicyclists share space on the Mariahilferstrasse.  Source: Christian Fürthner