Future of the Automobile Program

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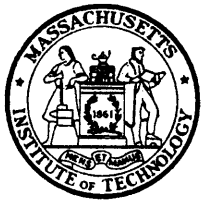


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# THE HIGHWAY SAFETY PROBLEM IN COMPARATIVE PROSPECTIVE

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## THE HIGHWAY SAFETY PROBLEM IN COMPARATIVE PERSPECTIVE

The introduction of motor vehicles in any society produces a large gain in personal mobility but invariably at the price of a large increase in the number of transportation related deaths and injuries. In the early years of motor vehicle use fatality rates are typically high -- often 30 or more fatalities per 100 million vehicle miles of travel. As drivers and pedestrians gain experience and internalize the "logic" of motor vehicle operations* and as roadway improvements are introduced to accommodate burgeoning traffic, the fatality rate generally drops dramatically. However, the increase in motor vehicle travel is often so great that the fatality rate per capita continues upward.

To stabilize or reduce the rate per capita (and in the process to reduce the rate per mile much more) governments in most developed countries have initiated safety programs in the areas of roadway design, vehicle performance, and driver behavior. This paper is concerned with two closely linked questions about the efforts of advanced nations to deal with the "highway safety problem". First, why did those nations with particularly vigorous programs, notably the United States, Sweden, and Japan, identify highway safety as a major problem in need of immediate remediation. Second, why have safety programs in these three countries, addressed as they are, to what might appear as an identical problem, taken radically different forms.

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* Visitors to third world countries, and in particular those unfortunate enough to drive there, frequently remark on the lack of understanding of vehicle maneuvering capabilities or stopping distances. While this knowledge seems more or less self evident to adults raised in auto cultures, in fact it is only gained gradually and at great cost in lives. (Even in auto societies, of course, many children and teenagers are killed or injured before they become sufficiently aware of the danger, but the focus on negligent driving behavior and teenage drinking in such cases often casts the phenomenon in a different light.)

In searching for answers we will first examine the nature of the highway safety problem as well as data on its magnitude in developed countries. Next, we will summarize the programs implemented in the three countries. Finally we will examine three factors in each society -- the interplay of interest groups, the structure of government, and ideologies of responsibility and behavior control -- in attempting to explain the way the problem is understood in each country and the choice of particular solutions.

What might be labeled the "motivating hope" underlying this inquiry is the possibility that even the most successful societies might do a better job than they have in reducing motor vehicle tragedies by finding a better fit between problem perceptions and feasible solutions in their society. It is hoped that an examination of comparative experience may in some small way prove useful for this purpose.

## Thinking About the Highway Safety Problem

Many undesirable conditions in human life arouse little comment. Most notably, all people spared other misfortunes die of old age. Yet, there is no commotion about the "old age mortality problem" (compared with, say, the "teenage drunk driving problem") and for an obvious reason: at present, no remedial action is humanly available. This cannot be said of highway fatalities, however, since at the extreme these misfortunes can be banished by proscribing motor vehicle travel or by restricting speeds to such low levels that fatalities are negligible and injuries infrequent. Since such

proposals are hardly ever made, even by those most hostile to the automobile, we can reasonably infer that a condition does not become a problem merely because a solution exists.

Rather, it seems clear that the perceived benefits of a solution must outweigh its perceived costs before a society recognizes a condition to be remediable and, therefore, proceeds to label it a "problem". Furthermore, the most significant costs and benefits seem, in many cases, not to be economic and to vary widely from country to country. Finally, the very measures of the problem may vary significantly between countries. The first two points will become clearer after we review the highway safety programs in the three study countries. However, the question of measurement needs some attention at this point if the country summarizes are to be intelligible.

The measure selected to quantify the magnitude of the highway safety problem may itself say a good deal about a country's perception of the problem. Then, again, it may merely speak to the difficulties of measurement. In practice, while writers on the topic in all countries initially avow the desirability of discussing the combined sum of deaths, injuries, and other costs to society, the discussion generally narrows quickly to fatality rates to permit basing it on reasonably reliable data. Discussions of injuries quickly flounder on the lack of an objective rating scale that considers ability to function and on the uneven reporting of injuries: do all injuries count the same? (e.g., is a broken neck equal in severity to two broken arms?) Are self-reported mobility limitations or days off from work or medical evaluations the most appropriate measures of

injury? etc.) Attempts to quantify accidents in cash terms get little further: How should pain and suffering be quantified? Are lost wages the key (which means, incidentally, that accidents are more "serious" in richer countries) or perhaps the net social loss (i.e., the difference between the victim's lifetime income stream and the goods and services the victim would have consumed during his or her lifetime)? Hence, those writers who persist in using injury measures arrive at wildly differing estimates of the magnitude of the problem, and these tend to correlate very closely with the writer's predispositions.

Fatalities, at least are unambiguous but there are still problems. For one, as the time between the accident and the victim's death increases, it becomes progressivly harder to be sure the death is accident-related and even if it clearly is, to be sure it is reported as such.* Another problem, more significant for our purpose, is the appropriate rate to use. In Japan and Sweden, the predominant measure is annual fatalities per 100,000 population. This tends to portray motor vehicle fatalities as a public health problem. In the United States the most common measure is fatalities per 100 million vehicle miles of travel,** which tends to be more useful in measuring the

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* To deal with this problem, the trend around the world is now toward a 30 day cutoff on fatalities. However, the Japanese and the French still follow their traditional definitions (respectively, 6 day and no time cutoff) and these are used in the data presented in Tables 1 and 2.

** Even this is widely understood to be the "wrong" measure since passenger miles of travel are presumably the bottom line of any transport system. However, the lack of data on average occupancies of vehicles has generally prevented use of this measure in the U.S. Also, since passenger mileage estimates are altogether lacking in Europe or Japan, the measure cannot be used for comparative analysis.

safety performance of the transport system. For comparative purposes, both measures are presented in Tables 1 and 2.

## The Fit Between the "Problem" and the Solutions

Options for improving highway safety fall logically into four categories:

1. Reductions in motor vehicle travel
2. Improvements to the roadway system
3. Improvements to the motor vehicle
4. Improvements in driver capabilities and behavior

The first, to the extent it is put forward at all, is generally stated in the positive form of improving transit systems or restricting cities so that travelers will not want to drive as much. It has generally served as a subsidiary justification for programs desired for other reasons, however, and no transit project or urban development plan seems ever to have been adopted in any country primarily for its safety benefits. (And, it bears adding, the trend in motor vehicle use in the U.S., Japan, and Sweden has continued upward even since 1974.)

Roadway improvements are an interesting strategy because they reduce fatalities per vehicle mile in most cases*, but also generate

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* A common exception would be a crooked road widely perceived as "dangerous" which appears to be "safe" once straightened. Drivers, therefore, increase their speed while relaxing their vigilance and accidents, to the surprise of highway engineers, go up. This type of response is thought by some observers to be much more common in the area of vehicle design and provides the basic argument for "Peltzmanism", to be discussed briefly in a moment.

additional travel (and risk exposure) by making travel easier. Nevertheless, such projects and particularly freeway building, have been enormously popular in developed countries since World War II. They have invariably been justified to a considerable extend for their safety benefits and hardly anyone has tried to make the case that they might actually increase fatalities.*

Improvements to the vehicle fall generally into the categories of (1) structural modifications to absorb crash energy, control fuel spills, and prevent foreign objects from penetrating the passenger compartment,** (2) passenger restraints to deal with the "second collision" when passengers collide with the vehicle interior, and (3) vehicle performance improvements in the areas of braking, tires, and handling. The latter have, to date, mostly taken the form of standardizing vehicle performance to eliminate models with aberrant handling characteristics such as the Corvair. Almost all the participants in highway safety debates seem to have tacitly accepted the

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* The practical problem lies in demonstrating what portion of the traffic using these roads would not have existed otherwise. And in America, at least, there is another problem -- travel itself tends to be regarded as both virtuous and voluntary and the fact that a new transport line permits the public to travel so much more that fatalities increase is hardly to be counted against it.

** Structural modifications have also been employed in America to reduce vehicle repair costs in minor accidents. (The "five mile per hour bumper".) These measures seem to have resulted from disputes between insurance companies and the auto industry over who should pay the cost of repairs and have not figured in highway safety discussions in other countries.

"Peltzman hypothesis"* that improvements in vehicle stopping distances or emergency handling characteristics will most likely simply cause drivers to speed up, so that the overall accident situation remains unchanged.

Driver capabilities and behavior can be improved in a positive manner through driver education programs and traffic safety instruction for children, or more negatively, through setting and enforcing speed limits, drunk and reckless (or wreckful!) driving laws, seat belt use laws, and vehicle maintenance inspections.

The reader may have detected an underlying logic in the traditional tri-partite approach to the highway safety problem (colloquially, bad roads, lousy cars, and nutty driving.) It is that a different set of actors can be assigned responsibility for each part of the problem. Governments are generally blamed for bad roads, auto makers for lousy cars, and nutty drivers for nutty driving. And, once a society designates a sector as most responsible, two modes of corrective address are possible; one, utilizing education and subtle social controls, the other involving sanctions and police action.

