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Walking and cycling as transport

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In this report the possibilities for more people to walk or use a bicycle over short distances is discussed. Comparisons between North European countries show limitations. The bike is mostly used by people without a car, and as an alternative to walking or using public transport. A relatively high number of short trips by car in Norway can be explained by a low degree of urbanisation and by a special car-culture among young people.

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Sammendrag:
I denne rapporten drøftes mulighetene for å få flere til å gå eller sykle snarere enn å kjøre bil på korte avstander. Internasjonal sammenligning viser at sykkelen i liten grad er et alternativ til bilen. I Nederland, hvor man sykler mye, kommer dette i stedet for gange elle reiser med kollektive transportmidler. Mange korte turer med bil i Norge kan knyttes til lav urbaniseringsgrad og kulturelle faktorer.

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Preface

This working report on walking and cycling as transport and as possible alternatives to the automobile over short distances, has been written as part of a strategic research program on theoretical and methodological aspects of travel behaviour. Under this programme we aim to further the understanding of travel habits and changes in such behaviour.

The programme has four main objects:

1. Development of research methods related to the study of individual travel behaviour.
2. Changes in life style and its consequences for individual travel behaviour.
3. Barriers to mobility and its effect on the general welfare of the population.
4. Sustainable mobility - limitations and possibilities.

The strategic research program aims to support studies that are otherwise difficult to finance. This report is one such example. The data on travel patterns in various Northern European countries were gathered as part of the EU-project *WALCYNG*. Parts of the analysis were also conducted with support from EU.

Responsible for this report is sociologist Trygve Solheim. Sociologists Ingunn Stangeby and Randi Hjorthol have given valuable comments.

Oslo, September 1997
INSTITUTE OF TRANSPORT ECONMICS

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Contents

1. One hundred years of mobility 1
2. Previous research is lacking 4
3. The present state of individual mobility 5
4. Limits to walking and cycling 6
5. Car access gives car-use in Norway 8
6. The purpose of short trips 11
7. A preliminary conclusion 14
8. Differences between countries - a first comparison 15
9. Further comparison - short trips and license to drive 17
10. Who does the walking and cycling? 19
11. A final conclusion - mission impossible 21
References 24

1. One hundred years of mobility

Recent travel studies show that nearly one out of three car trips in Norway are 2 km or shorter. A fact like that should indicate a large potential for a shift from driving a car to walking or cycling. So far such a shift in travel behaviour has not come about. We do not really know why. Our knowledge concerning possible competition between cars and non-motorised modes of transport is surely lacking, as is our knowledge about the role of our feet and bicycles in everyday travel patterns. At the same time more walking and cycling as a replacement for car-use could mean a large reduction in local environmental problems.

It has been calculated by ethnologists that the average distance each of us travelled around the turn of this century was around 900 meters (Nordstrøm 1979, Solheim 1985), excluding walking inside or on own farmland. This is a distance that we can walk in 10 minutes. To day the average length of daily trips is around 38 kilometres (Vibe 1993a). This figure is for Norway, but approximately the same can be found for other European countries, North America, Australia, Japan etc. (Salomon et al 1993).

The increase in trips by car over the last 35 years in Norway is around 1000 per cent (Rideng 1997). Short trips by all other transport modes are constant in absolute numbers and decreasing as shares of a market. This transport revolution is not without problems (Shaeffer and Sclar 1975, Button 1993). Safety was first considered the main issue as more and more people were killed or injured in traffic accidents. Today the main issue is a strong concern with environmental problems; global heating, local pollution, noise, increasing use of non-renewable energy, destruction of landscape and built environment. Goals related to a sustainable development and means to reach these goals have been formulated and are still searched for (OECD 1995). The following general alternatives have been put forward:

- Reduce the total need for travelling, especially by private car.
- Improve technology especially on cars to reduce emissions, noise etc.
- Encourage people to shift from the use of cars to more environmentally friendly modes of transport; public transport and non-motorised modes like walking and cycling.

Our main issue in this report is to consider the potential for a shift from car-use to walking[1] or cycling especially for short trips. We do this first by studying short

[1] The trips on foot considered in this report is where the whole trip is on foot. Walking to the bus etc. is not included.

trips and how they are conducted by different groups of the population. This analysis is based on data from the Norwegian national travel survey from 1992, based on interviews on telephone with 6000 individuals aged 13 or more (Vibe 1993b). Our main task is to identify the role of different transport modes (walking, cycling, car-driving) for people who have access to a car compared to people who do not have such access. Our main purpose is to search for uses of one's feet or a bicycle when a car is available.

Our second data set is comprised of data from travel surveys in Norway, Sweden (Statistiska Centralbyrån 1995), The Netherlands (Centraal Bureau voor de Statstiek 1994) and Great Britain (The Department of Transport 1995). Through these data we will look for differences between countries concerning use of transport modes on short trips and consider possible causes for different behaviour in different countries. Our aim is mainly to identify the importance of man-made conditions for walking and cycling.

