



4 | A SOCIAL PERSPECTIVE ON THE FUTURE OF TRANSPORTATION DESIGN

Cathy L. Antonakos

Introduction

In industrialized nations, transportation systems depend on global resources for their support and growth. Yet this dependence has resulted in environmental and social imbalances that are now large and pervasive. It is widely accepted that motorized transportation is not environmentally sustainable, yet there is little discussion of the sustainability of modern transport from a social perspective. This paper presents a multi-disciplinary perspective on transportation and society, discussing the potential for new transportation and land use designs to diminish unwanted social impacts from traffic and inequities in transportation systems.

First mass-produced in the early 1900's, automobiles quickly became popular as they relieved travelers of dependence on public transportation systems such as trolleys and trains and enabled people to live in homes further from central employment areas. In the U.S., the dream of unhampered mobility grew as new roads were laid out and access to automobiles increased. Roadways designed under the assumption of auto travel guided development patterns for years to come. In the 1950's and 1960's, federally-funded highways in the U.S. were promoted as part of the system of national defense. The models used to guide highway development focus on moving cars into and out of cities via high-speed, high-capacity roadways (Pas 1986). Although outdated, the development patterns and transportation system designs established with the advent of freeways and widespread use of automobiles continue today, and travelers in industrialized nations around the world are entrenched in auto-dependent lifestyles. The loss of quality of life due to dependence on the automobile has resulted in an emerging recognition of the need for change, but tools for change are still in limited supply.

Current efforts to reduce emissions of greenhouse gases worldwide identify motorized transport systems in the industrialized world as a major source of pollution. In fact, the focus of our efforts to "fix" transportation lies in the environmental realm. The social impacts of modern transportation and methods for dealing with them are often overlooked. The assumption of equal access to private vehicles for all subgroups of the population prevails in allotment of global and national resources for motorized transportation (Schaeffer and Sclar 1980). Motorists experience distortion of speed and space (Illich 1978), and as a result of decades of dependence on automobiles, people anticipate urban designs that facilitate auto transport. Commuters experience stress when driving in congested areas (Novaco, Stokols and Milanesi 1990), and people now spend more time driving longer distances than they did ten years ago (Downs 1992).

Cathy L. Antonakos is an assistant research scientist in the Center for Nursing Research at the University of Michigan. She has a Ph.D. from the Urban and Regional Planning Program at the University of Michigan. Her research interests include land use planning and transportation system design, non-motorized transportation, and stress during travel.

Methods to reduce social impacts from transportation include special transport services for special populations, traffic-calming street designs, new land use patterns to facilitate non-motor travel and use of public transportation, and traffic management technologies to reduce emissions and improve traffic flow. Yet even with improvements in design and improved traffic management, trends toward increased travel, congestion, and dependence on automobiles for transportation are likely to continue (Downs 1992). This paper addresses the question of whether transportation design, in its current form, is socially sustainable, and examines the issue of how much influence innovative transport design can have on society in coming decades. A summary of social issues related to transportation is presented, and design solutions intended to reduce social impacts from transportation are described and discussed.

Social Issues and Transport Design

The question "is modern transport design socially sustainable?" can be answered in part by examining several key aspects of transportation and society: 1) the transportation needs of special population; 2) the influence of transportation on perceptions of urban space and expectations of urban form; 3) the influence of the transportation system on community spirit; and 4) the health implications of modern transportation.

Transportation for Special Populations

Perhaps the earliest recognized social impact from modern transport in the U.S. was that entire subgroups of the population—who did not have access to automobiles—were left out. They had few options, and special transportation systems had to be devised to support them. We effectively devote a large proportion of the world's resources and generate much of the world's pollution to support only people with auto-mobility. It has long been recognized that transportation facilitates economic activity; so to use resources to provide speedy transport for the most productive segment of our population may seem appropriate. Limited attention is given to people without access to cars, through public transportation and special transit services, in some areas. But these transportation services, in effect, further segregate people without auto-mobility from the rest of society. Current transportation design may result in entrapment to a life of poverty for some segments of the population, while limiting access to basic goods and services for others.

Not only jobs but also services, health high among them, are out of reach of those without transportation...Dealing with an unsound transportation system affects choice, health, welfare and livelihood to further paralyze the poor. (Kay, 1997, p. 42)

A similar sentiment is expressed by Engwicht (1993), in discussion of the plight of handicapped individuals.

