



A C C E S S S

A C C E S S N U M B E R 1 5 F A L L 1 9 9 9

CONTENTS

2 Editorial: Eclecticism

BY MELVIN M. WEBBER

3 Requiem for Potholes

BY CARL MONISMITH
as told to Melanie Curry

6 Instead of Free Parking

BY DONALD SHOUP

10 Partners in Transit

BY EUGENE BARDACH, TIMOTHY DEAL, AND MARY WALTHER

14 Pooled Cars

BY SUSAN SHAHEEN

18 Travel for the Fun of It

BY PATRICIA L. MOKHTARIAN AND ILAN SALOMON

21 Recent Papers in Print

The University of California Transportation Center, founded in 1988, facilitates research, education, and public service for the entire UC system. Activities have centered on the Berkeley, Davis, Irvine, Los Angeles, Riverside, and Santa Barbara campuses.

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Eclecticism

IN THIS TIME of occupational specialization, we expect each profession to focus on the narrowly specific tasks it's responsible for, letting others worry about everything else. Engineers, economists, accountants, land use planners, lawyers—each professional group is expected to mind its own business. But, at the same time, we know that's not good enough, if only because we know everything really is connected to everything else.

In recent decades we've been learning how to think as systems analysts and to trace causal chains wherever they may lead. As a result, the boundaries defining disciplines and professions have been eroding—paradoxically, even as specialization is becoming ever more refined. That erosion has been apparent in transportation, no doubt because transportation itself has no boundaries. It intrudes into virtually every corner of modern society—manufacturing, retail trade, agriculture, recreation, education, medicine, national defense, daily life. There's probably no field of human activity that's independent of transportation systems. Hence every aspect of human welfare is intimately affected by them.

Once we probe beyond traditional professional boundaries, we find that the sources of problems typically lie outside our own specialized arenas. For example, when seen in a larger societal context, the problem of traffic congestion is no longer the exclusive province of traffic specialists. The roots of the problem lie elsewhere—in land use regulation, or in taxation policy, or in

mortgage practices, or in changing corporate processes, or in rising incomes, or, more likely, in some amalgam of all these and other seemingly external factors. Moreover, each component of that amalgam is the product of its own complex causal chain.

Many of this magazine's contributors are transportation specialists whose specialties lie in the interstices between the other traditional disciplines and professions. They're looking into the relations of the transportation subsystem to the rest of the societal system, asking how transportation enhances individuals' access to opportunities and business firms' access to goods, services, and markets. They're asking how transportation relates to economic development, to urbanization, to the quality of individuals' lives—asking how it both lubricates social and economic intercourse and glues the parts of society together. Not content to serve only as suppliers of infrastructure, they're simultaneously focused on the effects of transportation hardware and on the outcomes of infrastructure for consumers.

Whether searching for underlying sources of problems or reaching for new instruments of social betterment, workers in fields that touch on public policy are compelled to ignore traditional boundaries. They must be intellectually independent of their own professions and follow wherever the internal logic of their inquiries may lead them. So, unavoidably, we who call ourselves transportation specialists find we've become eclectic generalists as well.

Melvin M. Webber

Requiem for Potholes

BY CARL MONISMITH
as told to Melanie Curry

ON THE SURFACE, pavement must seem beneath consideration. No reason to think about it—you just drive on it, park on it, watch out of the corner of your eye to make sure your car is following the lines painted on it. Until, that is, until you hit a pothole. Then you're suddenly aware of the pavement, or at least of its flaws. You may swerve, you may curse, you may write a letter to the mayor—a pothole can have that kind of power.

Potholes are a nuisance. They're unsightly. They ruin a smooth ride. And if they're not fixed early in their development, they can grow into monsters that consume tires and axles, getting bigger and meaner as traffic continues bumping over them.

Sometimes potholes are caused by improper design of the original pavement. Or maybe the design was good but the workmanship was substandard: the underlying materials may not have been well compacted, or there was too much air in the asphalt mix, which lets water seep in, loosening the substratum and weakening the whole structure. Or perhaps the traffic turned out to be greater than had been anticipated, so it began to break down early. Or maybe the pavement in that spot has just gotten old.

In any case, potholes seem inevitable. They form when pavement bends under the pressure of traffic. Eventually cracks form, generally starting at the bottom as the pavement pushes downward into the underlying material, then working their way to the top. They grow wider and deeper and longer with each passing vehicle. They reach out to each other and eventually form a network of fissures sometimes referred to as alligator cracks.

As tires continue passing over them, the cracks widen, and little blocks of pavement between them grow loose. Eventually those blocks pop out of place, and each loosened block leaves a hole, making it easier for surrounding blocks to move around, loosen up, and break out too. Before long, instead of a network of cracks, you have a pothole.

LIFE CYCLE OF A PAVEMENT

A normal asphalt pavement is designed to last about twenty years. The first stage of construction prepares the subgrade, the original in-place material that will underly the finished roadbed. Its

structure must be evaluated, along with such material properties of the soil as density and water content. Then the engineer can select the right combination of materials to handle anticipated traffic at that spot. The upper couple of feet of in-place soil is mixed, smoothed, and compacted to bring it to a uniform constituency. Then granular layers of rock are placed on top and compacted, the thickness of those layers depending on expected traffic loads and the subgrade's strength.

Then paving materials are prepared, the basic materials being asphalt mixed with rock aggregate. Asphalt is the heaviest part of crude oil, the bottom of the barrel, so to speak—what remains after lighter constituents like gasoline, kerosene, diesel oil, and lube oil are distilled off at the refinery. It's not present in all petroleum, but the Los Angeles Basin and California's Central Valley happen to be good sources. The asphalt has to meet specifications for particular applications—whether for paving or roofing or pipe coatings or asphalt tile—and sometimes this requires further refining.

Asphalt constitutes only about 10 percent of the pavement mix; the other 90 percent is rock aggregate. The asphalt holds the particles of aggregate together, but the aggregate is necessary to stabilize the pavement: in the heat of the day, asphalt expands in volume at up to ten times the rate that aggregate does. It needs the rock to prevent it bleeding to the surface and reducing skid resistance. The best way to provide stability is to separate the bits of rock according to size, then to mix them together proportionately so they fit together well.

When it's time to lay the pavement, the aggregate is heated to around 300 degrees Fahrenheit. It needs to be hot enough to get a good coating when mixed with the asphalt and to get rid of any moisture. The asphalt is heated as well, making it fluid to coat the rocks. Once both materials are hot, they're mixed briefly—maybe thirty seconds—dumped into a truck, and taken to the job site where a paving machine spreads it out to the desired thickness and rollers compact it to the desired density. When the roadway is finished and opened to traffic, its surface is smooth and its sub-surface is strong—but only until tires pummel it into alligator cracks, and potholes begin to deface what had been the pavement

engineer's carefully crafted handiwork.

Isolated potholes are simple to repair because they don't usually involve a new pavement design. If an emergency repair is necessary and there are plans to follow it later with a new pavement overlay or with more extensive rehabilitation, then a repair might be as simple as filling the hole with asphalt mix and compacting it with rollers. A more permanent repair usually involves cutting a nice straight-sided hole in the pavement, perhaps digging down below the level of the current asphalt, and applying a bonding material (called a tack coat) to the sides before filling it up with new asphalt. As with new pavements, the more time spent on getting the repair right, the longer it will last.

ARE POTHoles INEVITABLE?

We've learned much about the mechanics of soils and asphalt materials, and we're sophisticated about pavement construction and traffic patterns. So, can we build pavements that last? If we were to combine what we've learned in our laboratories and in our field experience and if we were to exploit the innovative design, building, and maintenance practices developed by our European, South African, and Australian counterparts, perhaps we could eliminate potholes.

Pavement design and construction are treated differently in South Africa, which has many miles of excellent asphalt pavement. Although their asphalt layers are thinner than ours (generally only about two inches thick), they spend much more time preparing the roadbed before constructing the pavement. They do plenty of compacting and smoothing of underlying soils, including mixing back and forth along stretches of the road to assure consistent strength under the asphalt. It takes time and effort and costs money, but in the long term they end up with excellent foundations under their pavements. The results in South Africa are good roads that last a long time, despite their relatively thin asphalt surfaces.

