INCREASED PEDESTRIAN CONSIDERATIONS IN TRANSPORTATION PLANNING AS THE INTERSECTION OF COMMUNITY MOVEMENTS AND POLICY IMPROVEMENTS

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

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Introduction

This paper will explore the shaping of pedestrian-centered transportation in the United States through the STS framework of social shaping of technology (SST). Transportation is a complex field in which built advancements often lag behind current knowledge. SST allows for the investigation of how entrenched systems like transportation can be shaped by a cycle of directions, forms, and outcomes across various stakeholder groups. This paper will investigate special interest groups and design policies working in the area of pedestrian mobility before using two Virginia universities as examples of how new design practices are being applied.

STS Analytic Pathway

Transportation design is a complex field based on an iterative process of calculation, implementation, and evaluation with the goal of making systems safe and efficient. Technical parameters are crucial for a successful design, but community needs are just as important for defining (and redefining) success. As an STS framework, social shaping of technology (SST) is particularly well-suited to explaining the development patterns of systems like transportation infrastructure. SST serves as a sort of middle ground between social constructivism (SCOT) and technological determinism in its assertion that development occurs through the interaction of different social and technical influences. Unlike the straight-line path described by determinism or constructivism, SST views design and application as moving through a cycle that incorporates feedback from social, economic, and technical performance (Williams & Edge, 1996).

Social shaping of technology takes into account three key elements when assessing innovation: *direction* of development, *forms* of artifacts, and *outcomes* upon relevant social groups. Stakeholders interpret an artifact based on their desires and create pressure for the

artifact to change when their needs are not being met. New forms of the artifact result, and the new outcomes are interpreted by stakeholders, restarting the cycle. Because of the protracted timescale and extensive bureaucracy surrounding urban transportation infrastructure, it has historically been seen as inflexible in its direction, forms, and outcomes. It is easy for planners, engineers, and other actors within the system to become fixed in their thinking, allowing archetypes to become locked into use long after their logic has expired (Hommels, 2005).

Transportation Planning – Movers and Shakers

The development of transportation networks in the United States has been rapid and dramatic since the early 20th century. Gravel roads gave way to local paved routes, then state-maintained highways, then ultimately the Interstate Highway System. In the early years – and particularly in the Homesteaded Midwest – rectangular grids were the standard for urban planning. As the network and the country grew, major roadways intended for high-speed, long-distance travel cut through established communities and fractured development (Boeing, 2020). Car-centered streets have been linked to greater emissions, more traffic fatalities, and decreased physical activity compared to walkable streets (Forsyth & Southworth, 2008). Figure 1 shows the general patterns of street configurations over decades of development.

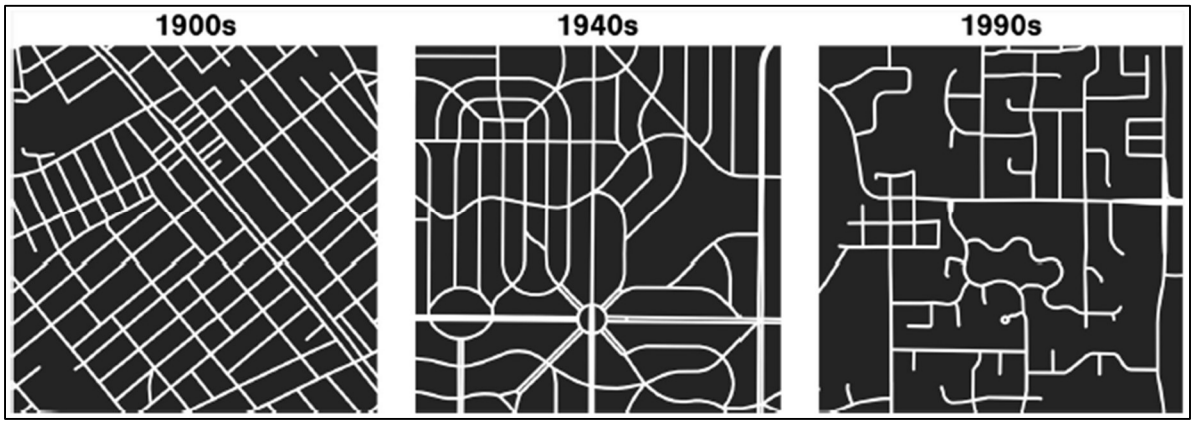

Figure 1. Examples of street networks of U.S. cities planned during different decades. Note the shift from an orthogonal grid to a disconnected sprawl (from Boeing, 2020 pp.126).