When I visited Groningen in the north of Holland, I was only there for three hours yet saw three people in wheelchairs using the streets or bike lanes...The significance of my Groningen experience did not hit me until I reflected on my visit to Los Angeles...I could not recall seeing anyone in wheelchairs using the streets of Los Angeles. Nor could I recall seeing anyone using wheelchairs in Paris or during two days in London. In Groningen, I realized that one of the most insidious side effects of car-based transport systems was its contribution to segregation and the loss of social diversity. (Engwicht, 1993, p. 29)

Sprawling development, and the dependence on automobiles that comes with it, works for people who are mobile, and who can accommodate longer travel distances and more time spent on the road. But we have yet to realize the long-term impacts of current transportation planning on land development and traffic patterns (Manning 1984), so it is difficult to project the impacts of this planning on populations with changing demographic characteristics. In particular, it is unlikely that aging baby-boomers in the U.S. will want to live in large homes on large lots, far from goods and services. Rather, the aging population is more likely to drive less, to drive shorter distances, to avoid highways, and to drive at less congested times of day (Benekohal 1994), but planning efforts rarely consider changing demographic profiles in the design of transportation systems.

Perceptions of Urban Space and Expectations of Urban Form

Several generations of individuals have now been raised in dependence on automobiles for transportation. We lack exposure to alternative ways of living, and this leads to expectations that the current patterns of development and dependence on automobiles for travel will continue. Alternative modes of transportation are perceived as inconvenient and undesirable, and receive little attention in the planning process. Distorted perceptions of space result from high-speed travel, perceptions that influence our expectations of how urban spaces should be arranged, and how they should function to support us. As expressed by Ivan Illich:

Past a certain threshold of energy consumption the transportation industry dictates the configuration of social space. Motorways expand, driving wedges between neighbors and removing fields beyond the distance a farmer can walk...The habitual passenger cannot grasp the folly of the traffic based overwhelmingly on transport. His inherited perceptions of space and time and of personal pace have been industrially deformed...he has lost control over the physical, social, and psychic powers that reside in man's feet...left on his own, he feels immobile. (Illich, 1978, p. 121-122)

In fact, high-speed travel is used to travel longer distances, not reducing the amount of time spent traveling (Manning 1984). So with increased travel distances, and increased congestion, travelers are spending more time in their cars—and more unpleasant time—than they did ten years ago (Downs 1992). In the U.S., the unchanging American dream leads to a continued provision of homes in outlying areas, on large lots, far from commercial and employment centers. We expect more of the same and are resistant to change. Our experiences and resulting perspectives on transportation, in conjunction with the high profits sprawling land development patterns bring to developers, all but ensure further increases in congestion and greater travel times in the future.

Spending so much time in cars, physically removed from our outdoor suburban and urban worlds, also leads to detachment from these areas—a loss of ownership of public space (Engwicht 1993). The appropriate design scale for people traveling in cars differs from that for people traveling on foot (Rappoport 1991). Yet planners tend to choose the scale appropriate for the majority of travelers, losing opportunities to design pedestrian-friendly environments, thus making pedestrian travel less inviting.

Community Spirit

How do current transportation designs affect our community spirit, in the places where we live, work and shop? We are experiencing a rapid change in our landscape, with loss of farmland and open space in outlying areas near suburbs. People have become increasingly segregated, with the poor locked into inner city areas, and the wealthy located in far-off suburbs. Parents bear an increasing burden, as they drive to work, drive to run family errands, and serve as chauffeurs for their children, while living in suburbs that make all of these travel activities still more burdensome by design. The elderly often reside in special facilities, apart from the rest of society. In cities, people can feel quite isolated despite higher living densities and less segregated communities, due to the overwhelming impact of heavy traffic in their midst (Appleyard 1981). And stressful commutes, in conjunction with the anonymity motorists experience, in recent years have led to frequent incidents of violence among drivers.

Community Health

The health implications of modern transport have long been recognized: loss of life, permanent disability, and property damage resulting from auto accidents; long-term health effects from exposure to harmful chemical emissions in congested areas; and the often life-threatening effects of exposure to toxic emissions for people who suffer from respiratory illnesses. Motor vehicle design and roadway designs have been improved to reduce the hazards from driving. And new fuel-efficient technologies are emerging. Yet the increase in the number of vehicles and the larger proportion of minivans and sport utility vehicles with poor fuel efficiencies on the

roadway undermine progress toward improving air quality. Until new technologies for substantial reductions in emissions appear in force, the problems related to auto-generated pollutants will remain. Even then, with greater numbers of vehicles on the road and more miles traveled per vehicle, the hazards from driving and the total level of global emissions attributable to automobiles may not decline, but increase.