A number of European countries also take a lot of trouble to prepare road foundations. For example, the French and German engineers do extensive roadbed preparation. They take pains to achieve a very uniform subgrade, in part to reduce the effects of frost. (When ground freezes, it can cause the entire roadbed to rise; but with a uniform subgrade, roadbeds will heave evenly. Then, when the thaw arrives, a flat, consistent surface underlying the pavement will keep it from breaking up under traffic load.)

France seems to have good luck avoiding the pitfalls of potholes, especially on its heavily traveled highways. This may be due in part to careful roadbed preparation, and perhaps in part to the widespread use of new tools and cutting-edge technology like improved mix and soil testing, and analytically detailed pavement design. We have this technology available to us in the United States, but few contractors are using it.

INSTITUTIONAL DETERMINANTS OF PAVEMENT QUALITY

With support from Caltrans, the Pavement Research Center here at UC Berkeley has been learning a lot about the mechanics of asphalt pavements. Caltrans is one of the nation's most innovative transportation agencies, and our research is providing information to improve their design methods and specifications for construction and reconstruction of highways. Nevertheless, one wonders whether the new technical specifications will be enough. Institutional arrangements may prove to be just as critical as mechanics in determining a pavement's quality. Consider, for example, the contrast between the French and American systems of contracting for pavement work.

THE AMERICAN PRACTICE

Here's how it's currently done in California (and much of the US): The government has a Pavement Management System in which, every two years, engineers venture out to evaluate the condition of state highways—all 44,500 lane miles of them in California. They also study traffic patterns and estimate pavement loads. Based on their evaluations, they decide on appropriate maintenance and rehabilitation strategies.

Once they have a good idea what jobs are necessary—emergency repairs, rehabilitation, or new construction—the engineers estimate the costs. The state has to make certain that funds are available to award a contract, and then bids are called for. Contractors are given the plans and specifications in the call for bids, and they base their proposals on them.

Contractors submit their bids by a stated deadline, and the bids are examined. Generally the state seeks the lowest bid possible. Rarely are there exceptions to the low-bid rule.

Caltrans requires contractors to meet quality standards for a variety of measures, such as the ratio of asphalt to aggregate, quality of asphalt, degree of compaction, water content, smoothness, and thickness of pavement. Contractors must submit samples and data from tests performed in the field to prove they're meeting those standards—and Caltrans has to oversee quality control. For example, they might check for correct compaction either by drilling out a core sample after the pavement is laid and testing it in the laboratory, or by the on-site use of a nuclear gauge that transmits and collects gamma rays to determine density of the material.

The quality control system also offers monetary reinforcement of standards. Using what are called pay factors, the state agency creates something like a market that rewards contractors for exceeding specifications and penalizes them for not meeting them. Of course there's a minimal acceptable limit, but if something is adequate but not quite up to spec, a certain percentage might be deducted from the contractor's approved bid. On the other hand, exceeding specifications could bring a bonus. For

example, the state of Arizona has decided that smoothness is very important, so for achieving very smooth pavement a contractor there might be paid as much as 25 percent over the bid price.

Pay-factor incentives were used with powerful effect after the Northridge earthquake in Los Angeles when bridges fell along several key freeway routes, hanging up traffic and in some cases isolating communities. In an effort to get back to normal as quickly as possible, Caltrans offered bonuses for completing repairs before a specified completion date. One contractor submitted a remarkably low bid and won the contract to repair part of the Santa Monica Freeway. He then made a huge profit by working day and night, completing the work in less than half the specified time, and cashing in on the pay-factor bonus. In effect, Caltrans had created a market-like system that rewarded enterprise.

THE FRENCH METHOD

France's standard approach to bidding for contracts is notably different from ours. There, a contractor will submit a *design* for a job. Instead of meeting government-set specifications, contractors come up with their own plans and specifications and are then required to guarantee their work, usually for a period of five to ten years. Quality control is up to the contractor and is not overseen by a government agency. The guarantee means that if a problem develops the contractor has to fix it. In the US, once the job is done, as long as it has met specifications, the contractor is no longer liable. If a problem develops—a pothole, say—a whole new round of specifications and bids and bonuses must begin.

Wherever contractors have the flexibility to design the project and guarantee their work, there are inevitable consequences. For example, contractors must be large enough to have their own engineering design and research staffs as well as laboratories. This is so in France where there are few, but large, highway contractors. Small contractors in the US would have trouble competing in such an environment. They would also need sufficient funds to cover costs of repairs in the event they become necessary. Again, small contractors would find this a hardship.

France's success in building excellent major highways seems in some part to reflect those contractual relations. These, in turn, would seem to reflect different national traditions associated with managing the public and private enterprises. The stereotypes suggest that European nations rely more heavily on governmental regulation than does the US, and that the Americans are wont to rely on the workings of market processes. Rather than having governmental agencies write decision rules, say the Americans, let the market decide—let the private sector determine the appropriate outcomes.

With respect to pavement design, however, it seems we Americans have chosen to do it their way, and they ours. Rather

than encourage private engineering/contracting firms to determine the best structure for a road, paradoxically, we have assigned the design task to government departments, then charged them with monitoring the performance of the private construction firms.

The success of some European roads suggests we might improve our own by modifying some of our managerial arrangements to gain advantages of the French kind. It's already been tried in the US in various ways, such as turn-key construction of housing projects, in which private builders design, finance, and build. The SR91 toll road in Orange County, California, was built and financed with private money, and will be owned and maintained privately for a set period of time before reverting to the state. It's still a fairly new road, and we don't know how long it will remain free of potholes, nor how motivated its owners will be to keep it well maintained. But it seems there is room for private enterprise in American road-building.

CONCLUSIONS

Most people would give a lot to keep highways free of potholes. We now have the technical know-how to design asphalt pavements that are strong and have a life expectancy of twenty or more years. So we should be able to forestall damage to the surface.

We know how to incorporate proven materials and tested internal mechanics into the asphalt layer, but perhaps we should also take a cue from the South Africans and the French and experiment with working harder on the subgrade.

We need also to incorporate into the design those institutional arrangements that might guarantee longevity. So perhaps we should take a cue from the Europeans and experiment with encouraging innovation among contractors by permitting them more room for innovation in both design and construction.

Once we attain the quality of road standards of which we're capable, there'll surely be not even a small obituary notice in the national press, because we're seldom conscious of pavements that are intact. But, just as surely, no one will mourn the passing of the pothole. ♦

FURTHER READING

Transportation Research Board: NCHRP syntheses and reports

Association of Asphalt Paving Technologists: *Proceedings*, 1928 to 1999.

International Conferences in Asphalt Pavements: 8 sets of volumes 1962 to 1997.

International Conferences in Managing Pavements: 4 sets of volumes, 1985 to 1998.

Instead of Free Parking

BY DONALD SHOUP

W E AMERICANS first learn about free parking when we play Monopoly. Players pay rent, buy houses, build hotels, or go to jail after a toss of the dice, and one toss out of forty lands us on “Free Parking.” The odds of landing on free parking increase dramatically when we begin to drive cars because—*notwithstanding the experience of commuters in some large cities—*American motorists park free on 99 percent of all trips.

But there is no such thing as a free parking space. Someone must pay for it. If motorists don't, then who does? Initially, developers pay for parking when they provide spaces to meet requirements in zoning ordinances. Because the required parking spaces raise the cost of development, the cost of parking is then translated into higher prices for everything else, and everyone pays for parking indirectly. Residents pay through higher prices for housing, consumers pay through higher prices for goods and services, employers pay through higher office rents. Only in our role as motorists do we not pay for parking.

Where the cost of parking a car is included in higher prices for other goods and services, people cannot choose to pay less for parking by using less of it. Bundling the cost of parking into higher prices for everything else therefore distorts consumer choices toward cars and away from other options.

