

Stepping stones to a better cycling future

A presentation by Malcolm Wardlaw to the CTC/CCN conference in Chesterfield on 13th October 2001.



In the last issue of Cycle Touring & Campaigning magazine [1], there was an excellent article by John Stuart Clark, which I think did an outstanding job of summarising the problems we are facing in cycling at the moment. He concludes:

"Maybe now that Britain has reached a junction where our cycling culture has become as impoverished as America's, manufacturers will wake up. For campaigners and planners, it is clearly time to shift the spotlight from the hardware of infrastructure to the software of minds. For mainstay cyclists, we have a responsibility to proselytise at every opportunity. How I would like to give Max Clifford the brief to raise the awareness of cycling in Britain, to see what he could come up with."

That says it all beautifully. In this talk, I'm going to review some of the facts about cycling that I have gathered from official sources. It is possible that some of the results will surprise you. I'd like to think that I can persuade you there are messages in these statistics that we should be using far more forcefully in building our case for a better cycling future.

What is known?

3,423 road deaths in 1999 is reliable knowledge;
.....but what about 4.2 billion kilometres of cycling?



How do they know?

- Traffic census data counts passing vehicles at 16,000 sites;
- National Travel Survey interviews 8,000 individuals per year;
- Many countries don't have much data on cycling - we are lucky.



Change the software of minds using available knowledge

What is known?

Before I get into that, I first need to say something about the information that is available. We can be pretty sure that figures for the number of people killed in crashes are reliable, but on the other hand, how confident can we be about estimates of the number of kilometres cycled in Britain each year? The official estimate is just over 4 billion kilometres. The statisticians make a big grab by gathering data at 16,000 count sites around the country. They have been doing that since 1949, so there's plenty of scope for looking at long term trends..... That is a lot of counting, but, there is a good deal of cycling on urban backstreets and country

lanes that gets missed. It is far more likely that figures for cycling are underestimated rather than overestimated. When we calculate risk, we thus get a pessimistic result. This should be borne in mind.

Similarly, how do you find out how much cycling is done by (for instance) teenage boys? It's not easy! The National Travel Survey has been ongoing since the early Seventies and is based on interviews with 8,000 individuals per year to build up information on personal travel that may be split by age group and by mode of transport. Unfortunately young males are notoriously uncooperative in this exercise, and most cyclists are young males.... Again, there will be some bias in the data.

It should be understood that the amount of information on cycling available in Britain [2][3] is much greater than in most other countries. In the USA and Canada, data on cycling are virtually non-existent. This stepping-stones approach is only possible because the information was collected and made freely available. In other countries, campaigners are not so lucky.

How dangerous is cycling?

A quick-cut measure to put the risk in day-to-day terms is to calculate how many years of cycling there are for each death. To put it another way, this is the number of years you could expect to cycle before being killed in an accident. We know that currently about 170 cyclists get killed per year and from surveys we know there are about 3 million regular cyclists in Britain. There are in addition at least another 3 million occasional cyclists, but we will ignore them here. We divide 3 million by 170 to get **18,000 years**.

Now that looks like quite a lot of cycling. The average cyclist in Britain is not very active, however, using their bike for just two hours per week. A more useful measure of the risks for active cyclists is to look at CTC members. There are 3 to 5 deaths per year, out of 60,000 members, so that gives 12,000 to 20,000 years.

The safety of cycling in Britain

How many years of cycling for each cyclist death?

Average cyclist:
170 deaths/year out of
3 million regular cyclists:

18,000 years.

CTC members:
3 to 5 deaths/year out of
60,000 members gives:

12,000 to 20,000 years

“Gung ho” cyclist:
5,000 miles per year,
but only average skill level,
will last how long?

5,000 years

Again, that is quite a lot of cycling. Even if we stick with the lower figure of 12,000 years, that is a very long time. 12,000 years ago there were still no cities at all, so such a time spans the entire ascent of human civilization! So it looks like CTC members face a risk per hour that is much lower than the average. We might put together a very pessimistic scenario of the "gung-ho" cyclist, who rides for more than an hour every day, covers around 5,000 miles per year, yet still faces the same risks as the average rider. Even this individual may expect 5,000 years of cycling before a fatal crash. That means, if I'd set off about the time they'd built the Great Pyramid and ridden 5,000 miles per year, century in and century out, it would only be now that I'd be in line for getting killed.

