

## **Walking and the Relationship to Public Transport**

**Carmen Hass-Klau**

### ***Abstract***

This paper is discussing the relationship between public transport and walking. One of the issues, which will be discussed, is whether walking is an alternative to public transport or complements the use of public transport and whether this is different between cities which are dominated by light rail in contrast to buses.

According to the research carried out by ETP and the University of Wuppertal there appears to be a tendency that European cities which operate significant light rail systems have gained more public transport passengers over the 10 year period of 1986-1996 than cities which relied only on buses. The reasons are not clear. It may well be that those cities which operate light rail have a tendency to implement more effective car restraining measures, partly because light rail can help to develop the political consensus supporting the adoption of a more radical approach to car restraint than bus based systems have allowed.

Our research also showed that light rail cities are richer than bus only cities. This would imply that there are more high quality shops and the variation of shops is higher. We know from our surveys of nearly 8000 pedestrians in 20 European cities that people like to walk in and to particular streets and places because of the quality of the shops.

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### ***Contact Author***

Carmen Hass-Klau  
University of Wuppertal  
Fachbereich 11- Bauingenieurwesen  
Pauluskirchstr.7  
D-42285 Wuppertal  
Germany

Tel: (49) 202 439 3093

Fax: (49) 439 3092

E-mail: [hassklau@uni-wuppertal.de](mailto:hassklau@uni-wuppertal.de)

***Carmen Hass-Klau, Dipl Ing, MSc, PhD, FCIT***

Professor in Civil Engineering: Transport and Public Transport Systems in Europe at the University of Wuppertal, Germany and Proprietor of Environmental and Transport Planning a research organisation based in Brighton specialising in the field of public transport, pedestrianisation, the environment, cycling and traffic calming.

Professor Hass-Klau was born in 1947. She completed an Engineering Degree in Urban and Regional Planning at the University of Berlin and an MSc in Urban and Regional Planning Studies and a PhD in Geography from the University of Reading. Professor Hass-Klau has completed studies for many organisations including the Department of the Environment, Transport and Regions, the Anglo-German Foundation for the Study of Industrial Society, the Countryside Commission, and many local authorities.

She has been an adviser to the British and German government and is still on the Swedish Transport Research Board.

## **Walking and the Relationship to Public Transport**

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### ***Introduction***

Walking has always been a fringe subject in transport planning and transport engineering. This is surprising because more people walk than use any other form of transport. It has hardly ever been a decisive part of land use planning either, which again is odd because when designing residential and shopping areas, walking between and within them is a crucial part of everyday life.

In the city engineering departments of many European countries, and in the practice of many transport surveys, 'walking-and-cycling' is treated as a single mode (called 'slow'), which leads to an impoverished understanding of both, because it conceals their unique and quite different characteristics. Imagine what practical policies could develop if we defined a single mode called 'high speed trains and shipping': nobody in their right mind would treat them as if they had the same characteristics.

Yet this is exactly what some traffic engineers are doing when aggregating walking and cycling. It leads to bad statistics and evidence, and superficial thinking, such as the illusion that a few improvements for pedestrians, for instance wider pavements, will increase the willingness to walk and may even increase the modal split in walking. This is not the case.

Walking and pedestrian behaviour are complex issues; we are a long way away from fully understanding them, and we will never do so until they are accorded the same professional respect as is paid to motoring or public transport use. And even here, we will never really understand these other modes properly unless we include an understanding of the contribution of walking as a stage, short or long, in virtually all other journeys.

Let us first start to discuss what has happened to walking as a mode in its own right during the last decades.

### ***Decline in Walking***

There is no doubt that overall walking has declined not only in the United States, Canada or Australia but also in Europe. In Britain there has been a 5% decline in the total number of journeys on foot over a 20-year period (1975/76 to 1993/95). The decline in walking distance is even sharper and has been reduced from an average of 249 miles per person in 1975/6 to 200 miles in 1993/95 (Department of Transport 1977 and Department of Transport 1996).