In the resent debate on transport policies two different propositions have been stated:

- That car-ownership induces car-use which might imply that the only way of reducing car-use is to make it more difficult to own a car. In this article we will present data that may show that having access to a car means using it even for very short trips, but maybe not under any circumstances.
- That alternatives to car-use exist over short distances, if conditions for such alternatives are good enough. In this article we will discuss this topic by comparing countries where amenities for cycling and walking are known to be very different.

Let us try to broaden the picture by introducing a small model to which we can discuss our findings as we move on. The model is only a way of systematising thoughts about how much, why and how we travel. In this article we focus on short trips and try to understand why many of us use a car even though the distance is short enough for non-motorised transport.

The explanatory variables can be as follows; access to different transport means (a car, a bicycle), external conditions (man-made or natural), special positive or negative measures in relation to transport means, especially restrictions to the use of a car, and cultural factors that promote or prevent use of specific means of transport. The factor "culture" points to the fact that many of our actions are formed by values, not only by actions being a means to an end. We use a car because it is important to us, we use a bicycle because it is good for something else etc.

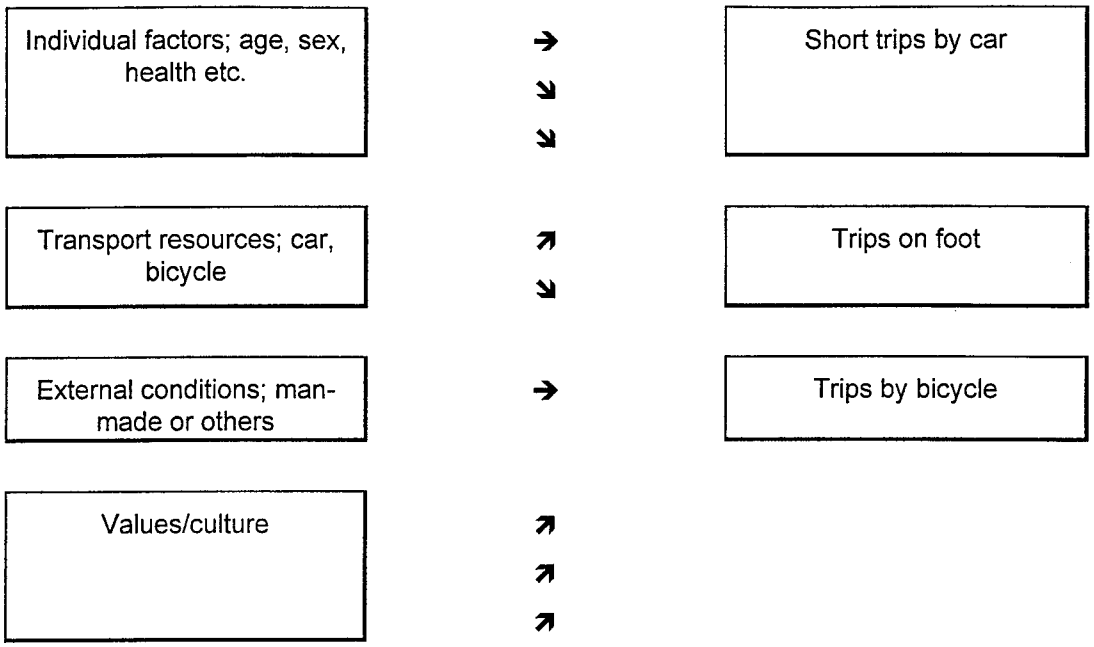

Figure 1: Factors that influence number of trips by different modes.

2. Previous research is lacking

In preparing for this study we have searched for pervious work on two different topics:

- *Studies on travel behaviour and in particular walking and cycling as alternative transport modes for car-driving on short trips.* Such studies seem to be almost non-existent. We find several studies on the possible competition between public transport and private automobiles (TRRL 1980), but non on the possible competition between non-motorised modes and private cars. There has been some research on cycling in Norway (Borger et al 1993), Denmark (Trafikministeriet 1993) and other countries (U.S. Department of Transport 1991), but few in-depth analyses of motorised versus non-motorised transport as possible alternatives. Previous studies have not taken into consideration on what kind of trips walking and cycling could be alternatives to the automobile. (Mitchell and Stokes 1982, Hillman and Whalley 1979, Pharoah and Apel 1995).
- *Studies on effects of new amenities for more walking and cycling.* Such studies are numerous on examples from Denmark, The Netherlands and Germany (Kolbenstvedt et al 1996, Transportrådet 1994). However, such studies mainly show examples of how to improve the physical conditions especially for cycling, and do little to show effects on cycling, walking and car-use. An example from London gives similar strategies for more walking (LPAC 1997).

Walking and cycling is very often seen as synonyms, as the same alternative to the present evil of motorised transport. This is probably not true. Walking is something inherent in the human condition. We all walk, some however more than others. Only 3 per cent of the population can not go out on foot (Mitchell and Stokes 1982).

A bicycle is a mode of transport of around the same age as the automobile. The bicycle is actually as much a result of the transport revolution as the bus or the car, pleasant cycling made possible by the invention of air-filled rubber tires. Walking will always be a more general alternative than cycling as the use of a bicycle will always be limited to a certain proportion of the population.

