Where and when is shared space

safe?

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Traditional highway engineering assumes that safety requires the spatial segregation of pedestrians, cyclists and motorized vehicles or, where this is not possible, rigorously enforced rules, signs and signals dictating temporal segregation. Road users, according to the established paradigm, are irresponsible, stupid, selfish automatons whose safety can only be assured by physical barriers to conflict, supplemented by legal sanctions for disobeying the rules.

"Shared space" stands many of the traditional assumptions on their heads. It assumes a very different road user - one who is responsible, alert and responsive to evidence of safety or danger. It proposes tearing down physical barriers such as pedestrian guard rails and segregation infrastructure as pedestrian bridges, and filling in pedestrian tunnels. It also proposes removing stop signs and traffic lights and other signage and road markings demanding compliance at the cost of criminal or financial sanctions. It deliberately creates uncertainty as to who has the right of way on the assumption that road users will work it out for themselves in a civilized fashion.

The idea is attracting growing numbers of adherents – if one types "shared space" into Google one is rewarded with 100s of 1000s of hits. It has its own website - http://www.shared-space.org/ - and a useful Wikipedia entry - http://en.wikipedia.org/wiki/Shared_space. Two English websites that have been prominent in the promotion of the idea are: http://www.hamilton-baillie.co.uk/ and http://www.publicrealm.info/

In the streets where it has been implemented it has, thus far, improved appearance, enhanced conviviality and not increased accidents – and frequently reduced them.

But clearly it is not appropriate everywhere. A counter example frequently cited by sceptics and opponents are the high road traffic accident rates in third world countries who enjoy "natural" shared space – i.e. countries which have yet to get round to installing conventional segregation and signage.

The next four slides present examples of places and circumstances in which the idea works well.

Campsites

Supermarket car parks

Campsites and supermarket car parks mix people and cars safely because the physical layout makes high speeds difficult and because pedestrians and drivers are the same people – circumstances that help both to appreciate the benefits of considerate behaviour.

Chiesa San Francesco

Amsterdam

In Italian hill towns and old Amsterdam it works well because people came first, and cars were introduced slowly into streets in which pedestrians had an established priority and the street layouts and crowds severely limited speeds.

Drachten

Haren

These pictures provide examples of success in a more challenging environment. Both are schemes that have reduced car-dominance and elevated the status of pedestrians and cyclists. The principal achievement of the late Hans Monderman was his reversal of car dominance – in Drachten, with a roundabout and fountains, he civilized a signalized junction, and made it safer - http://www.youtube.com/watch?v=tye8zJr7pZ0 . Monerman also explains the Haren scheme at http://www.youtube.com/watch?v=plgcFjCJJPA&feature=related

Seven Dials

Kensington High Street

Accidents Halved as Street is Stripped of “Safety” Features

Two London examples. Seven Dials in Covent Garden shares some of the features of old Amsterdam – narrow streets with lots of people – and Drachten – a roundabout which has reduced car dominance. Kensington High Street is not a proper example of shared space, the picture illustrates a signal-controlled pedestrian crossing, but demonstrates that it is possible to strip out the traditional staggered “cattle-pen” crossing enforced by guard rails, and reduce accidents.

Archway Road?

http://www.youtube.com/results?search_query=shared+space+archway&search_type=

This video clip is a view of London's Archway Road at school letting-out time - http://www.youtube.com/results?search_query=shared+space+archway&search_type= . There is a pedestrian underpass but the students, and many others, prefer crossing on the surface, and hurdling the central reservation fence. It looks dangerous, but it has a good accident record. The slide has been awarded a question mark because it is not recommended as a form of shared space. But it demonstrates "risk compensation" – behaviour essential to the safe operation of shared space schemes. The participants in the ballet are all alert and responsive to the behaviour of the others..

An American street circa 1925?

This nostalgic example of shared space has also been given a question mark. Why? In England at this time there were even fewer cars than in America, and a nation-wide 20mph speed limit. Yet the child road death rate was more than three time higher than it is today. However today's vastly superior child road-accident death rate is not evidence that roads have become safer for children to play in. They are seen by parents as so dangerous that children are not allowed out anymore.