A similar development can be seen in Germany where 36% of all trips were carried out on foot in 1976. Twelve years later (1989) this had declined to 26% (Monheim 1995). The last German figure is 11 years old and it is usually assumed that walking has

declined even further since then. Interestingly enough the average walking distance per journey has stayed the same and is very similar in the different countries.

Walking as a main mode has even declined, for the city as a whole, in those cities which have introduced large pedestrian and traffic calmed areas such as Freiburg, Nuremberg or Munich. This is because the transport policy in the rest of these cities - constituting the majority of the area and of the travel - has remained primarily car-orientated. It seems that this has outweighed the traffic restraint in the centre, and the major impact in the centre is diluted when we look at the overall modal split for the city as a whole.

However these overall statistics on walking do not provide the whole picture, and may not even be correct. We know that in travel surveys walking is always underestimated and the counting techniques are not very accurate, nor are we certain that the degree of underestimation has remained stable over time. Furthermore linked trips are hardly ever properly identified in statistics. It is also impossible (or very difficult) to measure those walking trips which have not been made because of fear of accidents and assaults.

### ***What do we know about walking?***

Although walking data is always weaker than vehicle data, when it exists it always gives a rich picture of high variation as between areas. The Birmingham Travel Survey of 1994 showed that the modal share of walking varied according to whether they were inner or outer wards. Amsterdam data highlight the variation in walking to shops within a city. For instance, 43% of residents living in the historic part of Amsterdam walked (39% used the bicycle) when carrying out shopping. In the inner city areas, this increased slightly to 45% (29% cycled). But in the housing quarters built between 1900-1940, the walking figure for shopping dropped to 21% and in the modern housing estates to 11% (Amsterdam Jaarboek 1994).

We are also certain that there is a relationship between population density and walking. People living in densely populated areas were much more reliant on walking than households residing in the suburban or rural regions. Daor and Goodwin (1976) found that substantially more walking was carried out in the densest areas, and this seemed to apply both to the number of walking trips, and also to walking access for public transport journeys (which themselves were higher in the denser areas because the public transport services were better and the car ownership was lower). Hillman and Whalley (1979) found that up to two thirds of all shopping and educational trips in the mostly densely populated areas took place on foot.

In 1998 we carried out a statistical analysis which revealed that the high levels of walking in London Boroughs could be explained by high population density and low car ownership levels. But because of the close connection of density and car ownership, it was not possible to distinguish the relative importance of these two factors: we know they are important in combination, but we do not know their impact separately, from such cross-section surveys (Hass-Klau et al 1998).

However, over time car ownership tends to change more swiftly than population density, so it may be that slow changes in density cause (with other factors) faster changes in car ownership, and this will then have the most immediate effect on walking. In the longer run, car ownership then becomes one of the mechanisms by which density

changes affect walking. If this hypothesis is true, then developments such as increased central and inner area housing densities may bring about both lower car ownership and more walking, by both direct and indirect processes.

We also know that the location of a shop in either a town or neighbourhood centre does tend to affect the level of walking. In Britain, 95% of all shopping trips to neighbourhood centres are made on foot, compared to 20% to town centres.

The ETP study of 20 cities (Hass-Klau et al 1999) showed a high level of walking to the town centre, especially in small cities, by residents. The population size of the sample cities varied between 22,000 to 1,300,000. Ten cities had under or around 100,000 inhabitants. In 6 out of these smaller 10 cities more than 50% of the residents walked to the city centres. In addition in 2 cities the proportion of cycling was relatively high and the walking-cycling total came to over 50%. An exception in town size was Brighton (155,000 inhabitants) where more than 50% of the users of the city centre still walked there. Brighton has one of the highest population densities and by European standards one of the lowest car ownership levels (341 compared, for example, to 652 cars per 1000 population in the Italian city Como).

However we also found that the highest car ownership levels were not always related to a lower modal split in walking. In fact, many cities with very high car ownership also had a very high modal split in walking to the town centres. This may have an important bearing on the discussion about density, since it is another example where it is not true to say that there is an inevitable and simple rule that high incomes lead to higher car ownership and hence to less walking.