Minimum parking requirements in zoning ordinances promote free parking, but they often hinder development on sites where it is difficult to both construct a building and provide the required parking. They can also hamper adaptive reuse of existing buildings where the new use would require expensive new parking spaces. To mitigate these problems, some cities allow developers to pay a fee in lieu of providing the required parking. For example, Palo Alto, California, allows developers to pay the city \$17,848 for each parking space that's not provided. The cities then use the fee revenue to provide publicly owned parking spaces in lieu of the privately owned parking spaces that developers would have provided.

A SURVEY OF IN-LIEU PARKING FEE PROGRAMS

I surveyed the in-lieu parking programs in forty-six cities—twenty-four in the United States, seven in Canada, six in the United

Kingdom, six in Germany, two in South Africa, and one in Iceland. I examined the ordinances and supporting documents for the programs and interviewed the officials who administer them.

Officials in the surveyed cities contend that in-lieu fees have advantages for both cities and developers. The following five points summarize these advantages.

1. An Option. In-lieu fees give developers an alternative to meeting parking requirements on sites where providing all the required spaces would be difficult or extremely expensive.

2. Shared Parking. Public parking spaces allow shared use among different sites whose peak parking demands occur at different times. Shared public parking is more efficient than single-use private parking because fewer spaces are needed to meet the total peak parking demand. Parking that is shared among different establishments also allows motorists to park once and visit multiple sites on foot.

3. Better Urban Design. Cities can put public parking lots and structures where they do not deter vehicle and pedestrian circulation. Less on-site parking allows continuous storefronts without dead gaps for adjacent surface parking lots. To improve the streetscape, some cities dedicate the first floor of public parking structures to retail use. Developers can undertake infill projects without assembling large sites to accommodate on-site parking, and architects have greater freedom to design better buildings in a more pedestrian-friendly environment.

4. Fewer Variances. Developers often request variances from parking requirements. These variances create unearned economic windfalls, granted to some developers but denied to others. If developers can pay cash rather than provide the required parking, cities do not need to grant parking variances and can treat all developers equitably.

5. Historic Preservation. The in-lieu policy makes it easier to preserve historic buildings and rehabilitate historic areas by allowing for alternative locations of parking garages.

Officials in all the surveyed cities judged the in-lieu fees as successful, and they reported that the fees had become a form of administrative relief for developers who do not want to provide the required parking spaces.

WHO DECIDES?

Most cities allow developers the choice of paying the in-lieu fee or providing the required parking, but a few cities *require* developers to pay. Officials in these latter cities say mandated fees encourage shared parking, discourage proliferation of surface parking lots, emphasize continuous shopfronts, improve pedestrian circulation, reduce traffic congestion, and improve urban design.

Some cities also allow property owners to *remove* existing required spaces by paying in-lieu fees. This option can consolidate scattered parking spaces, facilitate reinvestment in older buildings, and encourage more efficient use of scarce land previously committed to surface parking.

IMPACT FEES IMPLICIT IN PARKING REQUIREMENTS

Many cities require developers to pay impact fees to finance public infrastructure—such as roads and schools. Parking requirements resemble impact fees because developers must provide required infrastructure—parking spaces—to obtain building permits. The cost of required parking is typically buried in the cost of development, but in-lieu fees expose the true cost of parking spaces and allow us to express the cost of parking requirements in terms comparable to municipal impact fees. When cities *require* developers to pay the fees rather than provide the parking, the in-lieu fees *are* de facto impact fees.

To compare the price of parking requirements with impact fees, we must first convert the required parking into a cost per square foot of building area. We can do this because the cities' in-lieu fees are their estimates of the cost of providing parking spaces. The in-lieu fees therefore reveal the impact fees implicit in the parking requirements themselves.

The *parking impact fee* depends on (1) the parking requirement (how many spaces per 1,000 square feet), and (2) the in-lieu fee (per parking space). Table 1 presents parking requirements and in-lieu fees for office buildings in the central business districts of twenty-nine cities. The last column shows the parking impact fees implicit in the parking requirements.

The first row shows that Palo Alto requires four parking spaces per 1,000 square feet of gross floor area for office buildings. Palo Alto's in-lieu fee is \$17,848 per required parking space not provided, so the parking requirement is equivalent to an impact fee of \$71 per square foot of office space ($4 \times \$17,848 \div 1,000$). A developer who does not provide any parking must pay the city a parking impact fee of \$71 per square foot of office space.

The parking impact fees range from \$71 per square foot in Palo Alto to \$2 per square foot in Waltham Forest. The median parking impact fee is 2.5 times higher in the US cities than in the Canadian cities—\$25 per square foot of office space in the US but only \$10 per square foot in Canada. US cities have higher parking

impact fees because they require more parking, not because they have higher in-lieu fees. The median parking requirement is almost three times higher in the US than in Canada—2.9 spaces per 1,000 square feet in the US but only one space per 1,000 square feet in Canada. The median in-lieu fee is lower in the US (\$9,125 per space) than in Canada (\$9,781 per space).

The average parking impact fee for the US cities is \$31 per square foot of office space, which dwarfs the impact fees levied for all other public purposes. A 1991 survey of one hundred US cities found that the total impact fees for all purposes (roads, schools, parks, water, sewers, flood control, and the like) averaged \$6.97 per square foot of office space. The average parking impact fee for office buildings is thus 4.4 times the average impact fee for all other public purposes combined. If impact fees reveal a city's preferences for public services, then it seems that many cities' highest priority is free parking.

Officials in most cities reported that they set the in-lieu fee below the cost of providing a public parking space because the fee would be "too high" if the city charged the full cost. When the cost of required parking is hidden in the cost of development, cost does not seem to matter. But when the cost of required parking is made explicit in cash, everyone can see that it is "too high."

REDUCE DEMAND RATHER THAN INCREASE SUPPLY?

Minimum parking requirements impose high costs, but reform is difficult because parking requirements are entrenched in cities' practice and legislated in zoning ordinances. Nevertheless, allowing developers the option to finance public parking rather than provide private parking suggests another promising in-lieu option: *Allow developers to reduce the demand for parking rather than increase the supply of parking.*

One way to reduce the demand for parking is to make public transit a more viable alternative. For example, employer-paid transit passes reduce the demand for parking at work, and a city can therefore reduce the parking requirements for developers who make a commitment to provide transit passes for all employees at their sites. Suppose that providing free transit passes to all employees at a site reduces parking demand there by one parking space per 1,000 square feet. In this case, a developer's covenant to provide free transit passes to employees at the site would be an appropriate alternative to providing one required parking space per 1,000 square feet.

Some transit agencies offer employers the option of buying Eco Passes that allow all their employees to ride free on all local transit lines. Eco Passes are priced according to their probability of use, and the price per employee is low because many employees do not ride transit even when it is free. Employers can therefore buy Eco Passes for all employees at a low cost. In California's Silicon

TABLE 1

Parking requirements for office buildings in city centers interpreted as impact fees, 1996 (US dollars)

CITY	IN-LIEU PARKING FEE (\$/space)	PARKING REQUIREMENT (spaces /1,000 sq ft)	PARKING IMPACT FEE (\$/sq ft)
Palo Alto, CA	\$17,848	4.0	\$71
Beverly Hills, CA	20,180	2.9	59
Walnut Creek, CA	16,373	3.3	55
Kingston upon Thames, UK	20,800	2.3	48
Carmel, CA	27,520	1.7	46
Mountain View, CA	13,000	3.0	39
Sutton, UK	13,360	2.7	36
Harrow, UK	14,352	2.3	33
Hamburg, Germany	20,705	1.5	32
Lake Forest, IL	9,000	3.5	32
Mill Valley, CA	6,751	4.4	30
Palm Springs, CA	9,250	3.1	28
Reykjavik, Iceland	13,000	2.2	28
Claremont, CA	9,000	2.9	26
Concord, CA	8,500	2.9	24
Davis, CA	8,000	2.5	20
Orlando, FL	9,883	2.0	20
Kitchener, Ontario	14,599	1.3	19
Chapel Hill, NC	7,200	2.5	18
Kirkland, WA	6,000	2.9	17
Hermosa Beach, CA	6,000	2.6	16
Berkeley, CA	10,000	1.5	15
Burnaby, British Columbia	7,299	2.0	15
Vancouver, British Columbia	9,708	1.0	10
State College, PA	5,850	1.3	8
Ottawa, Ontario	10,043	0.7	7
Calgary, Alberta	9,781	0.7	7
Port Elizabeth, South Africa	1,846	2.3	4
Waltham Forest, UK	2,000	0.9	2
MEAN	\$11,305	2.3	\$26
MEDIAN	\$ 9,781	2.3	\$24

TABLE 2

Eco Pass price schedule, Santa Clara Valley Transportation Authority (annual price per employee)

LOCATION	NUMBER OF EMPLOYEES		
	1-99	100-4,999	5,000+
Downtown San Jose	\$80	\$60	\$40
Areas served by bus and light rail	\$60	\$40	\$20
Areas served by bus only	\$40	\$20	\$10

Valley, for example, the Santa Clara Valley Transportation Authority (SCVTA) charges from \$10 to \$80 per employee per year for Eco Passes, depending on an employer's location and number of employees.