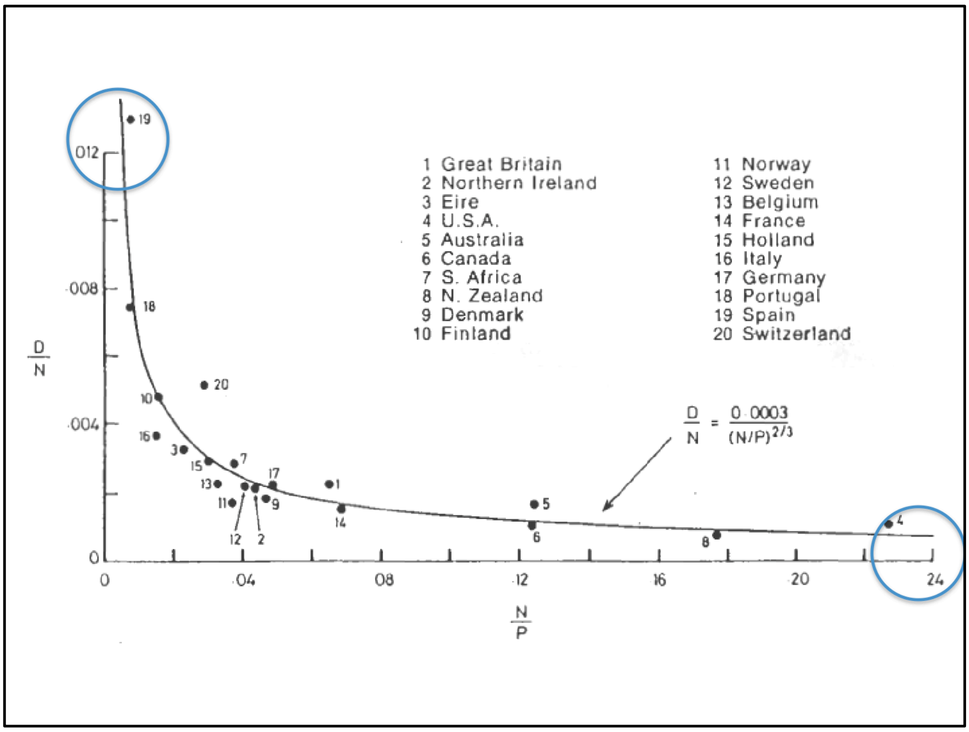
In 1971 a survey of children's independent mobility disclosed that 80% of 7 and 8 year old children got to school on their own unaccompanied by an adult. A follow-up survey in 1990 revealed that this number had dropped to 9%. And now I can find no school that will allow a 7 or 8 year old child out the school gate at the end of the day without a responsible adult to collect them. (see *One False Move …http://john-adams.co.uk/wp-content/uploads/2007/11/one%20false%20move.pdf* .)

Would shared space schemes that encourage more children on to the street result in a return to historic high child road accident rates?

http://www.youtube.com/watch?v=RjrEQaG5jPM

This video clip (http://www.youtube.com/watch?v=RjrEQaG5jPM) provides an Indian example of shared space. Pedestrians, cyclists, cars, buses and tuk-tuks, all mingling in the absence of signals, signs or road markings – working it out for themselves. Although we see no collisions in this clip, unfortunately for advocates of shared space, we do know that Indian roads such as this have much higher accident rates than those in England. Does this constitute evidence against shared space?

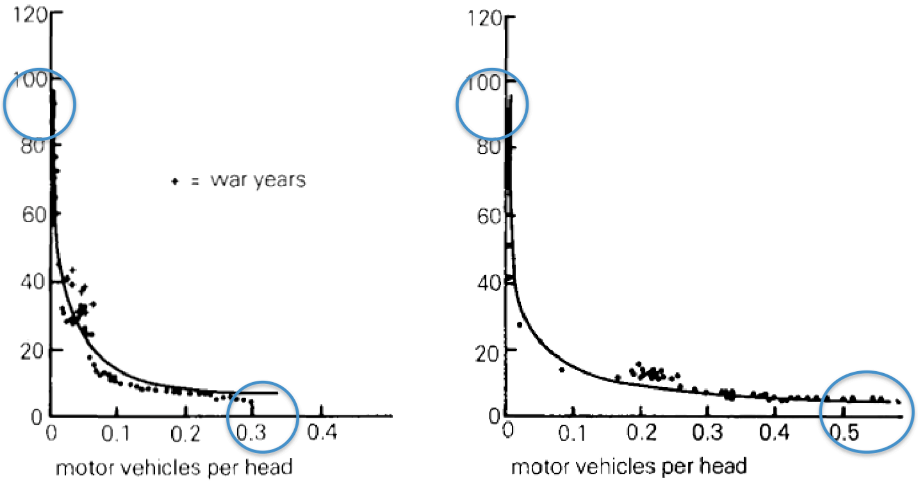
The next eight slides provide some statistical context within which this question, and that posed in the previous slide, might be explored.