3. The present state of individual mobility

The data in this report are based on the same pattern of enquiry with a trip diary covering one day, Great Britain differs with both a diary for one day and for a whole week, and with questions related to characteristics of the person reporting. The definition of a trip as having a separate purpose, is also the same. What varies is sampling procedures, procedures for collecting the data (by personal interview, by phone or by mail) and formulation of questions[2].

Such differences may have an impact on the number of trips reported. The average lies around three trips per day. The variances we see between the countries can partly stem from real differences in the amount of mobility and are partly due to differences in methods.

Table 1: Number of trips per person per day. 5 European countries

Country	Year*	On foot	Bicycle	Car as driver	Car as passenger	Public transport	All trips
Norway	1991/92	0.66	0.20	1.70	0.39	0.26	3.25
Sweden	1994/95	0.48	0.37	1.25	0.50	0.33	2.93
Denmark[2]	1992	0.30	0.50	1.40	0.30	0.30	2.90
Great Britain	1992/94	0.84	0.05	1.07	0.63	0.25	2.88
The Netherlands	1994	0.67	1.01	1.28	0.51	0.19	3.74

[2] Trips longer than 300 m

The Netherlands have the highest number of trips, mainly due to its many trips by bicycle.

We also find a relatively high number of trips in Norway, mainly related to a high number of trips by car.

[2] In different Norwegian surveys we have found differences in number of trips per person per day when using different methods for getting people to remember the day of trip-registration.

4. Limits to walking and cycling

Of all trips in Norway 30 per cent are 1 km or shorter. The percentage is of course highest for trips on foot (68 per cent) and for bicycle (47 per cent). However, 16 per cent of all car trips fall within this category.

Table 2: Length of trips by different modes in Norway. Per cent

Length	On foot	Bicycle	Car as driver	Public transport	All trips
<= 1 km	68	47	16	3	30
1.1 - 2 km	15	19	12	6	13
2.1 - 3 km	10	14	11	11	10
3.1 - 5 km	5	11	15	17	13
> 5 km	2	9	46	63	34
Sum	100	100	100	100	100
Number of trips	3794	1144	9653	1303	15 894

Norwegian National Travel Survey 1992 (Vibe 1993)

If we include trips up and equal to 2 km, 28 per cent of all car trips are included. More than half of all car trips are 5 km or shorter. The potential for less car driving and more walking or cycling should therefore be considerable. Driving 2 km may take from 2 to 6 minutes depending on traffic conditions, but then we do not include time to walk to and start the car, and time for parking and walking to the place for our purpose.

Most trips on foot are 2 km or shorter (83 per cent) which may lead to the conclusion that 2 km seems like a reasonable upper limit for walking. The time needed for such a trip is around 20 minutes, assuming that 6 km/hour is the average speed for walking.

Eighty per cent of bicycle trips are 3 km or shorter (66 per cent being shorter or equal to 2 km). This should imply a possible upper limit for such trips of around this length. However, as 9 per cent of bicycle trips are actually longer than 5 km, 5 km may be just as well argued for as an upper limit for what we should expect people to be willing to do. Two km on a bike is a 10 minutes' trip, 5 km takes around half an hour, etc.

If all car trips 2 km or shorter were to be conducted on foot or by bicycle, the number of car trips would be reduced by almost 30 per cent, the expected growth over the next 20-30 years in most European countries, but mileage would drop by only 2 per cent. Only by reducing car trips up to 5 km would total mileage drop considerably, by 10 per cent if all such trips were included. This does not imply that local environment would not profit more from less driving over such short distances.

We know that energy use is higher when the engine is cold. We also know that the catalyst does not work when the engine is cold. A decrease in car-use on short trips would therefore reduce local noise and pollution to a higher degree than what would stem from a comparatively small reduction in average mileage.

5. Car access gives car-use in Norway

70 per cent of persons 18-74 years old have access to a car for personal use, on the day of registration (Vibe 1993a). An additional 10 per cent have a license and a car in the household, but did not have access to that car "yesterday"[3]. A most important question is whether car owners use their cars almost under any circumstances or whether favourable conditions may bring them to use other modes.

There is a most significant difference between those who do have a car and those who do not. Those without a car walk much more (trips per day) than those with a car. However, we also see significant differences within the first mentioned group, mostly between the young and the old. Those who walk most are the youngest, those under 18. The number of trips on foot on an average day decrease with increasing age. We also see that people without a car who live in the larger cities walk more than those who live in smaller cities or in the countryside. Among those who do not have car, men seem to walk a bit longer each day than women, even though the number of trips is the same. The differences between age groups are smaller when we consider distance. This may indicate that young people have many short trips while older people have fewer trips, but longer.

If we look at the average length of walking per day for the whole population we find that this lies right above 900 metes, exactly the same length historians have estimated for people living at the turn of this century. This is true for both people without or with a car. The purposes of these trips are however very different. For those without a car, walking is still a mean of transport.

Cycling is even more dominated by the young than walking. In general the use of a bicycle diminishes with growing age. We also see that men without a car bicycle much more than women, more than twice as much.

