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The risks of cycling

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Abstract

In the City of Helsinki, the number of injury-causing bicycle accidents per km traveled is 5-times higher than for motorcar traffic and 10-times higher than for bus traffic.

A recent study in Helsinki showed that it is safer to cycle on streets amongst cars than on our two-way cycle paths along streets. It is hard to imagine that our present two-way cycling network could be rebuilt. But in those countries and cities which are just beginning to build their cycling facilities, two-way cycle paths should be avoided in urban street networks.

Even in more advanced cycling countries like Denmark and in the Netherlands, with a lot of cyclists and with their one-way lanes and paths, cycling is still much more dangerous than car driving or public transport.

Still, we want to increase cycling for environmental and health reasons. But are these reasons strong enough to compensate the serious safety problems of cycling, especially when cycling seems to compete mainly with the very safe public transport? The important question is: Does increased cycling weaken the level of public transport service?

Cycling is nice and healthy for cyclists, but public transport is essential for

many and perhaps the most manageable way towards sustainable traffic.

It is clear that we must radically improve the safety of cycling. But how can this be done?

So far, most of the important successful steps in traffic safety work have been based on restrictions of the freedom of car driving. When trying to improve the safety of cycling, the starting point is different. Popular arguments for sustainable traffic and the freedom of cycling often seem to neglect safety problems.

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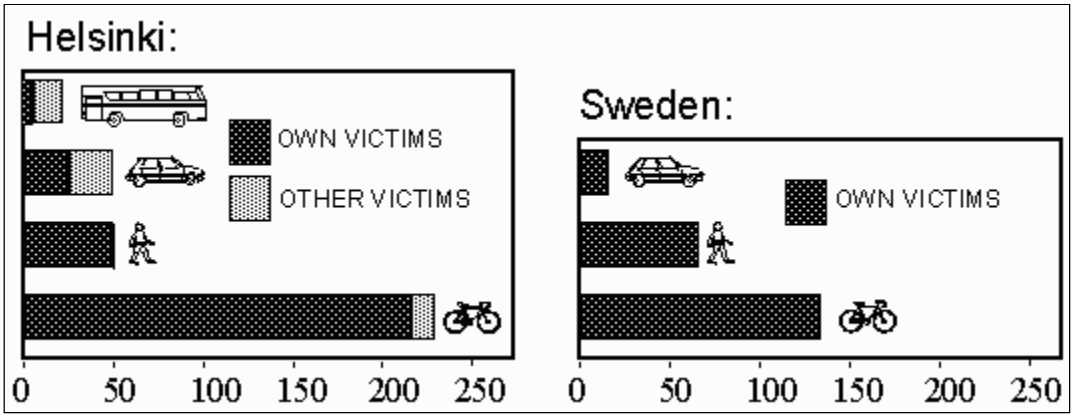
Cycling is dangerous

In the City of Helsinki, the number of injury-causing bicycle accidents per km traveled is 5-times higher than for motorcar traffic and 10-times higher than for bus traffic (Figure 1). The heavy rail traffic system is almost free of accidents. Hospital statistics would show even worse figures for cycling.

Figure 1: Risks of cycling in Helsinki, Sweden and in the Netherlands /1/**.**

Injuries per 100 million person km. in Helsinki and Sweden



In the Netherlands, the risk of a fatal accident per km. is 4.5 times as high for a cyclist as for a motorist.

In Finland and in Helsinki, we have an official goal of doubling bicycle use. This is an interesting goal from the point of view of traffic safety. While we have also decided to halve the number of serious bicycle accidents, no sufficient measures have been introduced. For example, we can not reduce bicycle accidents by building new cycle paths.

A recent study in Helsinki showed that it is safer to cycle on streets amongst cars than on two-way cycle paths along streets (Figure 2). The distribution of bicycle use was estimated by assigning a sample of real trips on a map. We got the origins and the destinations of the trips (street addresses) from travel survey data /2/.