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* Sam Peltzman in his review of American auto safety regulations "The Effects of Automobile Safety Regulation" (Journal of Political Economy, 1975, Vol. 83, No. 41, pp. 677-725.) establishes himself as the Malthus of highway safety by arguing that travelers have a combined demand function for reduced travel time and safety. Thus, travelers will try to convert any improvement in vehicle crash protection into increased travel speed, which will have the effect of holding traveler accident risk for any trip at a constant level. Most of the corollaries of this argument, for example, the contention that drivers concentrate on injury risk rather than accident risk in making judgements about appropriate travel speeds, have found little support elsewhere in highway safety discussions, but a full discussion here is beyond the scope of this inquiry.

One might surmise (as we will try to confirm shortly) that a society's designation of that element of the motor vehicle system most to "blame" for the "highway safety problem" corresponds to the differing ability of society's to alter the behavior of governments, car makers, and individual travelers/citizens. This ability in turn may depend on the tools of social control and behavior modification available to each society.

Conversely, as we also suspect but cannot prove by reference to the countries under study (all of which have vigorous safety programs), where societies cannot deal effectively with any of the "safety sectors" for whatever reason the condition of high motor vehicle fatality rates is much less likely to be labeled a significant problem.*

The phrase "society's designation of that element most to blame for the 'highway safety problem'" used above, was a necessary transitional expression, but masks the vital process of "blame designation" which we seek to explain. In attempting to unmask the process, we will look carefully at the role of interest groups (broadly defined) on the assumption that ideas about who might be at fault do not magically form in the public mind, but are in general, carefully nurtured by those groups with much to gain from the adoption of certain ideas

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* Yet another interpretation of the relative emphasis on highway safety problems is intriguing, namely that the existence of a social problem in a society more generally - drunkenness in Sweden as a case in point - which is actually more feared in other contexts (perhaps domestic violence and the loss of industrial output) leads to a focus upon and accentuation of the "drunk driver problem" because the problem can be most effectively dealt with in this context (rather than in the factory where it quickly leads to class conflict or in the home where the state cannot effectively intercede.) We must emphasize, however, that based on evidence at hand, this hypothesis is very nearly pure speculation.

rather than others. However, to add one last bit of complexity, we will summise that interests do not battle in opposition on a flat plane, but rather maneuver within a forest of governmental structures and political cultures. Maintenance of this political infrastructure will generally prove much more important than a decisive resolution of any single issue such as highway safety and the ultimate designation of fault and the choice of a solution, while motivated initially by various interests, may bear of much stronger resemblance to the process machinery than the raw materials.

## Why the United States, Sweden, and Japan?

Before proceeding any further with theory spinning, it might be best to have some actual evidence at hand. This will take the form of brief case studies of the highway safety issue and government programs adopted to address it in the U.S., Sweden, and Japan. These countries were chosen partly because they have the "safest" roads in the world (the U.S. and Sweden on top with Japan getting there very rapidly) and, particularly in the case of Japan, because their political cultures are very different.

Tables 1 & 2 show fatality rates per vehicle mile and per capita for the U.S., Sweden, Japan, France, and West Germany for the periods for which data are available. France and West Germany have been included for contrast as the developed countries with the highest fatality rates on both measures* although it is important to note

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*Possibly a future version of this paper will include case studies of these safety slugabeds (so different in most other respects) which might throw light on the hypothesis that where institutional, cultural, or economic interests block the path to low fatality rates, the condition is not judged to be a problem

that the general trend of these measures in all countries have been downward, whatever the formal commitment to safety.*

## The American Case: Freeways and High Technology**

The United States has always been the world's most motorized country (see Table 3) -- a result of low population density, cheap oil, and a strong economy. In consequence, the motor vehicle as a public health problem has long been recognized. However, several peculiar characteristics of American society have channeled means of dealing with the problem in certain directions.

In the early years of the auto age, after the very initial period when attempts in a number of locales to deal with the motor car by banning it were swept aside by popular desire, the predominant approach was to penalize miscreant drivers. These were identified as a practical matter by their involvement in accidents and were, under statutes adopted in most states, to be treated as criminals if an accident was shown to be due to their negligence.

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* This phenomenon is explained variously as the result of growing driver/pedestrian experience with the motor vehicle system, aging of the baby boom cohert which held fatality rates up in the 1960s, or even, if one is a diehard Peltzmanite, by the growth in real incomes which increases the value of time and income lost due to accidents (and thus deters reckless driving).

** This account of the evolution of the American approach to highway safety is based on: Charles McCarry, Citizen Nader, New York: Saturday Review Press, 1972, pp. 56-57, and Chapters 4 and 5; Ralph Nader, Unsafe At Any Speed, New York: Grossman, 1965, especially Chapter 7, "The Traffic Safety Establishment"; Daniel P. Moynihan, "Epidemic on the Highways", The Reporter, April 30, 1959, pp. 16-23; and Alan Altshuler with James P. Womack and John R. Pucher, The Urban Transportation System: Politics and Policy Innovation, Cambridge: MIT Press, 1979, Chapter 7, "Safety".

TABLE 1

FATALITIES PER 100 MILLION VEHICLE MILES

| | U.S. | Sweden | Japan | France | West Germany |
|---|---|---|---|---|---|
| 1923-1927* | 18.2 | | | | |
| 1928-1932* | 15.6 | | | | |
| 1933-1936* | 15.8 | | | | |
| 1937-1945* | 11.8 | | | | |
| 1946-1950* | 8.3 | | | | |
| 1951-1955* | 6.9 | | | | |
| 1956-1960* | 5.7 | | | | |
| 1961 | 4.9 | | | | |
| 1962 | 5.1 | | | | |
| 1963 | 5.2 | | | | |
| 1964 | 5.4 | 6.4 | 37.2** | 14.7 | 15.6 |
| 1965 | 5.3 | na | 28.9** | 15.0 | 13.5 |
| 1966 | 5.5 | na | 31.1** | 13.8 | 13.5 |
| 1967 | 5.3 | na | 24.8 | 13.4 | 13.0 |
| 1968 | 5.2 | na | 20.8 | 13.4 | 11.9 |
| 1969 | 5.0 | na | 14.3 | 13.7 | 11.3 |
| 1970 | 4.7 | 6.1 | 12.5 | 13.4 | 11.4 |
| 1971 | 4.4 | na | 12.6 | 13.4 | 10.6 |
| 1972 | 4.3 | 4.7 | na | 12.9 | 10.1 |
| 1973 | 4.1 | 4.4 | na | 11.6 | 9.7 |
| 1974 | 3.5 | 4.3 | 9.5 | 9.2 | 9.3 |
| 1975 | 3.4 | 4.5 | 8.2 | 8.7 | 8.1 |
| 1976 | 3.2 | 4.3 | 6.9 | 8.5 | 7.6 |
| 1977 | 3.2 | 3.7 | 5.7** | 8.4 | 7.9 |

* Averages during each period.

** Estimated assuming that the ratio of "24 hour fatalities" to total fatalities was the same in 1964-1966 and 1977 as during the period 1967-1976.

TABLE 1 Sources: Fatalities per vehicle mile for France and West Germany are as estimated by the International Road Federation in World Road Statistics (various years), Table VII, "Road Accidents". Estimates for the U.S. for the years 1923-1963 are from National Safety Council, Safety Facts (1975 edition), p. 59. U.S. data for years from 1964 are from National Highway Traffic Safety Administration, Highway Safety 1978, Table A-1.

TABLE 2

ANNUAL MOTOR VEHICLE FATALITIES
PER 100,000 RESIDENT POPULATION

| | U.S. | Sweden | Japan | France | West Germany |
|---|---|---|---|---|---|
| 1900 | | | | | |
| 1910 | | | | | |
| 1920 | | | | | |
| 1925 | | | | | |
| 1930 | | | | | |
| 1935 | 28.6 | | | | |
| 1940 | 26.1 | | | | |
| 1945 | 21.2 | | | | |
| 1948 | 22.1 | | | | |
| 1953 | 24.0 | | | | |
| 1955 | 23.4 | | | | |
| 1960 | 21.2 | 14.6 | 14.4 | 17.9 | 25.7 |
| 1961 | 19.8 | 15.2 | 15.7 | 20.2 | 25.6 |
| 1962 | 21.0 | 15.7 | 14.5 | 21.5 | 25.4 |
| 1963 | 22.1 | 16.7 | 15.8 | 21.4 | 25.0 |
| 1964 | 23.9 | 17.1 | 17.3 | 23.0 | 29.4 |
| 1965 | 24.3 | 17.0 | 16.3 | 24.8 | 27.6 |
| 1966 | 26.0 | 16.8 | 18.2 | 24.7 | 29.3 |
| 1967 | 25.7 | 13.7 | 17.5 | 25.6 | 29.6 |
| 1968 | 26.4 | 16.0 | 18.1 | 26.7 | 27.6 |
| 1969 | 26.6 | 16.0 | 20.0 | 29.1 | 27.4 |
| 1970 | 25.8 | 16.3 | 20.6 | 29.6 | 31.5 |
| 1971 | 25.5 | 15.0 | 20.0 | 31.3 | 30.5 |
| 1972 | 26.2 | 14.7 | 19.1 | 32.0 | 30.4 |
| 1973 | 25.8 | 14.5 | 17.5 | 29.9 | 26.3 |
| 1974 | 21.4 | 14.7 | 14.0 | 25.4 | 22.7 |
| 1975 | 20.9 | 14.3 | 12.7 | 24.9 | 24.0 |
| 1976 | 21.2 | 14.2 | 11.5 | 26.1 | 24.1 |
| 1977 | 22.1 | 12.5 | 10.5 | 24.7 | 23.7 |

TABLE 2 Sources: U.S. data for years 1935-1960 from National Safety Council, Accident Facts (1975 Edition), p. 59. 1961-1977 from National Highway Traffic Safety Administration, Highway Safety 1978, p. A-36, Table A-14. Data for Sweden, Japan, France, and West Germany computed from population estimates in United Nations, Statistical Office, (Dept. of International Economic and Social Affairs), Demographic Yearbook, New York: United Nations, (various years, Tables 4 and 5), and vehicle fatality estimates from United Nationas, Statistical Office, Demographic Yearbook, New York: United Nations, (various years).