Persons with access to a car travel much more than people who do not have such access. Mainly these extra trips are by car, and they walk and cycle. What is of interest is that men to a greater extent than women skip walking and leave their bicycle behind.

Women with access to a car do still walk more than men. On the other hand men with a car use a bicycle some more than women do, even though it does not make up for the difference in walking. Men with a car also seem to drive a car more than women do, but if we only look at short car-trips (2 km or shorter) women have as many trips as men.

[3] Day for registering trips in the trip-diary.

Table 3: Number of trips and number of km on foot and bicycle per person per day, by sex age, car-ownership and region. Persons without access to a car. Norway 1992.

	Trips on foot	Km on foot per day	Trips by bicycle	Km by bicycle per day	Number of persons
Men	0,94	1,01	0,52	0,18	797
Women	0,92	0,93	0,21	0,42	1403
13 - 17	1,23	1,11	0,79	1,46	394
18 - 24	1,00	0,89	0,35	0,73	265
25 - 44	1,05	1,09	0,31	0,78	499
45 - 66	0,79	1,01	0,18	0,48	510
67 - 74	0,73	0,86	0,11	0,23	319
75 +	0,61	0,42	0,10	0,17	207
Oslo	1,05	0,98	0,29	0,75	505
> 100 000	1,00	0,91	0,25	0,55	365
36-100 000	0,88	0,93	0,40	1,00	243
Smaller towns	0,86	1,08	0,37	0,66	469
Rest of Norway	0,85	0,89	0,33	0,64	618
No car, no license	0,92	0,91	0,20	0,38	589
No car, license	1,37	1,23	0,37	1,04	195
Car, no license	0,93	0,91	0,42	0,79	881
Car, not yesterday	0,78	0,99	0,29	0,75	535
All persons	0,96	0,96	0,32	0,70	2200

Another significant difference is that those between 18 and 24 who do have a car, walk much less than the rest. There is also a clear tendency that the use of a car (in number of short trips) diminishes with age with an extreme high number for the youngest. Several explanations may exist behind these facts. One is socialisation to car-use in an age of increasing automobile dominance. This explanation points towards more and not less car-use in the future, and less walking and cycling. Another explanation may be that car-use in a way wears off with increasing age, that driving is most exiting when we are young.

It is hard to build optimism regarding any future increase in walking and cycling from these facts. Mostly, walking and cycling seem to be performed by those who do not have alternatives.

Table 4: Number of trips per person per day on foot, by bicycle and by car; all trips and trips 2 km and 5 km and shorter, by sex, age and type of region. Persons who had access to a car on the registered day. Norway 1992.

	On foot	Bicycle	By car	Car <= 2 km	Car <= 5 km	Number of persons
Men	0,46	0,14*	2,61	0,68	1,31*	2136
Women	0,56*	0,11	2,11	0,67	1,24	1651
18 - 24	0,34*	0,16	2,99	0,86	1,58	354
25 - 44	0,51	0,14	2,62	0,78	1,44	1738
45 - 66	0,51	0,10	2,16	0,52*	1,07*	1375
67 - 74	0,64*	0,07	1,58	0,58*	1,02*	228
75 +	0,55	0,09	1,22	0,46*	0,77*	90
Oslo	0,56	0,11	2,18	0,52*	1,00*	759
> 100 000	0,55	0,09*	2,46	0,61*	1,24	622
36-100 000	0,44	0,13	2,51	0,64	1,35	472
Smaller towns	0,51	0,12	2,54	0,79	1,47*	799
Rest of Norway	0,47	0,15	2,34	0,74	1,32	1135
All persons	0,50	0,12	2,39	0,68	1,28	3787

* Points to significant differences between categories

Among those who have access to a car we do not find a significantly higher number of non-motorised trips in the largest urban areas. Some more walking is made up for by less cycling. What we do find however is that they use a car less, in general, and especially for shorter trips. In days of increasing urbanisation and a possible move back to the inner city this may lead to some reduction in the use of cars, and especially for short trips, but no increase in the use of other modes.

6. The purpose of short trips

The next question is whether our feet or our bicycles function as means of transport, i.e. that these trips have a purpose apart from being just a trip.

Table 5: Trips by purpose and mode. Persons who did not have access to a car on day of trip-registration. Norway 1992.

	All trips	On foot	Bicycle
To work	14	9	15
To school	9	6	13
In work	2	0	1
Shopping	26	32	25
Caring	5	4	2
Leisure	21	25	21
Visits	17	17	18
Other	6	7	5
Sum	100	100	100
Number of trips	5987	2042	712

People who do not have access to a car for daily use have fewer trips in average per day (2.7 trips per day) than those who have a car available (3.4 trips per day) (table 6). The average for the whole population is 3,15 trips per day (see table 1).

People without a car have a lower proportion of trips to work (22 per cent versus 15) and a much higher proportion to school (9 per cent versus 1). Those without a car also have fewer trips related to caring for others than those with a car (5 per cent versus 10), but they have a higher proportion of trips related to leisure and social visits (37 per cent versus 31). All this stems from the fact that these two groups consist of people of different age and stage in life.

