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**The Place of Bicycle Transportation in Modern Industrialized Societies:  
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## **1 Bicycle Transportation in Urban History**

While nearly all older cities were on waterways, because water was needed both for consumption and for transport, the internal transport was by foot and animal. This limited the possible extent of the city to that within the range of pedestrian or equestrian travel. Aside from steep hills and the waterways, the city spread out in all directions as people walked.

This situation existed for thousands of years, only slightly improved as wheeled transport improved. The advent of steam rail after 1830 enabled those cities that had growth potential to grow out along the rail lines. The operational conditions of rail dictated that the rail system be largely radial, with spokes converging on the place that attracted all users, the urban center, which further developed in size and importance because of the goods and people brought in by rail. Any enterprise situated in the urban center had access to more goods and more people than any enterprise situated elsewhere; hence the growing importance of the urban center and of the ability of rail to concentrate goods and people there.

Steam rail could not run along streets; it had to have its own right of way (very few were elevated). Horse drawn mass transit filled in the gaps between rail spokes until the spokes became too far apart as distance from the urban center increased, leaving green wedges between rail lines. The application of electric power enabled

rail to go underground and speeded up street railways. These enabled the service area of the urban core to grow in size, but still limited the further growth to the radial pattern dictated by the high-speed rail lines.

Out in the rural areas, transportation was along the long-distance rail lines, where these existed, with horse drawn traffic to and from the nearest rail station.

The physical characteristics of rail set the initial pattern, but we now understand that that was just a special instance of the pattern enforced by the socio-economic characteristics of mass transit. We can usefully divide the mass personal transportation service into three types, largely depending on location and distance: long distance, suburban, and local. Long distance connects urban centers and is served by a mix of fast and medium-speed services. Suburban connects suburbs with their urban center, and typically has medium-speed service. Local both connects suburbs to each other and serves as feeder to whichever suburban and long-distance stations exist in its area; it provides low-speed service.

Into this pattern, about 1890, came the bicycle, a personal road vehicle both faster and cheaper than horses, not constrained by the route and timetable limitations of rail, but limited in carrying capacity. The bicycle filled in the gaps between the long-distance and suburban rail lines, competing against the local services, and even against the suburban services. People rapidly

adopted cycling, both for recreation and transportation, within its scope. However, the bicycle's limitations in carrying capacity, personal fitness, speed relative to suburban and long-distance services, clothing, and weather protection prevented suburban growth into areas that would have to depend on bicycle transportation. Urban growth patterns were still constrained by the rail network.

For those purposes within its capabilities, the bicycle served well in this urban pattern. Distances between desired origins and destinations were reasonable for daily transportational cycling, and distances between suburbs, and between a suburb and open or rural areas, were reasonable for weekend recreational cycling.

Into this pattern, about 1910, came the automobile, a personal road vehicle much faster than anything else, unconstrained by the route and schedule limitations of rail, and capable of carrying nearly every load needed by a household. As such, the automobile was capable of providing a completely new service, but it took time for the conditions to develop that enabled that service to be used. The automobile allowed two types of change: it allowed suburban housing to be built outside the reach of mass transit, and it allowed the establishment of activity connections between the radial rail lines. However, it was not until after World War 2 that there was sufficient prosperity and population growth to allow cities to grow in the way that the automobile's service allowed.

Suburban rail survives the impact of the automobile in those locations where the urban center is sufficiently attractive, though congested, as in New York City. Those who live in rail suburbs and work in the urban center are still well served by suburban rail, but these have become a smaller proportion of the working population. Indeed, in a very few cases, new suburban rail services were built to support an existing urban center, as BART was built to support downtown San Francisco. The growth pattern allowed by the automobile's abilities spread out to greater distances from the urban center and allowed the establishment of activity connections between suburbs on different rail lines, and between those not on any rail line at all. The growth allowed by the automobile made two big changes. It transformed the urban pattern from a radial pattern to a network pattern, and it greatly increased travel distances.