TABLE 3

POPULATION PER MOTOR VEHICLE

| | U.S. | Sweden | Japan | France | West Germany |
|---|---|---|---|---|---|
| 1900 | 9512.5 | | | | |
| 1910 | 197.2 | | | | |
| 1920 | 11.5 | | | | |
| 1925 | 5.8 | 76.0 | | | |
| 1930 | 4.6 | 42.0 | | | |
| 1935 | 4.8 | 39.0 | | | |
| 1940 | 4.1 | 78.0 | | | |
| 1945 | 4.5 | 70.0 | | | |
| 1948 | 3.6 | 26.0 | | | |
| 1953 | 2.9 | 13.0 | 133.6 | 14.0 | 27.6 |
| 1955 | 2.6 | 10.0 | | | |
| 1960 | 2.4 | 5.7 | 50.7 | 6.4 | 10.5 |
| 1961 | 2.4 | 5.2 | 39.1 | 5.7 | 9.2 |
| 1962 | 2.4 | 4.8 | 31.5 | 5.3 | 7.9 |
| 1963 | 2.3 | 4.8 | 23.5 | 4.8 | 7.0 |
| 1964 | 2.3 | 4.2 | 18.5 | 4.4 | 6.3 |
| 1965 | 2.2 | 4.0 | 15.2 | 4.1 | 5.8 |
| 1966 | 2.1 | 3.8 | 12.3 | 3.9 | 5.3 |
| 1967 | 2.1 | 3.7 | 9.7 | 3.5 | 4.9 |
| 1968 | 2.0 | 3.6 | 8.1 | 3.6 | 4.9 |
| 1969 | 2.0 | 3.4 | 6.8 | 3.4 | 4.6 |
| 1970 | 1.9 | 3.3 | 5.9 | 3.2 | 4.2 |
| 1971 | 1.9 | 3.2 | 5.3 | 3.4 | 3.9 |
| 1972 | 1.8 | 3.1 | 4.8 | 3.3 | 3.7 |
| 1973 | 1.7 | 3.1 | 4.4 | 3.2 | 3.5 |
| 1974 | 1.7 | 2.9 | 4.2 | 3.1 | 3.3 |
| 1975 | 1.6 | 2.8 | 4.0 | 3.0 | 3.2 |
| 1976 | 1.6 | 2.7 | 3.8 | 2.9 | 3.0 |

TABLE 3 Sources: U.S. data for 1900-1945 calculated from vehicle registration data in U.S. Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1970, Washington: U.S. GPO, 1975, p. 716, and from population data in U.S. Bureau of the Census, Statistical Abstract of the United States (1978 Ed.), Washington: U.S. GPO, 1979, Table 2. All other items calculated from population data from United Nations Statistical Office, Demographic Yearbook (various years), New York: U.N., and vehicle registration data from U.N. Statistical Office, Statistical Yearbook (various years), New York: U.N.

This approach encountered several problems. First, perhaps because Americans incorporated the auto into their daily lives so thoroughly, the notion that misuse of (a "mistake" with) a motor vehicle was a crime was simply never accepted. In addition, local police and traffic courts (with sheriffs and judges often elected) proved extremely susceptible to extra-legal persuasion that offenses were not serious (even when stiff laws were on the books). Finally, the fact that motor vehicle "criminals" cut across social and economic lines (and in the early days were predominantly wealthy) more or less clinched the case that motor vehicle laws would not be enforced with severe penalties, and especially prison terms.*

In the 1920s, as the highway system was improved to accommodate the rapid growth in traffic** and as vehicles were improved to keep

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* The situation seems hardly to have changed over the years. See for example, Susan Sheehan's account ("Auto Accident", The New Yorker, September 25, 1978, pp. 75-123) of an accident in West Virginia in 1975 which incapacitated her husband for six months. The driver of the other vehicle had bald tires, defective brakes, no registration, a phony license plate, no insurance, no safety inspection, and freely confessed to Sheehan that he often drove on the wrong side of the road at night with his lights out "for the heck of it". When he struck her husband's car while driving on the wrong side of the road at a high rate of speed in a snow storm, the investigating officer determined that he was, indeed, at fault. His penalty in traffic court was a $10 fine, this despite his previous involvement in similar accidents and his lack of license, safety sticker, and insurance. When Sheehan's insurance company sued to recover its losses of more than $10,000, the defendant blandly stated that he would file for bankruptcy if the company won and the case was dropped. (Things are handled rather differently in Sweden, as we will see in a moment.)

** It is easy for Americans to forget that motor vehicles overran the U.S. in the 1920s rather than after the Second World War. By 1929, the number of people per motor vehicle was lower at 4.6 than it was to be in any European country until 1964 (Sweden) and in Japan until 1973. (See Table 3.)

out the elements (by means of steel roofs which greatly reduced fatalities in rollovers) and improve driveability (including, in particular, better tires less prone to blow outs), the fatality rate dropped rapidly enough on a vehicle mile basis to hold fatalities per capita at a roughly constant level.

While this was occurring, a safety ideology was also being concocted by the motor vehicle manufacturers, the insurance industry and the highway safety organizations which they supported, notably the National Safety Council and the Automotive Safety Foundation. It provided a positive approach to an acknowledged problem but one consistent with auto and insurance interests and in sync with American notions of governmental versus individual responsibility. This ideology was packaged as the famous "nut behind the wheel" theory of safety, a concept with some rather strange policy prescriptions: While the culprits were found to be negligent "nuts" (thus absolving "responsible" drivers of this fear that they might somehow be implacated also and removing the role of the vehicle from consideration), the solution was found to lie in teaching responsible drivers to "drive defensively" and in giving them better roads -- limited access, divided highways in particular -- which would be to a considerable extent "nut proof". Some attention was devoted to the need for uniform traffic laws but no serious effort was made to lobby for tougher penalties for negligent driving or for lower speed limits. And the vehicle itself was not mentioned except for assurances that it was getting better all the time.

In the first decade after World War II, the notion that the motor vehicle was the centerpiece of American life, that it simply would be used irresponsibly some of the time, and that accordingly drivers should hone their evasion skills so as to defend themselves, held total sway. However, the notion that better roads could help also grew in strength and became a major selling point of the Interstate system. Curiously, just as this system was coming into widespread use and reducing fatalities per vehicle mile to about one-half the level on non-express main highways, the boom in vehicle mileage caused in part by the Interstate system itself and in part by the rapid growth of the economy, was driving total fatalities and fatalities per capita upward.

When the World War II baby boom suddenly reached driving age around 1960, fatalities per vehicle mile also began to creep up after dropping steadily for at least forty years. Nothing much happened at first beyond ritualized "crack downs" on misbehaving motorists,* but a leap in technology and in altered relation between government and large corporate enterprises making consumer products changed the predominant ideology of highway safety practically overnight.

The first step in the process had actually occurred during the Second World War when researchers at the Cornell Aeronautical Laboratory and elsewhere discovered that relatively simple modifications to

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* Abraham Ribicoff, as Governor of Connecticut in the mid-1950s, was the leader of the "crack down" school of safety. His education about the concept-fatalities declined imperceptibly while total accidents and injuries actually grew faster than vehicle miles of travel and the political cost to the Governor was high -- made him particularly receptive to a new approach to motor vehicle safety after arriving in the Senate in 1962.

aircraft cockpits could greatly reduce pilot injuries and fatalities caused by the crash landings inevitable in war time operations. Elimination of sharp surfaces, secure belting of the pilot to a rigid seat, and aircraft frames which crushed in a controlled way to absorb crash energy while preventing foreign objects from reaching the pilot, prevented pilot deaths and injuries even in remarkably violent crashes.

After the war, research in these areas continued but at a modest level and mostly with military funding. One insurance company financed construction of a proto-type safety vehicle at Cornell (in 1955) but the vehicle was envisioned as the ultimate safety vehicle rather than a serious candidate for mass production and auto makers showed little interest. Privately they maintained that vehicles as a whole were slowly getting safer, that there was little public demand for safety per se, and that the companies worried in particular about product liability with regard to safety innovations. They pointed out that under American law a manufacturer was unlikely to get in trouble producing cars about average in safety with its competitions, even if the "average" was not very safe compared with what was technically feasible. However, if a manufacturer marketed a "safe" vehicle which buyers were then injured in, there seemed a real prospect that the buyer might collect from the manufacturer.*

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* The precise issue has come up again in the dispute over air bags where purchasers of this option have tried to collect from GM after receiving injuries in accidents where it is alleged that the safety equipment failed to perform properly. The company has won an early case on a technicality (see New York Times, September 19, 1977, p. 25, "Driver Looses Suit Against GM Over Failure of Air Bag to Inflate"), but fears remain high in Detroit that more safety equipment means more damage suits.

