

SUSTAINABLE TRANSPORT POLICY IN EUROPE: THE ROLE OF LIGHT RAIL AND ITS RIVALS

Paper prepared for 40ERSA Conference, Barcelona, 30th August – 2nd September, 2000.

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June 2000.

Abstract

The paper reports on a British research project focusing on the role of modern light rail in urban development, and its relative advantages and disadvantages compared to rival forms of modern public transport investment. Most European Member States and the Commission itself has stressed the need for further progress in developing sustainable transport policies especially for major urban areas. However, financial constraints in most countries have led to the full metro railway form of mass transit being rejected as too expensive a form of infrastructure. Cheaper alternatives normally involve a choice between modern tram (light rail) and various forms of bus priority. Although Britain has a small number of recently constructed urban light rail systems, the current British government seems to favour bus as the cheaper and more flexible mode. Guided forms of bus, or separated busways have been used successfully in cities as varied as Leeds, Essen, Pittsburgh, and Ottawa. In addition to questions of comparative infrastructure and operating cost, the paper discusses whether a 'rail factor' gives the light rail form a built-in popularity, which can simultaneously enhance quality of life, labour market access, and the city's image.

1. Introduction.

The paper will discuss some of the findings of a recently completed international research report (Hass-Klau et al, 2000, available through web-site www.etphassklau@mistral.co.uk) comparing urban light rail with modern forms of bus-based urban transport, such as guided bus, or segregated busways. It will focus on two separate elements of the original study. Firstly there are the issues relating to infrastructure and vehicle cost, since debate over light rail versus its rivals tends to focus on the belief that light rail is relatively costly and an urban transport mode. Secondly, we discuss in more detail the findings of surveys of car users which were carried out in four large British cities in summer 1999. These surveys offer interesting insights into what features of public transport car users would like to see improved before they would use it regularly, and what their attitudes are to light rail compared to guided bus.

2. Cost of Schemes for Different Public Transport Modes

2.1 Infrastructure costs

- light rail

The infrastructure costs of light rail schemes, which include the costs for a double track bed, rails, points, overhead wiring, stations and sometimes environmental treatment of the surrounding areas, such as planting of trees, vary considerably. They depend to a large extent on the existing surface, the number and type of stations but also on whether the light rail track is in tunnel or running on surface. According to Table 1, the actual costs ignoring cost forecasts which in many cases were too optimistic, varied between £3.7 - 10 million per km built (excluding vehicles). However if tunnel sections are included then the costs increase sharply, as can be seen from Buffalo where the cost per km was nearly £58 million. In our interviews with one of the most distinguished German experts, Professor Ahlbrecht, on the technical aspects of light rail in Germany, he estimated the costs of a light rail infrastructure to be between £1.8 - 7 million per km.

- guided buses

Information on the infrastructure costs for guided buses is limited because only 5 guideways (Essen, Mannheim, Adelaide, Leeds, Ipswich) have been built. The cost varied between £2.2 - 4 million per kilometre, which is somewhat lower than for light rail. In 4 cases, of which 3 were estimates, the per km cost was around £4 million. The

scheme in Essen cannot be compared strictly with Leeds or Adelaide because everywhere where the guideway was introduced there had already been a light rail corridor. In Mannheim the guided bus runs along the tram track. Wooden planks and a metal railing are provided for this section. We estimate that the costs were minimal. According to the information we received from Essen, the guideway costs were estimated to be roughly the same as the infrastructure costs for a light rail line.

The estimated costs for the proposed guideway in Edinburgh are also around £4 million per km but this price includes the stations and cost of land purchase. The second phase in Leeds, along York Road, is estimated to be of a similar price, around £4 million per km of guideway. Again this price includes the costs for stations, bus lanes and junction treatments. The construction costs for Chester are estimated to be £2.5 million per km for the guideway (two ways) (Chester City Council 1999).

If the construction costs are taken on their own (without vehicles, stations, trees and any other requirements) then the costs per km can vary between £560,000 - £1.8 million per lane km. However, higher costs per km are also possible under difficult conditions. FirstGroup provides cost figures of £1 million per lane km for the guideway, and a two lane construction is estimated by them to be £1.8 million per km (FirstLeeds 1998). The Ipswich section was quoted to be £1.5 million per km (two ways) when it was built in 1995.