Dangerous and safe activities

Very dangerous:

- climbing Mount Everest (1 in 5 risk of death)
- climbing north face of the Eiger (1 in 8 risk of death)

Quite dangerous:

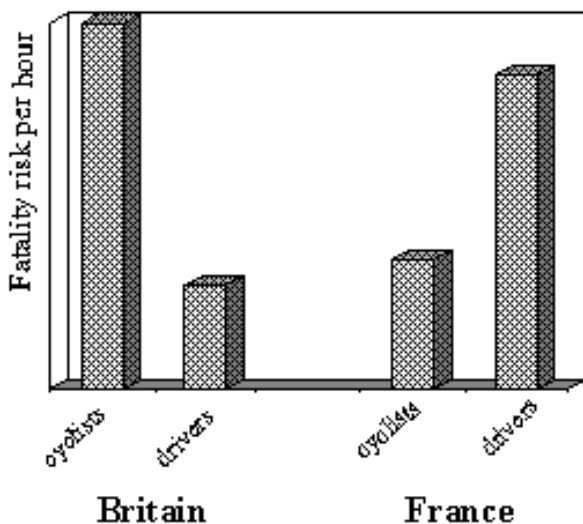
- climbing the Matterhorn (1 in 1,000 risk of death)
- one year of motorcycling (1 in 1,200 risk of death)

Not dangerous:

- one year of cycling (1 in 12,000 - 20,000 risk of death).

By any sensible, everyday standard, normal road cycling is a low-risk activity, even here in Britain where, as we are well aware, casualty rates are higher than they are in other countries. Leisure and utility cycling are low-risk activities and they should rightly have the public image of being safe activities. That is what the evidence tells us.

Opposites don't attract: Britain and France



Opposites don't attract

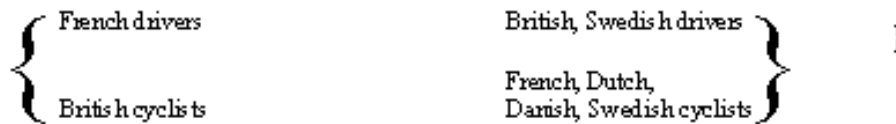
Having got you believing that, I will now tell you that if I carry out a paper exercise and draw on official statistics to calculate average hourly risks of death for cyclists and drivers in Britain, cycling comes out as being several times riskier. That does not make it dangerous, as we saw; if you take a small risk and multiply by 3.5, it's still a small risk.

It is interesting to compare circumstances here in Britain with those in France [4]. Now isn't that interesting? In France, an hour of cycling is much safer than an hour of driving - not perhaps such a huge surprise to those who have cycled and driven in France! In

fact, the risks for French drivers are about the same as for British cyclists, while the risks for British drivers are about the same as for French cyclists. The French drive the same cars we do and ride the same bikes, and like us they pursue the tradition of vehicular cycling. It is quite wrong to assume that cycling will inevitably be more dangerous than driving, just as it is wrong to believe that bicycles and cars cannot safely share road space. There must be competence and respect on both sides. When those conditions are met, it can happen.

Cycling and driving in various countries

Cycling safer than driving:	France, Denmark.
No significant difference in risk:	New Zealand, Germany, Sweden, Switzerland, Netherlands.
Cycling not quite as safe:	Austria, Finland, Norway, Australia.
Significant difference:	Britain Italy.



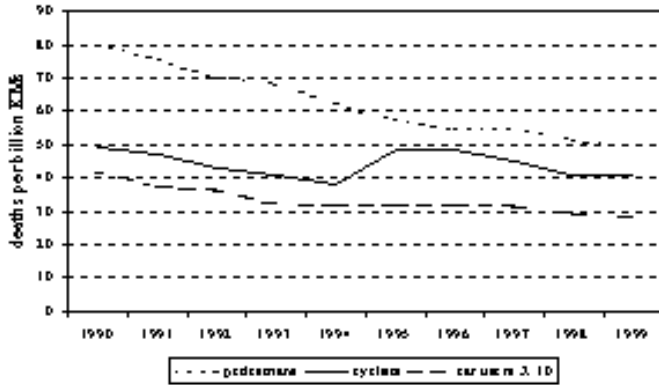
Cycling and driving in various countries

If we take a general sweep across countries for which there are available data [5], we find there is a wide spread of risks for driving and for cycling. It may surprise many to discover that in most countries there is not much difference in risk compared on an hourly basis. There are a few countries where cycling is clearly safer than driving, and there are a few where cycling is clearly riskier than driving. Britain falls into the latter category. In fact, there is no other industrialised country where there is such a large difference in risk between cyclists and drivers.

