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## DOOR-TO-DOOR TRANSIT

by Melvin M. Webber

### I

Much of the debate surrounding the appropriateness of one transport mode over another has been couched in the language of hardware systems. In some respects, that is no doubt merely a shorthand way of describing operating characteristics of alternative modes. And yet, although it is the variances in operating service characteristics that are important, these tend to get neglected in the shorthand ways we speak of transport modes and in the passions with which we promote them.

I shall want to argue here that there are no inherent values attached to the auto-highway system, or to rail systems, or to buses, or to any other hardware system per se. Each system may be instrumentally valuable in a given urban setting, but only as it happens to match land use and density patterns and as it happens to match travel patterns and preferences of people living in that specific city. Gross transplant of hardware systems from one city to another, without place-specific analysis of land use patterns and travel behavior and without careful matching of operating service traits of transport modes, is guaranteed to lead only to gross error. No single mixture of transport mode is appropriate to all city settings; for cities differ in their

spatial structures.

I offer these propositions as fundamental principles of transportation planning, and I observe that these principles are being violated in city after city around the world. For reasons that are somewhat opaque, civic leaders promote high-speed urban highways in places where they are operational misfits; others promote underground rail systems in places where they are incapable of attracting mass patronage; still others nowadays are pushing trolley cars with virtually zero rationale behind them.

I make these assertions after having observed a lot of transport investment mistakes in a lot of cities in a lot of countries, and (I must say), after having been associated with one major mistake in my own metropolitan area. Having been involved in the initial design and then in the post hoc evaluation of the BART system, I am particularly sensitive to the fragility of the high-confidence that accompanies initial enthusiasm and promotion of major public works of these sorts. No matter how sure we are that our preferred hardware system is the best, the operational test that comes after the investment has been made is the telling one. Some of these investments are proving to be among the most costly ever made in urban settings; and some of them are proving in retrospect to have been outright mistakes.

As a result of the post hoc evaluations of the BART system we now know a few things some of us did not know

before it was built.

Let me enumerate a few propositions that I now believe are tenable.

1. Commuters choose among available transport modes mostly on the basis of comparative money costs and time costs for the total commute trip, door-to-door. Other attributes, such as comfort and privacy are trivial as compared with expenditures of dollars and minutes.

2. Commuters charge up the time spent in waiting for and getting into a vehicle at several times the rate they apply to travel inside a moving vehicle. This means that the closer a vehicle comes to both a commuter's house and workplace, the more likely he is to use that vehicle rather than some other. It also means that the fewer the number of transfers between vehicles, the better.

3. Large-vehicle systems are most appropriate in cities having high-density concentrations of commuters at both the residential end and the employment end of routes. Small-vehicle systems are most appropriate to low-density situations, especially where origins and destinations are spatially dispersed.

4. In those cities having ubiquitous networks of roads and freeways, high automobile-ownership ratios, and low-density settlement patterns, it may be too late deliberately to induce high-density settlement by using high-capacity

transit systems to reshape land markets. Most cities of the U.S. West that were built since the 1920s and, thus, since mass automobile use, have evolved in low-density patterns. Their overall spatial structures are probably as firmly fixed as are the structures of the old central cities of Europe and the U.S. East Coast. (And, I might add, they are equally viable urban forms.)

5. The costs of rail rapid transit systems are proving to be extraordinarily high, making for individual trip costs that are exorbitant. In turn, they are commanding subsidies that are higher than those demanded by other modes.

6. I am therefore led to draw the more-general conclusion that large-vehicle systems cannot provide the patterns of spatially dispersed travel services that commuters in the newer, Western and Southern metropolitan areas call for. Transport modes and services suited to low-density and dispersed origins and destinations are more likely to work well. Buses of various sizes offer one such option. Automobiles offer another.

## II

A lot has been written about the American's peculiar love-affair with the automobile, as though it were mere affection or fascination that has led to the dominance of private cars over all other modes of urban transport. But the auto is certainly not an American phenomenon. It is as

popular elsewhere in the world as it is here. Whether in the highly developed nations of Europe or the least-developed nations of Africa and Asia, people who can afford cars buy them and use them, seemingly with more emotional passion than Americans do, but probably for the same reasons, nevertheless. Autos are popular because they offer better transport service in some urban situations than do other modes. The key to the auto's popularity is its capacity to furnish door-to-door, no-wait, no-transfer service. In competition with other transport modes in low density places, it usually wins hands down--mostly because travel time from origin to destination is typically shorter than via other modes and because money costs, although not low, are tolerable.