The cheapest guideway costs were found in Adelaide. Taking account of inflation, the costs were £500,000 - £996,000 per lane km (two lanes). This price does not include the 25 bridges and the 60m tunnel. The cost per meter width for a bridge for two lanes was £5,977 and the cost per meter for the tunnel was £12,500 at 1998 prices.

The costs for the infrastructure of the Val-de-Marne guided bus (TVR) were marginal as the busway already existed. We calculated about £1.2 million (single track)(RATP 1999) which is a similar price to the guideways built so far.

- busways

The construction costs for busways vary as widely as for light rail, and according to the information collected both the cheapest and the most expensive sections of busways were built in Pittsburgh, costing between £2.4 - £14.4 million. According to Table 1, Quito was the cheapest (£2.8 million per km) but although the price includes vehicles (about 50) the busway was not newly built. Züblin AG-Mercedes quoted £526,316 per km two ways for the basic concrete strips. The newly built busway (West Busway) in Pittsburgh will cost £202.7million (£ 14 million per km).

- bus lanes

By far the cheapest method of separating public transport from car traffic is the designation of bus lanes. Here the costs are as low £5,700 per km (single lane). Several cities quoted about £300,000 but that would include junction treatments and resurfacing.

Table 1: Cost of infrastructure of light rail, guided busways, busways and bus lanes at 1998 prices

LIGHT RAIL

Town	Length of track in km	Cost per km (double track) in millions £ at 1998 prices	Comments
Berlin		5.15 - 6.86	Track approx. cost
Birmingham (forecast)	20.1	6.55	System, 18 km former rail track
Bonn z. Auerberg	1.35	7.11	Track, new street design
Bonn Bad-Go.berg	2.5	42.3	Track, 100% tunnel
Bremen (line 4 forecast)	8.5	3.05	Track, edge of town
Bremen (line 4)	3.5	4.77	Track, new street design
Bremen (line 6)	2.5	8.40	Track, separated track, difficult bridge
Buffalo	10.3	57.7	System, 77% in tunnel
Croydon (forecast)	28	6.1	System, part former rail track
Duisburg		3.70 - 4.12	Track, only rails and wires
Le Mans (forecast)	13.5	9.78	System
Manchester (1992)	31	5.01	System, part former rail track
Manchester (1999) (forecast)	6.7	12.3	Extension in harbour development area,
Nantes	27(new build14.4)	8.70 (only new 17.8)	System, part former rail track
Paris (T1)	9	10.0	System, without vehicles and street design
Paris (T2)	10.3	6.04	System, former rail track, new 1.2 km tunnel, without vehicles
Pittsburgh Stage I	16.9	30.3	
Pittsburgh Stage II	19.3	13.5	System, 23% in tunnel
Portland	24.3	9.03	System
Saarbrücken	44 (new build 15)	3.14 (only new 11.17)	System, part former rail track
Sacramento	29.4	5.24	System
Sheffield	29	7.82	System, new street design
Strasbourg (line A)	12.6	14.61	System, 10% tunnel, new street design
Strasbourg (line B) (forecast)	12	10.03	Line B

GUIDED BUS (double track)

Town	Length of track in km	Cost per km (double track) in millions £ at 1998 prices	Comments
Adelaide	12	2.99	
Chester (forecast)	3.8 (seg 2.8)	1.84 (only seg. 2.5)	Part old rail track
Edinburgh (forecast)	9	4.36	Including land costs (£13 million)
Ipswich	0.2	2.3	Includes 2 bus stops
Leeds, Scott Hall Road ¹	1.75 guideway + 0.5 bus lane ¹	4.10 (3.2 include bus lane)	1.75 single lane one way guideway and 0.5 contra flow bus lane
Leeds, York Road (forecast)	2.5 guideway + 3 bus lane	4.00 (1.8 incl. Bus lane)	2.5 single lane of which 500m are double lane, stations and junction treatments
Liverpool (forecast)	12.4 (seg.8.7)	4.00 (only seg. 5.75)	
Paris (Val de Marne)	1.5	2.2 (1.2 for single track)	This track is part of a busway of 12.5km which was built in 1991/92

BUSWAYS (2 bus lanes)

Ottawa (first stage)	20.6	5.9	Including stations
Paris (Trans Val de Marne)	12.5	4.94	This busway also has a short section (1.5km) where the TVR is running
Pittsburgh (East busway)	9.9	10.56 or 11.2	Different sources
Pittsburgh (East busway extension) (forecast)	3.7	10.2	
Pittsburgh (South busway)	6.4	4.87	
Pittsburgh (West busway)	14.5	14.0	Including 2 tunnels, 4 stations and 4 park and ride sites
Quito	11.2	2.76	System, trolleybus, mostly separated track but not newly built