Because frequent riders often buy conventional transit passes, transit agencies must price these passes on the assumption that riders will use them frequently. And because transit agencies price transit passes to cover the costs imposed by frequent riders, infrequent riders will not buy them. In contrast, Eco Passes are priced like employer-paid insurance that covers every member of a defined population, and the price of an Eco Pass is therefore much lower than the price of a conventional transit pass. For example, the SCVTA's price for its Eco Pass is only 2 to 19 percent of the price for its conventional transit pass (\$420 per year).

COST-EFFECTIVENESS OF EMPLOYER-PAID TRANSIT PASSES

Minimum parking requirements increase the supply of parking, while providing Eco Passes increases the demand for transit. We can estimate the cost-effectiveness of providing Eco Passes in lieu of parking spaces by combining their cost with information on how they reduce the cost of meeting parking requirements.

Employers in Silicon Valley pay \$10 to \$80 per employee per year for Eco Passes. If there are four employees per 1,000 square feet of office space, Eco Passes will cost from 4¢ to 32¢ per square foot of office space per year. How does this cost of offering Eco Passes to all employees compare with the resulting reduction in the capital cost of providing parking spaces?

The SCVTA serves two of the surveyed cities that have in-lieu parking fees. The cost of providing the parking required for office buildings is \$39 per square foot of office space in Mountain View and \$71 per square foot of office space in Palo Alto. A survey of Silicon Valley commuters whose employers offered Eco Passes found that commuter parking demand declined by approximately 19 percent. A city might in this case grant a 19-percent reduction in the parking requirement for office developments that offer Eco Passes for all commuters. If the Eco Passes reduce parking requirements by 19 percent, they will reduce the capital cost of providing the required parking spaces by \$7.41 per square foot of office space in Mountain View (\$39 x 19 percent) and by \$13.49 per square foot of office space in Palo Alto (\$71 x 19 percent).

In this example, spending between 4¢ and 32¢ per square foot of office space per year to provide Eco Passes would reduce the capital cost of required parking by between \$7.41 and \$13.49 per square foot. We can convert this relationship into the potential return on each dollar spent for Eco Passes: spending \$1 a year to provide Eco Passes will reduce the up-front capital cost to provide required parking by between \$23 ($\$7.41 \div 0.32$) and \$337 ($\$13.49 \div 0.04$). The annual cost of the Eco Passes ranges

between 0.3 percent and 4.3 percent of the reduction in the up-front capital cost of the required parking. Eco Passes will also reduce the operating and maintenance costs for parking because fewer spaces are required. The low cost of reducing parking demand compared with the high cost of increasing the parking supply shows that Eco Passes are a cost-effective way to reduce the high cost of meeting parking requirements mandated by zoning ordinances.

CONCLUSION: THE HIGH COST OF MINIMUM PARKING REQUIREMENTS

The impact fees implicit in parking requirements dwarf the impact fees for all other public purposes combined. The evidence of high parking impact fees should make it hard for planners to ignore the high cost of minimum parking requirements. Given the high cost of required parking spaces, planners should not assume that the demand for parking automatically justifies minimum parking requirements.

Planners who set parking requirements rarely think about the price that motorists pay for parking. But demand depends on price,

and most motorists park free. Planners who require enough spaces to satisfy the existing demand for parking make the mistake of requiring enough spaces to satisfy the demand for *free* parking, no matter how much it costs. In-lieu parking fees unveil the high cost of this mistake. ♦

FURTHER READING

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Partners in Transit

BY EUGENE BARDACH, TIMOTHY DEAL, AND MARY WALTHER

NORTH RICHMOND, located in west Contra Costa County adjacent to San Francisco Bay, is one of the most distressed communities in California. It's plagued by poverty and high unemployment, like many other places. It differs from other high-poverty minority communities principally in being somewhat isolated geographically, and therefore in need of creative transportation solutions.

In 1996, North Richmond faced the specter of welfare reform along with every other community in California and the nation. In very short order, many residents of North Richmond were expected to find jobs or accept assigned jobs. If the federal law were to be implemented as written, many could find themselves dropped from public assistance after 18 months (if they did find work) or sooner (if they did not).

Unfortunately, welfare reform showed up just when bus service was being curtailed. Following several years of increasing financial pressure, the Alameda-Contra Costa Transit District (AC Transit) was forced to cut its overall service level by 11 percent. In North Richmond that meant an end to evening service after 7:30 p.m. and a reduction in Saturday service to one-hour headways. In a community where relatively few residents owned cars and where there were virtually no jobs within its borders, this was disastrous. These changes meant that the kinds of jobs low-skilled individuals would be likely to find, like sorting packages at UPS on the graveyard shift, were inaccessible. Any job that started or ended much outside standard business hours could not be reached by bus, and there were no alternatives for most North Richmond residents.

In early 1997, community leaders, concerned about the effects of welfare reform on North Richmond, met to talk about strategies for coping with the changes. They quickly identified transportation as an across-the-board priority, meaning that transportation solutions were necessary to deal with problems ranging from employability to after-school recreation opportunities and mobility for family caregivers. It became clear that AC Transit's service reductions had to be reconsidered, and in May 1997 these community leaders tried to persuade AC Transit to restore service.

THE CLASSROOM

Community members were invited to address the AC Transit board meeting of July 9, 1997. Residents, with help from the staffs of several community nonprofits, carefully planned their presentation with an eye to educating the bus company. Several community members emerged as leaders in this process. Joe Wallace, a longtime North Richmond resident, was one of them. He told about the kinds of problems faced by AC Transit customers: "I would love to take night classes at Contra Costa College, but the bus service ends just as the classes begin," he said. "The first bus leaves North Richmond in the mornings at 6:09 a.m., and the last bus leaving the Del Norte BART station for North Richmond is at 7:35 p.m. If you work or go to school nights, you must find other means [for getting there]. If you work weekends, [you have] a problem because [there's] only one bus per hour." He pointed out a chilling fact: "The poor people who must use the buses for doctors' appointments. . . must leave home from one and a half to two hours early just for appointments here in Richmond."

Other presentations by some of the professional staff of county and nonprofit agencies active in North Richmond supported Wallace's testimony. One of the speakers was Nina Goldman, who had demonstrated loyalty to the community and its interests with several years of community organizing work and effective management of the county's Integrated Service program. A team like that—including someone from the community and a middle-class outside professional—brought a mix of needed leadership skills.

To their surprise and delight, the AC Transit board responded by approving, in principle, a service augmentation. AC's staff also realized it needed to teach the community about the financial constraints it faced. To this end, it arranged a series of meetings between AC personnel and the North Richmond residents. These meetings, which were carefully planned by Joe Wallace, Nina Goldman, and AC planner Aena Prakash, brought AC Transit representatives—from board members to bus drivers—into North Richmond to listen to the community's concerns, identify specific needs, and educate citizens about the agency's constraints. This

was a period of excitement, marked by high emotion and angry words. Community members' first response was to express anger at having been excluded from neighborhood meetings that AC staff had held to explain service cuts. It could have been the beginning of a confrontational relationship between community and agency, but instead something very different happened.