Driving-induced stress is also a growing problem. It has been found to elevate drivers' blood pressure levels after commutes in congested areas, and produces still higher blood pressure readings among people with the longest commutes (Novaco, Stokols and Milanesi 1990). Although "road rage" is a common experience, prescriptives to reduce it are targeted only at motorists. We are told to adopt stress-reducing behaviors while driving, and some commuters now telecommute to avoid traffic. Though helpful, these strategies fail to consider change in transportation design as a means to reduce stress.

Transport Design around the World

Many of the undesirable social impacts from automobiles have long been recognized in European cities. There, physical limitations on development led to an earlier call to restrict automobiles in densely populated areas. Innovative traffic control techniques are now used to reclaim a desirable atmosphere on residential streets and to enhance safety for children, pedestrians and bicyclists. Germany has adopted a *traffic-calming* strategy, with 30 kilometer per hour speed limits on some streets, and narrowing of lanes to create space for bike paths and trees. In The Netherlands, the *woonerf* (living yard) is a redesigned residential street with one road surface for all activities—walking, playing, driving and parking. Barriers prohibit through-traffic, landscaping forces cars to weave along the streets, and safe play spaces for children are provided (Homburger et al. 1990). These designs have been very successful, demonstrating that traffic behavior can be influenced by street design, with a positive outcome for people in heavily-trafficked areas (Eubank-Ahrens 1991). Evaluations of these projects have included traffic speed, noise level, air pollution, parking, and street activity, as measures of success.

In Denmark, The Netherlands, and Germany, the temptation to calculate a financial rate of return is usually either resisted altogether, or set within the context of wider evaluation methods which emphasize subjective as well as objective criteria. For the Vinderup through road scheme (Denmark), the finding that 72 percent of residents found the town easier to move about in, for example, was considered to be more relevant to judging overall success than the finding that average motorist journey times had increased by nine seconds...Such investigations help to reveal the true success of schemes in meeting the objectives of traffic calming. (Pharaoh and Russell 1991, p. 104)

Transit villages, also referred to as satellite communities, are being developed in various locations around the world (Bernick and Cervero 1997). In Stockholm, planning for the metropolitan region carried out in the 1940's and 1950's led to establishment of a number of successful small cities on the outskirts, linked to the central city by rail. Within these cities, pedestrian and bicycle travel are common due to careful land use planning, though the majority of employed residents still commute by rail outside of the satellite city to work. Population in each city ranged from approximately 25,000 to nearly 100,000 residents in 1990. Similar patterns of development have been applied around Tokyo and Singapore, and transit villages are now appearing in some locations in the United States. (Bernick and Cervero 1997)

The keys to success in these programs include: 1) attention to social and economic issues in transportation planning; 2) public policy initiatives to generate change; 3) restrictive public control over land development; 4) policies to restrict auto use; 5) incentives for development around transit centers; 6) public relations programs to influence public attitudes about the proposed change; 7) careful design planning; and 8) evaluation of both the safety of the new designs and citizens' perceptions of the impacts of these changes on quality of life and travel experiences.

Changes in Transportation Planning and Community Design in the U.S.

In the U.S., some progress in considering society in transportation planning has been made in areas where citizens have created political forces to fight transportation and land use plans. In Portland, Oregon, citizens' groups rallied successfully in the 1970s and 1980s to limit development and overturn plans for highway expansion. Despite fast growth, planners and legislators in Oregon have worked to create a livable city that supports use of public transportation as well as walking and bicycling, and limits sprawl through establishment of an Urban Growth Boundary (Kunstler 1993; Lassar 1989). Regional governance of the area's development has in large part made possible the successful development of public transportation in the region.

In a growing number of places in the U.S., planners have worked closely with architects to create *neotraditional developments*—communities with central downtowns and mixed land uses that support walking. These land use patterns effectively reduce reliance on the automobile within the development and limit its impact on the community (Nolan 1997; Pollan 1997; Southworth 1997). As compared with most suburban developments, neotraditional communities are more compact and integrated. The designs are patterned after cities built in the early 1900's that we now consider to be traditional neighborhoods in established communities in the United States.