The basic problem seems to be that car drivers are not afraid of cyclists. At crossings, car drivers focus their attention on other cars rather than on cyclists /3,4/. This causes troubles for cyclists, especially in a two-way cycle path system (Figures 3 and 4).

Figure 2 shows that 45% of the cycling kilometres in Helsinki are on cycle paths along streets, but 56% of injury accidents happen to these cyclists.

Figure 2: Bicycle use and bicycle accidents on different facility types in Helsinki /5/.

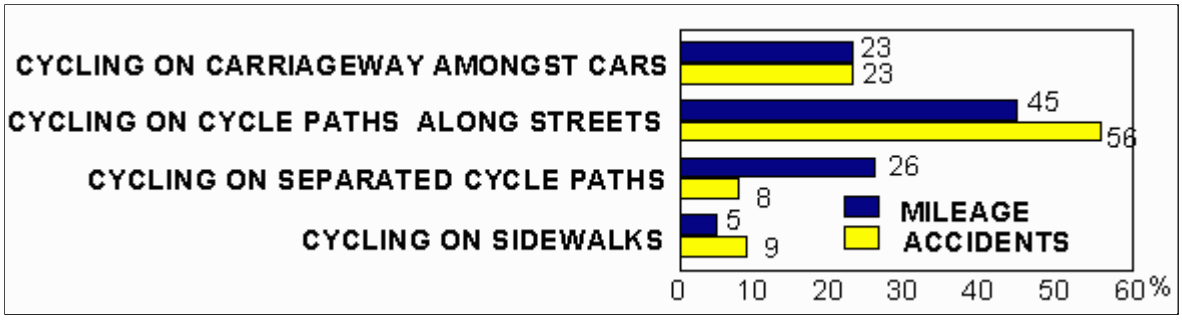


Figure 3 shows that the risk of a crossing accident is 3-times higher for cyclists coming from a cycle path than when crossing on the carriageway amongst cars.

Figure 3: Crossing events and crossing accidents for bicycles /5/.

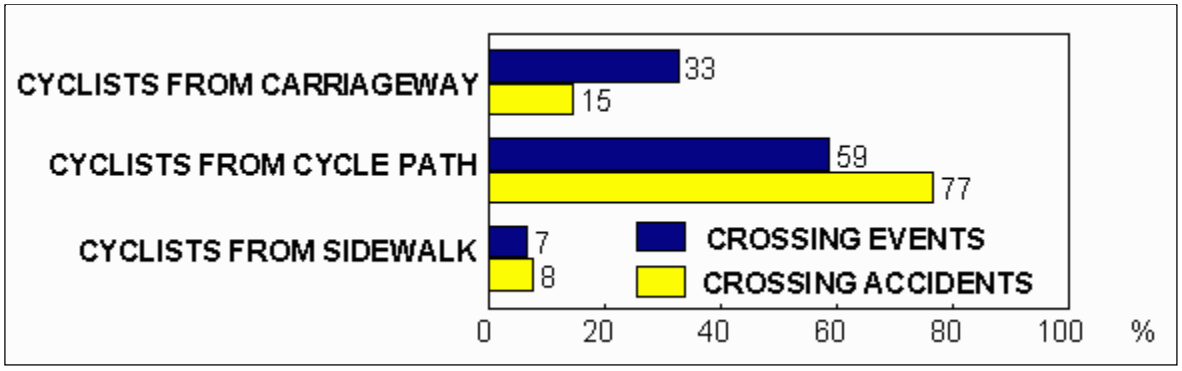
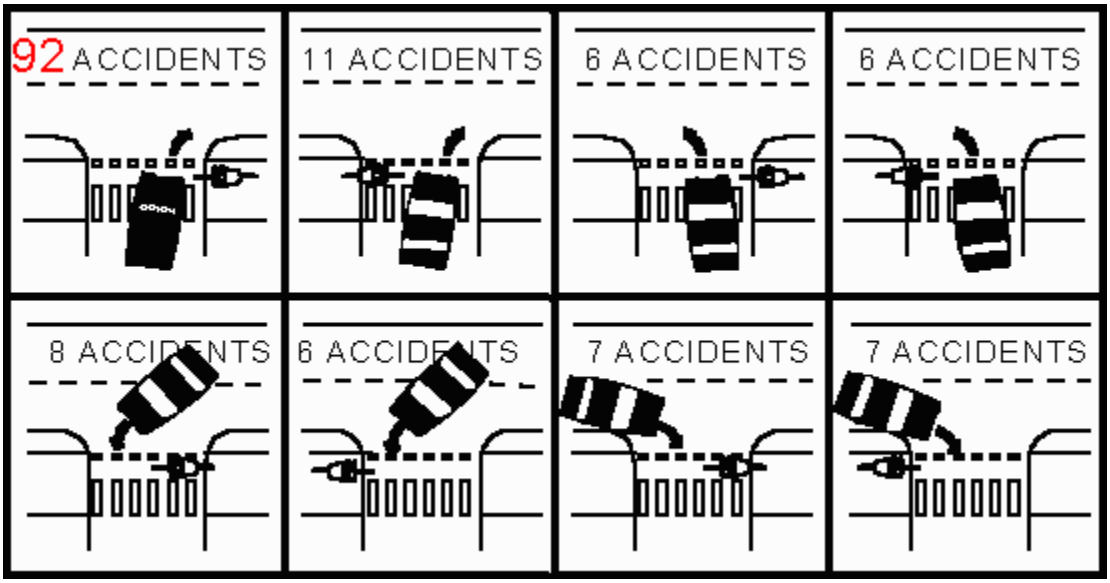