Table 6: Trips by purpose and mode. Persons who had access to a car on day of trip-registration. Per cent. Norway 1992.

Purpose	All trips	On foot	Bicycle	Car <= 2 km	Car <= 5 km
To work	22	12	28	15	18
To school	1	0	3	0	1
In work	4	1	0	3	4
Shopping	26	25	27	42	36
Caring	10	2	4	14	14
Leisure	17	38	23	8	9
Visits	14	12	8	12	13
Other	6	10	7	6	5
Sum	100	100	100	100	100
Number of trips	12 899	1907	464	2557	4841

For those who do not have a car we see clearly that a bicycle is a means of transport first of all to school, but also to work, and that walking as much as being a means for a purpose, mostly shopping, also is a means in itself, walking as leisure. Here we have some problems separating the data as leisure as purpose may mean both a leisure-activity and leisure as walking. Mostly we should say that those who do not have a car use their feet or a bicycle to meet the needs that a car does for those who have one, but they travel much less.

We have already seen that those who do have a car use their feet or a bicycle on a much lower proportion of their trips than those who do not have a car. What seems obvious is that walking, for people with a car, to a greater extent is a mean in itself or for other leisure purposes. 38 per cent of all trips on foot are for leisure-purposes and many where walking is the purpose of the trip. The bicycle, for car-owners, has a very different kind of usage. Twenty-eight per cent of all trips by a bike is for work. We can therefore conclude that for those with a car, the bicycle to some extent has a consciously chosen position, as a transport mode for certain people (men) on their trip to work (table 6).

The use of a car on short trips is also connected to a very specific purpose, namely shopping. Forty-two per cent of all trips 2 km or shorter are for shopping. Also driving to kindergarten etc. is a relatively frequent reason for driving a car over short distances, almost as high as driving to work (14 versus 15 per cent).

If we compare men and women, both with access to a car, we see some important differences that can bring us closer to an understanding of short trips, use of cars, and the purpose of such trips.

Among women a higher proportion of walking is for work (14 per cent against 11 per cent for men) as women more often work close to their homes. Women also have a higher proportion of walking to visit people or bring children to kindergarten. The proportion of men's walking that are for leisure purposes is much higher than among women. This may indicate that walking for women is more often a mode of transport than among men.

The bicycle is more often used for leisure among men while for women it is used for shopping and caring for others. The proportion cycling to work is the same for men and women.

We find great similarities when comparing the use of a car among men and women, as around 15 per cent of short trips is for work and 42 per cent is for shopping. However, there are also some striking differences between the two sexes. A higher proportion of men's short trips is in work (5 per cent against 1 for women) and for leisure purposes (10 per cent against 5 for women). Almost 20 per cent of the short trips conducted by women is related to caring for others (against 11 per cent among men). These figures clearly reflect the different roles that men and women perform, apart from shopping where the one seems to be as active as the other, though we do not know the content of their purchases.

Walking is mostly a purpose in itself for those who have access to a car. This reduces the potential for more walking as a mode of transport. The high share of work related bicycle-trips leads us to the opposite position as this shows bicycling as an alternative. The car is a carrier that makes it difficult to replace by other modes for shorter trips. However, the nearly half of short trips that do not involve transport of goods or other persons should be a possible target for change.

7. A preliminary conclusion

For people without a car walking and cycling seem to be a mode of transport. The only problem with this group is that it diminishes in size. People who have a car walk and cycle much less than those without, and especially walking seems to be very much a purpose in itself for this group.

The car is used a lot even on very short trips, but we see that it is being used for real purposes like shopping and transporting others. These two purposes amount to nearly 60 per cent of short car trips. Men also use a car for short trips with leisure purposes, while women do more transporting, the classical gender division of labour (Hjorthol 1996).

In general, men and women use a car on short trips to the same extent. The most appalling difference is between the very young and the older, with the group 18-24 as an extreme car-use group.

Mostly these data from Norway seem to support the first hypothesis that people who have access to a car, use it, also for very short trips. It also indicates that walking is more of a purpose in itself other than a transport mode. The cycle is more of a transport mode, and the small number of people, especially men, who cycle to work even though they do have a car, may indicate a small potential for more such trips.

8. Differences between countries - a first comparison

It seems to be some differences between the included countries as to how many trips being conducted on average each day, with The Netherlands on top, followed by Norway, and with the three remaining countries on the same, but a little lower level (table 1). We deal with this by using percentages and by assuming that, where the figures are low, short trips are not systematically excluded.

We can classify these countries according to what kind of transport mode that dominates in one country, compared to other countries. However, first of all we want to make the point that the countries can be divided into two groups, not looking at transport:

- Norway and Sweden are both sparsely populated with a cold climate, may be except for the southern parts of Sweden. Accept for some parts, both Sweden and Norway have a topography that is not in favour of cycling.
- Great Britain and The Netherlands (and of course Denmark[4]) are both densely populated and with a milder climate. Both countries are also comparatively flat.

