

SAFER WITHOUT A CAR

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Safety is a Key Issue

Safety for cyclists is an area of big interest in connection with, so to say, any discussion concerning cycling. It is a problem for the society and for the cyclists themselves that cyclists are killed and injured in significant numbers. Not least important is the subjective or perceived safety, e.g. the feeling of being unsafe when using a bicycle in mixed and fast motor traffic.

The perceived safety is an issue of central importance when attempting to make more people use the bicycle.

The actual safety, measured by hard figures of fatalities and injuries (actually a measurement of the *unsafety*), is on the other hand fundamental to justify governments introducing policies encouraging the use of the bicycle.

This paper will only deal with the latter question of actual safety.

It is often heard as an argument against bicycle promotion that it is not ethical to promote a means of transport as alternative to the car as long as the transport means is in itself less safe than the car. And it is true that in probably all countries the bicycle will have a higher score than the motor car in terms of fatalities or injuries per driven distance.

Positive side effects can, however, still justify bicycle promotion. Environment and health are such side effects. And calculations have indicated that the positive effect on health from cycling by far outweighs the extra risk of accidents imposed on cyclists^{1,2}.

This paper will, however, not discuss side effects but exclusively deal with the issue of actual safety in traffic.

Societal, Egoistic and Ethical Safety Figures

Safety figures can be, and are, presented in many ways.

In a societal approach it is most reasonable to regard traffic safety in terms of fatalities or injuries per inhabitant per year. This makes possible to relate the negative consequences of a given transport system to the number of people using the same transport system.

There is no direct connection between safety in countries with a significant amount of cycling (e.g. Netherlands and Denmark) and countries with a high degree of car use (e.g. United Kingdom and USA).

Societal Safety for Various Countries

Figures shown are killed in
traffic 1992 per million inhabitants

United Kingdom	77
Netherlands	87
Denmark	113
Germany	135
USA	158
France	162

Sometimes similar figures are presented where the total distance travelled is also taken into account. This makes a society with a lot of transport appear relatively more safe than a society with less traveling. This is misleading, as losing a child, a friend or a relative basically must be the same problem independently of the average travelling distance of the society.

When, however, comparing the safety impact of various means of transport some sort of relation to their use must be taken into account. If not, one will reach the obviously wrong conclusion that a given means of transport is safer the less it is used.

The most simple and most widely used figure to compare is the number of fatalities or injuries for a given means of transport per distance travelled. This figure can be regarded an "egoistic safety" as it regards only what goes wrong with a given type of road user and does not take the possible impact on other road users into account.

It is this calculation which has lead to the often heard statement that "cycling is less safe than motoring" and which also supports the designation "safe cars" for vehicles that protects their own passengers but have proven to lead to more serious impacts on other vehicles in accidents.

A not less relevant figure for egoistic safety relates the number of fatalities or injuries to the number of trips where the means of transport in question is used. This sort of measure will be much more stable towards increases in the average distance traveled³⁾ and will give a result which is more in accordance with the societal approach mentioned above.

Examples of egoistic safety related to distance and number of trips are seen below. In all cases the number of fatalities have been used as this a fairly simple and reliable figure.

A similar "ethical safety" would include also what goes wrong with other road users and relate this to the use of a given means of transport, which is not quite as simple.

A reasonable approach would be to count fatalities and injuries from sole accidents, accidents involving other vehicles of the same type and accidents involving more "weak" road users and relate this to the use of the given means of transport. This would not take into account "guilt" in the accidents but simply regard e.g. accidents between cyclists and pedestrians as a burden imposed on society due to the use of bicycles.

Figures for Adults' Egoistic Safety in Denmark

Figures are from 1992. Only adults (16-74 year) are regarded as data for children and elderly are not included in the travel surveys. Source: Statistics Denmark and the Danish Ministry of Transport.

	killed 1992	km/day in 1,000	killed per bill. kms
pedestrian	63	2,664	65
cyclist	54	6,304	26
car user	220	102,768	6

	killed 1992	trips/day in 1,000	killed per bill. trips
pedestrian	63	1,301	132
cyclist	54	2,012	74
car user	220	6,738	89

Road users would, listed in order of decreasing weakness in this connection, be pedestrians, cyclists, moped drivers, motor cyclists and car users. Lorries and busses could be regarded a special group of road users representing a vehicle stronger than the car, and a splitting up of the passenger cars according to their resistance to accidents and their impact on other cars in accidents could be considered as well.

An example of ethical safety figures is shown below. For reasons of simplicity road users have been split up into only three groups: pedestrians, cyclists and motorised road users.