There is nothing to suggest that cycling is in any consistent way more dangerous than driving: it all depends on local conditions and attitudes. If we define an upper risk bracket, we find French drivers with British cyclists. At the lower risk bracket we find British and Swedish drivers with French, Dutch, Danish and Swedish cyclists. But they all fit pretty much into the same range. We can confidently dispose of the myth that cycling is more dangerous than driving in any systematic way.

We need to be aware that the situation we face in Britain is a unique one. A fine record for drivers is juxtaposed with a poor one for cyclists. So on paper, we have further to climb than other countries.

Existing agenda is making things worse....



Awkward question #1: why did cyclist fatality rates get worse?

Awkward question #2: why does nobody care?

[Enlarge graph](#)

Existing agenda is making things worse

As if that insight is not daunting enough, just to add insult to injury, current policies seem to be making things worse rather than better. A review of fatality rates (risk of death per kilometre) for different road users during the Nineties shows that cyclists did not share the improved trends enjoyed by pedestrians and car users. We see that the Nineties split into two phases. In the first phase up to 1994, the fatality rate for cyclists declined in smooth progression with pedestrians and car users. This is what we would expect, since fatal crashes have a common cause: motor vehicle impact speeds. If impact speeds fall, say, as in this case, because of economic recession, then all road users gain equally because impact speeds fall for all types of crash.

However, after 1994, there was an excess of cyclist deaths which led to a regression of safety through the second half of the Nineties. If you look closely, you will notice that the fatality rate in 1999 was higher than it had been in 1994. It is highly unusual for a single group to suffer such a regression. In the whole injury record back to 1970, the only similar such increase in cyclist deaths was caused by the seatbelt laws of 1983, which also changed the trends for car users [6]. Why did cyclists alone suffer this sharp regression?

All we can say is that something within the world of cycling went wrong such as to cause a relaxation of caution. It is clearly time to review every policy that was put into force during the Nineties. Indeed, it is all too clear that we have reached stagnation if not worse. This is where the stepping stones begin.

Stone One: the secret of the average....

Split British cyclists by age group and what do we see?

Age group	Risk ratio cycling:driving	like driving in:
17-24	1.2 - 1.5	Britain, Netherlands
25-39	2.3 - 3.0	Austria, Australia
40-60	7.0 - 9.0	Greece, Turkey, Venezuela
60+	2.3 - 3.0	Austria, Australia
average	3.5 - 4.0	France, Belgium, Portugal

The average reveals and yet conceals!

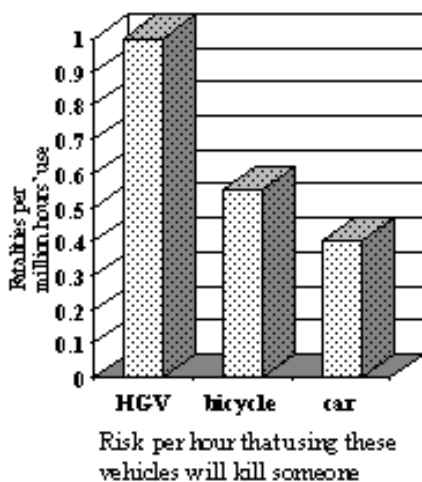
Stone One: the secret of the average

Some years ago, the Transport Research Laboratory carried out a detailed comparison of the risks of cycling, walking and driving in Britain [7]. This analysis revealed a most interesting pattern when the risk was broken down by age group.

This is a classic case of the average revealing and yet concealing. Even here in Britain, there is an age group for which the risks of cycling and driving are not much different. 17-24 year olds are not significantly more at risk cycling than driving, but when cycling they are drastically less danger to others. Getting this group out of cars and onto bikes would be an entirely risk-free measure that would also cut road danger as effectively as campaigns against drinking and driving. That is our first stepping stone. Getting more young adults to cycle really will mean less danger.

Notice that for most other age groups, the risks are not as high as the average would suggest. There is just one group that has an alarmingly bad safety record, and that is the 40-60 year age group. We have no information as to why this group should have a problem, but we can see that this group jacks up the average for everyone else. For British adults in the age range 17 to 40, the risk in cycling is hardly out of line with the EU average for drivers.

Stone Two: cyclists don't kill...



- In 1999, 172 cyclists got killed, but only 6 others died;
- 1,100 drivers got killed, and so did 600 car passengers, 650 pedestrians, 100 cyclists and 250 motorcyclists
- 52 HGV drivers got killed, and so did 568 members of the public.
- Motorcycling has all-party support,

So why is it that *cycling* is the political dead duck??