New initiatives to develop *transit villages* are also being promoted with success in many areas (Bernick and Cervero

1997). Public-private partnerships bring commercial development into the area around a mass transit center. Multi-story residential buildings provide housing appropriate for people with different income levels. And residents within the village can travel to and from transit stations on foot. Shopping and entertainment provided within the village afford residents less dependence on automobiles for a variety of activities.

Traffic calming and integration of land uses are key elements in these designs, though several conditions seem to be required for their success: 1) the presence of a public resource widely perceived as worth preserving, or a sense that quality of life for residents of a community should be regained; 2) an initiative on the part of a developer; 3) a public-private partnership to foster economic growth and social health; and, 4) in some instances, coordination between planning agencies at the local and regional levels.

Evaluating Design Solutions for Industrialized Nations

What is the potential for improved transportation system design to positively influence societies? *Traffic-calming* designs do create a more pedestrian scale, though they have only a local effect, and may merely shift traffic to nearby roads. Yet they can benefit all people on the street, especially the elderly, the physically handicapped, and young children who are less able to manage in high-traffic areas. These designs effectively slow traffic, changing perceptions of urban areas, and supporting pedestrian travel. They may also improve community spirit by increasing the aesthetic quality of an area and pedestrians' perceived safety.

Transit villages have the potential to reduce auto travel and improve quality of life in areas where it is pressing to do so, but, again, these developments have mostly local impact and are appropriate only in areas with mass transit. What is striking about transit villages, though, is that in the U.S., a couple have sprung up in the midst of low-income areas. Special efforts have been made to include social issues in the planning process, in community rebuilding efforts in these areas (Bernick and Cervero 1997). More so than any of the other transportation designs discussed, transit villages appear to have the potential to provide physical and economic mobility for low-income groups in cities. And, if properly planned, these communities could provide comfortable housing for people with physical handicaps, and the aging, who would benefit from ready access to mass transit and close proximity to a mix of land uses. Transit villages may improve community spirit by providing a better quality of life for urban dwellers.

Neotraditional designs may be effective in reducing auto travel for the people who live within the community, at least for some trips; but they typically offer few jobs within their borders, and tend to be located at the suburban fringe. They may provide special benefits for families with young children,

as the streets are relatively safe for play and travel by foot. In theory, these designs would also benefit handicapped and aging populations though, for the most part, these neighborhoods are populated by small families. Neotraditional designs may also have a favorable influence on perceptions of street environments, and foster a slower pace of travel within the community. Improved community spirit is a key aim in these projects.

Though each of the proposed solutions has limitations and all are expensive to implement, they can collectively confer significant benefits to modern society. The problem with transportation improvements aimed at reducing congestion, improving traffic flow, or providing alternative travel choices for people who are now heavily dependent on cars, is that these projects may merely siphon off more public funds to benefit motorists, without benefitting people who have limited mobility (Krumholz 1978). And, for a variety of reasons (Downs 1992), it is unclear whether congestion-mitigation technologies will in fact reduce congestion in the long run. Yet, traffic-calming, transit villages and neotraditional designs at least have the potential to benefit all people. Unlike technological systems and special transit services, design solutions for transportation are compelling as, once in place, they have the potential to continue to produce social benefits with minimal upkeep.

Conclusion

There is an indisputable need to change the design of transportation, in conjunction with new patterns for land use development. With a growing desire for change and examples of new transportation and land use designs in place around the world, efforts are now needed to evaluate the effectiveness of these designs from a social perspective. As new technologies such as gasoline-powered fuel cells emerge and are promoted to reduce environmental impacts from automobiles, the focus on social issues may become still more important. In developing nations, in particular, there will be opportunities to embrace gasoline-powered fuel cells, in effect leaping over the internal combustion engine that is now the mainstay in industrialized nations. Although fuel-cell technology may reduce some of the automobile's environmental impacts, it will not reduce the environmental and social costs from construction of supportive infrastructure, nor the environmental impacts from manufacturing of vehicles. The social impacts of developing motorized transportation systems in areas where non-motor travel is an integral part of society should not be ignored. In the industrialized world we face the flip side of this coin—trying to fit public transport and non-motor transport into environments designed only for cars. In the U.S. as compared with other industrialized nations, the lack of regional control over land use development and strict public policies aimed at curtailing the use of automobiles (Downs 1992) may undermine the success of compact and integrated land use development, and successful development of public transit (Bernick and Cervero 1997).