The network pattern also suited bicycle transportation, which had first used that pattern, but the much longer distances discouraged bicycle transportation. The greater speed of the automobile, its greater and more flexible carrying capacity, its suitability for multi-purpose, multi-stop trips, its ease and comfort, all caused most bicycle riders to switch to motoring for all trips, and some small number to switch many trips to motoring.

## 2 Utility of Bicycle Transportation in Modern Society

In this discussion of bicycle transportation, the qualification must always be made that the use is within its limitations and, in many cases, is contingent upon adequate bicycle parking. Bicycle transportation is competitive with other transportation modes:

- 1: Local mass transit.
- 2: All transportation in congested urban areas. That niche is served by bicycle messengers, but you don't see, in the same areas served by numerous bicycle messengers, the attorneys whom they serve traveling to court or to offices of other attorneys by bicycle; concerns about clothing and prestige prohibit such.
- 3: Walking, but very few trips, except in congested urban centers, are pure walking trips.
- 4: Urban motor trips when congestion and inconvenient parking make motoring too slow and inconvenient. This is the condition in the old walking cities that are praised as the prime examples of modern bicycle transportation. In those cities motoring and parking are so inconvenient that the choice is between walking and cycling, and cycling wins by being a bit faster, but insufficiently fast to muss up the urban clothes used in those climates. Amsterdam is the prize example of these.
- 5: Walking and local mass transit when those are the choices for those without immediate access to a car.
- 6: Motoring and walking to locations where car parking is by permit only and where style of clothing is largely optional, as on many university campuses.

As you can see from the above, when combined with the performance limitations of bicycle transportation, the uses which are competitive in modern society are no more than niche uses. The widest niche is probably that for those without

immediate access to a car who would otherwise use local mass transit. For many of these trips, the clothing restrictions are not stringent and the distances not too great. However, many of these users do not look favorably upon cycling, but rather as an imposition forced upon them by the absence of car access. Some look forward to becoming able to buy a car, others look to becoming of age to drive, while still others look to a change in residence and employment, as when graduating from college. There are those also for whom motoring is no longer allowed, for whatever reason.

It has become more and more apparent that the utility of bicycle transportation in modern society has to be evaluated by non-transportational criteria. The two criteria most often suggested are environmentalism in its anti-motoring form and pure enjoyment, either for the immediate pleasure of cycling during the work week or for maintaining the physical condition necessary for enjoying weekend cycling.

The anti-motoring bicycle advocates look on highway travel as both dangerous and unpleasant; motoring because it endangers the environment and produces unpleasant, time wasting, and expensive sprawl; bicycling because it is done near motorists. They concentrate on getting government to produce facilities that people think are safe and pleasant, in the belief that motoring is so unpleasant that people will flock to safe and pleasant bikeways, once these are produced. Their antipathy to motoring is not reflected in the population in general; most people appreciate the value of the motoring that they have to do, and, once bikeways get produced, very few people switch any significant proportion of trips from motoring to cycling.

Cycling for enjoyment has a long history. In the USA, the nation where motoring first superseded bicycle transportation, from perhaps 1920, those persons who cycled for enjoyment cycled ten to twenty times further per year than the average American bicycle rider, and they kept participating in cycling for many more years than the average American bicycle rider. Of course, those persons who cycled for enjoyment also cycled for transportation, partly because they enjoyed cycling and partly because cycling during the working week kept them in physical condition to enjoy the weekend cycling. Cycling by those who

enjoy cycling has had its ups and downs. It was down in the 1920s, up in the Great Depression and until 1950, down in the 1950s, up again in the 1960s and 1970s, coasted in the 1980s, and again gained in the 1990s.

### **3 Demography of Transportational Cyclists**

This paper does not directly address the pure recreational cyclists who only rarely and incidentally perform transportational functions by bicycle. By definition, their activity is outside a discussion of bicycle transportation. However, these persons inject their desires into transportational planning, as is discussed below under social attitudes. Most such persons desire to enjoy themselves in locations as far removed from motor traffic as possible. Indeed, for many of them their recreational bicycling activity involves considerable motoring to reach their desired locations. Their desires should be considered under park and recreational issues rather than transportational issues and transportation budgets.