Figure 4 gives an example of the problem. All of the eight traffic situations in

figure 4 are equally common. But the first situation, with a right-turning car and a cyclist coming from the right, causes more than ten times as many accidents as any of the other situations. Right-turning drivers focus their attention mainly on cars from the left on the major street, and "forget" the cyclists approaching from the right.

Figure 4: Accident types at non-signalised crossings of two-way cycle paths and minor streets /3/.

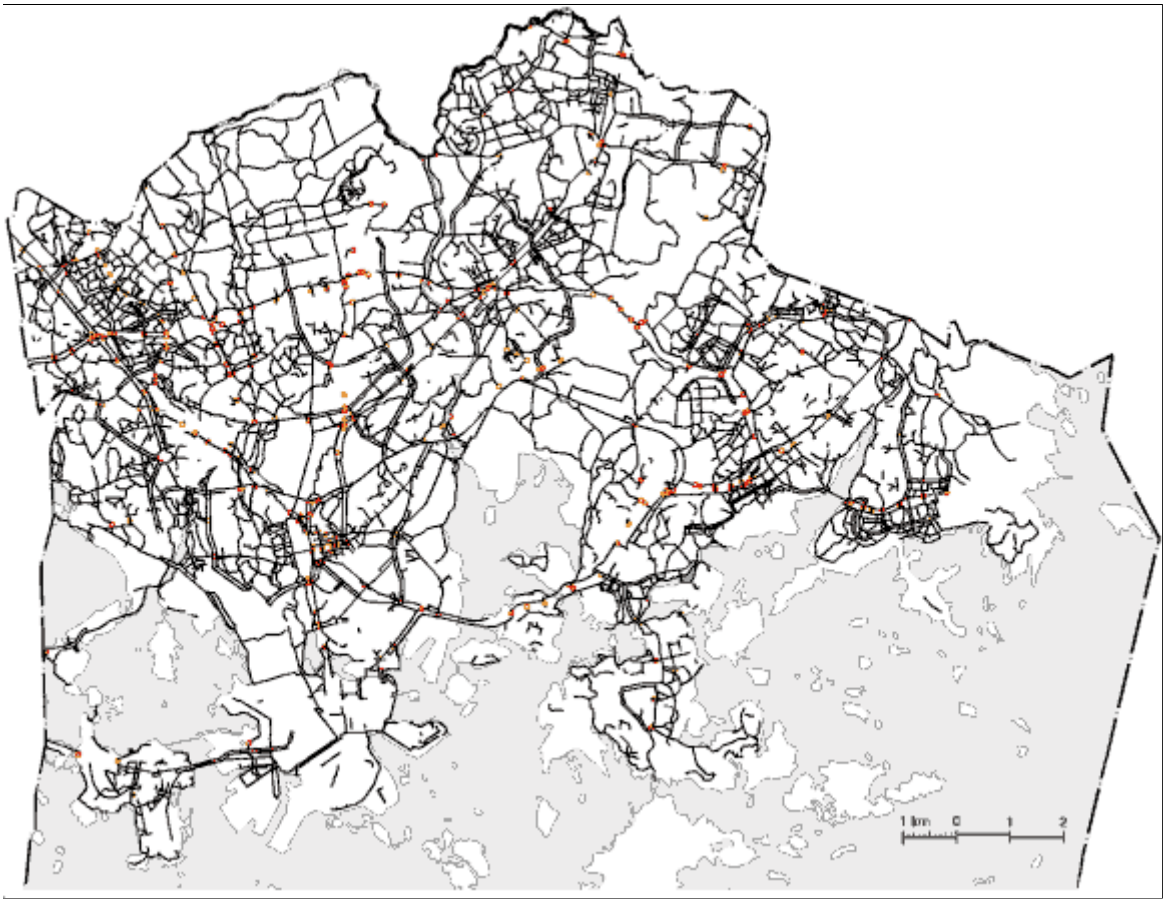


The present Finnish two-way cycle path network is based on the *SCAFT* Nordic traffic planning guide from the late 1960s /6/. This guide considered pedestrians and cyclists to be