We should relate Norwegian travel habits to the fact that Norway is a sparsely populated country with few if any large cities. This is changing and may lead to different types of travel behaviour in the future; fewer short trips by car, maybe more walking and cycling, and more use of public transport.

The percentage of all trips that are non-motorised seems to differ less when comparing all the countries (table 7), than if we look at cycling and walking as individual transport modes. The share for non-motorised transport for Norway is 27 per cent, Sweden 29, Great Britain 31 and The Netherlands 45 per cent. The most densely populated countries have the highest proportion of non-motorised transport. This supports the former conclusion that urban living supports walking and to a degree, cycling.

Sweden and The Netherlands have a relatively high proportion of cycling compared to, respectively, Norway and Great Britain. The Netherlands is of course at the very top in Northern Europe when it comes to using a bicycle, Great Britain at the very bottom, but the British walk.

[4] Denmark was originally included in this study, but as the Danish travel survey has a lower limit for trips to be included, 300 m, the data from Denmark are not easily compared with data from the other countries. In terms of behaviour Denmark falls somewhere between The Netherlands and Norway/Sweden.

We also see that Norway and Sweden have a higher proportion of people driving, compared to Great Britain and The Netherlands. However, here we also see important differences in that Norwegians drive more than people in Sweden. Both Great Britain and Sweden have a relatively high proportion of persons being car passengers. People in The Netherlands seem to use public transport less than people in the other countries (5 versus 8 to 11 per cent).

Norwegians seem to prefer driving a car to walking, cycling or being driven by someone else. Swedes do more often use a bike and are more often passengers with others driving. They also use public transport more often than Norwegians. Some of this may be due to effective policies against using a car for all purposes.

The very high proportion of people biking in The Netherlands seems to replace first of all walking, but also the use of public transport and travelling by car as passenger, all this if we compare The Netherlands with Great Britain. To a very small extent do people in The Netherlands seem to replace driving a car by going by bicycle.

Differences between Swedes and Norwegians may indicate some possibilities for imposing more environmentally friendly transport modes, but to some extent cycling replaces walking. Differences between The British and The Dutch show clearly that the use of a bike first of all replaces walking, being a car-passenger and using public transport.

Table 7: Transport modes for individual trips in some European countries. Per cent.

Country	On foot	Bicycle	Car as driver	Car as passenger	Public transport	Sum	Number of trips per person
Norway	21	6	53	12	8	100	3,25
Sweden	16	13	43	17	11	100	2,93
Denmark	11	17	50	11	11	100	2,90
Great Britain	29	2	37	22	9	100	2,88
The Netherlands	18	27	34	14	5	100	3,74

9. Further comparison - short trips and license to drive

It is always hard to compare data from different countries due to differences in categorisation etc. Looking at the length of trips by different modes we therefore limit ourselves to the two very different countries, Norway and The Netherlands (table 8 and 9). We find first of all that a much higher proportion of trips in Norway is short trips. Thirty per cent compared to 16 per cent in The Netherlands are 1 km or shorter. In The Netherlands a higher percentage (43) is 1.1 to 5 km (36 per cent in Norway), and also for trips longer than 5 km (41 per cent in The Netherlands versus 34 per cent in Norway).

This can not be explained by a higher number of registered trips in Norway (the opposite is the fact), but rather that Norwegians seem to have more short trips than the Dutch (and the others). What is really striking is the fact that 16 per cent of car trips in Norway are 1 km or shorter compared to 3 per cent in The Netherlands. In The Netherlands 61 per cent are longer than 5 km compared to 46 per cent for Norway.

Table 8: Length of trips by different modes in Norway and The Netherlands. Per cent

		Norway		
Length	On foot	Bicycle	Car as driver	All trips
<= 1 km	68	47	16	30
1.1 - 2 km	15	19	12	13
2.1 - 3 km	10	14	11	10
3.1 - 5 km	5	11	15	13
> 5 km	2	9	46	34
Sum	100	100	100	100
		The Netherlands		
<= 1 km	52	18	3	16
1.1 - 2.5 km	38	41	18	27
2.5 - 3.7 km	5	17	11	11
3.7 - 5 km	2	6	7	5
> 5 km	3	17	61	41
Sum	100	100	100	100

The Dutch seem also willing to use a bike on longer distances. In Norway 47 per cent of bicycle trips are 1 km or shorter. In The Netherlands this figure is 18 per cent.

These facts can lead to several conclusions, but most of all to the fact that it really seems to be a culture in Norway for using cars over very short distances and a resistance towards using a bike over longer distances, partly of course due to

heavy winters and steep hills. However, even if we compare Norwegians to Swedes we find that Swedes do not use a car to such an extent on short distances and seem to be willing to bicycle over longer distances.

The figures for number of trips by car as driver among people with access to car seem to be very similar in the different countries. Comparing Great Britain and Norway we find 1,28 trips per day in Norway and 1,20 in Great Britain.

Comparing Norway and Sweden, even though categories for car-ownership differ slightly (in table 9 "car and license" is divided into two subgroups) the number of car trips shorter than 5 km is 1.19 in Norway compared to 0.85 in Sweden. This surely gives an indication that Norwegians really drive a car more often than people in other countries.