BUS LANES (single track) in £

Dortmund	0.3	5,700	Only painting
Berlin	1	8,600 approx	Only painting
Duisburg	1	180,000 approx	Probably full resurfacing, junction treatment
Bonn	0.6	267,000	Probably full resurfacing, junction treatment
Edinburgh (Greenways)	26	298,000	Mostly bus lanes, also includes traffic calming off the main roads
London (M4)	5.6	340,000	Single lane on former reservation

Sources: Riedel, H.-U. 1990, RATP 1999a and various local authorities

¹ Leeds: The total costs were £4 million. This includes the stations (6) and the environmental treatment of the guided busway such as trees. It did not include the costs for the park and ride site. The guided bus is one way hence we added a factor of 1.8 for the two way stretch.

3. Attitudes of Car Users to Public Transport in Major British Cities

3.1 Results of Surveys in Leeds, Edinburgh, Manchester and Sheffield

Surveys of similar numbers of car users were carried out in Leeds (May 1999), Edinburgh (June 1999), Manchester and Sheffield (September 1999) and the results are summarised below. In total 1,852 interviews were carried out with the permission of the major car park operators, over the full 3 day period in each case.

Roughly 3 out of 5 of the car drivers interviewed (Q.1) in Leeds, Edinburgh and Manchester city centre car parks, and slightly less in Sheffield, admitted that it would have been possible for them to have done their journey by bus or train.

When asked for the main single reason *why they did not use public transport* (Q.1a), general inconvenience was most frequently mentioned, followed by the slowness of the public transport trip. The people in Leeds and Manchester were **more likely** than those in Edinburgh and Sheffield to stress the duration of bus or train journeys, together with their perceived unreliability and low frequency. In Edinburgh, they were **more likely** to give their desire to make linked trips (seen as being easier by car, at least if they are beyond walking distance) and the amount they had to carry as the key reasons to use the car. The Sheffield respondents were also sensitive to the reduced attractiveness of public transport the more they were carrying. It was striking that awareness of public transport being too expensive was low (though slightly higher in the Scots capital). Perhaps one should recall that this was a sample of car users. People who do in fact regularly use public transport might well be more sensitive to its fare level (even more so those who do not use it much because of its fare level).

Among those reasons which appeared under 'other' the most significant was a perception that disabled access on public transport was unsatisfactory (given by 3 respondents in Edinburgh and 5 in Leeds). Apart from this, alternative reasons were either mentioned by only one person, or were close to the other answers. For example, the 'flexibility' of the car was similar to its convenience, or people who did not use public transport *because* they had a car were in effect not using it on principle.

Questions 2 and 2a concerned *how often and for what purpose the car drivers we interviewed do actually use public transport*. The people interviewed in Edinburgh were most likely to be 'occasional' users of public transport (71%) against 59% in Leeds and even lower proportions in Manchester and Sheffield (53% and 51% respectively).

However, in Edinburgh this seemed to focus more on its use for work (15% more than once a week) and occasional other social uses. For the other three cities, work was the most significant occasional use of public transport, followed by shopping and other social purposes. However, about 10-15% of the car drivers in these three cities used public transport for shopping at least once a week.

One should also be aware that the locations chosen for the interviews may have had an effect on these occasional uses of public transport. The Edinburgh interviews were all done at a major car park at Edinburgh Castle (which may have led to a higher proportion of commuters and visitors among the respondents), whereas over half of the Leeds interviews were done adjacent to the Kirkgate shopping centre and Market. It is perhaps surprising that occasional use of public transport for shopping is not even higher for the Leeds sample. The Manchester interviews were carried out in a car park adjacent to the Kendall's department store and up-market clothes shopping streets. The sample of interviewees there included substantial numbers of regular car shoppers. Sheffield interviews took place quite close to the main city centre shopping area, though easily accessible also to major office employment concentrations, and this is partly reflected in the answers on occasional use of public transport there.

The next questions (Q.3 and 3a) focused on *whether public transport could be improved enough to attract car users* more often, and if so in what way. A more positive attitude to public transport in Edinburgh could be detected, where 71% thought it could be improved enough to generate more use. In contrast, in Sheffield, only 59% thought this.