At that first meeting, there was some disorder as residents stood up and blasted board members for ignoring them. But instead of responding with equal vehemence, the AC Transit representatives listened to the comments, acknowledged them, and apologized. This helped defuse the volatile atmosphere, and angry residents calmed down enough to accept the conciliatory gesture. It was an important first step in what would be a long and ultimately constructive process: the residents vented their frustrations, were heard, and were then able to listen to what the agency had to tell them.

RECIPE FOR SUCCESS: A LEARNING PARTNERSHIP

Relationships between the North Richmond community and the board and staff of AC Transit were initially turbulent but quickly smoothed out to become a remarkably amicable and effective partnership. We're calling it a "learning partnership." We don't mean to tout a learning partnership as a universal strategy for poor communities trying to get the attention of mass-transit agencies. But it can be useful to analyze how such a partnership functions, and to consider the conditions necessary to allow it to work.

A "learning partnership" recognizes that most large public bureaucracies—in the United States this includes most public transit agencies—are indifferent learners. To a large extent, their learning problems do not originate with the individuals who manage these bureaucracies, but rather with the various constraints that are placed on agencies by the publics they serve. For example, flexibility is typically limited by tight overall budget constraints, line-item budgeting, and traditions of budgetary accountability. Personnel rules and collective-bargaining contracts reduce flexibility even further. A preference for working within familiar routines prevents many agency employees from working hard to improve performance, and those managers who are eager to push for change have relatively few resources for counteracting that preference.

But times are changing. In this era of "reinventing government," many agencies are trying to improve. They are gathering systematic information about customer satisfaction, asking for feedback and suggestions from their line-level personnel who are in close contact with agency customers, and giving more discre-

tion to low-level staff to make the sorts of accommodations that promise to improve service with no increase in cost. AC Transit is, by some accounts, an example of a more diligent learner, at least since the present General Manager, Sharon Banks, assumed her position in 1992. Certainly this was suggested by the agency's dealings with the North Richmond community.

For its part, the community, partly on its own initiative and partly in response to prompting from AC staff, learned about the transit agency's situation and taught AC staff about the community's situation. This relationship, where teaching and learning go in both directions, forms the essence of a learning partnership.

TEACHERS AND STUDENTS

In most effective teacher-student relationships, both the teacher and the student are receptive to learning and frequently switch roles. In a confrontational relationship, which is perhaps a more typical style of relations between a poor community and a public agency, it is difficult for two battling factions to reach a point where they can listen to each other, let alone enter into a productive partnership. With North Richmond and AC Transit, however, certain conditions were present that made such a partnership possible.

First, the community itself, faced with a serious crisis, became organized. Several leaders emerged who were articulate, forceful, and dedicated; and their work not only helped form a basis for a good working partnership but helped create a clear sense of united purpose within the community itself. These leaders made a conscious choice to try to be teachers to AC Transit; in the words of one of them, they wanted "to show AC that we were trying to inform them about a situation they certainly must not be aware of, rather than to blame them. We wanted them to feel that we assumed that, once they were better informed, being good people, they would certainly make this problem go away."

As for AC Transit, the agency had been self-consciously "reinventing" itself since Sharon Banks took over and had already made several relevant changes. For example, the organization had created cross-functional committees, with representation from planners, drivers, road supervisors, and facility superintendents as well as managers, to discuss the ramifications of service changes. The drivers' union and AC management had worked hard to change what had been a somewhat hostile relationship into a productive one. Also, the agency had been reaching out to the public. When forced to cut services, AC held 48 community meetings throughout its district to explain why the cuts were necessary and to listen to comments from community groups. North Richmond's exclusion from this process was one sign that AC had not perfect-

ed its listening strategy. However, by the time it began to meet with Richmond's community representatives, the agency already had some practice listening to angry groups.

In addition to these changes, there were two basic conditions present in this case that helped allow the learning partnership to mature: Despite its monetary constraints, AC Transit had at least a little budgetary flexibility; and its board had some concern for the equitable treatment of poor neighborhoods.

LEARNING TO LISTEN

After the emotional outbursts of the first meeting were out of the way, both agency and community got down to the business of teaching and learning. AC Transit representatives reviewed the budgetary history of the agency and explained its priorities (for example, it was very important to preserve the routes heavily used by school children, 60,000 of whom are served by AC Transit). They had to explain that shortening headways would result in shorter service hours. They also discussed details of the agency's budget, and opened the possibility of tapping its recently established "contingency reserve" fund to help pay for the expanded services the community wanted. But agency representatives also let the community know that it needed help finding outside funding, and it expected some of that help to come from the community.

Meanwhile residents were also teaching and learning. Community members placed stickers on large wall maps indicating where they wanted bus stops. There was an outpouring of ideas, some of which had to be gently rejected (like the enthusiastic suggestion that community members drive idle buses; this became an opportunity for AC representatives to teach about liability and labor relations).

But other ideas were not so easily set aside, and both parties to the discussion were learning to consider possibilities before rejecting them outright. For example, the residents were emphatic about starting the new service by Thanksgiving, so that they would have access to jobs during the Christmas hiring season. At first AC Transit balked: usually it takes quite a long time to start a new service, since there are many different elements that need to be planned (as one example, schedules have to be calibrated, tested, planned, and published ahead of time). The inclusion of the drivers' union in the public meetings proved to be important for removing this stumbling block. AC management could not have obliged drivers to accept modifications in the assignments cycle at

this late date, but after hearing pleas from the community, union representatives were able to explain to other drivers why this was an important consideration. Volunteer drivers eventually stepped forward. This gave impetus to removing other roadblocks—and the new service was indeed inaugurated by Thanksgiving.

Not only did AC begin nighttime service, but the new service was in some respects even better than the old. The new Line 376—"the North Richmond Night Jobs Shuttle," as some called it—improved what transit planners call "connectivity" with schedules of other bus lines, combined stops from previously separate routes, and permitted bus drivers to make limited deviations from the fixed route in order to discharge patrons closer to their homes.

WINNING TRUST

In any partnership, a trusting relationship is not only more pleasant, but also more productive. Trust made it easier for the community and the agency to work synergistically to solve common problems. Furthermore, by signaling that the transit agency would actually do something for the community, the agency also increased the likelihood that factions within the community would coalesce and treat one another as partners rather than competitors. That development in turn facilitated more agreeable and productive relations between representatives of both the community and the transit agency. Furthermore, once service became operational, a cooperative community helped market the service—thereby increasing route "productivity"—and discouraged vandalism.

The key question for the community was why it should believe the agency's protestations of budget constraints. To a poor community, a public transit agency will often look like a powerful institution, capable of doing pretty much what it wants in its domain. If it doesn't serve the community, it must be because it doesn't want to.

The agency signaled its trustworthiness to the community in several ways. For example, AC staff and the board member representing North Richmond made repeated visits to the community, absorbed the community's "venting" in a constructive spirit, and listened respectfully to community members' statements of their needs and desires. AC board members received the North Richmond spokespeople at their July 9 board meeting with evident respect and a relatively quick affirmation in principle that the community would receive a higher level of service. Also, AC staff expended a lot of creative effort to patch together the revenue for the new service from a variety of sources. Then, drawing on a

\$26,000 grant from the Zellerbach Family Fund, the agency employed 26 people from the community (including Joe Wallace) to help promote the new service.

CONCLUSION

From the transit agency's point of view, the essence of a learning partnership is to regard community claims not as the demands of illegitimate special interests but as useable information about the nature of potential customers' needs for service. From the community point of view, the essence of the learning partnership is for locals to accept agency limitations not as a spur to confrontation but as an unfortunate handicap that the community must help the agency to overcome. Most important, the great virtue of the Learning Partnership model is that, if it does work, it can be the vehicle for effective joint problem-solving. If it doesn't, the community can still fight city hall. ♦

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Pooled Cars

BY SUSAN SHAHEEN

WORLDWIDE GROWTH in automobile ownership has triggered many ideas for reducing car use. Most popular of course are plans to expand and improve public transit. The array of alternatives is far wider, however. One that I find potentially plausible and promising is the idea of pooling cars.