By the 1960s people were beginning to criticize contemporary urban planning for not meeting the needs of communities. Jane Jacobs's *The Death and Life of Great American Cities* (1961) became the seminal work in the area of urban walkability. Jacobs criticized standard practice for generating communities that lacked cohesion, safety, prosperity, and spirit, and advocated for an enhanced pedestrian experience as part of a more vibrant urban community. More recently, groups like Project Drawdown and America Walks have been advocating for walkability and accessibility in cities across the United States. Practice shapers like the Federal Highway Administration (FHWA) and Leadership in Energy and Environmental Design (LEED) have also started giving greater consideration to griddedness and walkability in their standards.

Community Organizations

Jane Jacobs wrote her book criticizing urban planning after witnessing first hand shortcomings in and around her neighborhood. She noticed that certain patterns of development had led to economic failure and community disconnect wherever they were implemented. Sidewalks are, in her view, one of the most important elements in creating a healthy community. Greater pedestrian movement adds vibrance to a community and generates more "eyes on the street," a term for general public trust and accountability. Sidewalks serve as the first point of contact between people who would otherwise continue as strangers, and are a safer recreation option than isolated parks. Jacobs thus prefers limiting the amount of streetscape dedicated to car traffic in favor of larger, safer sidewalks (1961).

In the decades since Jacobs's work was first published, more groups have sprung up advocating for mobility and accessibility in urban spaces. The negative impacts of car-centric infrastructure have become overwhelming for many stakeholders, particularly disabled Americans and those who face barriers to vehicle ownership. The Every Body Walk! Collaborative and America Walks are two grassroots organizations that have been working in cities across the country to encourage the growth of walking, through both community outreach and demanding change from those involved in the physical infrastructure available to pedestrians. These two groups have been encouraging people to "rediscover the joy of walking," pointing to the benefits increased daily activity can have on physical and mental health (Walljasper et al., 2016). They seek a form for infrastructure that places greater emphasis on the movement and prosperity of people rather than vehicles.

Doctors have also spoken frequently about the benefits of walking and the associated barriers. Cardiovascular disease is a leading cause of death in the United States but as few as 150 minutes of moderate-intensity aerobic activity like brisk walking can reduce the risk for heart attacks and other related health issues. Despite their best intent, many patients fall short of their desired outcomes because the form of their communities are not conducive to a prescribed walking habit. Doctors like David Sagbir, MD are fighting against this by organizing "Walk with a Doc" get-togethers to guide their patients through parks and other spaces (Abbasi, 2016). In support of this and other similar movements, the National Physical Activity Plan (NPAP) Alliance, a private-public partnership aimed at increasing physical activity among the U.S. population, released a report card assessing the physical and social capability of meeting walking goals (2017). Their aim is to bring attention to the shortcomings affecting their patients and to persuade decisionmakers to enact change.

Organizations like Project Drawdown advocate for walkable cities due to their potential positive impact on the environment. Walking is a far cheaper transportation option with no direct emissions; converting 5 percent of urban vehicle traffic worldwide to walking could result in a change of about 3.1 gigatons of greenhouse gas emissions (CO_2-eq) by 2050. However, making the shift to accommodate pedestrians would require considering the "7Ds" of the urban environment – demand, demographics, density, design, destination, distance, and diversity – in order for walking to be appealing (Frischmann et al., 2023).

The movements described in this section are not just interest groups creating echo chambers within communities; there is a magnitude behind the direction of their work that is bringing about real change in communities that need it. Oklahoma City, once labeled the "worst walking city" and "second fattest city" in the US, committed to narrowing major streets to make room for dedicated bike lanes and wider, safer sidewalks. The neighborhood of Charles Avenue in St. Paul, Minnesota successfully advocated for a number of traffic calming measures that they drew up during a series of organized social events. One of the country's earliest car-oriented suburbs, Arlington, Virginia, saw its path change as residents demanded more mixed-use development and more sidewalks to the amount of time required to run daily errands. Arlington neighborhoods also have greater rates of walking due to their proximity to Metro and other transit stops (Walljasper et al., 2016).

These changes have largely been happening at the local scale, dependent upon pressure from within communities to get action going. However, as discussed in the next section, it is becoming increasingly common for the pressure to be coming from transportation design policy and standards.