Those who cycle for transportation to any significant extent can be divided into the voluntary and involuntary cyclists. The involuntary cyclists are those who have little other choice for personal transportation. Such are those under driving age, those attending universities where they either do not have cars or where motoring to campus is restricted, those without sufficient money to afford motoring, those unable to obtain or retain a motoring licence, those who live in the few American urban centers where motoring is very inconvenient. These are all niches with little significance. In some ways the most significant are those under driving age, but today a large proportion of such persons are chauffeured by adults in the interest of safety from various dangers. Those without sufficient money to afford motoring ought to be a significant group, but few of them use bicycle transportation. Those who do, obtain significant benefits from their activity, being more able than others in their economic position to reach a greater variety of destinations at a greater variety of times.

Voluntary cyclists do not respond to the niche considerations above. They recognize that the activity of bicycle transportation rarely provides transportational benefits and generally incurs transportational disadvantages. They

accept the transportational disadvantages as the price they pay for their enjoyment of cycling. Transportational cyclists have need to start and end their trips in the same locations as motorists. Transportational cycling, practically by definition, involves cycling, on a regular basis, in areas and along routes with motor traffic. The planning and engineering consequences will be discussed below.

People who choose to perform transportational cycling have certain personal characteristics. One characteristic is that they do not have the typical exaggerated fear of motor traffic; those who do just don't participate in voluntary transportational cycling. That leads to another characteristic, that they are willing to participate in an activity that most people consider to be unduly dangerous and suitable only for risk-taking odd-balls. That is not the only social disadvantage. Participating in bicycle transportation is seen as an activity of odd people, involving being seen in peculiar clothes (even though these are changed upon reaching the destination), and often involves limitations in social activities associated with employment. Even though bicycle transportation usually requires a higher than usual degree of physical and emotional fitness, transportational cyclists are seen as unwilling, or unable, to participate in the career-advancing social conformity of the workplace.

One might think that the physical activity portion of transportational cycling would appeal to those whose working activities involve physical fitness. That is not so. The physical laborer has enough at work to satisfy his needs; it is the desk worker, and particularly the intellectual laborer, who feels the need for the physical activity that his work does not provide.

This analysis provides the basis for these characteristics of typical voluntary transportational cyclists.

- 1: Work in professions in which technical excellence is valued above conformity.
- 2: Prefer to think for themselves.
- 3: Think in objective terms.
- 4: Rarely have to be involved in persuading people (as opposed to participating in objective discussion).
- 5: Are inclined to be physically active.
- 6: Are not frequently required to travel during the work day or for multi-day trips.

Therefore, voluntary transportational cyclists are more likely to be found among professors, scientists, engineers, technicians, attorneys, doctors. Voluntary transportational cyclists are less likely than usual to be found among salesmen, preachers, and politicians.

Cyclists motivated largely by anti-motoring ideology constitute one other class of voluntary transportational cyclist. Such persons are also undaunted by being considered odd; this may be mitigated by their belief that a far larger proportion of the population agrees with their ideology than is actually the case. Their objection to automobiles means that they retain, probably even exaggerate, the typical public fear of same-direction motor traffic. The combination of their fear and their anti-motoring ideology requires that they advocate bikeways. They believe that a large proportion of the general population desperately wants to switch from motoring to bicycle transportation, but is deterred largely by fear of same-direction motor traffic. Bikeways, they recognize, reduce the fear of same-direction motor traffic. Therefore, they believe, the provision of bikeways will cause a significant switch from motoring to bicycle transportation.

These anti-motoring cyclists, because they are very strongly motivated by their ideology, form the majority in the bicycle advocacy organizations and make the most noise about bicycle transportation. In this they are supported by that portion of the urban planning profession that seeks to reduce motoring. However, the arguments of the anti-motoring cyclists have failed to find validity. Their arguments about traffic safety and bikeway design are contrary to the known facts and established principles of traffic operation. Their arguments that a motoring lifestyle has been foisted on the public by a conspiracy of automotive and developer interests have not received credibility. Their arguments about the public's dissatisfaction with motoring and the disutility of motoring, and about the public's willingness to switch from motoring to bicycle transportation, have been disproved by the failure of any significant switch once bikeways have been provided.