It's an idea that has been tried, especially in Europe, and has sometimes proved successful. Simply put, carsharing is organized short-term car rental, aimed at increasing an individual car's use while promoting transit riding. Shared vehicles provide a community resource at transit stations, neighborhoods, campuses, employment centers, resorts, etc., offering enhanced accessibility where public transit service is unavailable.

Carsharing organizations (CSOs) have emerged, some acquiring fleets of low-emission, energy-efficient cars that they offer on a membership basis. Because the CSOs are responsible for car maintenance, there's an incentive for them to perform repairs properly, thus helping reduce pollution and energy consumption. Their members profit by gaining use of a car without bearing the full costs of ownership. Transit operators benefit by tapping an expanded market. Motorists benefit from fewer cars on the road, and employers from less demand for parking spaces. (For example, Lufthansa Airlines installed a short-term rental scheme in 1993 for its employees at Munich and Frankfurt airports and averted over \$20 million in parking infrastructure costs.) Carsharing appears to be a win-win strategy.

A scenario for successful carsharing in the US might read like this: Mary rides the train on leaving work at the end of the day. Arriving at a station close to home, she uses her "smart card" to rent a shared-use vehicle, then drives the rest of the way home. She uses the car during the evening and drives back to her station in the morning, where she leaves the car. Someone else will use the car during the day, perhaps to get to work or run errands. Meanwhile, Mary rides the train to a stop near her work where she rents another vehicle and drives to her office. This vehicle

could then be used by her colleagues for personal and business errands throughout the day.

Both vehicles in this example spend less time idly parked than would a private vehicle used by one person for commuting and errands. By carsharing, travelers can easily use a variety of transportation modes, including public transit. They also forgo responsibility for insurance, maintenance, and parking.

AN INTERNATIONAL HAPPENING

Over the past decade, carsharing has become more common, especially in Europe and North America. There are many ways to implement carsharing, but most efforts involve only a few vehicles shared by a group of individuals. Cars are typically deployed from a neighborhood lot or transit station, and the majority of programs still manage their services and operations manually: users place a reservation with a human operator, get the vehicle key from a self-service key box, and record mileage and use-data themselves.

Most carsharing efforts are in Europe and remain small. One of the earliest, the Sefage cooperative, begun in Zurich in 1948, provided use of cars to those who could not afford them. Several other experiments were attempted during the next thirty years, including one in Sweden that began as an experiment in 1983 and lasted until 1998. Though small (35 households shared 5 cars), this program inspired many current Swedish CSOs.

Other successful carsharing groups got started in the late 1980s in Europe. Today there are approximately 200 CSOs in 450 cities throughout Switzerland, Germany, Austria, the Netherlands, Denmark, Sweden, Norway, Great Britain, and Italy. These organizations collectively claim a membership of over 130,000.

The two oldest and largest CSOs are Mobility CarSharing Switzerland, with 1,200 cars, and Stadtauto Drive of Germany, with approximately 300 cars. The Swiss program, begun in 1987, now operates in 800 locations in over 300 communities, with more than 27,000 members. Stadtauto Drive began operations in 1988 and now has approximately 7,000 members.

These two organizations, founded a year apart, evolved independently. Mobility CarSharing Switzerland sprang from a grassroots effort. In contrast, Stadtauto Drive began as a university research project to demonstrate that carsharing could be a viable transportation alternative for Germany. These two are recognized worldwide as modern pioneers of carsharing. Both CSOs grew about 50 percent per year until 1996, and Mobility CarSharing Switzerland continues to grow about 25 percent per year. Stadtauto Drive's growth rate has slowed more substantially, however.

Stadtauto Drive management attributes the slow growth to several factors. Some members have moved from the inner city to the countryside where access to carsharing and public transit is limited. Others, who use the cars on only rare occasions, find the yearly membership fees too costly and switch to traditional auto rentals. Other members find they require vehicles so often that the effort to reserve shared-use cars becomes too great a burden. Many of them buy private cars and leave the CSO.

EUROPEAN INNOVATIONS

As carsharing programs expand beyond 100 vehicles, manually operated systems become expensive and inconvenient, subject to mistakes in reservations, access, and billing. They also become more vulnerable to vandalism and theft. As a result, some CSOs are pressured to enlarge even further and generate revenue to pay for new communication and reservation technologies.

Recently, both Stadtauto Drive and Mobility CarSharing Switzerland have started modernizing, moving from manual "key box" operations to a system of smart cards for automating reservations, accessing vehicle keys, securing vehicles from theft, and billing. The shift to smart cards simplifies vehicle access for customers and eases administration and management of large systems.

In addition to advanced carsharing technologies, large European CSOs are developing a range of new services, including partnerships with transit agencies, car-leasing programs, car rental companies, and taxis. These partnerships include business and marketing collaborations and, in many cases, smart-card technology. The alliances promise many benefits and possibilities for CSOs, as seen in the Swiss Zuger Pass Plus program, which bundles carsharing, public transit, car rental, taxi, and bicycle rentals into a sort of frequent-flyer program. Another Swiss program, Easy-Ride, connects practically every public transportation com-

pany in Switzerland, including rail, bus, taxi, carsharing, and car rental. Smart cards simplify ticketing and marketing and encourage travelers to use several transport modes.

DEVELOPMENTS IN ASIA

In recent years carsharing experiments have cropped up in Singapore and Japan. The high cost of owning a car in Singapore may be a reason that within a few weeks of its announcement, 150 people signed up to participate in a carsharing program that had room for only 80. Present participants live in a large, high-rise development and share four cars. Two other condominium complexes are testing their own programs, with one car for every forty residents.

In October 1997, the Honda Motor Company launched a test carsharing system, called the Intelligent Community Vehicle System, in Motegi, Japan. Participants have access to four types of electric vehicles at several sites. Using a smart card, participants can reserve, unlock, and start the vehicles, eliminating the need for ignition keys. Fees can be automatically deducted from participants' accounts. Other high-tech attributes of this system include global positioning for up-to-the-minute monitoring of vehicle location, platooning technologies that allow a worker driving a lead car to collect unoccupied vehicles and guide them to a port, an auto-driving function so cars can conveniently meet users, and an autocharging system that instructs the vehicles to dock at a charging terminal when batteries are low.

SHARING CARS IN NORTH AMERICA

Two formal carsharing projects were undertaken in the US in the 1980s. Researchers at Purdue University conducted a field test that offered short-term rentals of minicars as well as a special-purpose fleet of large sedans and trucks. The study found that the minicars were used for 75 percent of participating households' vehicle miles of travel, while the special-purpose fleet was used 35 percent of the time it was available.

STAR, or Short-Term Auto Rental, began operating as a private carsharing enterprise in 1983 at a large (9,000 resident) apartment complex in San Francisco. STAR kept its rental rates low to discourage auto ownership, and it saved money by buying used economy-class vehicles. At its peak the company maintained a fleet of 51 vehicles and had a membership of 350. However, the operation failed halfway through its planned three-year program.

The primary problem was the low and erratic income of many of the tenants, some of them students sharing apartments and not listed on the rental lease, and many not credit-worthy. STAR's pricing structure, which encouraged long-term as well as short-term rentals, also invited problems such as long-distance towing charges incurred when the older vehicles broke down far from San Francisco.

I know about nine carsharing organizations in North America, five of them in Canada. All are small, and none yet uses smart technologies. Four are run for profit; the others are nonprofits. At present, a smart carsharing demonstration program in northern California (known as CarLink) is testing and evaluating several state-of-the-art communication and reservation technologies. The CarLink field test, which is currently being conducted in the Dublin-Pleasanton region of northern California, is cosponsored by the Institute of Transportation Studies at UC Davis and its partners—the Bay Area Rapid Transit District (BART), American Honda Motor Company, Caltrans, UC's Lawrence Livermore National Laboratory (LLNL), Teletrac (a company that provides vehicle tracking technologies), and INVERS (which developed a key management system). Approximately sixty participants use smart keys and an Internet reservation system to share twelve Hondas fueled by compressed natural gas (CNG). The cars are based at the Dublin-Pleasanton BART Station and at LLNL, about fifteen miles away. Three different types of participants pay different rates.