Design Policy and Standards

In the early years of the interstate highway system, the focus of almost all projects was widening roadways and expanding network capacity. Planners envisioned a system of superhighways that allowed for rapid movement between cities, states, and even across the country. As the system has aged, however, long-term analyses have shown that widening roads rarely has any real effect on reducing congestion or improving safety. Design manuals and industry standards released in the past ten years have made a significant shift away from the old route one practices toward more holistic, people friendly modes.

The Institute of Transportation Engineers (ITE) was commissioned early in the 20th century to work on a handbook (the Traffic Engineering Handbook) that could be used by roadway designers across the country. The third edition of this handbook coincided with the boom of suburbs and instructed planners to anticipate single-use zoning when planning for future developments and to prioritize looping streets and cul-de-sacs within these communities (ITE, 1965). The language of subsequent manuals remained largely consistent until 1999 when the *Traditional Neighborhood Development: Street Design Guidelines* were published. These new standards did away with one-size-fits-all solutions and prescribed geometric values in favor of general explanations of fundamental concepts that can be applied based on the unique needs of a particular area (Southworth & Ben-Joseph, 2003). The 7th edition of the Transportation Engineering Handbook (ITE, 2015) continues on in this tone including this passage from the preface:

> Beyond the standard updates to reflect evolving changes in practice, this new edition of the Handbook also reflects the shifting philosophy of traffic engineering practice in which transportation professionals no longer serve as merely planners, designers, and

> operators of transportation systems. Rather, they are integral components of more comprehensive societal roles of community builders, influencers of social and economic change, and investors of public resources. (p. xvii)

Road widening is specifically mentioned throughout as a practice that is to be avoided whenever possible as it is known to not be effective at meeting the main goals of reducing congestion and improving safety. Standards also frequently call attention to non-automobile pathing considerations and emphasize the importance of stakeholder involvement.

Federal government agencies are also taking steps to bring their policy in line with non-automobile design goals. Alongside an appropriations bill in 2021, Congress requested that the Federal Highway Administration (FHWA) look into using a Complete Streets model to reduce the number of traffic fatalities, particular among pedestrians and cyclists. The Complete Streets model incorporates all users of a transportation system into design and assessment conversations, including motorists, pedestrians, cyclists, and individuals with disabilities. FHWA's assessment of their current standing found holes in their ability to measure performance and safety for all transportation modes, as well as their ability to assess how Complete Streets factor into the decision-making process for major projects. In response to their findings, FHWA established a Complete Streets initiative that will improve the ability of the agency to provide technical support and policy guidance for practices that improve safety for all users (FHWA, 2022).

Leadership in Energy and Environmental Design (LEED) is a program run by the U.S. Green Building Council (USGBC) that certifies buildings and neighborhoods for excellence in sustainable design, construction, and operation. Certificate levels are determined based on points earned on the scorecard for the category of project (USGBC, 2020). The Neighborhood Development (LEED-ND) rating system evaluates larger projects that may include multiple

buildings and other supporting infrastructure. The scorecard rewards developments that prioritize mixed-use development and include a variety of residential unit sizes. It also includes a number of credits related to walkability, bicycle facilities, and access to transit (Smith, 2015). Szibbo (2015) also appreciates the effort of LEED-ND in the areas of equity, economy, and environment but notes that it could place greater emphasis on developing affordable housing within sustainable neighborhoods.

Virginia Universities – Case Studies in Walkability

College campuses in the United States are unique as a community building block due to the relationships that students are able to forge with one another. Academic activities allow them to interact with other with similar interests, they tend to be at similar ages (with limited responsibility), and the physical layout of campuses are conducive to greater person-to-person interaction. Development is dense and varied, with students rarely needing to walk more than 15 minutes for any purpose (Slowey, 2021). Because of this special use case, university campuses can serve as proving grounds for design concepts that cannot be quickly implemented in larger city environments. This section describes two universities in Virginia that have recently amped up efforts to improve walkability in and around campus.

University of Virginia – Charlottesville

The University of Virginia's (UVA) main campus (internally to as Grounds) is located within the city of Charlottesville and the adjoining county of Albemarle. It is classified as a suburban campus with a total area of 1,682 acres (U.S. News and World Report, 2021a). The university's two largest active projects, Brandon Avenue and Ivy Corridor, are mixed-use developments with residential, academic, and dining space supported by community-facing active ground floors. Both projects also include significant stormwater features that are

incorporated into the landscape and are designed for active use. Adjoining streets are being adapted for more limited motorist with wider sidewalks, dedicated bike lanes, and minimal car entrances (Perkins+Will, 2016; Dumont Janks et al., 2016).