However, failure on all the facts and reasoning has not, so far, reduced the fervor with which the anti-motoring cyclists advocate their agenda. They are reduced to emotional arguments which they advance with fervor, transforming what ought

to be objective discussions concerning transportation facts into discussions of motivations, in which neither side can agree with the other.

## 4 Motives for Trips

Voluntary transportation cyclists choose which trips to make by bicycle according to their needs and desires. Their prime motivation is the enjoyment of cycling. This enjoyment in cycling causes them to want to travel by bicycle when that is possible and does not have undesirable characteristics. Under most circumstances, the ability to travel as fast as one desires is a large element in the enjoyment. Being forced to ride slowly, or with many delays, destroys the enjoyment. For many cyclists, the physical conditioning produced by cycling is a secondary motivation. This is not because physical conditioning is, itself, a secondary goal, but because the physical conditioning produced by frequent cycling, much of which has to occur during the working week, enables the cyclist to enjoy the weekend trips that are entirely for enjoyment. As with enjoyment, being forced to travel slowly, or with many delays, prevents the physical conditioning effect. The voluntary transportation cyclist who considers a trip that would involve slow cycling with many delays chooses to make that trip by car, in less time, so that he can use the time saved for a non-transportation trip that provides both enjoyment and physical conditioning.

## 5 Types of Trips and Routes

Transportation cyclists have the same travel purposes as other people. Therefore, their transportation cycling trips follow much the same pattern as typical personal trips. However, voluntary transportation cyclists select those trips that they choose to make by bicycle from among those that are cycling possible, according to how well those trips match their needs or desires about cycling and trip purpose.

For most people, the time required to travel is a significant personal cost; they choose to travel by the quickest route. Cyclists are no different; they frequently choose the route that takes least trip time. Since one of the joys of cycling is the pleasure of moving along as fast as one wants, cyclists choose routes that allow them to maintain their desired speeds with few delays. These two

characteristics determine the high priority that voluntary transportation cyclists place upon direct routes with few interruptions, which means, in the great majority of cases, traveling along major arterials.

However, different criteria apply when time is not important. For most people, time is more important when going to work than when returning from work. Therefore, voluntary transportation cyclists are more likely to choose the direct route with short travel time to go to work, while having a greater tendency to choose a longer route after work. If the longer trip is to accomplish some typical purpose, such as shopping, then the cyclist tends to select the shortest trip, much as a motorist would, and therefore selects a typical street route.

For cycling purposes, voluntary transportation cyclists select among the longer routes for the return trip according to the enjoyment that is provided. This involves the ability to ride as fast as desired with few delays, but also with challenging hills if such are available. While this criterion ignores motor traffic, it also tends to select routes with heavy traffic, simply because these routes allow traveling as fast as desired with fewest delays. An exception is for climbs along residential streets, because a significant climb reduces the fastest cycling speed to much less than that of the normal motor traffic on those streets.

## 6 Appropriate Cyclist Behavior

"Cyclists fare best when they act and are treated as drivers of vehicles." (Forester, 1993) Our roadway designs and our traffic laws have been developed so that vehicles driven by humans can operate according to the best blend of safety and convenience. Bicycles, while being narrower and slower than typical motor vehicles, still operate according to the same physical laws as other vehicles, and cyclists have the same abilities in vision, perception, reaction time, and understanding as other humans. Trying to operate a bicycle on a roadway according to a different set of traffic laws than are obeyed by other drivers causes confusion, delays, conflict, and collisions.

People have tried to invent safer ways of operating bicycles than obeying the rules of the road for drivers of vehicles, but all such efforts

have failed. Such systems involve either greater inconvenience or greater danger, often both together because greater inconvenience encourages dangerous short-cut practices.

## 7 Facilities for Bicycle Transportation

The appropriate facilities for bicycle transportation are well-designed and well-maintained standard roadways with width adequate for the amount of traffic that chooses to use them. Generally, this means adequate width in the outside through lane for motorists to overtake cyclists without delay. The mechanical characteristics of bicycles require smooth road surfaces that do not have cracks or slots parallel to the direction of travel (such as parallel-bar drain grates, gutterpan joints, and street railway tracks), and require the figure-eight type of induction-loop traffic-signal sensor. Beyond that, there is little to be done.