Homeside users drive a CarLink vehicle between the BART station and home each day, keeping the car overnight and on weekends for personal use. They pay a \$200 monthly fee, which includes a tank of CNG fuel, insurance, and maintenance costs. Workside commuters take BART to the Dublin-Pleasanton station and drive a CarLink vehicle to and from LLNL. Their \$60 monthly fee, again for fuel, insurance, and maintenance, can be shared with coworkers by carpooling. Day users pick up a CarLink vehicle at either BART or LLNL and use it for business trips or personal errands during the day for \$1.50 per hour plus \$.10 per mile.

In southern California, a similar demonstration program (called Intellishare) employs electric vehicles, smart cards, and on-board computer automatic-vehicle-location technologies. Carsharing programs using smart technologies are potentially more convenient and reliable, which could make them attractive to users and increase the likelihood of their use and success.

WHAT HAVE WE LEARNED?

To date, all noncorporate carsharing organizations in Europe began as small local operations, usually with government funding and inspired by ideological concerns about car dependence and negative effects of cars on urban settlements.

One study concluded that new start-up CSOs are likely to succeed if they remain self-organizing and local for a long time. Recent history suggests it is difficult to transform a small, often neighborhood-based, grassroots CSO into an economically viable business. Many have miscalculated the number of vehicles needed, placed too great an emphasis on advanced technology, or expended funds for marketing with little return. In Europe, many of the failed organizations have merged or been acquired by larger European CSOs.

Several surveys of carsharing users have been conducted in Europe, and although most were limited to simple questionnaires among small sample populations, they do provide useful insight. A survey in Switzerland and Germany found users were between 25 and 40 years of age with an above-average education, were likely to be male, earned a below-average income, and were sensitive to environmental and traffic problems.

Another European study surveyed individuals who had not participated in carsharing. The principle reasons for not joining were the unprofessional image of many CSOs, an insufficient variety of products and services, higher costs than transit, a system that was "complicated, impractical, and time consuming," and vehicles not readily available near home.

In Europe, the model CSO is one whose vehicles are used intensively by customers who drive infrequently for relatively short distances. While CSOs require frequent use to keep prices low, they are most economical for drivers who use cars sparingly. Stadtauto Drive reports that their vehicles average 21,250 miles per year, compared to 9,060 miles of the average German car. Trips tend to be short: 77 percent less than 24 hours, and 56 percent ranging between 12 and 62 miles. Average occupancy of a Stadtauto Drive vehicle is two persons, compared to the German average of 1.3. Individual members drive less than half the mileage of the average private car driver.

Another study of Mobility Carsharing Switzerland found the trip expenses of early members were reduced by \$1,700 annually, and that carsharing is cost-effective for users who drive less than 5,630 miles per year. Car mileage for individuals who had owned

private vehicles was reduced 33 to 50 percent after they joined the CSO. Most members increased their public transportation use. (Differences in land use and transit use patterns indicate that such a dramatic reduction in car usage is probably much greater in Europe than we could expect in North America.)

CONCLUSIONS

CSOs are more likely to be economically successful where they provide a dense network and variety of vehicles, serve a diverse mix of users, create joint-marketing partnerships with other transit companies, offer flexible yet simple rate systems, and provide for easy emergency access to taxis and long-term car rentals. They are most likely to thrive where environmental consciousness is high, driving disincentives such as high parking costs and traffic congestion are pervasive, car-ownership costs are high, and alternative modes of transportation are easily accessible.

CSOs may be precursors of a new kind of mobility-service company. As car ownership proliferates and vehicles become more

modular and specialized, entrepreneurial companies may see an opportunity to offer full transport services at work sites, transit stations, shopping centers, and in neighborhoods, based on partnership-management strategies. Carsharing organizations could lead the way to a whole new range of transportation options for many. ♦

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Travel for the Fun of It

BY PATRICIA L. MOKHTARIAN AND ILAN SALOMON

A SEEMING TRUISM, repeated countless times in university transportation courses, holds that “travel is a derived demand.” That is, travel occurs because someone wants to do something somewhere else. This basic proposition underlies most policies designed to reduce motorized travel and thereby reduce congestion, increase safety, improve air quality, or reduce consumption of nonrenewable energy resources.

For example, some land use policies seek to place residences at high densities close to work and shopping, with the aim of reducing trips to reach frequently visited destinations. Telecommuting, teleconferencing, and teleshopping present possibilities for people to engage in their usual activities, substituting communication for transportation. The implicit assumption that travelers are cost minimizers also underlies various pricing strategies aimed to induce fewer or shorter trips (congestion pricing, higher fuel taxes, higher parking fees). By increasing the cost of getting there, the theory contends, we can reduce the attractiveness of some destinations and thus reduce the volume of travel.

However, two types of travel appear to be at odds with the derived-demand concept. First is the phenomenon of joyriding—trips themselves being the desired activity. These trips have received little if any attention in trip-generation models, implying that their magnitude is considered too small to be important, or that their complexity and variation defy our modeling capabilities, or simply that they fail to fit that truism underlying the models.

Second is the phenomenon of excess travel—unnecessary mileage attached to routine trips, such as the journey to work. Our research suggests that some excess mileage can be attributed to nothing more than the desire to travel. The benefits enjoyed are independent of and in addition to those associated with getting to the destination.

None of this is news, of course. Joyriding has long been associated with automobiles, but recreational travel has been an outgrowth of virtually every means of transportation ever known (consider horseback riding or sailing). A recent MIT study observes that the transition from slow transit to fast automobiles and airplanes is making for more miles traveled per capita. An Australian study finds that satisfaction with hypothetical commut-

ing times is highest at about fifteen minutes, implying both longer and shorter times are less satisfactory. Some of our own earlier work on the demand for telecommuting found that not everyone who is able to telecommute chooses to do so—that some enjoy the regular commute even when they don’t have to take it.

There’s been a lot of commentary recently on attitudes toward automobiles, much of it reinforcing these notions that people desire travel for its own sake. Automobile advertisements frequently play to the desire for mobility: “It’s an unrestricted round trip ticket to anywhere” (Acura Integra); it “takes me places roads don’t even go” (Ford Explorer); “a car so advanced, it might set telecommuting back a few years” (Honda Accord). These themes doubtless resonate with a number of automobile consumers, such as the one recently spotted on a California highway with a vanity license plate reading “BRN4TRVL.”

Our research clearly indicates that people like to travel. And they do so for many reasons that may have nothing to do with practical considerations like getting to work or gathering provisions. People go out seeking adventure, looking for novel, exciting, or unusual experiences—and travel is part or sometimes all of the experience. They look for variety from monotonous routine, sometimes deciding to take a different, perhaps longer route home from work. Many people declare their independence and control over their own lives by driving their cars whenever and wherever they wish. And everyone knows that one way of flaunting status is through travel—to a prestigious vacation spot or in a bright convertible or large luxury car.

Some people find their commute time creates a much-needed transition, or buffer, between their states of mind at work and home. Lots of people take off because they like to be outdoors. (Ted Leonsis, president and CEO of AOL Studios, says that the biggest competitor to AOL is “nice weather.”) Sometimes the need to take off has to do with escaping something or someone that’s oppressive—Aunt Kate coming to visit, perhaps, or the sound of the neighbor’s weed whacker. Scenery, interesting crowds, anything might induce a person to take the long way home. And some people like being efficient, adding tasks to their trip in order to be more productive while they’re out and about.

In an effort to learn about peoples' attitudes toward travel, both overall travel and for specific trip purposes and by specific modes, we surveyed a randomly selected sample of households in three San Francisco Bay Area cities representing a variety of land use patterns. We got back about 1900 useable responses. We had designed the questionnaire to reveal demographic characteristics, attitudes toward travel, lifestyle, personality traits, and amounts of travel. Our aims were, first, to measure respondents' affinity for travel and, second, to relate travel preferences to their identifiable personal attributes. There is much analysis still to be done on the latter, but we can tell here what we've discovered so far about the former.