Apparently the egoistic safety depends very much upon whether the accidents are related to trips or distance traveled. Whichever of the two reflects the most "true" figure is a difficult but far from irrelevant discussion. Obviously the car is used for some purposes that is not replaceable by walking or cycling and therefore one should, in any case, be careful about direct comparisons. The individual has a certain lifestyle, some trips by car might be directly replaceable by cycling, some long trips might not be replaceable at all, but might on the other hand be replaced by public transport or by a shorter bicycle trip. People not having a car in the household often manage to live quite an interesting life but will obviously drive less by car and will especially make fewer impulsive long distance car trips.

Figures for Ethical Safety in Denmark

Figures show fatalities in the 11-year period 1983-1993. Travel survey data are from 1992 and only for adults. On one hand this underestimates number of trips and distance travelled as children also are active travellers. On the other hand cars will be overestimated for the period, as there has been a steady increase of 2-3 per cent per year for car traffic in the period 1983-1993. Differences are, however, so big, that these errors are of minor importance. Sources are as above, accident figures was compiled by the Danish Council of Road Safety Research.

Counterparts in pedestrian fatalities:

none or weaker	0 (ped)
bicycle	26 (cyc)
motorised	1,426 (mot)

Counterparts in cyclist fatalities:

none or weaker	88 (cyc)
bicycle	17 (cyc)
motorised	864 (mot)

Counterparts in motorist fatalities

none or weaker	1,515 (mot)
motorised	3,350 (mot)

	fatality agent 1983-93	km/day in 1,000 (1992)	killings per bill. kms
pedestrian	0	2,664	0
cyclist	131	6,304	5
motorist	7,155	102,768	17

	fatality agent 1983-93	trips/day in 1,000 (1992)	killings per bill. trips
pedestrian	0	1,301	0
cyclist	131	2,012	16
motorist	7,155	6,738	264

Safety Figures for Different Lifestyles

A "lifestyle-approach" to the question of safety is made possible by Danish travel survey data which includes a question of the number of cars in the household. We thereby have rather precise

figures for adults' use of various means of transport depending on whether they have none, one or more than one car in the household. Combining the figures with the average risks of getting killed (egoistic safety) using the various transport means one can calculate the risk of getting killed in traffic for the various types of persons in question.

Figures for Egoistic Safety Versus Car Ownership

Travel surveys of Denmark (1992) gives the following figures for adults' daily transport (kilometres per person per day) in dependence of car ownership:

	transport household no car	transport household one car	transport household two+ cars
walking	1.0	0.5	0.4
cycling	3.0	1.3	0.7
car	6.2	30.3	42.6
public transport	9.8	4.1	3.6
total	20.0	36.2	47.3

Multiplying these figures with the fatality risk per kilometre for adults for the various means of transport (public transport set to zero as nobody was killed in public transport means in 1992 and the average rate is anyway very small) yields (unit: fatality risk in 10^{-9} per day):

	fatal risk household no car	fatal risk household one car	fatal risk household two+ cars
walking	65	32	26
cycling	70	31	16
car	36	178	250
public transport	0	0	0
total	172	241	292
killed/mio/yr	63	88	107

The quite surprising result is that even though the car is regarded "safer" than walking and cycling, those living without a car in the household have the least risk of getting killed in traffic.

One can argue, that the total transport of the families with one or more cars is greater, and that this should be taken into account. It is an ideological question whether one will regard the more transport as a contribution to the quality of life or the result of a more or less deliberate inexpedient planning of the daily movements. It seems however to be strongly indicated, that the availability of cars in a household increases adults' risk of getting killed in traffic.

Conclusions

The often heard statement that "Cycling is more dangerous than cardriving" can only be justified when figures for egoistic safety related to the travelled distance is taken into account. The egoistic safety for cyclists when measured as the risk of getting killed per trip is more favourable than the similar figure for car users.

Speaking of ethical safety, e.g. figures taking into account those accidents with weaker road users, points out the use of motor vehicles to be significantly more dangerous than cycling, especially when set in relation to the number of trips.

More surprisingly, calculations of egoistic safety show that adults living in households with cars are more often killed in traffic than those living without a car. It seems thus for safety reasons also from an egoistic point of view to be worthwhile adjusting one's lifestyle to not being dependant upon a car.

References

- 1: Safety, the Achilles Heel of Cycling. Thomas Krag, paper issued at Velo-city Copenhagen 1989.
- 2: Cycling - Towards Health and Safety. British Medical Association, Oxford University Press, 1992.
- 3: See for example Werner Brög p. 21 in Conference Papers from Velo-city Nottingham 1993, Nottinghamshire County Council, 1994.