Is the modern transport system sustainable from a social perspective? The material presented here suggests the social costs of modern transportation design are increasing, and that many cities in their current form will not remain socially or economically sustainable. Pressure to find alternatives and reduce the stress of driving will likely grow with increasing traffic. Even with innovations in design, the impacts of the patterns of development that are now established will persist well into the future. It will be some time before we understand the extent of the influence of new transport designs and land use patterns on society. If these new developments and redesigned environments become merely oases or refuges for suburbanites who commute daily in congested conditions, then the success will be only partial. But if these new designs are embraced along with comprehensive efforts to steer land use development and transportation design away from further dependence on automobiles, and to desegregate society, then the impacts may be far-reaching. It seems quite plausible that as exposure to alternative designs increases and the elements of successful designs become established, the demand for these alternatives will also grow, and the political and economic support for them will also likely increase.

References

- Appleyard, Donald. 1981. *Livable Streets*. Berkeley, CA: University of California Press.
- Benekohal, Rahim F., Richard M. Michaels, Eunjae Shim and Paulo T. V. Resende. 1994. Effects of aging on older drivers' travel characteristics. *Transportation Research Record*, No. 1438, pp. 91-98.
- Bernick, Michael and Robert Cervero. 1997. *Transit Villages in the 21st Century*. New York: McGraw-Hill.
- Downs, Anthony. 1992. *Stuck in Traffic*. Washington, D.C.: The Brookings Institute. Cambridge, MA: The Lincoln Institute of Land Policy.
- Engwicht, David. 1993. *Reclaiming our Cities and Towns. Better Living with Less Traffic*. Philadelphia, PA: New Society Publishers.
- Eubank-Ahrens, Brenda. 1991. A closer look at the users of Woonerven. In *Public Streets for Public Use*, ed. Ann Vernez Moudon, 63-79. New York, NY: Columbia University Press.
- Homburger, Wolfgang S., Elizabeth A. Deakin, Peter C. Bosselman, Daniel T. Smith, and Bert Beukers. 1989. *Residential Street Design and Traffic Control*. Englewood Cliffs, NJ: Prentice-Hall.
- Illich, Ivan. 1978. *Toward a History of Needs*. New York, NY: Pantheon Books.
- Kay, Jane Holtz. 1997. *Asphalt Nation*. New York: Crown Publishers.

Kunstler, James Howard. 1993. *The Geography of Nowhere*. New York: Simon and Schuster.

Krumholz, N., J. Cogger, and J. Liner. 1978. Make no big plans...Planning in Cleveland in the 1970's. *Planning Theory in the 1980's*. New Brunswick, NJ: Center for Urban Policy Research, Rutgers University, 1978.

Lassar, Terry Jill. 1989. *Carrots and Sticks: New Zoning Downtown*. Washington, D.C.: Urban Land Institute.

Manning, Ian. 1984. *Beyond Walking Distance*. Netley, South Australia: Griffin Press, Ltd.

Nolan, William L. 1997. The new American neighborhood. *Better Homes and Gardens*. September, pp. 42-56.

Novaco, Raymond W., Daniel Stokols, and Louis Milanese. 1990. Objective and subjective dimensions of travel impedance as determinants of commuting stress. *American Journal of Community Psychology*, vol. 18(2), pp. 231-257.

Pas, Eric. 1986. The urban transportation planning process. In *The Geography of Urban Transportation*, ed. Susan Hanson, pp. 49-70. New York, NY: Guilford Press.

Pharaoh, Tim M. and John R. E. Russell. 1991. Traffic calming policy and performance: The Netherlands, Denmark, and Germany. *Town Planning Review* 62 no. 1: 79-105.

Pollan, Michael. 1997. Town-building is no Mickey Mouse operation. *The New York Times Magazine* December 14, pp. 56-63 ff.

Rappoport, Amos. 1991. Pedestrian street use: culture and perception. In *Public Streets for Public Use*, ed. Anne Vernez Moudon, 80-92. New York, NY: Columbia University Press.

Schaeffer, K. H. and Elliott Sclar. 1980. *Access for All*. New York: Columbia University Press.

Southworth, Michael. 1997. Walkable suburbs? An evaluation of neotraditional communities at the urban edge. *Journal of the American Planning Association* Winter, pp. 28-44.