Stone Two: cyclists don't kill

Those who focus only on cyclist versus driver risks are apt to miss that cycling is a benign mode of transport. There were 172 cyclists killed in 1999, but only 6 other road users were killed in crashes involving a bicycle. By comparison, there were 1,100 drivers killed, but 1,600 other road users were killed in crashes involving cars. The reason is obvious enough: car crashes are far more violent than bicycle crashes. To the 1,100 drivers must be added 600 passengers, 650 pedestrians, 100 cyclists and 250 motorcyclists. From the viewpoint of the policy maker weighing the merits and

drawbacks of different modes of transport, it matters that the bicycle is so unlikely to inflict serious harm on others. If we apply available information to calculate the risk per hour of different vehicles causing fatal injury to any road user (see [2] and [3]), we find that even in Britain, where the user risks are so apart, most of the difference between bicycle and car disappears.

If we add heavy goods vehicles to the picture, we are struck by how great a threat they represent to others. In 1999, 52 drivers were killed, but 568 members of the public were killed too. That is a scandalous imposition of danger on the public - and the issue has no political profile. The use of HGVs is currently increasing faster than for other classes of vehicle, yet when did you last hear a Minister for Transport say: "More lorries mean more danger."? The promotion of motorcycles also has all-party support, yet motorbikes are four times more dangerous to pedestrians than cars and more than ten times more dangerous to riders than bicycles. There is clearly no rationale whatsoever behind the political treatment of different types of vehicle.

Even so, one does have to ponder: given all the pressures to increase exercise, reduce danger, pollution and congestion, why is it that the promotion of *cycling* is a political dead duck?

This ain't no sensible world.

Stone Three: the Growth Rule

Consider these two facts: 0.8% of road travel is by bicycle; 5% of road deaths are cyclists. It is silly to conclude that if 16% of road travel were by bike, 100% of road deaths would be cyclists. But that is exactly what the DTLR does assume when it is estimating the effects of increased cycling.

It is clear enough that the main reason the risks of cycling are higher here in Britain than elsewhere is simply that there are not enough cyclists on the roads. If there were more cyclists, cycling would get safer - and

Stone Three: the Growth Rule

Fact One: 0.8% of road miles are by bicycle:

Fact Two: 5% of deaths are cyclists.

Silly conclusion: if 16% of miles were by bicycle, 100% of road deaths would be cyclists....

Time to meet the Growth Rule:

Increase in cycling	Increase in deaths	Reduction in risk
2 X	25%	-37%
4X	60%	-60%
8X	double	-75%

that's a mathematical certainty, as we saw above. The official view follows the comfortable simplicity that if you quadruple the amount of cycling you'll quadruple the number of deaths. Is there evidence of a more realistic alternative relationship?

Yes. Time to meet the Growth Rule.

I must make it clear that the Growth Rule is not my original observation. It was first noticed by Scandinavian researchers a couple of years ago [8]. Their work was pointed out to me by an American called Peter Jacobsen, who had read my BMJ paper and had further tested the Growth Rule in Californian and Danish cities and found it to hold true. My work has been to apply the Growth Rule to several countries in Europe to see how it held up.

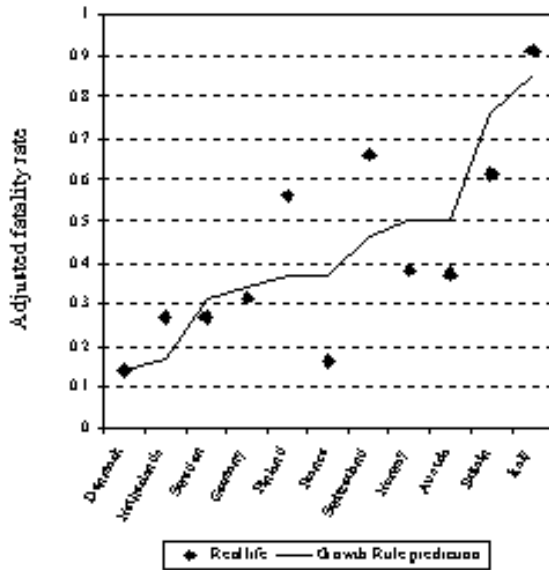
The Growth Rule states that if the amount of cycling doubles, the number of deaths increases only 25%, hence the risk in cycling decreases by 37%. If the amount of cycling quadruples, deaths increase by 60% while the risk goes down by 60%. If the Growth Rule is right, fulfilling the National Cycling Strategy would lead to an increase in deaths from 170 to 270 - and there is reason to believe that most of these extra deaths would be cancelled by reduced deaths in other groups. That sounds pretty dramatic, but how reliable is this Growth Rule?