There is need for adequate end-of-trip facilities. Voluntary transportational cyclists ride good bicycles; riding clunkers destroys the joy of cycling. In all nations in which bicycle transportation is popular, bicycle theft is a problem. In the Netherlands, where the ancient urban design enables slow cycling to be faster than both walking and motoring, transportation is by clunker bicycle, at least partly because of the theft problem. In the U.S.A., where distances are greater, there is more need for good bicycles, and, therefore, greater need that bicycle parking be safe. Those who would be voluntary transportational cyclists won't participate unless they can markedly reduce the probability of theft. In many cases, that means keeping their bicycle close to them, either in their offices or, at least, in areas occupied by their employers, or, for short duration visits, wheeling their bicycles with them into those shops that permit.

End-of-trip facilities for regular voluntary transportational cyclists also include space for changing clothes and storing them, and, preferably, showering before work. The summer cyclist in much of the American climate, even after entering air-conditioned space, will drip sweat onto the documents on his desk for twenty minutes, and this is socially unacceptable.

## 8 Appropriate Societal Attitudes

The societal attitude appropriate toward transportational cyclists is acceptance of lawful, competent road behavior (as drivers of vehicles) as a reasonable and legitimate means of highway transportation, and social acceptance of them as reasonable persons whose activity, while uncommon, is as acceptable as playing tennis.

## 9 Actual Societal Attitudes

The actual societal attitude is very different from that which is appropriate. The strongest part of the general societal attitude is based on the exaggerated fear of same-direction motor traffic. Cyclists cannot protect themselves from being hit from behind by same-direction motor traffic. Since that type of accident is supposed to be extremely frequent, most people regard cyclists who ride "in traffic" as having a foolish disregard for danger, which is not at all a personal recommendation. The exaggerated fear of same-direction motor traffic also causes people to believe that the cyclist's prime duty is to stay out of the way of the motor traffic that might, even will, kill him. Thus society justifies "curb hugging" by the cyclist, bike-way building by society, and harassment of cyclists by individual motorists, all in the name of bicycle safety. Society considers that cyclists don't really belong on the roadway; for their own safety they shouldn't be using it, but are suffered to be there when nothing else is available.

Typical cyclists don't have any different view of themselves. They ride with feelings of guilt for using the roadway at all, more guilt for not always staying as far away from the cars as possible, and fear of those cars coming from behind. They fear that obeying the traffic laws for drivers of vehicles greatly endangers them, because doing so puts them out among the cars. Therefore, they believe that there is no good law for cyclists to obey and no skill for them to learn, aside from staying as far away from the cars as possible.

Voluntary transportational cyclists are least likely to suffer from this condition, called the "cyclist inferiority superstition"; if they had it, they wouldn't choose to cycle for transportation, and, once they learn from experience, they realize that motorists treat them right if they obey the rules of the road for drivers of vehicle.

The actions of cyclists affect the general societal attitude towards them. The typical incompetent and unlawful behavior of most cyclists reinforces the public feeling that cyclists don't belong on the road and cannot, and should not, obey the standard traffic laws.

Bicycle advocates are a group that the public fails to distinguish from the lawful, competent cyclists who are most frequently found among the voluntary transportation cyclists. The public incorrectly refers to both groups as "professional cyclists". Many hundreds of bicycle advocates are professionals; fewer than half a dozen American voluntary transportation cyclists support themselves through cycling activities. The bicycle advocates, both professional and amateur, are largely motivated by the environmentalist anti-motoring agenda, and see bicycle transportation as competition against motoring. To compete effectively, bicycle transportation must be attractive to the general public with its prevalent cyclist inferiority superstition. Thus, bicycle advocates' primary goal is physical protection from same-direction motor traffic, which means bikeways, with little care for anything else. There is obviously a close psychological link between the general fear that motoring will destroy our environment and the specific fear that cars from behind endanger you personally.