In 1947 Ruben Smeed, the founding father of transport studies in Britain, produced this graph based on 1938 data for 20 countries. He discovered an intriguing statistical relationship between the number of cars per person, N/P, and the road accident fatality rate per car, D/N. The data revealed that as numbers of cars increased, the death rate per car plummeted. When cars were few in number, each car was incredibly lethal.

Spain with one of the lowest car ownership rates at that time (about 1 per 100 population) had the highest death rate per car – about 13 per 1000. The United States with almost 23 cars per 100 population had fewer than 2 deaths per 1000 cars.

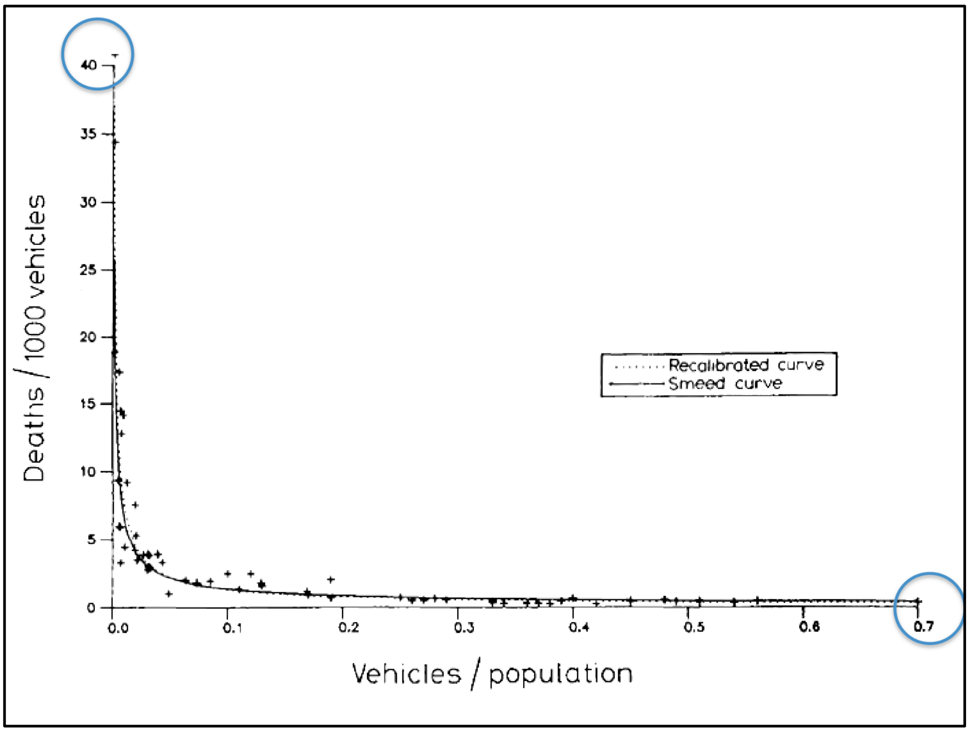
Fig 8. Smeed curves for (left) Great Britain, 1909-73, and (right) **U.S., 1905-72.** *Vertical axes = deaths per 1 000 vehicles. (From Adams[3], pp. 25* **and 27).**