a homogenous group of vulnerable road users, to be separated from motor traffic. This was an appealing principle, but it led to car/bicycle-accidents at at-grade crossings and to bicycle/pedestrian conflicts on cycle paths connected to sidewalks.

In the City of Helsinki (500 000 inhabitants), we have built 800 kilometres of two-way cycle paths (Figure 5). More than half of these are the dangerous ones, located along the streets. It is hard to imagine that this system could be rebuilt. But in those countries and cities which are just beginning to build their cycling network, two-way cycle paths should be avoided in the urban street network.

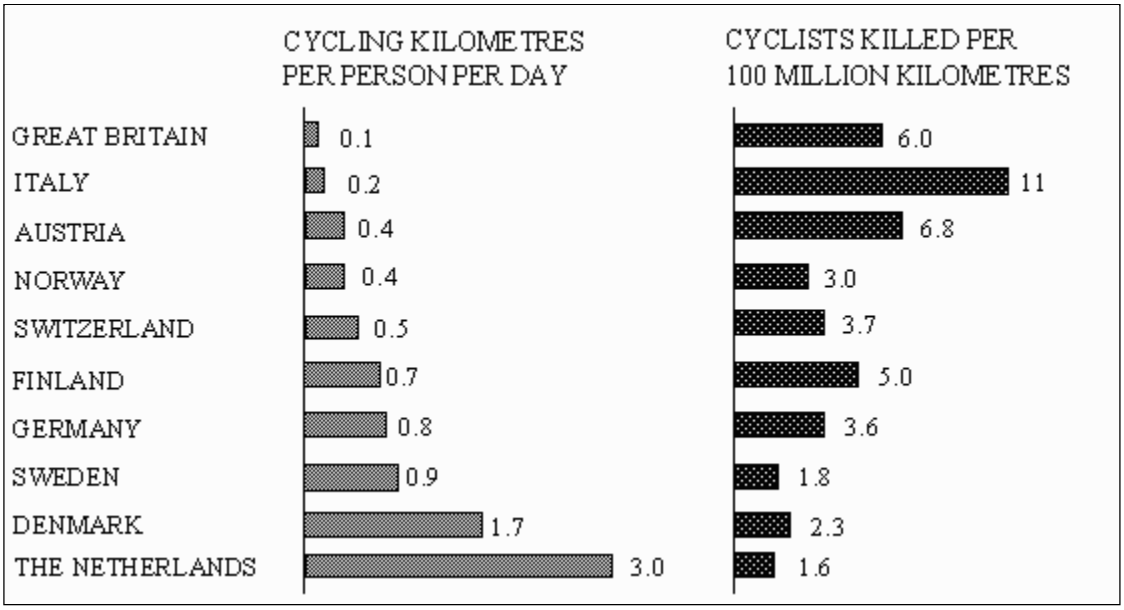
Figure 5: Cycle path network in the City of Helsinki.