This implies that, depending on the urban context, a number of quite different results may follow from increasing income: the classic one of low density, high car ownership, little walking is well established, but there may also be models of high density, high car ownership and high walking, or even high density, lower car ownership, high walking.

Let us return to the main topic of this paper: the relationship between walking and public transport.

### ***What is the relationship between walking and public transport?***

This is not a single relationship. One important distinction is between walking as a mode of transport in its own right, and walking as a stage in a journey of which a part - probably the longest part by distance, but not necessarily by time - is by bus or train. Both may be affected by public transport provision, in simple and complex ways. For example:

a) If the public transport network has a high density and good penetration into residential areas (and is also cheap), this could mean that walking as a separate mode is low. We have some empirical evidence (though not based on very many examples), which suggests that when the modal split of public transport increased, walking declined.

In these cases a simple explanation could be that public transport is actually competing with walking. But this cannot be the whole story as there is little evidence that it is the

same trips which are being diverted from walk to public transport: this is shown by the fact that trip length increased. Overall, it is more likely that the two trends do not represent a modal shift of the same trips, but rather a changing pattern of trips. It still does not say anything about linked trips.

A public transport network with the same characteristics as the above (high density and good penetration) will generate for each public transport trip at least two walking trips. They will be shorter if the public transport network is dense but the amount of walking will be higher if public transport is used frequently.

So you can see that in this example there is a three-way relationship between public transport and walking:

- (i) a reduction in walking as a mode on its own
- (ii) a reduction in walk length because of high public transport density
- (iii) and more walking trips because of high public transport use.

b) A reduction in level of service by public transport may in the short term, force more and longer journeys on foot, by non-car owners, but in the longer term then increase the number of people who are encouraged to buy cars. This would then first increase, then reduce, the modal split of walking (although there is still walking from the car to the house or shop etc - probably the least well-recorded statistics).

c) Replacing a bus service by a light rail service which has a less dense route structure but has often a faster service, and fewer stops, may have the effect that the number of walking trips to the light rail stops is reduced but the walking distances will increase. It is known that the radius for light rail stops attracting walking passengers is larger than the corresponding radius for bus stops.

All these speculations are hypotheses, which are entirely suitable for testing - but to do so requires more - and better quality - data. So we will not be able to prove or disprove all these relationships. But we will do what we can.

The official statistics on walking do not provide a coherent picture in relationship to public transport. Most smaller European cities, of about up to 200,000 inhabitants, show a higher percentage in walking and a low percentage in public transport than for the large cities. The interpretation could be that those people who do not drive or do not have accessibility to a car are more likely to walk than use public transport. This arises from two quite different reasons - distances to overcome in small cities are normally shorter, and public transport is often less subsidised, worse, and more expensive. Both make walking seem to be a better option than public transport.

From the available statistics it appears that the modal split between walking and public transport is at about the same level in the large European cities (400,000 - 1,000,000). We have not detailed enough statistics to know the relationship between walking and public transport which applies when the public transport is excellent.

There are signs that - at least in some circumstances - transport policy can affect the combined level of all environmentally friendly modes used to the town centres. An example of this is travel to the city centre of Groningen. A restrictive transport policy has increased the modal share of walking, cycling and public transport. This is also true

for trips within the cities of Munich, Münster and Lüneburg, and there is indicative evidence that it may be true for many more European towns where we do not yet have detailed data (Hass-Klau et al 1998).

The next question is - what about the difference in the level of walking in city centres between cities which are largely dominated by light rail and cities which are only running buses?

### *Light rail and its achievement in creating pedestrian-friendly areas*

In our study of light rail, buses and advanced bus systems, we came to the tentative conclusion that light rail cities are politically able to implement more rigorous traffic restraint measures than bus-only cities. That is not at all to say that bus-only cities are ruled out from having large-scale pedestrianisation and successfully implementing other traffic restraining measures. However it seems that the political forces encouraged by major light rail schemes (or indeed underground schemes) create more favourable public opinion and the political confidence to make the areas of traffic restraint larger and the parking policies more vigorous. This implies that the known direct impact of pedestrianisation on walking is itself closely related to the indirect impact of public transport on walking.