Let's put it to the test. Let's first see how the Growth Rule holds up explaining the variation in cyclist death rates across Europe that we found in our earlier survey.

The Growth Rule on test across Europe

There isn't much to say. I've made Denmark the basis for the comparison, and arranged the countries from there in descending order of cycle use down to Italy. A complication in this comparison is that attitudes to risk vary from country to country. What we really want to know is how a given level of cycling relates to a given %age of road deaths that are cyclists. So I calculate a dimensionless fatality rate:

The Growth Rule on test across Europe



[Enlarge graph](#)

...not bad!

Adjusted fatality rate =

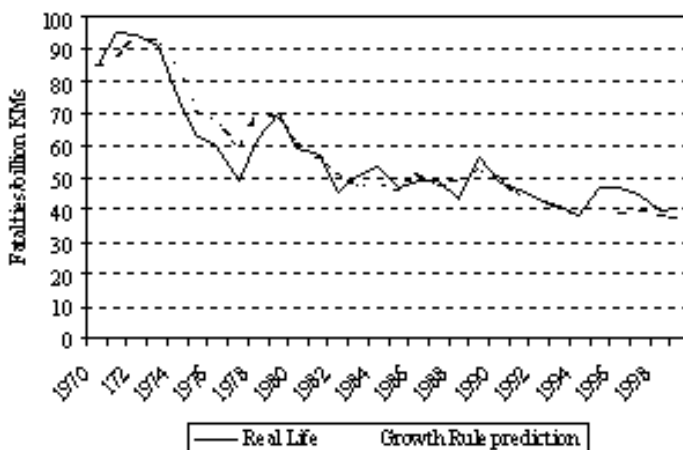
(cyclist deaths as a %age of all road deaths)

(per capita cycling as a %age of Denmark's)

Take Britain as an example. Here, cyclists were 5% of road deaths in 1990 (the last year for which comparative figures are available), while the amount of cycling per person was 8% of Denmark's. So the adjusted fatality rate is $5/8 = 0.625$. The Growth Rule predicts a slightly pessimistic value of 0.76, but that is close, bearing in mind we are comparing countries with a 12-fold difference in cycling levels!

There is a fair amount of scatter on the chart. Much of the scatter will be due to different traditions of measuring cycling in different countries. The Growth Rule line is virtually a best-fit through the scatter, quite an impressive performance!

The Growth Rule on test across time



[Enlarge graph](#)

...not bad!

The Growth Rule on test across time

Another test for the Growth Rule. According to the long term traffic census, there has been a good deal of change in the amount of cycling in Britain over the last thirty years. There was a period of strong growth in the Seventies peaking around 1983, after which there was steady decline back down to the same level as in 1970 currently - progress!

There is a complication here, because the overall number of road deaths has fallen by more than half since 1970, and this will have had some kind of effect on cyclist deaths. But what is the relationship? We're lucky in that the amount of cycling was about the same in 1999 as it was in 1970. This means we can compare the two years without fear of any "growth effect" confusing the answer. From 1970 to 1999, all road deaths fell from 7,500 to 3,400 (-56%), while cyclists deaths fell from 385 to 170 (-57%), so it looks like cyclist deaths fall in proportion with overall road deaths. This is not a surprising result, if one subscribes to the view that road deaths are controlled primarily by behaviour, rather

than technical measures. In applying the Growth Rule, the proportional relationship was assumed.

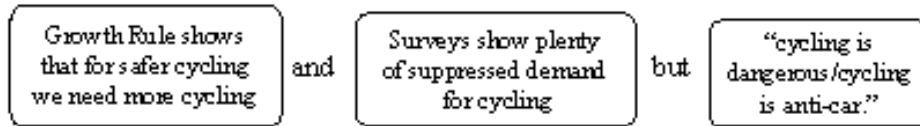
Comparing what actually happened with what the Growth Rule predicts leaves little to say, beyond that the Growth Rule model gets it dead right. If anything, it underestimates the benefits of the growth in cycling during the Seventies. It is particularly important to understand that the Growth Rule applies in the absence of any special measures to provide special infrastructure for cyclists. Clearly during the Seventies there was no effort to cater for cyclists, who pursued the tradition of vehicular cycling, and derived strong benefits from their increased presence in the traffic.