Our data clearly suggest that travelers are not cost (or distance) minimizers. For example, consonant with that Australian study, workers reported that their ideal one-way commute time is just over sixteen minutes on average. Only 3 percent desire a zero-to-two-minute commute, suggesting that entirely eliminating the commute does not resonate with most people as desirable.

In comparing workers' actual commute times with their stated ideal, we found that for a sizable minority (42 percent) of the sample, the two times are about equal. These people have either succeeded in achieving their ideal, or they have rationalized their ideal to match reality. Not surprisingly, fully half (52 percent) of the respondents are currently commuting at least 5 minutes longer than their ideal time. But an interesting 7 percent of the sample wants to commute longer than they currently do. Naturally enough, this group tends to have relatively short commute times now, but it does illustrate that it's possible to have a commute that's too short. Taken together, these results strongly suggest that commuting is not unequivocally a disutility to be minimized. Rather, there is an optimum to be achieved, and it is possible to fall short of that optimum on either side. We're now trying to model the ideal commute time as a function of such objective variables as

traveler demographics and actual travel time, and such subjective measures as the desire for adventure.

When we asked about overall travel patterns (i.e., for all trip purposes), respondents revealed a clear propensity toward excess travel. More than three-quarters of them reported that they sometimes or often traveled "out of the way to see beautiful scenery," "to explore new places," "on a new route to a familiar destination," or "just for the fun of it." We also asked respondents whether they want to travel more or less, distinguishing between short-distance trips of less than 100 miles and long-distance—both recreational and work-related—trips of more than 100 miles one-way. We think of those wanting to travel less as surfeited, those at the other end as deprived, and those in the middle as satisfied.

Figure 1 shows a clear difference in respondents' overall satisfaction with short-distance as opposed to long-distance travel. Thirty-five percent want to do less short-distance travel; only seven percent wish they did more; a majority (57 percent) are happy enough with their current amount of short-distance travel. In contrast, a majority (55 percent) favor more long-distance travel; only 10 percent prefer less. It's noteworthy that a study of 474 Jerusalem residents more than twenty years ago, using a similar measure of satisfaction but not distinguishing short- and long-distance travel, found a distribution of responses similar to the average of our short-distance and long-distance ratings. This seems to hint at some temporal/geographical stability in these attitudes. We also asked our respondents to rate their liking for travel on a five-point scale. Again, clear differences between overall ratings for short- and long-distance travel emerge, as Figure 2 shows. Levels of dislike are similar for both short-distance (13 percent) and long-distance (11 percent) travel. But a majority (55 percent) are indifferent about short-distance travel, whereas an even larger majority (63 percent) are positive about long-distance travel. For this measure of travel preference, the Israeli data coincide almost exactly

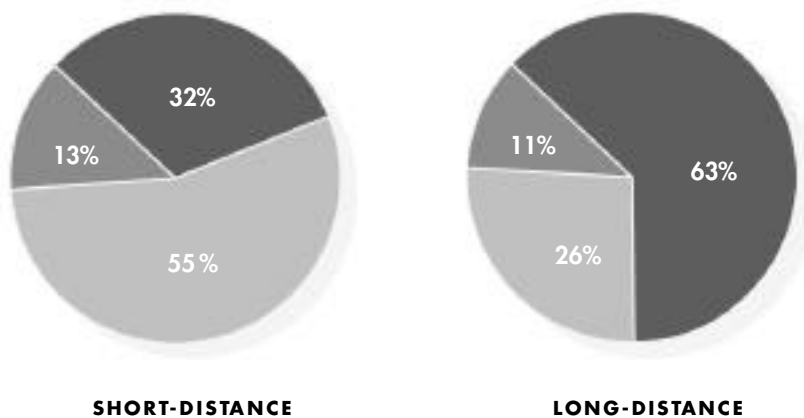
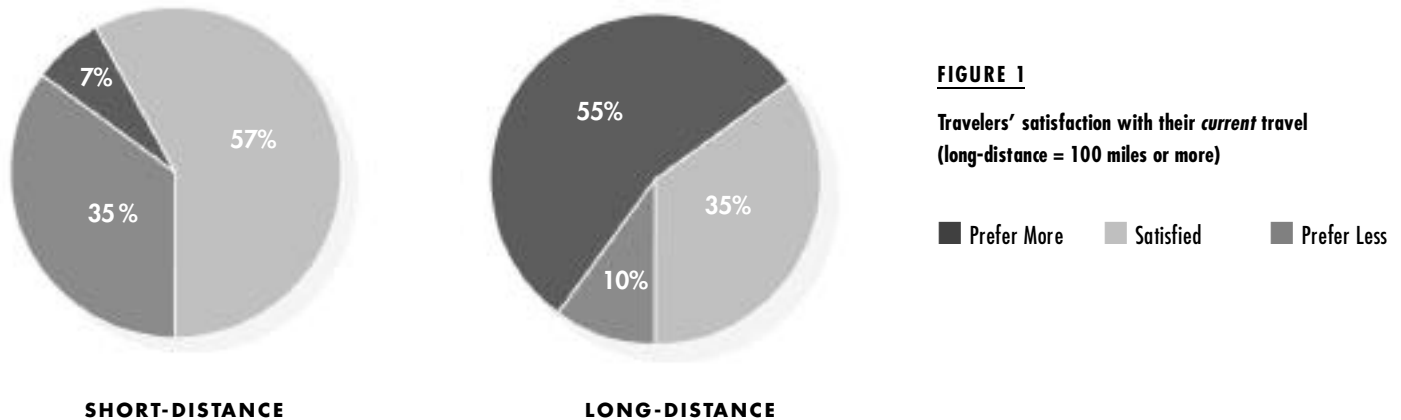


FIGURE 2
Travelers' attitudes about short- and long-distance travel (long-distance = 100 miles or more)

■ Like ■ Neutral ■ Dislike



with our long-distance distribution. This suggests that people's overall affinity for travel (which is all the Israeli study measured) may be dominated by their perceptions of long-distance travel.

It's evident that a great many people enjoy long drives to vacation spots, some even driving very long distances as a major ingredient of their vacations. The popularity of mobile house-trailers and Winnebagos, that permit one to travel while living "at home," is a telling indicator that sheer travel can serve as a medium for absorbing leisure time and as an integral form of recreational activity. Even when combined with visits to national parks and other en route destinations, the travel per se seems to be an important component of a vacation's activities. To be sure, it would be difficult to separate a subjective evaluation of the time spent in one's car from the time spent hiking or fishing. So too with distinguishing the pleasurable aspects of the commute from the instrumental value of getting to work. The stereotypes suggest that for most commuters the trek by car to and from one's job is a miserable bore, especially when roads are congested. And yet, for some the commute—even a slow one—can be enjoyed as a chance to be alone, to listen to the radio, to talk on the cell phone, or to talk to one's self. Despite the expressed desire to reduce short-distance travel shown in Figure 1, the degree of liking (or at least indifference) toward the short-distance travel shown in Figure 2 suggests that people may not be highly motivated to do so.

Overall, our findings firmly indicate that some people just love to go, even when they're going nowhere in particular. The additional evidence from Israel, Australia, and elsewhere, as well as our hunches, convince us that a thirst for mobility is universal, that it's not peculiar to Americans or Californians, although its intensity varies by individual, trip purpose, and idiosyncratic circumstances. The policy implications are important: people who love to

travel are unlikely to welcome neo-traditional neighborhood development policies and other efforts aimed at reducing their auto travel. This is not to suggest that these people value accessibility less. They want to reach work, the grocery store, and the dentist as easily as anyone else. But it does mean that they are willing to trade away access-by-proximity for access-by-travel. They want it all: mobility and accessibility. The intensity of our respondents' preferences suggests that, so long as they're free to decide for themselves, they'll continue to travel for the fun of it. ♦

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