Larger version of this image
(shows grade-separated intersections)



For an individual cyclist, cycling is usually safer the more cyclists there are around (Figure 6). Clearly, this effect does not result only from better traffic planning in advanced cycling countries. It appears that increased cycling improves the safety of individual cyclists as such, by reducing the share of dangerous surprises. Lars Ekman has shown this at Swedish crossings with no difference in their lay-out /7/.

Figure 6: Bicycle mileage per person and cyclist fatalities/100 million km in ten countries /1/.



It should be noted that also in Denmark and in the Netherlands, with many cyclists and with their one-way lanes and paths, cycling is still much more dangerous than car driving or public transport.

There is a good number of potential physical countermeasures to improve the safety of cycling. Yet, their expected effect on the totality is far from satisfactory /8/. More comprehensive solutions should be introduced. An effective area-wide speed management of motorised traffic could be one.

We want to increase cycling for environmental, economic and health reasons. But are these reasons strong enough to compensate the serious safety problems of cycling -- especially when cycling seems to compete mainly with the very safe public transport

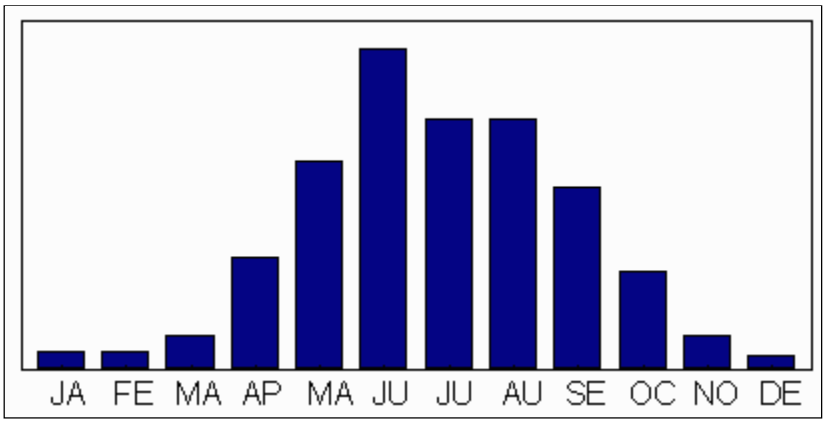
Cycling competes with public transport

Cycling competes rather more with public transport and walking than with the use of private motor vehicles. Most Europeans do not even have a chance to drive a car in their daily routines. In large cities with limited parking and street capacity, there is an additional problem. A car driver who chooses to ride a bicycle instead may only provide an opportunity for somebody else to utilize the car.

In Helsinki, cyclists were interviewed at the edge of the downtown area in summer 1998 /9/. 53 % Of these cyclists make the same trip by public transport during winter months; 18 % on foot and only 6 % by car.

Cycling is sensitive to weather conditions. In Helsinki, the cycling mileage during the wintertime is only 5 % of the summer peak (Figure 7). Elsewhere in Finland, this share is much higher because of less effective public transport and more bicycle-friendly weather. In Norway, the respective figure is 18 %, and in the Netherlands it is 40 % /10,11/.