The safety issue was tested definitively from the industry's perspective when the McNamara whiz kids at Ford marketed a "new life-guard design" as the key feature of the 1956 models. To their surprise the safety features sold well, but the models themselves very poorly. The company concluded it had cornered the safety market but might well go under in the process and by 1957 was firmly back in the horsepower race.

At the end of the decade, Ralph Nader and Daniel P. Moynihan produced two articles* on highway safety which presented in practically final form the new safety ideology of the 1960s. Moynihan was particularly adroit in shifting blame perceptions from the driver to the manufacturer in a lead off section titled "Whose Fault Is It?":

> "... the [National] Safety Council's most serious disservice to traffic safety comes from its emphasis on the individual's responsibility for accidents. The basic message of the enormous flood of material, publicity, and information that emerges from the Safety Council is that accidents are caused by individual carelessness and can be prevented if drivers will only pay attention.
>
> Perhaps an individual <u>can</u> reduce to some degree his own risks of being involved in a smash-up. But the exposure to accident situations is so great in

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* Daniel P. Moynihan, "Epidemic on the Highways", <u>The Reporter</u>, April 30, 1959, pp. 16-23; and Ralph Nader, "The <u>Safe</u> Car you Can't Buy", <u>The Nation</u>, April 11, 1959, pp. 310-313.

> America these days - with nearly seventy million cars on the highways - that admonishing individuals to drive carefully seems a little bit like trying to stop a typhoid epidemic by urging each family to boil its own drinking water and not eat oysters; that may help, of course, but why not try vaccinations, setting standards of cleanliness for food handlers, and purifying everybody's drinking water in the reservoirs?
>
> By emphasizing the individual's responsibility in automobile accidents, the Safety Council shifts public attention from factors such as automobile design, which we can reasonably hope to control, to factors such as temperament and behavior of eight million drivers, which are not susceptible to any form of consistent, overall control -- certainly not by a bunch of slogans." (p.17)

Moynihan was perfectly well aware, of course, that individuals do cause accidents -- studies conducted over many years had shown that 50-60 percent of drivers in fatal accidents were drunk and that excessive speed figured in many additional fatalities -- and that a logical alternative to the Safety Council's "slogans" were stiff penalties. The key phrase, however, was "reasonable hope of control" and the key contribution of Moynihanism was to direct safety activities into a new path where the nature of American institutions favored their success.

When the Kennedy Administration came into office in 1961, Moynihan was in a position (as Assistant Secretary of Labor) to promote his

ideas directly and brought Nader into the Department as a consultant to aid in preparing legislation. However, progress was slow and the legislation would doubtless have been very modest except for Nader's celebrated run in with GM's gumshoes while testifying for the administration's bill before the Ribicoff committee. By this action, GM made the key element of Naderism plausible -- that tapping of deep feelings of frustration among Americans toward the large producers of consumer products who had thus far, escaped formal public guidance. Nader capitalized on the opportunity by hammering away at the theme that dangerous automobiles such as the Corvair, rather than dangerous drivers, were the heart of the problem and that the companies would stop at nothing in trying to silence those who would preach this truth.

As the Nader program became institutionalized in the National Highway Traffic Safety Administration (NHTSA) it focused on two themes - recalls of vehicles found to be unsafe in use for safety modifications and design standards for new vehicles to improve their "crashworthiness". The former has proved popular with the press and seems to attract most of the attention although most safety experts believe the safety pay off is trivial.*

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* The reasons are simple: (1) The car companies had always secretly recalled vehicles with safety defects so as to protect themselves from damage suits, and (2) defective vehicles don't seem to cause very many accidents anyway. A multi-year NHTSA-funded review of this issue at Indiana University's Institute for Research in Public Safety ("Tri-Level Study of the Causes of Traffic Accidents: Interim Report II", Washington: U.S. Department of Transportation, August, 1976) found that mechanical failures were the main cause of only 5 percent of fatal accidents and that maintenance (bald tires and worn brakes) rather than design, was the culprit in half of these cases. Thus NHTSA believes that a totally effective recall program could only reduce fatalities by about 2.5 percent.

Vehicle design standards by contrast are thought to be promising by most experts*, but the most dramatic of these have dragged along in the preparation stage. The initial package of vehicle modifications -- telescoping steering columns, padded dash boards, crash-secure door locks, and seat belts -- have produced very limited fatality reductions (which is hardly surprising since only about 15 percent of motorists wear their safety belts**) and the companies have exercised remarkable foot dragging ingenuity in resisting second generation innovations -- notably the air bag*** and vehicle structures designed from the outset to maximize crash protection. Air bags or passive seat belts (which wrap around the motorist upon entering the car) are now scheduled for all large size new cars beginning in 1982 and for all cars in model year 1984. They may be delayed again, however, (they were originally scheduled for 1974) if industry entreaties to Congress about the financial burden succeed.

The third generation of "hardware fixes" shows the true potential of this approach but hovers somewhere off around the 21st century. Items include second generation air bags which mold themselves around the passenger much more subtly to provide protection in side collisions, vehicle structures employing space age materials to

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* Again, excepting the Peltzmanites.

** According to NHTSA's annual report Motor Vehicle Safety 1978, (Washington: United States Government Printing Office, 1979, p. A-31) only about 9 percent of American motorists in 1978 were observed to be using both lap and shoulder belts. Another 6 percent were wearing lap belts only. Practically all cars now on the road have belts.

*** The air bag is a nylon balloon which inflates instantly on impact using some of the air in the passenger compartment. It shields the passenger from impact with the steering wheel or dash board and then completely deflates to aid exit from the vehicle.

provide crash protection at very high speeds,* and radar-actuated brakes which sense the inevitability of a collision and apply full braking action. (This last concept incidentally, would seem to raise the notion of "autonomous technology" to a new plane. With a perfected radar braking system, motor vehicles would presumably refuse to run into each other no matter how impetuous or irresponsible their drivers became!)

Despite the smail's pace of progress on "technical fix" solutions to the auto safety problem,** and the prospects for some very stormy sailing in the early 1960s when the cost of such innovation hits home to the consumer,*** the conventional wisdom in the highway safety area now leans more heavily than ever toward hardware solutions which involve

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* The technology is ready now, but at a price. John DeLorean, the former GM executive who is planning production of a high performance sports car in Northern Ireland, has no concern about cost (his competition is Ferrari, Lambighini and so forth) and has included the advanced air bags and high technology structures in his DMC prototype. He claims occupants can survive brick wall crashes at 80 miles per hour, roughly twice the survivable speed in a full size conventional car.

** Fatalities per vehicle mile have declined since the mid-1960s (see Table 1) but mostly due to aging of drivers and the reduction in driving speeds after the 1974 oil embargo. In 1978 and 1979, the fatality rate is actually up very slightly for the first time since 1965.

*** Government planners are also concerned about what might be termed the "Three Mile Island" complex -- the sudden loss of confidence in high technology. Air bags clearly are pretty lofty technically -- sensitive electronic crash sensors which must work for the 12-15 year life of the vehicle and explosive bag inflation devices which pose a salvage problem. Government safety officially concede privately that press coverage of the isolated false positives and false negatives (i.e., doesn't function in an accident, does function in a non-accident) which are inevitable, may quickly sink the program.

regulation of a few companies rather than many consumers. Officials cite two recent forays into consumer behavior alterations as proof that technical fixes are the only viable option in the U.S.

The first of these was the seat belt interlock episode of 1974-1975 when new vehicles could not be started unless the driver's seat belt was fastened. The political response was immediate and forceful and NHTSA has vowed not to travel that path again.*

The second experience with consumer regulation was the 55 mile per hour speed limit adopted in 1974. Prior to this time the practice in the U.S. rather incredibly, had been to find out how fast motorists wanted to drive and then to set the limit at the upper end of that range. As the authoritative Handbook** of the Institute of Traffic Engineers explained:

> "The consensus of traffic engineers in the United States is that motorists usually adjust their speeds according to conditions of the road and not necessarily to posted speed limits. Hence, if unreasonably low limits are posted, the limits will be violated by large numbers of drivers. This leads to disrespect of other posted limits as well.

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* Eighteen countries around the world now have mandatory seat belt laws. (See Peter Ziegler, "The Effect of Safety Belt Usage Laws Around the World", Journal of Safety Research 9, No. 2, June, 1977.) NHTSA, perhaps inspired by the trend, was trying to accomplish mandatory belt use in a round about way after failing to convince a single state during its first decade of existence to adopt a seat belt law. No state has acted to buckle up its citizens since 1975 and, in fact, consumer regulation in general seems to be going backwards with most states now dropping the motorcycle helmet laws which NHTSA had convinced them to adopt in the early 1970s.

** Institute of Traffic Engineers, Transportation and Traffic Engineering Handbook, Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1975, p. 854.

> "Studies of speed in Europe have shown, almost without exception, that the speed of vehicles can be considerably reduced by installing a speed limit. Experience in the U.S. indicates that drivers do not drastically alter speed patterns with changes in speed limits."

And this is not simply engineering opinion. The speed limit policy of the American Association of State Highway Officials* reads:

> The 85th percentile speed is to be given primary consideration in speed zones below 50 miles per hour and the 90th percentile speed is to be given primary consideration in establishing speed zones of 50 miles per hour or above.**

Traditional practice not only called for participatory speed limit determination (where motorists voted with their gas pedal) but also for weak sanctions against those feeling a desire to go faster. Commonly a fair number of miles over the limit were allowed before any action was taken and the worst penalty was a modest fine. Speeding was priced rather than prohibited and the price was generally quite low once the probability per mile of being caught was multiplied by the average fine.