We also find that Swedes with license and a car in the household use a bike more than Norwegians, 0.28 trips per day versus 0.13 in Norway. On the other hand, Norwegians with a car have twice as many trips on foot per day compared to Swedes, a fact that may be due to differences in registration or due to the fact that Norwegians seem to place great value on walking.

Table 9: Number of trips per person per day by mode and car ownership in Norway, Sweden and Great Britain. Trips shorter than 5 km

Norway			
Car ownership	On foot	Bicycle	Car as driver
No car, no license	0.85	0.17	0.00
License, no car	1.29	0.34	0.16
Car, no license	0.85	0.37	0.02
Car, not yesterday	0.75	0.26	0.66
Car yesterday	0.78	0.11	1.28
Sweden			
Car ownership	On foot	Bicycle	Car as driver
No car, no license	0.65	0.31	0.00
License, no car	0.85	0.61	0.14
Car, no license	0.59	0.56	0.00
Car and license	0.37	0.28	0.85
Great Britain			
Car ownership	On foot*	Bicycle	Car as driver
No car	0.22	0.04	0.02
Car, non-driver	0.16	0.04	0.01
Car, other driver	0.15	0.06	0.52
Car, main driver	0.09	0.02	1.20

* These figures do probably not include trips on foot shorter than 1 mile

These facts most of all shows that using a car on short distances to some degree can be prohibited, by making it easier to cycle, by the proportion living in cities, by changing people's values. The Dutch experience points clearly towards that fact even though they also drive a car if they have one available.

10. Who does the walking and cycling?

The number of trips by bike decreases with increasing age in all countries, but most notably in Norway. The differences are also large in The Netherlands, but the level is much higher. Even among the old the number of trips by bike among the Dutch are higher than the number of short trips by car.

Norwegians below 18 years have an extremely high number of trips on foot and slightly more trips by bike than similar age-groups in Sweden, though these figures lie far below the numbers for cycling in The Netherlands. Apart from the very high number of trips on foot among the young in Norway, the differences between age-groups as to walking are small in all countries.

Table 10: Number of trips per person per day by mode and age in Norway, Sweden and The Netherlands. Trips shorter than 5 km

Norway			
Age	On foot	Bicycle	Car as driver
-17	1.20	0.71	0.02
18-24	0.59	0.22	1.02
25-44	0.60	0.16	1.23
45-64	0.53	0.11	0.84
65+	0.61	0.08	0.39
Sweden			
Age	On foot	Bicycle	Car as driver
-17	0.62	0.66	0.00
18-24	0.54	0.50	0.44
25-44	0.48	0.34	0.82
45-64	0.40	0.30	0.67
65+	0.47	0.18	0.31
The Netherlands			
Age	On foot	Bicycle	Car as driver
12-17	0.56	1.58	0.00
18-24	0.50	0.96	0.24
25-49	0.64	0.83	0.66
50-64	0.55	0.64	0.47
65+	0.56	0.45	0.23

What is really striking is the extremely high number of short trips by car among young people in Norway. Among those 18-24 years old the number of car trips 5 km or shorter in Norway is almost 2.5 times higher than in Sweden and 4 times higher than in The Netherlands, and not much lower than the similar number for those 25-44 years old. This may result from many factors that we may not be able to identify, but socialisation for driving in Norway seems much stronger than in the two other countries. Especially looking at smaller towns in Norway, and

Norway is less urbanised than the other countries we compare with, we find a very strong "car culture" among young people (Jørgensen 1994).

The figures for cycling in the three urban regions of Stockholm, Göteborg and Sweden show a significant difference confirming a former statement we made that cycling in Sweden is very much a phenomenon restricted to the southern parts of the country (table 11). If we compare the other two cities to Oslo we see only a small difference in the number of trips by bicycle.

Walking is a more used transport mode the larger the city. Both for Norway, Great Britain and The Netherlands we see how the number of trips is reduced as we go from the largest cities to small towns and rural areas. This tendency is the strongest in Great Britain and The Netherlands. The use of a bike is most normal in medium sized cities.

A car is used less in the largest cities. However, the level in Oslo is still much higher than in Stockholm or Göteborg, where people probably find alternatives, using a bike, going by public transport or driving as passengers for such small distances. Oslo has 50-100 per cent more short trips by car per person than in cities of the same size in other countries. However, Oslo does not have more trips on foot or by bicycle. The difference lies probably more in the use of public transport, on being passengers or by having more short trips in general, for what reasons we do not know.