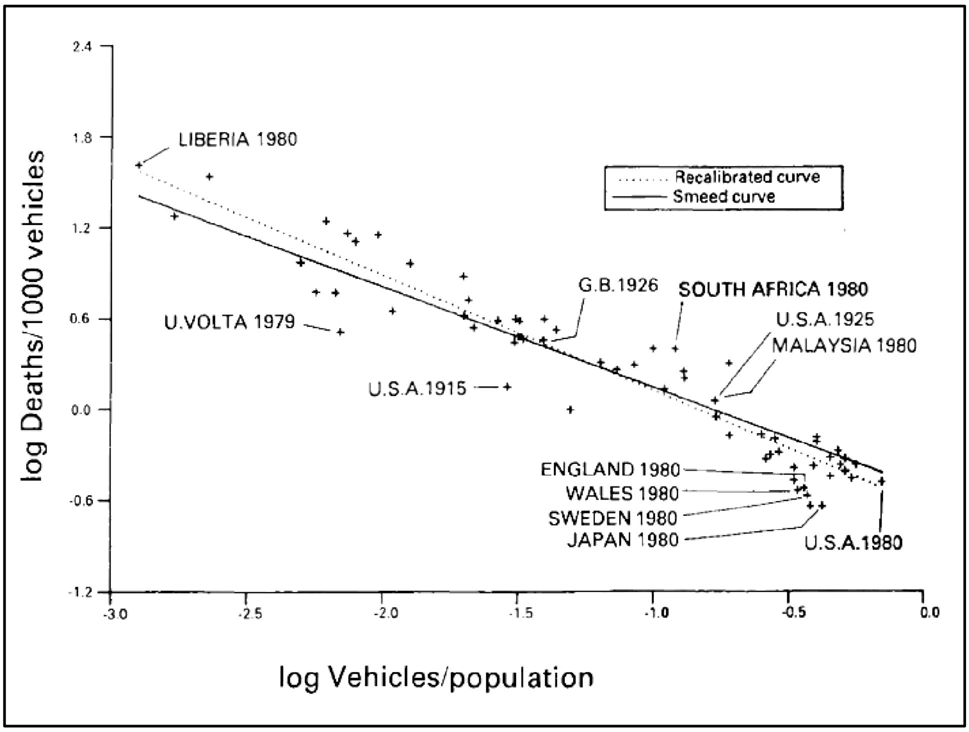
The correlation that he discovered in 1938 for cross-section data for 20 countries data was strong.

Some years later he returned to the subject and looked to see how well the relationship held for time-series data. The two longest series available were for Great Britain and the USA. The solid lines on the graphs are not lines of best fit, but the curve that he fitted to 1938 data. It still described the data remarkably well – even when projected well beyond the range of data available in 1938 (http://john-adams.co.uk/wp-content/uploads/2006/smeed%27s%20law.pdf).

At the beginning of motorization in the early years of the 20th century death rates per motor vehicle in both Britain and the USA were above 80 per 1000.



I revisited what had by now become known as the Smeed Law, with 1980s data. And found that despite the large increase in car ownership the relationship discovered by Smeed remained robust. By 1980 the United States had 70 cars for every 100 people and a death rate per 1000 vehicles of .33. Liberia, with 1 vehicle per 1000 population had a death rate per 1000 vehicles of 40.



Here in a modified form (with both axes transformed into logarithms) we can see the relationship more clearly. Liberia in 1980 with cars embodying 80 years of safety technology was achieving kill rates per vehicle comparable to those in the United States and Britain at the beginning of the century. Great Britain in 1926 and the USA in 1925 are added to the 1980s data to emphasize how well the Smeed Law fits both cross section and time series data.

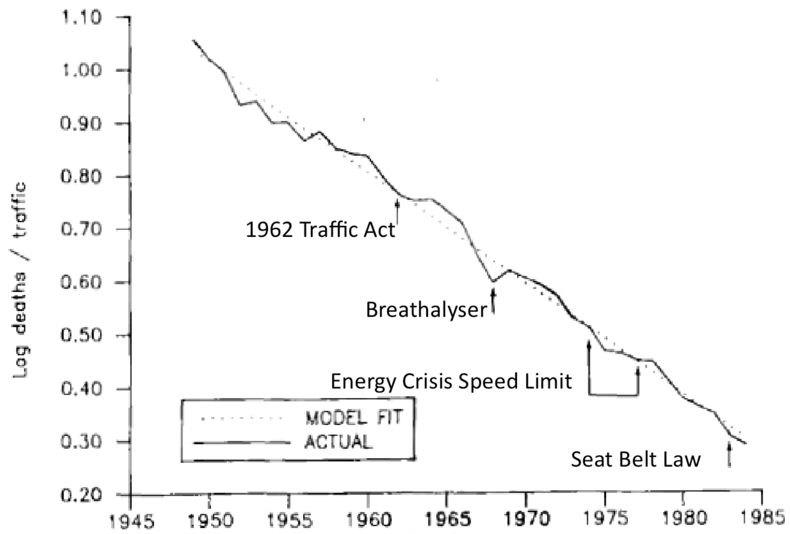


Fig 12. Logarithm of deaths per 100m. vehicle km, G.B., 1949-84 (from Adams[3], p. 106).