The nature of the improvement preferred showed that basic service availability was the key to attracting more demand. Better frequency of service (16-24%), followed by more routes being served (9-19%) and more reliability (7-14%) were most clearly called for. Perhaps car users are somewhat less price conscious than existing regular bus users: cheaper fares were the main request of 8-10% of the respondents, in 3rd or 4th place, and even lower than this (5.5%) in Manchester, perhaps reflecting the rather up-market interview location and sample there. The people of Edinburgh were rather more aware of the possibility of new types of public transport system (4%), and of better vehicles (4%). Despite publicity on the need for improvements in information and time-tabling, this was only chosen by a minority.

Although current Government policy relating to buses has stressed 'Quality Partnerships' and the desirability of achieving demand growth breakthroughs without

substantial increase in subsidy, there were strong majorities in favour of spending more (Q.4) on public transport (78-88% in Edinburgh, Leeds, and Manchester; rather lower at 72% in Sheffield but still a clear majority). The question was not able to go into detail on exactly what level of taxation (or private resources) would finance such expenditure. However the clear call for improved frequencies and other service improvements does suggest that privatised or deregulated local public transport has serious weaknesses evident to the public, which it seems they would be happy to pay to see improved.

Attitudes to light rail as compared to guided bus were tested in Q.5, but it emerged that these might depend on the image these two modes had in the mind of the interviewee. For the earlier Leeds survey, photographs of the existing Leeds guided bus (known as 'Superbus') were used, alongside photos of the very modern (almost space-age) light rail system of Strasbourg. The result was a majority in Leeds (48% to 37%) in favour of light rail. However, on the suggestion of Edinburgh officials, for the second survey half the sample was shown these same Strasbourg photos, and half were shown photos of light rail vehicles and stops from the more traditional light rail of Manchester and Karlsruhe (Germany). The latter, though modern systems, were of a rather less innovative design quality.

Although the Edinburgh sample *as a whole* showed a majority in favour of light rail (48% to 32%), this was made up of a strong vote in favour of light rail for those shown the 'Strasbourg' photos, and a small majority for guided bus for those shown photos of the more traditional systems. In other words, Edinburgh people were reacting in part to the design quality and modernity of what they were being shown, and a more attractive modern design tended to result in a vote in favour.

Having said that, the rather more positive attitudes to public transport revealed in other survey answers in Edinburgh is echoed by a stronger majority in favour of the more innovative (and expensive) light rail.

In contrast, when respondents in Manchester were shown photos of the more traditional light rail, these in fact included pictures of their own very popular Metrolink. This resulted in a strong preference in Manchester for light rail over guided bus (62% to 21%, with the rest "Don't Know"), and hardly any difference between the different photo subsamples.

Sheffield, however, seems to have a much stronger bus culture, and the guided bus alternative was preferred there by 52% to 32% overall. The majority for guided bus was narrower but still clear for the subsample shown the very modern Strasbourg light rail photos. It is difficult to be certain about the reasons for such a clear difference in public opinion; contributing factors may have been the strong tradition of high quality cheap bus service in Sheffield, and the perceived problems of the city's Supertram relative to Manchester's Metrolink.

The samples surveyed in the four cities were divided by age and gender as shown by Q.6 and Q7. The Manchester sample of car drivers was the most female (54%) and the Edinburgh sample the most male (61%). The 26-45 years prime age group represented a consistent 53-57% of the sample in each city, with slightly more middle-aged (46-65 years) people in Edinburgh and more younger people in Leeds and Sheffield. It is perhaps surprising how very few people of pension age were found in these samples of city centre drivers, around 3-4% in each city.

Survey Results

Question 1. If you drove here by car today would it have been possible for you to do this trip by bus or train?

%	Leeds	Edinburgh	Manchester	Sheffield	All
Yes	61.3	57.8	61.0	53.6	58.4
No	38.0	41.3	38.4	45.4	40.8
Don't know	0.7	0.9	0.6	1.0	0.8
Total	100	100	100	100	100

Question 1a. (If YES) Please state the main single reason that prevented you from making this trip by bus or train.