## 10 Bicycle Transportation Controversy

The bicycle transportation controversy is between those cyclists who recognize that it is in their best interest to act as drivers of vehicles, and to be treated as such, and the rest of society, which believes the cyclist inferiority superstition that it is dangerous for cyclists to obey the traffic rules and that bikeways make cycling safe for those who don't obey. This controversy goes back to 1970 and before. For a more detailed history, see Forester, 2001. Suffice it to write that the vehicular-cycling view has all the scientific and engineering support while the cyclist-inferiority view has only emotional support. Despite this imbalance, the cyclist-inferiority superstition has the political dominance. Most of the voting population are motorists, and the cyclist-inferiority superstition is a most convenient belief for motorists, because it provides safety and moral arguments for clearing cyclists from the roadways that motor-

ists think are theirs. Inventing and promoting the cyclist-inferiority superstition was done by the motoring organizations from the 1930s on, all in the name of bicycle safety. This resulted in the first official bikeway program in the U.S.A., in California in 1970, with the intent to control bicyclists. Only after this initial effort by motorists became public did the environmentalist anti-motoring groups recognize that this program, based on the cyclist-inferiority superstition, had the potential to encourage bicycle transportation in competition against motoring. This unlikely alliance in the bikeway program of motoring organizations and anti-motoring organizations has powered the governmental program for bicycle transportation ever since. That is why there are so many professionals in bicycle advocacy; building bikeways is the bicycle transportation program that the government pays for. Two official types of bikeways affect bicycle transportation: bicycle paths and bicycle lanes.

Bicycle paths have two sets of dangers, from their own traffic and from motor traffic. Bicycle paths are places where few users obey traffic rules, Therefore the maximum safe speed, when other users are present, is little more than walking speed, a condition which eliminates practical competition against motoring. Bicycle paths must intersect roadways; where they do, they defy standard operating rules and require, for safe operation, traffic signals with additional phases. Bicycle advocates praise such signals, ignoring the fact that the new phases delay all traffic by increasing the delay before the appropriate phase occurs, delays that would not be necessary without the bicycle path. Bicycle paths may be largely remote from motor traffic, such as along lake fronts, but such locations are too few to form a transportation network. For practical transportation by bicycle path, the paths must be alongside normal roads, a type named sidepaths. Sidepaths are so dangerous, because of the numerous locations for crossing traffic (both driveways and roadways) that they are the only type of bikeway that the bikeway safety standards warn against. It is impractical to install the multiplicity of many-phased traffic signals that would be required to make a sidepath system safe, and the delays would be enormous.

Bicycle lanes are not as dangerous as bicycle paths. Indeed, the standard advice to lawful, competent cyclists is to ride properly by ignoring the presence of the bicycle-lane stripe. Depending on the jurisdiction, this may involve disobeying the

law, and it often entails vocal criticism by motorists, but these problems, in practice, are not very significant. The problem with bicycle-lane stripes is more psychological; they demonstrate social support for the superstition that the stripe makes cycling safe, which is another demonstration of the cyclist-inferiority superstition. Thus bicycle-lane stripes both demonstrate the policy that cycling is not approved on roads without bicycle-lane stripes, and that the cyclist has no need to learn proper and safe cycling technique as the driver of a vehicle. The slight additional dangers are when the cyclist is misled by one of the typical design errors, or the motorist is misled by trying too hard to stay out of the lane when he should be occupying that space. In each case, both need to exercise slightly greater skill to know when to disobey the stripe.

However, the original claim was that bicycle lanes would make cycling safe for the beginning cyclist. Nobody ever put substance behind the argument that it takes less skill to ride on bikelaned streets than on normal streets. Analysis of the skills required demonstrates that the cyclist needs all the normal skills on a bikelaned street and, in addition, needs to know when to disobey the strips. Despite three decades of trying, bikeway advocates have never been able to demonstrate that bicycle lanes reduce car-bike collisions.