How might one account for this remarkable decrease in death rate per car as car numbers increase? As Smeed noted, other things being equal, the number of single vehicle accidents ought to increase in proportion to the number of vehicles, and the number of collisions between vehicles ought to increase in proportion to the square of the number of vehicles. Other things are clearly not equal. See *Risk and Freedom* - http://john-adams.co.uk/wp-content/uploads/2007/10/risk%20and%20freedom.pdf – chapter 7.

In Britain, one of the countries best endowed with transport statistics it is possible to calculate deaths per volume of traffic (a more accurate measure of exposure to risk than car ownership). This plot shows a linear relationship, the slope of which indicates that deaths per volume of traffic decreased at a rate of 4.7% per year. The rate appears remarkably independent of the major safety interventions during this period.

Deaths per volume of traffic were decreasing steadily before the 1962 Traffic Act, which introduced new speed limits, heavier fines and the totting-up procedure. Far from producing the expected downward step on the graph it was followed by a period of above trend growth.

The breathalyser did appear to have an effect, albeit temporary.

After the energy crisis speed limits were lifted the downward trend continued.

For a discussion of the effect of the seat belt law see – http://john-adams.co.uk/wp-content/uploads/2006/12/Seat%20belts%20for%20significance.pdf, and http://john-adams.co.uk/wp-content/uploads/2006/failure%20of%20seatbelt%20legislation.pdf

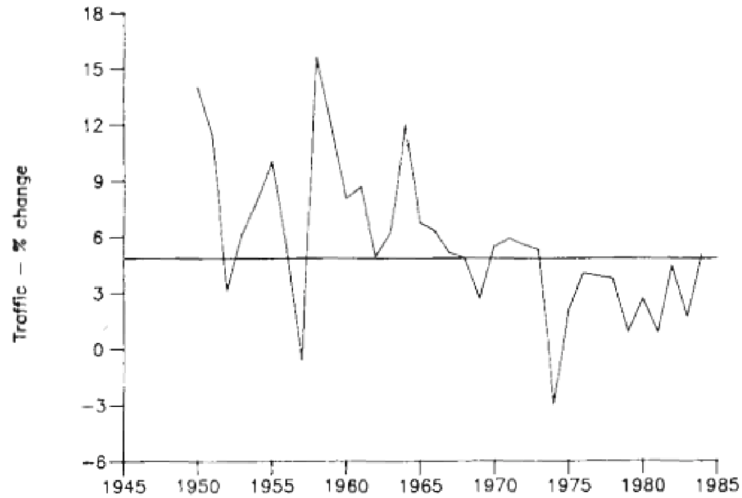


Fig 13. Motor vehicle traffic in Britain, percentage change over previous year (from Adams[3], p. 106).

The horizontal line on this graph indicates 4.7%.Some years traffic grew faster than 4.7% and some years less. If we know the volume of traffic in a given year, and the number of deaths per volume of traffic we can calculate the number of deaths.

In all but three of the 25 years before 1974 traffic volumes increased faster than the death rate was falling. The relationship illustrated in the previous slide suggests that numbers of deaths over this period should be rising. Conversely, after that year traffic volumes increased more slowly than the death rate was falling and so we expect numbers of deaths to fall. This is illustrated by the next slide.