Table 11: Number of trips per person per day by mode and region in Norway. Trips shorter than 5 km

Norway			
Urban region	On foot	Bicycle	Car as driver
Oslo (>500,000)	0.70	0.15	0.67
Over 100,000	0.67	0.13	0.86
36-100,000	0.55	0.20	0.95
Smaller cities	0.60	0.19	0.99
Rest of country	0.58	0.19	0.91
Sweden			
Stockholm	0.76	0.18	0.27
Göteborg (-500t)	0.58	0.23	0.31
Malmö (-250t)	0.65	0.51	0.41
Great Britain			
London	0.69	0.03	0.44
Other 250,000+	0.60	0.04	0.47
100,000-250,000	0.58	0.05	0.58
Less than 100,000	0.55	0.05	0.57
Rural	0.46	0.04	0.47
The Netherlands			
Degree of urbanisation			
Very strong	0.82	0.70	0.35
Strong	0.62	0.83	0.48
Medium	0.56	0.85	0.55
Little	0.50	0.92	0.52
Not urban	0.45	0.74	0.44

11. A final conclusion - mission impossible

The average number of trips a person conducts each day is around three, with the car as transport mode for around half of their trips, on foot 20 per cent and cycling 10 per cent. If we consider trips 2 km or shorter the car still transports us on 1/3 of these trips, on foot is 51 per cent and cycling 15 per cent (Norwegian figures).

Two km seems to be an upper limit to how long people are willing to walk, as 86 per cent (in Norway) of trips on foot are of this length or shorter. Sixty-six per cent of the bicycle trips are 2 km or shorter, but as 9 per cent are longer than 5 km, and an even higher amount if we consider The Netherlands, bicycle trips may have a higher upper limit. Replacing short trips by car does not decrease mileage to the same extent, but local environmental problems may be diminished.

The growing share of people who possesses a car means less walking and less cycling, especially among young people. It seems to be a drastic shift from non-motorised transport to car when they pass 18 years of age. This is especially the case for Norway where the number of short trips by car in general is high and especially among the young. Men and women seem to use a car as often for short trips when one is available. However, as alternatives, men use a bicycle while women walk.

Walking is first of all a mode of transport for those who do not have access to a car, but for these and for those who have a car, walking is often a goal in itself. A bicycle is more of a transport mode for all, for shopping, for work, even for some who has a car.

Short car trips are most of all trips for shopping or driving connected to transporting others (children or elderly people). This gives a relatively rational basis for using a car. Men and women have the same number of trips for shopping, but women do a lot more of transporting. Men drive short car trips in relation to leisure activities. Both men and women to a large extent drive a car to work, even for short distances as 2 km or less. Three times as many work trips ≤2 km are by car than by bicycle.

Differences between Norway and other countries may to some extent be explained by the fact that Norway is sparsely populated and less urbanised than most other European countries. Living in cities gives less car driving and more walking. Cycling is most widespread in the smaller cities. In countries with most cycling we find less walking and use of public transport, but not so much a lower level of car use.

Norway seems to have many more short trips by car than in other countries. The explanation to this lies probably in a combination of urbanisation, cultural values in general and youth culture in particular.

We started this article by asking questions related to the inevitable use of cars when one is available and to the possible use of a bicycle or walking when conditions are in favour of such use. We seem to be stuck with these questions, the answers to both are: yes we drive a car when one is available and yes in places where conditions are in favour of cycling, people walk or use a bike.

Walking

We all walk, as a means of transport to get to an activity, or as a purpose in itself. Some walk more than others, but the differences, between groups within a country and between countries, are relatively small, and mostly due to physical qualities related mainly to age. We all have feet, but some have stronger legs than others.

Walking should not mainly be considered as a distinctive transport mode, but as an inherent part of human beings. Whether walking can mean a replacement for car use is probably strongly related to values, possibly values related to negative consequences from driving cars. From the comparison of Norway vs. other countries it is also a question of where we live, in large cities or small towns.

Many seem to be unable to leave their car behind when the target for a trip is a few hundred meters down the road. On some of these trips it might even be faster to walk. In such situations we easily end up talking about morals, or lack of morals. Such questions may lie outside the realm of transport policies. However, the main conclusion is that the potential for a shift from car-driving to walking is relatively small.

Cycling

As opposed to walking, cycling is also a transport mode. We need a bike to cycle and we need special physical support, special amenities, to be able to use it safely and with comfort. Our analysis shows that cycling is strongly related to age and to physical conditions over some of which we have no control. Data from Norway and Sweden show that cycling is mostly used in southern parts of Sweden where the climate is in favour of such use and where the landscape is flat. What we also know is that this is where the man-made conditions are the best. The high share of bicycle trips related to work, in Norway and Sweden, leads us to the opposite position as this shows bicycling as a real alternative to the car, but only for a small part of the population.

Comparing Great Britain and The Netherlands we see that good amenities give more cycling, for young people as well as for grown-ups. The question is, however, in replacement for what. What we can conclude is that cycling in The Netherlands mainly is instead of walking, as in Great Britain, or using public transport, as in Great Britain and Sweden. To some extent, however, as shown by

the higher numbers for car driving over short distances in all countries compared to The Netherlands, cycling can be a replacement for car use.

Walking, cycling and car-driving answers to very different needs

We end by stating again, that walking, cycling and driving a car to a very small degree can be seen as real alternatives for specific needs. Mostly they fulfil very different purposes for very different groups in the population. The potential to get people to shift from one to the other is probably small and mostly as bicycle may replace cars. We may however get people to drive less, with planning, prices and other policies, and we can make it more pleasant to walk or cycle even though such modes do not replace the car.

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