%	Leeds	Edinburgh	Manchester	Sheffield	All
Too inconvenient	20.0	20.9	23.0	24.5	22.1
Too expensive	2.4	3.1	2.5	1.5	2.4
Too unreliable	4.4	0.9	2.5	1.7	2.4
Did not consider it	0.9	0.4	3.2	1.7	1.6
Inadequate information	1.1	0.4	0.4	0.2	0.5
Not frequent enough	3.7	2.2	2.3	3.1	2.9
Trip would take too long	14.3	10.6	12.0	6.3	10.7
Have to change	1.3	0.4	0.6	0.4	0.7
Want to make linked trips	5.5	9.0	3.2	0.6	4.5
Have to carry too much	2.4	4.7	2.7	2.3	3.0
Bus/train stop too far away	0.2	0.2	4.4	1.3	1.6
Too rough or unsafe	0.2	-	0.8	0.2	0.3
Too dirty	-	-	-	-	0.1
Don't know	1.1	0.4	-	-	0.4
Do not use it on principle	1.8	-	1.1	0.8	0.5
Other	4.0	4.7	2.5	8.8	6.0
Not applicable	36.7	41.8	38.6	46.7	41.0
TOTAL	100	100	100	100	100

Question 2. Do you ever use public transport?

%	Leeds	Edinburgh	Manchester	Sheffield	All
Yes	59.1	70.8	53.4	50.6	58.3
No	40.9	29.2	46.6	49.4	41.7
Total	100	100	100	100	100

2a. (If YES) For what purpose and how often?

For shopping

%	Leeds	Edinburgh	Manchester	Sheffield	All
More than once a week	6.6	4.3	5.3	6.3	5.6
About once a week	8.4	10.8	4.0	6.3	7.3
Once a month or less	10.3	15.7	20.3	13.0	14.8
Not used for this purpose	74.7	69.2	70.5	74.5	72.2
TOTAL	100	100	100	100	100

For work

%	Leeds	Edinburgh	Manchester	Sheffield	All
More than once a week	11.6	15.3	7.2	10.5	11.1
About once a week	2.6	4.9	3.0	3.8	3.6
Once a month or less	8.8	8.3	11.3	6.9	8.9
Not used for this purpose	76.9	71.5	78.8	78.9	76.5
TOTAL	100	100	100	100	100

For other purpose

%	Leeds	Edinburgh	Manchester	Sheffield	All
More than once a week	2.9	4.5	3.2	4.8	3.8
About once a week	4.2	7.0	3.2	6.1	5.1
Once a month or less	10.8	16.6	19.8	13.8	15.3
Not used for this purpose	82.2	71.9	73.8	75.3	75.8
TOTAL	100	100	100	100	100

Question 3. Could public transport be improved enough that you would use it more often?

%	Leeds	Edinburgh	Manchester	Sheffield	All
Yes	65.1	71.0	67.1	58.6	65.3
No	28.1	25.6	27.6	33.1	28.7
Don't know	6.8	3.4	5.3	8.4	6.0
TOTAL	100	100	100	100	100

Question 3a. (IF YES) What would be the main single improvement that you would like to see?

%	Leeds	Edinburgh	Manchester	Sheffield	All
Cheaper fares	8.1	8.8	5.5	9.8	8.0
More frequent service	20.7	23.8	16.9	16.7	19.5
More routes being served	8.8	16.2	18.8	12.3	14.0
More reliable service	10.5	7.4	14.6	6.7	9.8
Better info and timetables	1.5	2.5	2.3	0.6	1.7
Better vehicles	2.9	3.6	1.5	1.9	2.4
New types of PT system	1.5	3.6	1.9	2.3	2.3
Other	2.9	4.9	5.5	7.3	5.1
Don't know	0.7	0.2	0.4	-	0.4
Not applicable	42.4	29.0	32.7	41.8	36.6
TOTAL	100	100	100	100	100

Question 4. Should more money be spent on public transport?

%	Leeds	Edinburgh	Manchester	Sheffield	All
Yes	78.7	88.3	79.5	72.2	79.5
No	10.8	6.7	10.3	17.8	11.5
Don't know	10.5	4.9	10.2	10.0	8.9
TOTAL	100	100	100	100	100

Question 5. Here are photos of two types of public transport systems - which one do you prefer?