In a February 2023 interview, University Architect Alice Raucher, Senior Landscape Architect Rachel Lloyd, and Campus Planner Elisa Langille emphasized the importance of connectivity in these projects and UVA's wider goals. Much of the growth in the middle of the twentieth century, particularly the creation of the professional schools on North Grounds, was "opportunistic" – UVA grew into the space because it had the space. The consequence of this opportunistic expansion was the isolation of pockets of campus and an increased reliance on cars or buses. Even areas that are more centrally located seem separated by increasingly busy streets.

Even as it grows, UVA is asserting its commitment to being a feature of the city, not a monolithic entity occupying space within it. The interview panel pointed to a three-party agreement as being crucial to continued good relations with its neighbors. In this partnership UVA representatives are allowed to sit on the planning commissions of Charlottesville and Albemarle and a representative of each locality sits on the Mastering Planning Council for UVA. When decisions are made, they are not made by the university alone.

The form of new projects arises out of the intersection of the current principles of technical design and the needs of the people the projects serve. UVA has a demanding 2030 sustainability plan that includes provisions for stormwater management and reduction of greenhouse gas emissions related to transportation (Kelley, 2020). High density, developments interspersed with stormwater facilities certainly helps the university meet its climate goals, but Raucher and her office insist that technical demands are not the top priority. "'What does this

mean for the community' is always the first question we ask" when plotting out the basics of a new project.

Virginia Commonwealth University – Richmond

Virginia Commonwealth University (VCU) is located within the city of Richmond, though the campus is split into a main campus area and a separate district for the hospital and medical school. It is categorized as an urban campus with a total area of 198 acres ((U.S. News and World Report, 2021b). The surrounding area is much more developed than Charlottesville and VCU represents a much smaller portion of its city than UVA.

University Architect Jessica Hurley-Smith and University Planner Jeff Eastman in a March 2023 interview discussed the efforts to get around the unique challenges of an urban campus embedded in a historic city. Campus growth in the last 30 years has been much more rapid than in previous eras due to an increase in the number of full-time students. Unlike the University of Virginia and other colleges around the state, there is little unoccupied space for VCU to freely expand into. Instead, any development project has to involve the renovation or demolition of an existing building. VCU also has a smaller endowment than Virginia's larger universities so it is more reliant on funding from state sources.

Master planning for a campus within an urban area like Richmond must be more amenable to change as the city around the university changes rapidly. VCU submits a revised six-year outlook for projects to the state every two years to keep up with adjustments to the urban landscape around them. The master plan is heavily informed by space needs studies, parking and transportation counts, and student demographics. As the statistics inform planners of areas where pedestrian safety is compromised or where academic needs are not being met, they

respond by comparing technical solutions against community needs. While closing a road to vehicle traffic may reduce the number of pedestrian injuries and deaths, it would also increase congestion along alternative routes. The careful balance between technical expertise and social needs has allowed VCU to develop a more people-friendly campus.

Discussion

Grassroots community campaigns are advocating on their own behalf for a structure that supports their needs without physically breaking up their neighborhoods. Standards of practice are folding the lessons learned in the last half century into revised guidance that values holistic consideration of all travel modes over prescribed geometric design requirements. College campuses, typically dense, homogeneous communities, serve as proving grounds for mobility and connectivity strategies that city planners are hesitant to apply at scale. Campus projects also prove an important point about designing for a scenario and not for a general case. The context of an area is crucial when planning out transportation projects, and community needs are particularly important to defining context. Traditional design guidelines emphasize one-size-fits-all solutions based purely on quantitative metrics like annual average daily traffic (AADT), travel delay, and crash counts. Pedestrian design requires greater incorporation of the qualitative concerns of communities mentioned in the sections above. Preferences for sidewalk width or bike lane layout vary from community to community based on dominant mode or prevailing perception. The design standard manuals have started advising for more customized design in line with the demands from users, something designers will have to adapt to in the future.

Conclusion

Early growth in transportation infrastructure across the United States prioritized the movement of as many vehicles as possible as fast as possible. This direction of development created the form of wide streets and narrow sidewalks that make pedestrian travel less safe or enjoyable. As the long-term outcomes of such a system have started to show themselves – both in the data and in people's lives – practice has started to shift in favor of pedestrians. Through a cycle of forms and outcomes, the direction of design has changed. This change, like all large transportation projects, has been slow, but Universities have provided a unique opportunity to test out design themes. Should these experiments continue to be successful, it may not be long before American cities take on a very different form.

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