Here, we are on stronger ground concerning evidence and experience. Undoubtedly, in cities of a population size of 400,000 upwards, the economic and 'social' success of large-scale pedestrianisation seems to depend on a very effective public transport system. Both light rail and underground railways are ideal modes for the city centre as they are nearly pollution free, have a low noise level and a fixed right-of-way. In many German cases, the reason for building the light rail lines underground in the first place was to allow large-scale pedestrianisation at street level.

If it is true that light rail cities can politically push through more restraint measures, this would imply that the pedestrianisation areas can be larger and the traffic calmed streets longer. So pedestrians may then walk longer distances, more frequently and with more pleasure out of doing so than in cities which rely only on buses. So far research on this issue is fragmented and it is hoped that further research may shed some more light on this issue: it is important because of course many cities *will* continue to rely on buses, and it is necessary that methods of implementing large scale pedestrianisation are developed which are suitable and popular for these circumstances.

It is well established that people walk long distances in pedestrian-friendly town centres. Monheim, for example, quotes for Nuremberg, a city that has both an underground system and light rail, that 44% of pedestrians walked more than 2 km during weekdays which increased to 52% on a Saturday.

He also revealed that people who travelled by car walked comparable distances, on an average visit, to people coming by public transport (Monheim 1995). However, if it is correct that public transport passengers visit city centres more often than car users (Bobinger 1992), then public transport users will walk more frequently and, if the town centre is pedestrianised, further than car users.

Furthermore, a light rail city of say 400,000 - 600,000 population will have a more

pleasant large scale pedestrianisation scheme than the same city which is running buses through its 'pedestrianised' streets which may even have the same length. My suggestion is that because the light rail public transport mode is more pleasant, walking is more pleasant and therefore not only more people walk (subject, of course, to the underlying attractiveness of the type and quality of shops and other city activities) but they also walk longer distances.

Now interestingly enough in our latest study on light rail versus bus we found that light rail cities tend to be richer. Out of a sample of 46 European cities (24 were mostly light rail and 22 bus-only cities) 21 out of 24 light rail cities had a GDP per capita index of more than 110 (100 was the EU average) whereas out of the 22 bus-only cities we found only 8 which had this high level of income (Table 1).

A high level of income implies better quality shops and in many cases a more attractive variation of shops. We know from our surveys of nearly 8000 pedestrians in 20 European cities that people like particular streets and places simply because of the quality of the shops (Hass-Klau et al 1999).

Hence the relationship between public transport mode, the level and amount of walking and the types of shops is a very interesting one, because again it shows that the effect of income is much more complex than the traditional transport planners' assumptions imply.

**Table 1: Cross-tabulation of relative GDP/capita against light rail or bus-only**

	Light Rail	Bus-only
Richer (GDP/cap $\geq$ 110)	21	8
Poorer (GDP/cap $<$ 110)	3	14

Source: Hass-Klau et al 2000

From our recent study we also know that European-wide light rail cities have done better than bus-only cities in increasing the number of public transport passengers over a 10 year period (ibid).

Hence if light rail creates more passengers, then the percentage of walking may be higher in the city centres or neighbourhood centres than in bus cities because:

- a) light rail cities have more interesting shops because they are richer;
- b) walking is more pleasant in traffic restraint areas with light rail than in similar areas with buses.

### **Conclusion**

The argument in this paper has bad news and good news. The bad news is that the world is a lot more complex than we would like, and we will need much more data, more research projects, and changes in our professional priorities before we really advance our understanding. The good news - in my opinion - is that some of those complexities are *helping* the success of environmentally sustainable transport policies: 'complex' in this case is not a code word for 'impossible'.

In particular, the evidence suggests that with certain combinations of circumstances, it is possible to achieve high income and economic growth - which everybody wants -

with a pleasant environment in which walking becomes a favoured, high-status mode, not a last resort for the poor. This is not to say, alas, that such a desirable outcome is certain: only that it is possible, provided that the complementary conditions are put in place by vigorous and ambitious policy makers.

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