When the Arab oil embargo occurred in late 1973, the 55 mile per hour speed limit was the most visible action the Ford Administration had at hand by which Americans could demonstrate their outrage with

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* This is the association of state highway commissioners, those officials who, in conjunction with state legislatures, actually set speed limits.

** Cited in the Institute of Traffic Engineers, Handbook, p. 860.

oil prices. However, it soon developed that the limit was indeed largely symbolic. Average speeds crept back up, many states adopted speed laws removing penalties for the gap between 55 miles per hour and the previous speed limit, and NHTSA's power to withhold federal highway funds from states failing to enforce the 55 mile per hour limit was removed by Congress. One economist* even calculated that the residual reduction in speed after 1975 could be entirely accounted for by the speed damping effect of increased gas prices.

The lesson of the seat belt interlock and the 55 mph speed limit for government safety planners seemed clear: Don't attempt measures which alter driver/voter behavior or which run counter to the American belief that government should advise citizens about most sorts of behavior rather than actually governing them. Focus instead on changes in the vehicle and roadways which motorists won't notice** and which will protect them from their own behavior no matter how irresponsible.

Despite the sluggishness of the economy and growing public restiviness with regulation as the 1980s begin, government officials continue to be hopeful about technical fixes and for an unexpected reason: they believe the issue is now largely a contest between two powerful sectors of the economy -- the auto makers and the insurance companies -- rather than between a few safety advocates and the auto industry (as it was in the early 1960s).

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* Indeed, the indefatigable Peltzman. See his

** Indeed, to cite the Peltzman perspective one last time, it may be vital that motorists not notice that their roads and vehicles are safer lest they adjust their behavior accordingly.

The Insurance Institute for Highway Safety (now headed by the first NHTSA administrator*) long ago supplanted Nader's Center for Automotive Safety as the key lobbying group on auto safety and has largely carried the fight for the 5 mile per hour bumper (which it won) and for the air bag (which it may yet win). It is not surprising that IIHS is effective considering that it has the resources of practically the entire U.S. insurance industry behind it. What is remarkable is the rapid reorientation of the industry since the 1960s when the Insurance Institute's public relations director summarized the industry position on vehicle safety standards as follows: "They [the auto makers] don't want us telling them how to build autos and we don't want them telling us how to sell insurance."** The industry's new outlook in the 1970s can be partly explained by the influence of the same Nader-led consumer movement which brought about the initial auto safety standards: When consumer groups began prodding state insurance commissions to look more critically at industry sponsored rate increase requests, the insurance industry saw a path of less resistance in shifting some of the crash losses back to the industry (or consumers) in the initial production cost or even in preventing them altogether through better vehicle design. (In other words, by "telling them how

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* William Haddon by name, the person who fed Moynihan and Nader the ideas for their articles in 1959 based on his experience as a public health official. This had convinced him that the patient/motorist would never follow doctor's orders to drive responsibly.

** The speaker, Leonard T. McEnnis, Jr., made the mistake of expressing this view to Ralph Nader while Nader was working for Moynihan. Nader cited it in Unsafe At Any Speed (p. 257) as evidence of the insurance industry's disinterest in auto safety.

to build autos.") At the same time the industry was discovering, under the tutelage of Haddon and other safety researchers, that there was, indeed, a reasonable alternative to the nut behind the wheel approach to safety.*

## The Swedish Case: Comprehensive Penalties for Dangerous Behavior

Even a casual examination of Swedish motor vehicle and insurance laws makes clear that the predominant attitude toward motor vehicle use and misuse is very different from the U.S. On almost every dimension -- drunk driving, insurance, speed limits, seat belts, and traffic safety enforcements -- the Swedes pursue a dourly different approach.

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* A future version of this paper may present a more thorough explanation of the role of the insurance industry in the highway safety debate. Manipulation of government by one industry to control the activities of another is nothing new in American, of course -- the oleo coloring laws provide an early twentieth century example -- but the scale of the Insurance Institute's enterprises may be something out of the ordinary.

A revised paper might also consider the role of the United Auto Workers which is emerging as a key factor on safety and environmental regulation of the auto in the 1980s. The UAW has been on the winning side of all safety debates to date, but shows signs of changing course since the trouble at Chrysler has highlighted the competitive weakness of the American industry.

Yet another issue worthy of study is the attitude of the auto makers themselves toward safety regulation. One might conjecture that an industry with a product possessing highly inelastic long run demand and which is facing market saturation ought to favor regulations which require that value be added to the product. This should raise the price and manufacturer profits (assuming constant margins) and should not be a competitive disadvantage to any company, since all manufacturers (domestic and foreign) would be required to meet the same standards. Since this is obviously not the conventional thinking in the auto industry, what is?

The drunk driving laws* are perhaps the best known element of the Swedish system and most clearly indicate the willingness of the state to lean very hard on the individual. The "drink problem" was a central social concern in Sweden in the early 20th century and drunk driving laws were a key issue for the temperance parties in parliament. The first of these laws was enacted in 1916 and the provisions have been steadily strengthened since that time. Since 1934, the law has mandated a prison sentence of one month to one year for anyone convicted of drunk driving and the enforcement of the law seems, if anything, to have grown more stringent over time due to improved techniques for securing convictions. The 1934 law, in addition to initiating the mandatory jail terms, established an unambiguous test of drunkenness: A blood-alcohol concentration above 150 milligrams per 100 milliliters was to be taken as proof of drunkenness even if the driver's behavior was not overtly "drunken". This permitted a sharp increase in convictions both because those able to "hold their liquor" were convicted anyway and because sympathetic police and juries (who might otherwise side with the accused) were severely constrained in their options for leniency. (Extra-legal influence was also minimized by the fact that the traffic police and the courts were functions of national rather than local government.)

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* Sources for the discussions of the Swedish drunk driving laws are: A. G. Boyd, Road Safety and Insurance in Sweden, London: The Chartered Insurance Institute, 1962, Chapters 2 and 6; and the articles by Ihrfelt, Andenaes, Ross, Persson and Klette in Ragner Hauge (editor), Drinking and Driving in Scandanavia, Stockholm: Scandanavian University Books, 1978.

In 1941, the law was strengthened by dropping the blood-alcohol concentration for legal drunkenness from 150 to 80 mg. per 100 ml. and in 1957 the concentration was lowered again to 50 mg. per 100 ml. (which a small person might reach after only two beers). The lower limits did provide one modest concession to the "moderately" drunk driver: In the range between 50 and 150 mg. per 100 ml. the first offender only lost his license for six months (but jail terms could be imposed in the event of additional offenses in this range.)

A 1974 amendment to the law gave the authorities one final weapon by permitting the police to administer breathalyzer tests at road blocks, traffic accidents, and during stops for other traffic offenses, without need for visible evidence of drinking on the part of the driver. (The measure is similar to "implied consent" laws adopted in many American states at about the same time. The difference is that the American driver, even if convicted of DWI, can expect comparatively lenient treatment from traffic judges who usually limit penalties for first offenses to modest fines.)

The spirit of Swedish liability and insurance laws is very similar.* In the early years of the motor age (1916) the Law of Motor Traffic Liability established the "the burden of reversed proof". Under the law, motor vehicles were labeled "dangerous machinery" and operators were enjoined to exercise extraordinary caution: "Liability for a motor accident involving persons or property not carried in the car, rests upon ... the driver - unless the circumstances show the

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* Boyd, Road Safety and Insurance in Sweden, Chapters 4-6, is the main source on liability laws and insurance. Information on current no-claim discounts is from the Swedish Information Service, "Traffic Safety in Sweden", September, 1977, (mimeo).

accident was not caused by the driver ..." In practice, this meant that all parties in a multi-vehicle accident could be found at fault and that accidents where no party was found by the police to be at fault were much rarer than in the U.S.

The stringent procedures for finding fault were coupled to a compulsory liability insurance law in 1929 which set high minimum levels of coverage. In addition, the system of license issuance was made such that operation of uninsured vehicles on a wide scale became a practical impossibility. In the event a Swedish driver involved in an accident is found to have been drinking, the drunk driving and insurance/liability laws join forces to rain blows on the offender:

(1) The driver is automatically convicted of drunk driving and given a mandatory 3 months in jail.

(2) The driver looses his license for at least one year, and possibly permanently.

(3) The driver pays all medical and court costs associated with processing of his case.

(4) The driver's liability and collision coverages are automatically cancelled. The driver's insurance company pays claims to third parties and then sues to recover its costs from the insured.

(5) When (or if) the offender is licensed to drive again, his insurance coverage is as much as four times more costly.

For the sober driver involved in an accident, the Swedish insurance law also has bad news. All types of auto insurance are individually experience-rated with a premium reduction of 10 percentage points for each claim-free year until the premium drops to only 25 percent of

that for a new driver. Each claim, whether or not the driver is at fault, raises the premium 20 percentage points. Thus, one claim every other year, even for a very small amount, would maintain the premium at the 100 percent level.