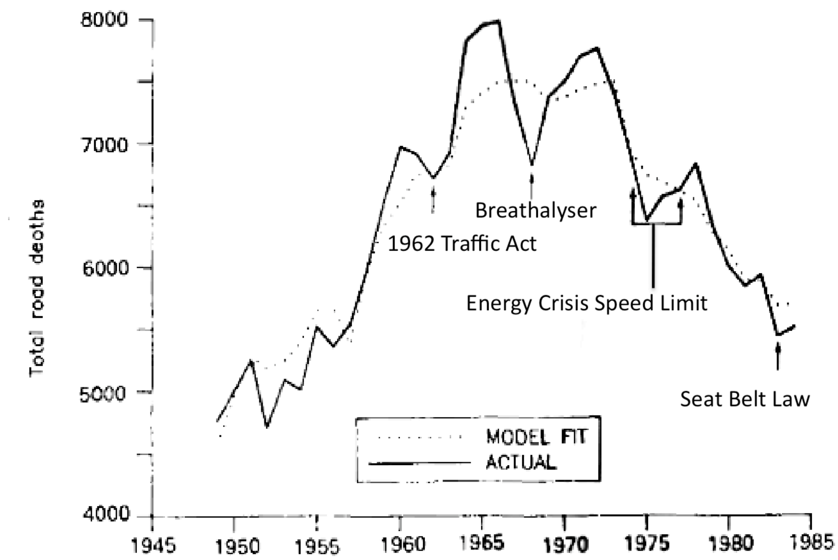
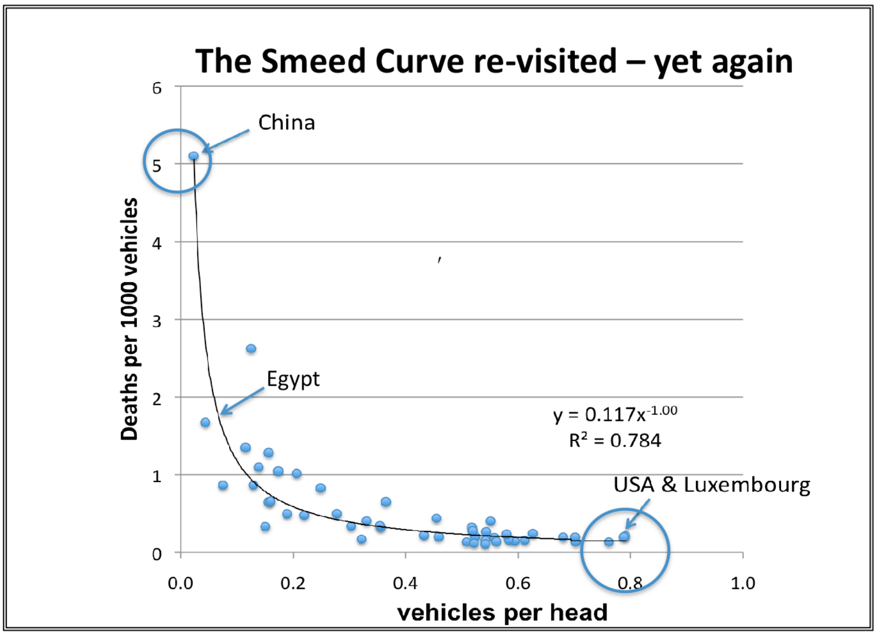


Fig 14. Road deaths in G.B., 1949-84, and estimate calculated by multiplying the annual number of deaths per 100m. vehicle km (estimated from the straight line in Fig 12) by the volume of traffic. (From Adams[1], p. 107.)

In years when traffic grew faster than 4.7% deaths tended to increase. When it grew more slowly deaths tended to decrease.



Source Accident mortality:
http://www.who.int/violence_injury_prevention/publications/road_traffic/world_report/en/index.html Statistical annex
Source Population and vehicles:
http://unstats.un.org/unsd/cdb/cdb_advanced_data_extract_fm.asp?HSrID=15070&HCrID=all&HYrID=2000&continue=Continue+%3E%3E

With 2000 data – although the rest of the affluent world has been catching up with the USA - the Smeed Law still performs well. The data set is rather short of low car-ownership countries because reliable data were no longer available for all three of the required data sets for many of the African countries represented on the earlier graph. Anecdotal reports suggest that these countries still have few cars – and each one is lethal.

A more comprehensive discussion of the above statistical relationships can be found in my book *Risk (http://www.amazon.co.uk/Risk-John-Adams/dp/1857280687/ref=sr_1_1?ie=UTF8&s=books&qid=1207826942&sr=8-1) , Smeed's Law: Some Further Thoughts*

Traffic Engineering and Control, February 1987 (http://john-adams.co.uk/wp-content/uploads/icons/pdf.gif) and *Risk and Freedom* (http://john-adams.co.uk/wp-content/uploads/2007/10/risk%20and%20freedom.pdf).

If safety interventions such as speed limits, totting-up, drink-drive legislation and seatbelt laws cannot explain the enormous decrease in death rates per car as motorisation increases, what might?

The Smeed Curve might be considered a societal learning curve. As one encounters more cars people, literally, learn how to live with them.

Another part of the explanation might be found in contemplation of other societal changes that accompany rising car ownership. Car ownership correlates highly with measures of affluence. Death rates per car decrease as affluence increases.

The principal purpose of the brief statistical excursion above has been to establish that traffic conditions, and attitudes, that prevailed in the early stages of motorization in currently highly motorized countries prevail in similar form today in countries in the early stages of motorization.

It is worth reminding ourselves of attitudes toward health and safety that prevailed Europe and North America in the first half of the 20th century in other aspects of life, and death. This iconic picture of high-steel workers having lunch is dated1932.