(Photos shown; note that in Edinburgh, half the sample were shown the same photos of very modern light rail as were shown in Leeds (the Strasbourg light rail system, S), and half were shown photos of light rail systems of more traditional appearance (Manchester Metrolink, M, and Karlsruhe)

%	Leeds S photos	Edinburgh Total	Edinburgh (S photos, 229 cases)	Edinburgh (M photos, 216 cases)
Guided bus	36.7	32.1	22.7	42.1
Light Rail	47.5	48.3	55.9	40.3
Neither/No answer	15.8	19.6	21.4	17.6
TOTAL	100	100	100	100

%	Manchester S photos	Manchester M photos	Sheffield S photos	Sheffield M photos
Guided bus	22.8	20.1	52.5	53.4
Light Rail	62.1	62.3	35.0	28.6
Neither/No answer	15.0	17.6	12.5	18.0
TOTAL	100	100	100	100

%	Leeds (S photos)	Edinburgh Total	Manchester Total	Sheffield Total	All Total
Guided bus	36.7	32.1	21.3	52.9	35.9
Light Rail	47.5	48.3	62.3	31.8	47.4
Neither/No answer	15.8	19.6	16.4	15.3	16.7
TOTAL	100	100	100	100	100

Question 6. Gender

%	Leeds	Edinburgh	Manchester	Sheffield	All
Male	51.2	61.1	45.1	57.1	53.6
Female	47.9	38.9	53.6	41.0	45.4
N.A.	0.9	-	1.3	1.9	1.0
TOTAL	100	100	100	100	100

Question 7. Age Group

%	Leeds	Edinburgh	Manchester	Sheffield	All
16-25	13.6	11.7	11.4	17.6	13.6
26-45	55.8	53.3	56.8	54.4	55.1
46-65	27.3	32.1	27.0	22.8	27.2
66 and over	3.1	2.9	4.0	3.3	3.3
N.A.	0.2	-	0.8	1.9	0.8
TOTAL	100	100	100	100	100

3.2 Some evidence from cross-tabulations of the survey of car-users in Leeds, Edinburgh, Manchester, and Sheffield.

The total sample size of 1852 for the survey of car users in the 4 cities allowed us to reach some interesting findings from cross-tabulations. Given the ease of carrying out such analysis in SPSS, other relationships could easily be tested. We will summarise the results as answers to hypothetical questions.

- Do people who admit their trip would have been possible by public transport have more of a tendency to use it occasionally (Q1 against Q2)?

Q1 Trip possible by public transport?	Q2 Do you ever use public transport?		Total
	Yes	No	
Yes	64.9	35.1	100
No	49.1	50.9	100

We do find that more of the car users who admitted their trip would have been possible by public transport tended to be occasional users of public transport (by about 65% to 35%). However, the respondents who told us that the city centre trip on which they were interviewed was not possible by public transport still split roughly 50/50 in terms of whether they ever used public transport.

- Do the public transport improvements preferred (Q3a) by occasional public transport users (Q2) differ from those suggested by people who currently never use public transport? (Positive results where Q3 answer was 'yes')

Q3a Public transport improvement preferred	Q2 Do you ever use public transport?	
	Yes	No
Cheaper fares	14.4	9.4
More frequent service	31.3	29.8
More routes being served	19.8	26.6
More reliable service	15.4	15.6
Better info and timetables	2.8	2.5
Better vehicles	4.8	2.0
New types of public transport systems	4.0	3.0
Don't know, others, multiple answers	7.5	11.1
Total	100	100

We see that the preferred ranking of the top four public transport improvements which respondents would like to see was the same for non-users as for occasional public transport users. This preferred ranking was for a more frequent service, more routes, reliability, and a cheaper service, in that order.

However, we see that those who are already occasional users of public transport are rather more interested in cheaper fares, but those who at present never use public

transport would be attracted by more routes being served. Otherwise, the distributions of answers are similar.

- gender and age

We examined systematic differences with respect to the gender and age of the city centre car users we interviewed with cross-tabulations of Q6 (Gender) and Q7 (Age) against the other variables.

(a) Gender

- Are women more aware of the possibility of using public transport?

	Q1 Would it have been possible to do this trip by bus or train?			
Q6 Gender	Yes	No	Don't know	Total
Female	65.5	33.9	0.6	100
Male	52.5	46.5	1.0	100

We see that nearly two thirds of the women admitted that they could have done the city centre trip by public transport, whereas only just over half of the men said this.

- Do women tend more to see possible improvements in public transport which would make them use it more often?

	Q3 Could public transport be improved enough to use it more often?			
Q6 Gender	Yes	No	Don't know	Total
Female	69.0	24.1	6.9	100
Male	62.5	32.4	5.1	100

We see that women are also more positive with reference to public transport in seeing possible improvements that would make them use it more often, though the difference between the genders is not great. Nearly two thirds of each gender is positive on this question.