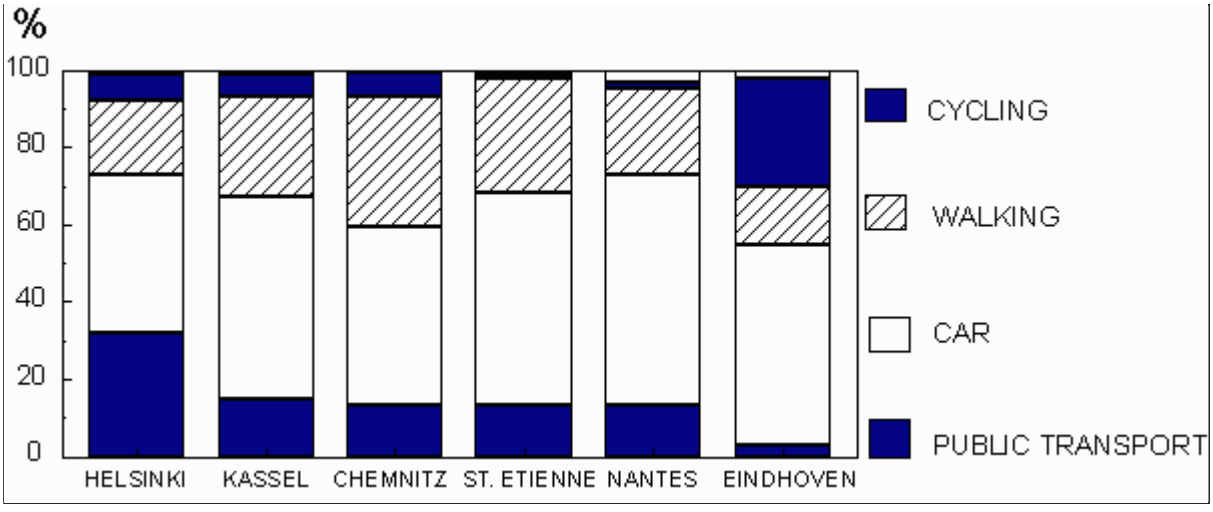
Figure 7: Monthly variation of cycling in Helsinki.



The seasonal variation of cycling decreases the cost-effectiveness of public transport. Jyväskylä is a Finnish inland city with 75 000 inhabitants. In Jyväskylä 41 % of those who use public transport on their work and school trips in winter ride a bicycle during the warm period of the year /12/.

The validity of comparisons between statistics for cities in different countries with different history, culture and infrastructure is questionable. However, figure 8 may give some hints about the problem in question.

Figure 8: Modal split in six European cities of comparable size /2,13/.



In Helsinki, 6% of all trips are made by bicycle and 32% by public transport. In the Dutch City of Eindhoven, the respective figures are 28% and 3%. Car trips are more frequent in Eindhoven than in Helsinki. Cycling does not pollute the air, but the total exhaust emission is not necessarily lower in Eindhoven than in Helsinki. The important question is: *does increased cycling weaken the level of public transport service?*

Although the seasonal variation in cycling is much weaker in Eindhoven than in Helsinki, it looks as if the public transport system of Eindhoven has serious problems with the variation in cycling.

Cycling is attractive and healthy for cyclists, but public transport is essential for many and perhaps the most manageable way towards sustainable traffic.

Increased cycling does not automatically mean decreased car traffic. Reduction of car traffic probably also requires restrictions in car use, especially in city centres. The Dutch city of Groeningen is a good example of such traffic policy /14/.

Cycling is not a harmless traffic mode for pedestrians.

At least in Helsinki and in Lund (Sweden), cycling leads to more police reports of pedestrian injury accidents per kilometre traveled than does private motor vehicle use /1/. To be sure, accidents caused by bicycles are usually less severe than those caused by cars. On the other hand, only a very small part of bicycle/pedestrian collisions is reported to the police.

Conflicts between cyclists and pedestrians result in part from poor planning. But also the attitudes of cyclists could be safer. One could claim that many cyclists feel themselves to be "saviours of the world". With their non-polluting, silent and relatively harmless vehicles, they may imagine that they have more rights than other road users.

Bicycle helmets

Perhaps the best argument for cycling is its influence on one’s health. But improvements to one’s health are attained only through regular exercise. A helmet is not a serious impediment for regular cyclists. An obligatory helmet may decrease the attraction of occasional cycling, but would this be a serious problem?