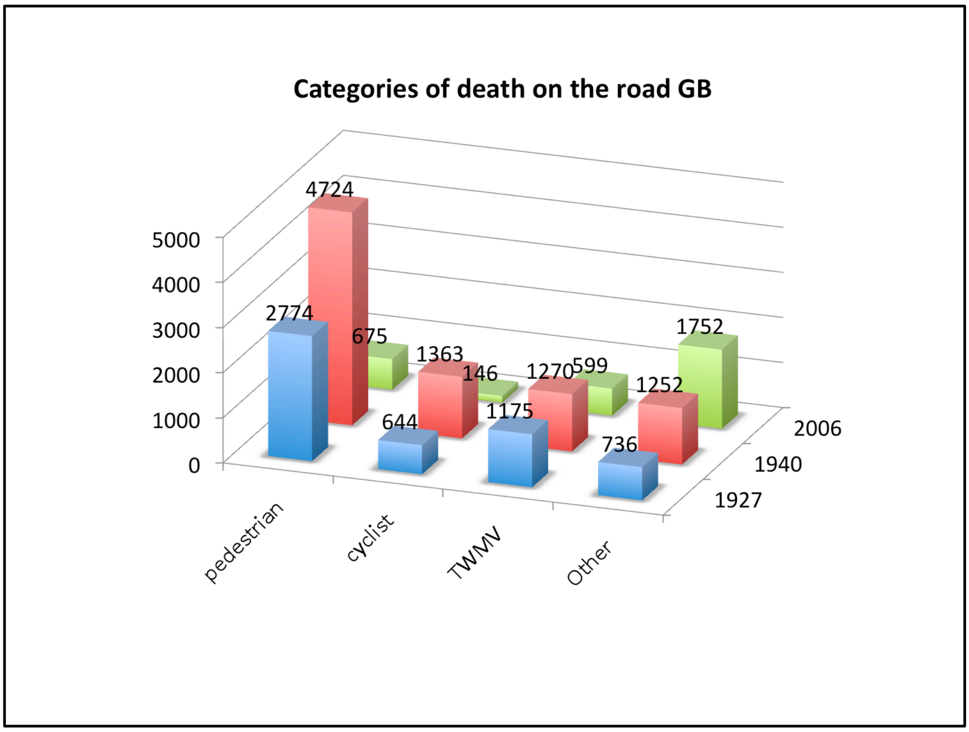
This one is dated1949.

These pictures of ship breaking in Bangladesh provide dramatic reminders that different health and safety standards operate at different times and in different parts of the world.

http://images.google.co.uk/imgres?imgurl=http://arkiblog.net/blog/wp-content/uploads/2006/08/12.jpg&imgrefurl=http://arkiblog.net/blog/2006/08/12/largest-structures-destroyed/&h=290&w=436&sz=87&hl=en&start=16&um=1&tbnid=F567Sf9JSr0YIM:&tbnh=84&tbnw=126&prev=/images%3Fq%3Dship%2Bbreaking%2Bbangladesh%26um%3D1%26hl%3Den%26client%3Dfirefox-a%26rls%3Dorg.mozilla:en-US:official%26sa%3DN

http://www.edwardburtynsky.com/WORKS/Ships/Shipbreaking/Shipbreaking_04.jpg

A floating iron mine lands on the beach and the third world miners set to without helmets, safety shoes, gloves or goggles apparently working under a non-existent safety regime.
It would be interesting to know how the accident rates for this industry in the 21st century compare with those of high steel workers in New York in 1932 or those of roughnecks in the oil industry at the beginning of he 20th century. Sadly such comparators don't exist.



When cars are few in number most fatalities are vulnerable road users (pedestrians, cyclists and motorcyclists).
As vehicle numbers increase the vulnerable retreat.

In 1927 in Britain 64% of road accident fatalities were pedestrians and cyclists.
In 2006 56% of fatalities were in motor vehicles.

	1927	1940*	2006
pedestrian	2774	4724	675
Cyclist	644	1363	146
TWMV	1175	1270	599
Other	736	1252	1752
Total	5323	8609	3172

* The peak year for road deaths in Britain

But one might speculate that this man coming off work is a pedestrian who does not own a car, and that the owner of the ship in the background owns a car and drives it with the same concern for the welfare of pedestrians as is manifest in his concern for his workers.

There must be no blood

BG LNG Plant, Idku, Egypt

The film *There will be Blood* provides a realistic description of Health and Safety standards in the oil industry at the beginning of the 20^{th} century. In the modern oil and gas industry no blood is allowed. In today's globalized world one finds in poor countries small health-and-safety islands amidst turbulent seas where life is cheap.