While the broad benefits of the Swedish welfare state reduce the claims on insurance (because auto insurance only pays losses not covered by medical and liability insurance) this fact may actually make the harsh penalties of the insurance and drunk driving laws more acceptable to the Swedish public. A drunk driver, in practice, is made to pay for vehicle and other property damages, a modest amount for pain and suffering, and the difference between disability insurance payments and the injured party's previous income. The courts develop a time payment schedule which makes it unlikely that an offender will be released from payment for lack of resources to meet a lump sum payment. Rather, repayments are scheduled as the offender has income and could conceivably stretch over the offender's life. Thus, the practical difference in motorist's liability between Sweden and America (as illustrated by the West Virginia example) are, to say the least, striking.

Swedish procedures in the area of speed control might better be characterized as "pragmatic" (rather than "moralistic") and the penalties are less severe. Current practices date from the mid-1960s where the Swedes concluded that their tradition of driving on the left but with cars equipped with left-hand drive, was a significant safety hazard, particularly given the large amount of traffic from Norway, Denmark and other continental countries with driving on the right.

A switch to the right was accomplished in 1967 under the guidance of the newly created Road Safety Office (Sweden's NHTSA). At the same time, speed limits were imposed on all roads. Over the next three years, a vast national experiment was conducted (in a methodical way hardly imaginable in the U.S.) on the relation between speed, road types, and accidents.* Speeds of 130, 110, 90, 70, and 50 kilometers per hour were tested on various types of roads and the results were used to set permanent nationwide limits in 1971. (These are 50 kmh in built up areas, 70 kmh on minor rural roads, 90 kmh on major country roads, and 110 kmh on motorways.)

The permanent limits were selected with the objective of producing comparable accident rates per vehicle mile on all road types. As for the accident rate itself, it was thought to represent the most appropriate tradeoff between reduced accident costs and increased travel time. The average Swede, however, has apparently concluded otherwise since speeding, particularly at the lower limits, seems to be more prevalent then in the U.S.: About two-thirds of Swedish drivers exceed the 70 kmh limit and about 25 percent do so by more than 10 kmh. 30 percent exceed the 90 kmh standard and 10 percent exceed the 110 kmh limit (or about the same fraction that exceeded the old 70 mph limit in the U.S.) Enforcement by the National Road Police is strict, with radar evidence accepted in court, but the penalties are limited to fines for most offenses and these fines, reflecting another aspect of the Swedish welfare state, are scaled down to fit the offender's

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* Information on Swedish experience with speed controls is taken from two publications of the Swedish National Road and Traffic Research Institute: "Objectives and Criteria for Speed Limit Systems", (NRTRI Report No. 116a, 1977) and "Trials with Differentiated Speed Limits during the years 1968-1972", (NRTRI Report No. 117a, 1977).

income. (Apparently when no moral stricture is felt to have been violated - as in the case of drunk driving - equitable treatment is given preference over efficacious sanctions.)

A final component of the current Swedish safety system is a seat belt use law enforced in all areas of the country since January 1, 1975. Compliance is reported to be about 85 percent, but the effect on fatalities has been modest. This is because about 60 percent of the Swedes voluntarily installed seat belts as far back as 1960 and since about 60 percent of Swedes driving on the highway were buckling up before the seat belt law was enacted. Not surprisingly, given Swedish willingness to bear much heavier burdens in the name of traffic safety, a government safety report drily notes that "there was no opposition to the seat belt law when introduced in Parliament."*

As the Swedes look to the future, they seem to contemplate more of the same. A study of the future of the motor vehicle system produced at government request by the Royal Academy of Engineering Sciences in 1978** recommended severer driving tests, a 90 kmh national speed limit and stepped up efforts to separate vulnerable pedestrians from traffic. Hardly any mention is made of high technology vehicle hardware strategies (in the country which pioneered the development of seat belts and controlled crash auto

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* Swedish Information Service, "Traffic Safety in Sweden", September, 1977 (mimeo).

** Royal Academy of Engineering Sciences, The Motor Vehicle 1980-2000, Stockholm: Royal Academy of Engineering Sciences, 1978, p. 16-17.

bodies) or of more "nut proof" freeways (in a country with higher GNP per capita than the U.S., but only about one quarter of the controlled access expressway mileage per capita). Apparently the Swedes believe that further extensions of the system of comprehensive penalties will make these steps unnecessary or redundant.

This raises a final question about the Swedish experience, however, and one we will not be able to answer here: Just what does the Swedish penalty system actually accomplish? For many years the universal opinion both in Sweden and abroad was that if other societies only had the means of imposing the harsh Swedish penalties, they too could have low fatality rates. However, in the early 1970s when foreign scholars began to look for the first time at the actual results of these laws*, they were unable to confirm that they actually had any effect. Careful analysis of accidents, injury, and fatality data at each point in time when the laws were tightened (1934, 1941, 1957, 1974), failed to find any changes in accident rates when such factors as driver age and experience were factored out.

While the findings do not conclusively disprove the effect of the laws (particularly for 1934 where accident data were gathered less systematically), they do question them. The problem remains, however, of how to account for Sweden's low fatality rate. How can a country with poor roads (less than a quarter of the controlled access mileage

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* The major researcher has been Laurence H. Ross. See his "The Scandanavian Myth: The Effectiveness of Drinking-and-Driving Legislation in Sweden and Norway", The Journal of Legal Studies, Vol. IV (2), (June, 1975); and "Scandanavia's Drinking-and-Driving Laws: Do They Work?" in Ragner Hauge (ed.), Drinking-and-Driving in Scandanavia, Stockholm: Scandanavian University Books, 1978, Chapter 3.

per capita of the U.S.), bad weather (the worst surface conditions coincide with the months of darkness), and small cars (the Volkswagen, rather than the Volvo, is the standard Swedish vehicle*) have a fatality rate comparable to the U.S. and less than half that of its continental neighbors, France and West Germany.

One possibility might be that the Swedes have developed a powerful set of social controls over behavior such as drunk driving which actually removes the need for formal penalties. The very success of the social controls, then, makes the harsh penalties palatable. Thus, Swedes don't drive when drunk, anyway, so jail terms for a few deviants are relatively non-controversial; Swedes all buckle up anyway, so seat belt laws hardly cause a stir, etc.

The "social controls hypothesis" is difficult to test, but seems worthy of consideration, particularly in light of the final case to be recounted here, that of Japan.

## The Case of Japan: Social Control of Dangerous Behavior?

In contrast with the slow but steady progress of the U.S. and Sweden in the field of highway safety, the Japanese have seemingly accomplished a miracle. In 1964 (the earliest date for which data are available), Japan's fatality rate per mile of 37.2 was among the very highest in the world and more than twice the highest level ever

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* There may be other factors, of course. Curiously, no one seems to have done any coorelational analysis of international fatality rates to factor out climate, road conditions, vehicle size, and other items so as to permit an accurate assessment of the role laws, customs, and so forth. Thus, this inquiry has, of necessity, concentrated mostly on what governments think they are accomplishing and it might well develop, as the result of a more thorough going statistical analysis of accident data, that some countries with high accident rates have actually been more successful in ameliorating conditions (and are more worthy of study) than other countries with low accident rates.

recorded in the U.S. (in the mid-1920s). In the late 1960s, the fatality rate per mile fell rapidly, but the extraordinary boom in vehicle registrations (see Table 3) and vehicle use pushed the fatality rate per capita up rapidly.

Beginning in 1955 (with the creation of a national Traffic Accident Prevention Headquarters) the Japanese government had taken formal notice of the highway safety problem, but without success.* By 1970, as the maturation of the Japanese economic boom permitted more societal attention to the by-products of rapid development, Japanese government officials reached the conclusion that the Japanese fatality rate per mile, at three times the American level, was a national embarrassment. In consequence, a new Office of Traffic Safety Measures was established in the Prime Minister's Office, funding for traffic safety was increased by a factor of 9 from an already substantial base, and a great national campaign was commenced according to the guidelines of the Fundamental Law Related to Traffic Safety Measures of 1970. By 1977, the fatality rate per vehicle mile had been more than halved (to a level 50 percent below France and Germany) and the fatality rate per capita had been reduced 46 percent even as motor vehicle

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* This account of the Japanese highway safety program is based on Japanese Prime Minister's Office, Japanese Government White Paper on Transportation Safety, (1978 Edition), Tokyo: International Association of Traffic and Safety Sciences, 1979; Katsumi Takeoda, "Recent Trends in Traffic Accidents: Japan's Amazing Progress in Lowering Traffic Deaths and Injuries", The Wheel Extended, Winter, 1976, pp. 26-39; and Ezra Vogel, Japan As Number One: Lessons for America, Cambridge: Harvard University Press, 1979, Chapter 9.

registrations increased by 79 percent.*

What was the nature of this remarkable program? Alas, the "active ingredients" in the Japanese safety concoction are far from clear. In typical Japanese fashion, the Office of Traffic Safety Measure scoured the world for ideas on highway safety** and the Japanese program has included just about every approach tried anywhere with the exception of vehicle hardware fixes, individually experience-rated insurance, and a seat belt use law.***

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* It should be noted that data for the Japanese case are particularly hard to come by. The International Road Federation (in its World Road Statistics) is the only published source of fatality per vehicle mile data (as presented in Table 1) but the Federation's estimates for Japan's are not consistent with fatality per capita rates available from the Japanese government (in the White Papers on Transportation Safety) and with registration data from the United Nation's Statistical Office (as reported in the Statistical Yearbook). Thus, the Federation reports a drop in the fatality rate per mile from 12.5 in 1970 to 5.7 in 1977, while the Japanese Government reports a drop in total highway fatalities from 21,535 in 1970 to 11,952 in 1977. The U.N., however, reports a 79 percent increase in motor vehicle registration between 1970 and 1977. If motor vehicle travel rose at the same rate as registrations, and if the traffic fatality data are accurate (as seems probable -- although one must exercise care to use the Ministry of Health and Welfare count which includes all motor vehicle fatalities rather than National Police Agency figures which only include deaths occurring within 24 hours and which total about one-third lower), then the fatality per vehicle mile rate of 12.5 in 1970 would have had to have fallen to 3.9 to reduce fatalities by 46 percent. Since the Federation's estimated rate of 5.7 is 50 percent off the mark, one is left wondering who or what to believe. The Japanese government does compile figures on vehicle miles of travel and fatalities per mile, but these are not published (beyond discussions of the general trend). A request to the Japanese government for additional data had not been answered at the time of this writing.