Bicycle-lane advocates always confuse the presence of the stripe, which is what defines a bicycle lane, with the presence of adequate width of roadway. The result is that there is political pressure to avoid widening a road to be suitable for all the traffic that desires to use it unless the additional width is striped as a bicycle lane. An outside through lane that is sufficiently wide for motorists to overtake cyclists both provides the efficiency and convenience desired by both parties without also introducing the legal and psychological problems inherent in the stripe. Such are called wide outside lanes.

As you can understand, bicycle advocates roundly dislike vehicular cyclists. This is because vehicular cyclists demonstrate that bicycle transportation is best done on good roads with adequate width, roads that have not been altered to suit the cyclist-inferiority superstition. This position angers the bicycle advocates because it controverts their expectation that bicycle transportation can be made sufficiently popular that it will signifi-

cantly reduce motoring.

## 11 Effect of Bicycle Transportation

The vehicular style of cycling is in the best interests of cyclists, while the bikeway program is against those best interests. Therefore, one would think that a vehicular-cycling policy would encourage an optimum amount of bicycle transportation. This view is opposed by the bicycle advocates, who claim that motoring and the lifestyle it allows are so distasteful to so many people, and that bicycling is so attractive, except for the dangerous presence of motor traffic, that, if bikeways are provided, a transportationally significant proportion of motor trips will be switched to bicycle trips.

After thirty years of bicycle advocacy, it should be obvious that the claims of the bicycle advocates have not held up. Yes, there is a correlation between the amount of bicycle transportation and the presence of bikeways, but the causal effect is more likely the other way round. That is, the social and urban conditions favorable to bicycle transportation produce sufficient bicycle transportation to enable the bicycle advocates to prevail upon government to produce bikeways. The personal automobile provides such useful transportation that few who have taken advantage of it find justification for foregoing its use. Meanwhile, those who enjoy cycling continue to use bicycle transportation when they are willing to accept its transportational disadvantages as the price they pay for the joy of cycling, either on that trip or as preparation for later joyous trips.

Current trends are indicating this conclusion. Fewer of the general public are using bicycle transportation and sales of the type of bicycles that they buy are flat or declining. Meanwhile, sales of the type of bicycle used by voluntary transportation cyclists and other enthusiastic cyclists are increasing. Surely some of these bicycles are being used for urban transportation, for the two reasons that I have given above. That is, for the immediate enjoyment of the trip, once the exaggerated fear of traffic is overcome, and for maintaining physical condition to enjoy other trips later.

In several respects, one can describe the cycling attitudes of these enthusiastic cyclists as



conservative. They accept the modern city with automobile traffic as its dominant form of transportation. They recognize that the traffic laws largely provide for safe and efficient movements by all drivers of vehicles, thus protecting them. They understand that they need to use the skills of drivers of vehicles when cycling. They advocate those improvements to the road system that enhance their operation as drivers of vehicles. Contrariwise, they do not expect cycling to replace motoring, and they oppose the governmental program of incompetent cycling on bikeways that is intended to facilitate that change. They oppose the unlawful mass demonstrations that are supposed to demonstrate the political power of cyclists to demand that change.

## 12 Conclusions

We may reasonably reach certain conclusions regarding bicycle transportation in the modern industrial society. One is that bicycle transportation will form only a small niche in a transportation picture that is dominated by private motor transportation. The governmental bikeway program that is intended to stimulate bicycle transportation will have no greater effect in the future than it has had in the past, and quite likely less effect considering the ongoing suburbanization. Part of the bicycle transportation will be done by those who have small access to automobile travel, and those persons will give it up as soon as they can obtain ready access to a car. Another part will be done by those who live in congested urban centers where motoring is very inconvenient; whether or not this will increase or decrease depends on the future of such urban centers. The third part of bicycle transportation is being done, and will continue to be done, by those who enjoy cycling activity. Such cyclists are best served by good quality conventional roads and a social and governmental policy that treats them as well as it treats other drivers of vehicles. Whether the failure of the anti-motoring program of bicycle advocacy will allow government and the leaders of society to change to such a vehicular cycling policy remains to be seen. The trend that voluntary transportation cycling is being done by an increasingly respected and conservative portion of society and in an increasingly conservative way adds hope for that transformation.

## 13 References

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