Egypt currently has a road death rate per vehicle 16 times higher than that of Britain. Here we have an example of the application of current British safety standards to a construction project in Egypt. Egyptian employees of BG (formerly British Gas) at a liquefied Natural Gas Plant - with helmets, goggles, gloves, safety boots, safety harnesses and bright yellow jackets. They are embedded in a safety regime that contrasts starkly with indigenous standards elsewhere in the country.

Outside the western health-and-safety bubble different standards prevail - at work and on the road.

Examples of behavioural interventions by senior leaders to promote a safety culture—promoting workplace safety to signal a wider change

- When arriving at a meeting room, the most senior person checks the fire escapes are unlocked and unblocked and encourages colleagues to place bags out of the way
- The most senior person opens the meeting with a reminder of the safety procedures (e.g. any fire tests planned, congregation points, nearest phone, fire extinguisher and alarm points)
- Backup junior colleagues challenging more senior staff on these issues.

This slide and the next, I am informed by a former BP employee, were the safety guidelines in force in BP's head office at the time that BP's Texas City installation was blowing up, killing 15 people.

Some of the other interventions that are used to set a cultural tone for safety within the oil industry include:

- promoting safe stair walking techniques, such as holding the handrail
- providing lids for the safe carrying of coffee
- correcting colleagues tipping back on their chairs
- encouraging colleagues to refuse any form of road transport that does not provide seat belts
- regular safety tours, meetings and reviews led by senior staff.

In the real world there will be some blood.

There are limits to the level of safety that can be achieved in the real world.

The only way to achieve zero risk in a transport system is to ensure that nothing and nobody moves.
In addition to pedestrians, road transport systems involve millions of moving parts piloted by fallible humans. There will be accidents.

To some this is heresy. On 2nd June 2001 the *British Medical Journal* announced that it was banning the use of the word "accident" in its columns (http://www.bmj.com/cgi/content/full/322/7298/1320). It was, they argued, an exculpatory word that encouraged negligence. As an alternative they suggested "injident" – injury producing incident. For my comment on the suggestion see "Do we have enough injidents" (http://john-adams.co.uk/wp-content/uploads/2006/Do%20we%20have%20enough%20injidents.pdf).

A street designed in the spirit of the BP safety culture would be a bleak, sterile and soulless place, and as successful as BP in preventing accidents.

Where and when is shared space safe?

Safe
Campsites
Supermarket car parks
Italian hill towns
Old Amsterdam
Drachten
Haren
Seven Dials
Kensington High Street

Not Safe
M25
Westway
England 1920s
Bangladesh & Egypt 2008

Safe? It depends
• On prevailing safety culture
• On perceived status of pedestrians and cyclists
• On how the design of the scheme influences the perceptions of all road users

Measured by deaths per car, England's roads have never been safer: partly because all road users have become more experienced with the dangers and more competent at coping with them, partly because the most vulnerable road users on foot and on bicycles have retreated from the threat, and partly, one might speculate, because as the socio-economic gulf between those with cars and those without has narrowed, the average motorist drives with less arrogance and distain for the vulnerable.

Shared space schemes work best in circumstances where speeds are physically constrained and where the proportion of vulnerable road users is high.

Along roads between the M25, London's outer ring road, and Covent Garden in central London these circumstances vary.

Those contemplating such schemes would be well advised to follow the procedures adopted by Kensington and Chelsea in implementing its High Street scheme and in developing its Exhibition Road project.:

1. Monitor what is happening before the scheme is implemented, including collecting accident statistics and CCTV surveillance of problematic stretches of the road.
2. Develop measures, physical and psychological, that reduce vehicle speeds and elevate the status of vulnerable road users
3. Monitor what happens after the scheme is implemented, including collecting accident statistics and CCTV surveillance of problematic stretches of the road.

'A safe road is more important than a pretty road.'
Sign displayed in a [traditional] highway engineers's office
http://www.guardian.co.uk/news/2007/oct/07/letters.theobserver1

It is now evident that, in modern Britain, with appropriate priorities and careful planning, there are many roads on which both are possible.

How do we define a "safe" road.
If we define it as a road on which an accident can never happen, no road can be called safe.
If we are prepared to settle for "a road with a superior accident record compared to roads with comparable vehicle and pedestrian traffic", then shared space schemes are beginning to develop an impressive safety record.