** As Vogel explains in Japan As Number One, Chapter 2, this is the standard first step in thinking about any problem.

*** The Japanese seem to be about the worst in the world about seat belts with only 8 percent usage reported by the Prime Minister's Office of Traffic Safety Measure in 1977, compared with about 14 percent in the U.S., and 60-80 percent in many European countries. The Japanese do require seat belts in all new cars and the use of seat belts on expressways (which accounts for a large part of the total usage.)

The principal elements were a massive road improvement program to protect pedestrians and bicyclists by installation of traffic signals, pedestrian crossings, and bike paths;* a massive road widening program; a freeway building program -- only one freeway had been opened in Japan prior to the commencement of the programs, 1200 miles of freeways were opened between 1970 and 1977; and a massive program in schools, offices, neighborhood associations, and through the media, to raise what the Japanese call "traffic safety consciousness". A 60 kmh national speed limit (excepting 100 kmh on the new freeways), in effect for many years, has been virgorously enforced as have all other traffic laws by means of a central computer and "notification" scheme introduced as part of the 1970 law.

The roadway improvement programs do not seem to differ in concept from those implemented over the years in the U.S. and Sweden except that the pattern of Japanese urban development presented a much greater opportunity for improvement.** These programs were in full stride in the 1960s and in the campaign commenced in 1970 only speeded their progress slightly. For example, the number of traffic

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* Bicyclists and pedestrians are a logical focus of Japanese efforts since together they account for 45 percent fatalities -- compared with 18 percent in the United States.

** The situation has been graphically described by the head of the Office of Traffic Safety Measures as follows: "... Japan's roads are generally very narrow. In addition, sidewalks are few and bicycle paths are almost non-existent. Roads wide enough to accommodate one lane traveling in either direction, i.e., roads 5.5 meters or greater in width, make up only 14 percent of total roads; roads of less than 3.5 meters width account for over 54 percent. Japan's road facilities are, accordingly, far from adequate. Even the so called trunk roads have private dwellings lining both sides of the road at many sections, National Route 1
(continued on page 42)

signals, road hazard signs, and pedestrian crossings each nearly doubled between 1967 and 1970, then doubled again between 1970 and 1973. Since the number of fatalities increased rapidly during 1967-1970 (23 percent) but fell rapidly during 1970-1973 (13 percent), even as VMT continued upward at about the same pace in both periods, one must wonder about the significance of the physical improvement element of the safety campaign.

A more likely explanation of the drop in fatalities after 1970 lies in the traffic law enforcement efforts of the National Police Agency. In late 1969, a nationwide computer-based "point system" was introduced to keep continuous track of the driving records of all drivers (totaling 37 million by 1977). Then, to give the Driver's Administration Center's computer something to record, the rules were changed in 1970 on police procedures for ticketing moving violations. Rather than stopping the offender, the police authorities simply make a photograph and mail the offender a ticket. Special speed detection equipment in many roads practically removes the human element alto-

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(continued from page 41)
being a prime example. With few sidewalks and paths for the exclusive use of pedestrians or bicycles (an impossible luxury with roads as narrow as they are), pedestrians and bicyclists must share the road with motor vehicle traffic and drivers can never be certain that a pedestrian will not dash suddenly into the road. Collisions are a danger at every small intersection. And there is no such luxury in Japan as the stretches of open countryside found in France and Great Britain, where one gets away from urban areas ... In addition ... trucks account for 37 percent of all motor vehicles, resulting in a highly complex vehicle mix. (In the advanced countries of Europe and America, trucks account for no more than 10 percent of motor vehicles on the road.)" (Takeoka, "Recent Trends in Traffic Accidents", p. 30.)

gether since the poloroid-type camera used photographs the offender and prints out the ticket in one operation. A clerk then obtains the driver's address by referencing the license number in the photo against data in the central computer.

Ticket issuance for moving violations jumped more than 200 percent between 1969 and 1977 (while vehicle registrations increased by about 90 percent). And only a modest increase in police manpower was needed. About 85 percent of all tickets are now issued via the "notification" procedure (i.e., without any direct contact between traffic officers and offenders) and almost all fines are paid promptly (which is prudent since the driving license can be quickly revoked for non-payment). The fines themselves are modest, averaging only about $15 apiece (and are perhaps more acceptable to the public for that reason), but the fear of being caught is apparently high. 12.5 million moving violations, or about one for every third driver, were issued in 1977.

Drunk driving penalties are harsher (beginning with a fine of about $100) and may include jail terms for repeat offenders. However, the emphasis is again on widespread detection. Police patrols (which do not spend time stopping speeders and other "overt" offenders who can be handled via the "notification" procedure) use breathalyzers and frequently stop motorists for drunk driving checks without any specific ground for suspicion. This is in sharp contrast with the Swedish system where penalties can be brutal, but the chance of being caught is quite low.*

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* Laurence Ross reports for Sweden that "... the famous road blocks are in actuality quite rare - at present, Stockholm has only two (continued on page 44)

The most intriguing element of the Japanese safety campaign is the effort to raise safety consciousness. This is done by means of a comprehensive education/socialization program for pre-schoolers, school children, the elderly, employees of major enterprises, and truck drivers. (The latter were felt to be a particularly important group to reach because of the large percentage of trucks on the road and because of the great risk of injuries in collision between trucks and the typical Japanese small car.)

The results achieved are not clear but the scope of the programs is rather mind-boggling as the following items from the 1978 report of the Prime Minister's Office of Traffic Safety Measures serve to indicate:

> "Traffic safety education at day care centers.
>
> In day care centers, education is being carried out for children according to each child's physical and mental development on the basis of the day care center education plan. Since children in day care centers are babies or little children, guidance consists mainly of practical experience ... Through this guidance, children learn how to protect themselves from danger promptly and become accustomed to the traffic rules ... In street corner parks where children usually play, the same kind of guidance is being given. At model parks on street corners ... various planned play facilities and equipment are prepared for children to develop their ability of safety while playing. (p. 106)

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per month - and are predictable as to time and place ... Most arrests in Scandanavia for drinking and driving appear, in fact, to occur as the result of accidents, where the public calls the police." ("The Effectiveness of Drinking-and-Driving Laws in Sweden and Great Britain", Proceedings of the 6th International Conference on Alcohol Drugs, and Traffic Safety, Toronto: Addiction Research Foundation, 1974, p. 677.) Contrast this with Tokyo where " [drunk driving] spot checks are unnervingly common." In the U.S. you can drive for months without being stopped", says one wary American in Tokyo. "But here I've been pulled over as often as five times in a single week." ("Deaths Are Reduced By Tokyo Traffic Plan", Philadelphia Inquirer, June 12, 1977.)

"Traffic safety education is given to small children as part of home discipline and also at safety clubs.

Small children are educated in traffic safety as a part of home discipline and also at kindergartens and day care centers. Under today's complex traffic environment, however, it is necessary to give such education more systematically and purposefully.

Traffic safety is closely related to local communities. Therefore, in order to carry out traffic safety measures for small children effectively, it is vital to create the solidarity of the residents and especially the full cooperation of mothers. The number of small children who attend day care centers or kindergartens has been increasing year by year, but approximately 40 percent of small children aged from 3 to 5 do not attend. The most effective way for promoting traffic safety education for small children is to establish child traffic safety clubs where children can learn traffic safety together with their mothers.

Since 1971 ... children's traffic safety clubs have been established throughout the country. As of September 30, 1977, there were about 15,000 clubs established in [all] 47 prefectures with the participation of 1,580,000 children and 1,480,000 adults. (p. 106)

"Traffic safety guidance at schools.

Traffic safety guidance at school aims at not only preventing children from traffic accidents, but also fostering the child's attitudes, abilities, and habits required for leading a safe life.

(1) Traffic safety guidance included in curriculum at schools.

At primary and junior high schools, students usually spend 12 to 20 hours per year of planned traffic safety guidance ... Guidance is being conducted by the use of slides, films and compositions written by children who have been involved in traffic accidents, aiming at fostering the necessary ability for children to avoid accidents. Children learn how to walk and cross a road, how to use transport facilities safely, how to ride a bicycle and characteristics of motor vehicles. Guidance is also provided by using mock training facilities (traffic parks, the [235] Traffic Safety Education Centers, etc.) in order to train children's practical ability ...