Travel-times are short because a car that is available for an individual's exclusive use sits patiently waiting outside his door and is immediately accessible--always on call, as it were. Where parking is available at both ends of a trip, as is common in low-density cities in the U.S., the car promises door-to-door accessibility. Where traffic flows freely, it promises a high-level of mobility. Money costs are tolerable because the use of automobiles is subsidized. U.S. motorists are charged a modest gas-tax fee to cover most costs of road-building, while the heavy costs of congestion and of air and noise pollution are not directly charged to the motorists who generate them. It is scarcely any wonder, given the car's inherent advantages and the

imposition of some of its operating costs on others, that it has become the preferred mode of transport for so many. It seems to be as popular in places like Mexico City where mass auto use has generated levels of congestion and air and noise pollution that 19th Century Pittsburgh steel workers would have found intolerable.

Of course, there are still a great many for whom discretionary use of a car is at best a dream. About a third of the U.S. population is not licensed to drive, most of them because they are physically incapable of doing so--they are either too young, too old, or too handicapped; perhaps a fourth of them are simply too poor to own cars, even though auto-use is underpriced. In any case, only two thirds of Americans are now able to drive, but not all of them have full discretionary use of cars. About half of U.S. families still have only one car, and all members of the family must share it. So, even though automobiles are dominant over all available personal transportation modes, we are a long way from free auto-mobility for everyone. That, I suggest--the absence of full and free auto-mobility for everyone--is the paramount transportation problem we confront in the new metropolitan areas of the U.S. West.

You may argue that things are bad enough already. We now have more than one car for every two persons. If the numbers were to approach one for every person, we, like the folks in Mexico City, would be scarcely able to move on the

most-congested routes, much less enjoy free mobility. And, of course you're probably right. So the problem must then be redefined to call for the design of a successor to the currently dominant private-automobile/public-highway system. We need a transport system that would permit virtually everyone to enjoy the equivalent of automotive mobility, although not exclusively with the present arrangement of privately owned cars, each exclusively dedicated to carrying its owner in privacy.

A wide array of urban-transport options has been widely discussed in recent years, as people have responded to traffic congestion, air and noise pollution, energy consumption, and the immobility of various population groups. Several Western American metropolises are pursuing heavy-rail and light-rail transit systems, in a nostalgic effort to resurrect a decadent 19th Century technology and to rein-duce the centralized city form that typified an earlier day. At the same time, new kinds of mass-transit vehicles are being explored, most of them on fixed-guideways that would suffer from the same inflexibility of route pattern than marked earlier rail systems and require the same pattern of high-density concentration at both ends of commuters' trips.

I am betting that, outside the high-density centers of the older Eastern metropolises, those fixed-route systems are bound to fail. They will fail to attract enough riders because only a small proportion of people's origins and des-

tinations can be adjacent to a fixed route. They will fail because a competitive automobile or another system with auto-like operating characteristics can offer superior service--from door-to-door, without waiting, without having to transfer from one vehicle to another. Because the post-War urban areas are shaped to match the automobile's capacities to go directly from anywhere to anywhere, the design criteria for an alternative future transport system must reflect the flexibilities that the modern city form requires. The fixed rail lines that matched cities' forms of an earlier time cannot provide the operational service attributes that current living patterns and life styles demand. By consumer market test, the auto mode is now by far the most preferred of any. In Western metropolitan areas, in places like Dallas, Denver, Houston, Honolulu, and Los Angeles, it is the mass transportation system, carrying up to 97 percent of all person-trips made in motorized vehicles.