There is an ironic story behind the Growth Rule. The researchers who first observed it in Sweden were studying the effect of altering the design of cycle path crossings at segregated junctions. They found that the engineering measure brought no net benefit - indeed, they concluded, as usual, that cyclists fared best on the road with motor traffic - they saw instead that there were inherent benefits from increased cycling.

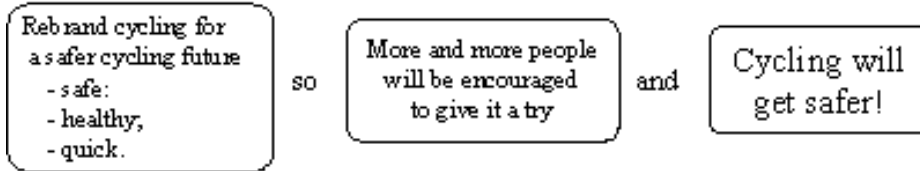
Although we do not as yet know why the Growth Rule is so universal, we can be pretty sure it is real. You have seen it before your eyes here, others have detected it in Sweden, Denmark and California, not just for cyclists, but for pedestrians too (publication by Jacobsen is pending).

The Growth Rule is the third of our stepping stones. It provides us the ultimate argument for the promotion of cycling; more cycling means safer cycling. End of argument.

Better marketing = safer cycling



Bad image = stagnation = no safer cycling



Brand image = self-fulfilling prophecy!

Better marketing = safer cycling

We have come full circle back to the article by John Stuart Clark.

"It is clearly time to shift the spotlight from the hardware of infrastructure to the software of minds."

We know from surveys that there is plenty of suppressed demand for cycling, and we want an increase in cycling to improve safety. So why isn't it happening? The problem is brand image - the "cycling is dangerous" tag. That deters new cyclists and it kills political interest, since it is assumed any promotion of cycling will necessarily involve unpopular restraint of driver behaviour. And we can't deny that at least in part we have done our bit to create the "cycling is dangerous" myth, through attacking drivers to a degree far beyond reason. Just to make things more complicated, some cyclists have identified the bicycle with extreme politics and fundamentalist hostility to the motor car, and indeed, to industrial civilisation. This is ironic, bearing in mind that the safety bicycle was invented by James Starley, who was a capitalist, and later founded the Rover car company. The real price of a bicycle has fallen by 90% over the last century only because of the more efficient methods of scale production that spun off from much larger industries.

A consumer society is made up of busy people with too many choices. We are all, whether we recognise it or not, conditioned by consumerism to make snap judgements based on brand image. Any marketing executive will tell you that brand image is a self-fulfilling prophecy - substance has nothing to do with it. Soft drinks are sold on the strength of positive messages about physical fitness and belonging to the cool group; they wouldn't sell on messages about tooth decay and the importance of regular brushing. It is brand image that pushes action in a consumer society.

If there is going to be a cycling revival, we have to destroy the old myths and create a new brand image for cycling - based on the

facts. Destroy the myth that cycling is dangerous and you destroy the other myth that pro-bike equals anti-car. The bike will sell on its strongest points:

- Safe
- Healthy
- Quick

No lie in any of that, especially pushing it at the 17-24 age group. Put the facts in a positive instead of negative light.

The logic path is clear enough. To make cycling safer, we must make it more popular; to make it more popular, we have to rebuild its image as something attractive that people will be drawn to getting into. Brand image is a self-fulfilling prophecy.

Changing the software of minds

If I were putting together an action plan for a cycling revival, these would be my main points:

1. Educate local government, the medical establishment and the road safety establishment about the three stepping stones:
 - encourage 17-24 age group to cycle rather than drive;
 - cyclists don't kill, so most other age groups are a safe bet too;
 - the safety benefits of much more cycling as given by the Growth Rule.
1. Also gather more backing from enlightened public health professionals;
2. Encourage existing cyclists to support the new image - safe, healthy, quick;
3. Keep pushing the Growth Rule message to sustain momentum of revival.

Changing the software of minds...

- Educate policy makers about the three stepping stones :
 - encourage 17-24 age group to cycle rather than drive;
 - cyclists don't kill, so most other age groups are a safe bet too;
 - the safety benefits of much more cycling as given by the Growth Rule;
- Encourage general promotion of the new image:
 - safe;
 - healthy;
 - quick.
- Keep pushing the Growth Rule to sustain momentum of revival.

More cycling = safer cycling + safer roads + better health

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