Among all kinds of traffic accidents involving high school students, there is a rather high rate of

> accidents involving motorcycles.[*] In view of this fact, traffic safety guidance at high school is being conducted on not only traffic morals and rules, but also safe riding of motorcycles.
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> (2) Maintaining safe travel to and from schools. In order to assure the safe travel of pupils and students to and from school, safe school roads have been designated ... In some local areas going to school in a group is guided for children in order to reduce traffic accidents. In this case, efforts have been made to have students learn practical traffic safety through their group activities, by instructing an appropriate number of students in one group how to line up and the role of a leader, etc. (p. 107)

"Traffic safety education for children [outside of school].

> For primary school children and junior high school students, efforts have been made to organize and foster Traffic Boy Scouts, by encouraging them to have meetings to study traffic safety, and to participate in activities such as traffic safety appeals in the streets. At the end of September, 1977, there were 4,422 Traffic Boy Scout [troops], composed of approximately 730,000 primary school children and 70,000 junior high school students. (p. 109)

"Traffic safety education for the aged.

> For the aged ... individual guidance by guidance personnel on patrol has been emphasized. Furthermore, efforts are being made to establish traffic safety clubs and traffic safety guidance personnel systems in old people's clubs ... At the end of September, 1977, there were approximately 1,520,000 old people who were [being] given individual guidance. Traffic safety clubs have been set up in 10,299 organizations, in which approximately 850,000 old people are receiving guidance. The traffic safety guidance personnel system has been adopted in 17,973 organizations, in which approximately 1,370,000 old people are receiving guidance. (p. 108)"

In addition, various programs have been established for traffic safety discussions in large business organizations and all

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* Motorcycle riders account for 16 percent of total highway fatalities in Japan compared with 9 percent in the U.S. In the U.S., 74 percent of total fatalities are riding in autos compared with only 37 percent in Japan. (NHTSA, Highway Safety 1978, p. A-34; Prime Minister's Office, White Paper on Transportation Safety, p. 13.)

organizations who employ persons to drive vehicles must now have comprehensive safe driving programs.*

Such programs are, of course, not unheard of in America where school children are occasionally given some traffic safety guidance (usually in the form of gory traffic safety movies designed to instill safe attitudes through fear, but which are generally taken by the children** as something of a joke) but the Japanese seem uniquely suited to succeeding with this approach.

Writers on Japanese culture from Ruth Benedict to Ezra Vogel*** have stressed the closeness of Japanese society, the importance to the Japanese of making Japan respectable in the eyes of the world,**** and the ability of Japanese institutions to instill attitudes in the citizenry.***** The continuing national safety campaign (now in its

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* Prime Minister's Office, White Paper on Transportation Safety, pp. 129-141.

** Or at any event, by the author as a child.

*** Ruth Benedict, The Sword and the Chrysanthemum: Patterns of Japanese Culture, Boston: Houghton Mifflin, 1946; and Ezra Vogel, Japan As Number One.

**** The Japanese term this giri or the duty to keep one's reputation unspotted. See Benedict Cap. 8. Thus, a finding that Japanese society is deficient in some respect predisposes the public to comply with recommended remedies.

***** Apparently "traffic morality" is inculcated as part of more general training in "self-discipline". Vogel (pp. 177-178) describes this process in the schools as follows: "Japanese schools, like the Japanese home, ... teach self-discipline. They teach it at a general level in ethics and society courses ... and in a practical way through the handling of classroom situations. Expected standards of behavior are high, but explicit punishments are used less than quiet, but clear, expressions of disapproval. Students, in their regular group sessions for self-reflection, are expected to talk about their inadequacies, as when they are insufficiently considerate of each other."

second five year phase with ambitious goals, far below the 1977 fatality rates, to be met by 1981) (1) teaches about auto culture and its dangers in a relentless fashion so that the young and the old will protect themselves from dangers as pedestrians, and (2) stresses the social consequences of "in-disciplined", careless behavior amongst motor vehicle operators. Given the socialization tools at hand, it would not be surprising if the Japanese campaign to raise safety consciousness were a distinct success (even though means of testing the results are not readily at hand given the simultaneous introduction of so many other safety measures).

## Some Tentative Conclusions

The point of departure for this inquiry was the question of why the U.S., Sweden, and Japan have identified highway safety as a major problem and why their safety programs have assumed contrasting forms. Now that we have characterized the "problem" and described the solution being pursued in each country, we may look for some causal links between problems, solutions, and fundamental aspects of each society.

We may begin by looking at the role of interest groups. In the U.S. case, these clearly have considerable explanatory power since the primacy over time of the "nut behind the wheel", the "lousy roads", and the "bad cars" explanations of injuries and fatalities can be traced to the efforts of the auto and insurance industries: The auto industry found the nut-behind-the-wheel (known collectively as the "lunatic fringe") a useful explanation in the 1930s. And in the 1950s,

when the industry was concerned that a lack of road capacity might choke off demand for cars, the lousy roads problem was widely trumpeted. The insurance industry was in close agreement with these diagnoses for many years, but had a better idea in the 1960s and turned on the products of its old ally.

In the Swedish and Japanese cases, the role of interest groups and particularly of industrial interests, is much less clear. In part the issue is obscured for the American researcher by the lack of scholarship in translation (or perhaps simply by a lack of scholarship). One suspects, however, that the role of interests are qualitatively different in Sweden and Japan. The Swedes and the Japanese may feel a good bit of distress about the onslaught of automobility, but one does not have the feeling that they hate their car companies. Indeed, the relations between governments and the automanufacturers are so much more cooperative, particularly in the area of trade, compared with the U.S., that one is not quite sure where government picks up and industry leaves off with respect to product standards. Similarly, one looks in vain for clear linkages between insurance arrangements and government policies on motor vehicle accident prevention.*

The activities of what one might term "moral interest groups", notably temperance organizations, seems more likely to explain the shape

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* For example, one hypothesis entertained at the outset of this study was that assumption by the state of health insurance costs would lead to a heightened emphasis by government on accident prevention. However, in Sweden the safety problem was defined in 1916 very much as it is today and long before the welfare state while in Japan government responsibility for health care is only modestly greater than in the U.S.

of the safety program in Sweden, but time and the availability of materials in translation have not permitted a more thorough exploration of this factor.

The structure of government, especially with regard to centralized control of the bureaucracy, is another possible explanation of differing safety program emphases, but the linkages seem weak. Sweden and Japan do have highly centralized governments and national police forces which permit more consistent application of sanctions against misbehaving motorists. However, it is difficult to imagine a very different outcome in the U.S., holding other factors constant, if traffic laws were enforced by the FBI and miscreants were sentenced by the federal courts.

Political cultures, which we have labeled ideologies, seem to be a more enlightening explanatory factor. The Americans are considerably different in this regard from the Swedes who seem to be as different in turn from the Japanese. In America the "problem" is indeed irresponsible drivers -- in fact the three societies are not really deeply divided on this point -- but there is no real way to deal with individual irresponsibility in a manner consistent with American views on government responsibility. Thus, ideologies of behavior control are the key to explaining program outcomes rather than ideologies of responsibility. In the American case, a significant revision of views about behavior control in the 1960s permitted government to make some efforts to control the behavior of large corporations, but the idea of effective behavior control of citizens is still beyond the pale. In Sweden, by contrast, rather stern government measures are culturally

sanctioned, but mostly against those perceived to have violated some moral norm, especially through drunkenness. In Japan, social control of behavior is much tighter, claustrophobically tight to American or Swedish thinking, and even "inconsiderate" behavior is deemed an appropriate objective for government remediation.

Given the very considerable difference in political cultures, was there any ground for our "motivating hope" that societies might learn from each other? It seems that there might be, but mostly in the long run. For the short term, the Swedes might learn from the Japanese that small penalties applied so as to produce a high probability of detection make more sense than blockbuster sanctions applied only to those whose behavior actually results in disaster. However, for America, even this seems a forlorn hope.*

For the American case it seems reasonably clear that the high technology approach must be worked through before the alternative

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* Take, for example, the efforts of the California Highway Patrol to enforce the 55 mph speed limit on Interstate 15 between Los Angeles and Las Vegas: When the new limit was established in 1974, speeding was so widespread that the patrol concluded ticketing was useless except as a means of increasing state revenues. A new approach termed "convoying" was tried in which state police cruisers were dispatched at regular intervals to drive in the center lane at 55 mph. A sign affixed to the rear of each cruiser explained that anyone attempting to pass would be arrested. The results were spectacular: Enormous packs of vehicles stretching for miles built up behind each cruiser, compliance with the speed limit neared 100 percent and practically no tickets were issued. But motorists were outraged and a torrent of complaints rained down on the state legislature. Within 10 days, legislation was passed instructing the highway patrol to "get tough" with speeders using "conventional" means, but to suspend use of "experimental" measures. Clearly, Californians wished to be advised, but not actually governed with respect to use of their motor vehicles. (This story was related to the author in 1976 by a member of the California Highway Patrol on loan to NHTSA to study "alternative" speed enforcement techniques.)

techniques of the Swedes or the Japanese will have any appeal. Perhaps high technology will succeed at an acceptable economic price to the consumer and the Swedes and Japanese will eventually supplement their own approach with the American model. Perhaps it will fail* and Americans will have cause to wonder about there own political culture, particularly as the rest of the world's developed societies achieve better results through acceptance of greater social control over individual behavior.

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* And the failure may be rather spectacular as the American "dinosaurs" are phased out and "world cars" (i.e., Volkswagen Rabbit-sized vehicles) become the American standard. The combination of small cars and high travel speeds (more possible on American roads than in Sweden and certainly than in Japan) may make for an abrupt jump in the fatality per mile rate.