At this time, it would be foolish to suggest a mandatory helmet law in the Netherlands, given the low use rate there. But in Finland and in Sweden, where almost one third of cyclists do voluntarily wear a helmet, such a law might not be a bad idea. A helmet for all cyclists could prevent half of the fatalities /15/.

Conclusions

It is clear that we must radically improve the safety of cycling. But how can this be done?

So far, most of the important successful steps in traffic safety work have been based on restrictions of the freedom of car driving; speed limits on highways, traffic calming in cities, signalised crossings, severe penalties for drunken driving, automated speed limit enforcement and obligatory use of seat belts. These steps have now been widely accepted in spite of the initial doubts or resistance from powerful automobile clubs, motoring journalists etc. Traffic safety has been a more compelling goal than the freedom of car driving.

This is not the case when trying to improve the safety of cycling. We tend to forget that the freedom of use of any traffic mode is usually counter to traffic safety. At present, popular arguments for sustainable traffic and the freedom of cycling often seem to take precedence over questions about safety.

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References:

/1/ Pasanen E.: Safety problems of pedestrians and cyclists. An internal report of the WALCYNG-project. Helsinki 1997. [ibid.]

/2/ Kaartokallio M.: Liikkumistottumukset ja niiden muutokset pääkaupunkiseudulla (Travel behaviour and its changes in the Helsinki metropolitan area, English and Swedish summary). Pääkaupunkiseudun julkaisusarja C:1997:7. [ibid.]

/3/ Summala H., Pasanen E., Räsänen M. & Sievänen J.: Bicycle accidents and driver's visual search at left and right turns. Accident Analysis and Prevention, Vol 28/2 1996. [ibid.]

/4/ Räsänen M. & Summala H.: Attention and expectation problems in bicycle-car collisions: an in-depth study. Accident Analysis and Prevention

30:657-666. 1998.

/5/ Pasanen E. & Räsänen M.: Pyöräilyn riskit Helsingissä. (Cycling risks in the City of Helsinki, English summary). Helsingin kaupunkisuunnitteluviraston liikennesuunnitteluosaston selvityksiä L 1999:5 [ibid.]

/6/ SCAFT: Riktlinjer för stadsplanering med hänsyn till trafiksäkerhet. Statens planverk, Statens vägverk 1968.

/7/ Ekman L.: On the Treatment of Flow in Traffic Safety Analysis; a non-parametric approach applied on vulnerable road users. University of Lund, Lund Institute of Technology, Department of Traffic Planning and Engineering. Bulletin 136, Lund 1996.

/8/ Værø H.: Biltiltag gavner cyklist-sikkerheden (Car safety measures benefit cyclist safety). Conference Proceedings of Velo Borealis. International Bicycle Conference. Trondheim, Norway, 23-26 June 1998.

/9/ Voltti V.: Pyöräliikenteen kehittäminen Helsingin keskustassa (Developing Bicycle Traffic in Helsinki City Centre, English and Swedish summary). Suunnittelukolmio. 29.3.1999.

/10/ Elvik R.,Kolbenstvedt M. & Stangeby I.: Gå eller sykle? Fakta om omfang, sikkerhet og miljø. TØI-rapport 432/1999.

/11/ A personal notification from Mr. Willem Vermeulen, De Voetgangers Vereniging, Den Haag, the Netherlands. January 1999.

/12/ JYSELI: Jyväskylän sudun liikenne 2010; Jyväskylän seudun asukkaiden mielipiteet liikenteestä 1997.

/13/ http://www.arttic.com/projects/sesame [URL no longer active February, 2004]

/14/ Cunnarsson S.O.: Begränsning av biltrafik i stadskärnor; Exempel från europeiska städer. KFB-rapport 1994:19.

/15/ Olkkonen S.: Bicycle injuries; incidence, risk factors and consequences. Reports from Liikenneturva (The Finnish Central Organisation for Traffic Safety) 39/1993. [ibid.]

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