Western cities and the extensive suburban areas surrounding the older Eastern cities are marked by low densities and by dispersed patterns of residences and work places. Few commuters originating in any single residential neighborhood are likely to be bound for the same work site at precisely the same time. So it is important that an alternative mass urban transport system be capable of serving small numbers of persons having the same combinations of origins, destinations, and schedules. It has to be capable

of collecting them virtually at their doors, on time, and then transporting them from wherever they are directly to wherever they want to go. That is to say, it must be capable of providing random access, just the way the telephone network connects everywhere to everywhere--directly, and on demand.

Those are the very attributes that make automobiles attractive. They must also become the attributes of public transit systems. If public transit is to compete with private cars, it must do so on the cars' own terms. That means, among other things, that future public transit must employ small vehicles that are able to carry those small groups of travelers who share the same combinations of origins, destinations, and schedules. The widespread dispersion of residences and work places since World War II has made large-vehicle systems obsolescent on all but a few routes within most American metropolises. The new modules are the 50-passenger bus, the 12-passenger van, and the 4-passenger motor car used as a public transit vehicle. The era of the suburban railroad and the 10-car subway train is long since past for most of America, certainly for the American West and the New American South.

Commuter automobiles are currently carrying only about 1.4 passengers each, and that's the source of much of the congestion that so troubles everyone. Despite the willingness of Congress and local officials to spend tens of bil-

lions of dollars to construct subways and new freeways, our problem is not a shortage of transport capacity. We have an excess of capacity. As wilfred Owen has observed, we have more than enough front seats in our cars to carry everyone in the country at the same time, leaving all the back seats empty. Moreover, we have enough road space for all of them to drive at the same time. Our problem is that we don't use all that capacity very well. If we could increase auto-occupancy to, say, 1.6 persons per car, congestion would decline; and the auto's operating energy-efficiency would equal that of a modern electrified railroad or subway. But how might car occupancy be increased?

One proven way is by using automobiles as carpool vehicles, a voluntary arrangement akin to friends sharing commuting costs. Alternatively, a profitable commercial arrangement, common in Third World cities, uses cars as shared taxis and as jitneys. That scheme has the virtues of creating employment opportunities for many who would be otherwise unemployed or underemployed, of offering door-to-door service on demand, and of eliminating the costs of parking, while simultaneously supplying automobility to persons who are unable to drive themselves.

With increasing ease of car-renting from local gas stations and other neighborhood outlets, incentives for personal ownership might fall. As one result, the national automobile fleet would get used more efficiently, and the

costs of parking unused vehicles would decline. Here, as with the prospects for shared taxis, jitneys, and premium buses, a large unexploited market awaits the imaginative private entrepreneur, who, until recently, had abandoned the urban transit market.

Some cities here and abroad have experimented with incentives aimed at increasing numbers of passengers per car, and their publics have responded quite as expected. (Commuters using the San Francisco Bay Bridge who pick up passengers as bus stops and BART stations are rewarded with speedy passage through the toll booths and a saving of at least 10 minutes and the 75-cent toll.) It seems it does not take much saving in travel time or money cost to induce motorists to share their cars with others, even strangers--so long as the arrangements are flexible and so long as individual driver's freedom is not unduly constrained.

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Prospects are promising for an urban transportation system that combines private use of private automobiles with public use of public automobiles and other shared vehicles that use streets and freeways. Exclusive use of selected streets for carpools, express buses, and group taxis can greatly increase travel speeds, thus making these multiple-occupant vehicles the most-rapid components of urban transport systems. Because overall door-to-door travel time is probably the most important factor affecting a commuter's choice of travel mode, there may be no more effective way of

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reducing congestion and increasing urban mobility than through preferential treatment for multiple-occupant vehicles, especially small vehicles.

No brave-new-world transport technology is called for. No shiny trains and ornate subway stations. Merely prosaic buses, vans, and automobiles operated more intelligently. We have already evolved the world's most effective transport system, and it already offers extraordinary mobility to a large proportion of Americans. It is not new vehicle types that we need. Nor do we need to spend a lot of money to create a lot of new travelways. Our task, instead, is to extend automobility to those who do not yet enjoy it and to do so without unduly increasing congestion, pollution, or energy consumption. We need neither huge investment in outdated rail technology nor a Manhattan project to develop post-modern new transport technology. We already have plenty of roads and plenty of underused vehicles. We just need to manage those resources more efficiently and more equitably.