- Do women tend to favour the spending of more money on public transport?

	Q4 Should more money be spent on public transport?			
Q6 Gender	Yes	No	Don't know	Total
Female	78.0	11.5	10.5	100
Male	81.6	11.2	7.2	100

There was very little difference between men and women in favouring more generous funding of public transport; the majority in favour is extremely high for both genders.

- How do the genders differ in terms of preferences for light rail versus guided bus, based on photographs shown?

	Q5 Preferred photo of light rail or guided bus?			
Q6 Gender	Light Rail	Guided bus	Neither	Total
Female	43.8	39.8	16.4	100
Male	50.5	32.8	16.7	100

There was a discernible tendency for men to favour light rail over guided bus more strongly (by 7%) than women. One might speculate over the reasons for this. It has been suggested that women feel safer on buses with a driver and/or conductor present; in addition, our survey in Sheffield confirmed that men were more attracted by the speed of the tram.

(b) Age

- Are older people more aware of the possibility of using public transport?

	Q1 Would it have been possible to do this trip by bus or train?			
Q7 Age	Yes	No	Don't know	Total
16-25 years	68.7	31.3	0	100
26-45 years	57.8	42.2	0	100
46-65 years	54.0	46.0	0	100
66+ years	58.1	41.9	0	100

Younger people (who had arrived in the city centre by car) were more aware of the possibility of doing the trip by public transport. The lowest level of awareness was in the middle-aged group (46-65 years).

- Do older people tend more to see possible improvements in public transport that would make them use it more often?

	Q3 Could public transport be improved enough to use it more often?			
Q7 Age	Yes	No	Don't know	Total
16-25	65.9	27.0	7.1	100

years				
26-45 years	66.8	27.4	5.9	100
46-65 years	63.5	31.5	5.0	100
66+ years	58.1	33.9	8.1	100

Although differences with respect to age are not wide, the pensioners group was slightly less able to see public transport improvements which would make them use it more often.

- Do older people tend more to think that more money should be spent on public transport?

.	Q4 Should more money be spent on public transport?			
Q7 Age	Yes	No	Don't know	Total
16-25 years	75.4	14.7	9.9	100
26-45 years	81.7	9.7	8.6	100
46-65 years	79.8	11.7	8.5	100
66+ years	69.4	24.2	6.5	100

Again, although there is a strong majority in all age groups in favour of more money being spent on public transport, the pensioner group was slightly less buoyant than the rest.

- How do the age groups differ in terms of preferences for light rail versus guided bus, based on photographs shown?

.	Q5 Preferred photo of light rail or guided bus?			
Q7 Age	Light Rail	Guided bus	Neither	Total
16-25 years	50.0	39.7	10.3	100
26-45 years	48.2	35.6	16.2	100
46-65 years	45.2	36.1	18.7	100
66+ years	41.9	27.4	30.6	100

The proportion favouring light rail falls with age, although a majority of all age groups favoured it over guided bus. The pensioner group seemed to show some 'fear of the unknown' in having a greater reluctance to express a preference at all. In rough terms, the light rail mode has a preference some 10% higher than guided bus, which still commands a substantial degree of loyalty.

3.3 General Remarks

Overall, the car drivers interviewed in these four important cities mostly revealed an openness towards public transport as a way of accessing the city centre, and tended to use their car because they did not regard the frequency, reliability, choice of routes and general convenience of public transport to be acceptable. However, 25-40% of them do use public transport either occasionally or regularly (for shopping or work or leisure), so that for them, unfamiliarity is not the problem. It is also clear that for motorists, the level of fares was not the main deterrent (though it may be for others). There was a strong feeling that more money needs to be spent on public transport, but that it would be best targeted at improvements in the density and quality of service. Attitudes to light rail compared to the guided bus alternative are positive except in Sheffield, but people in Leeds and Edinburgh are not well informed or experienced in assessing light rail, and opinions may be affected by the form of light rail they are offered, especially its perceived design quality and modernity.

Using cross-tabulations, we also found that car users' preferences over public transport improvements were little affected by whether they actually used public transport occasionally. The preferred ranking of improvements was higher frequency, more routes, better reliability and a cheaper service, in that order.

In terms of gender, we found that men seemed to favour light rail more strongly, though both genders would prefer it to guided bus. In terms of age, all age groups strongly favour more money being spent on public transport, with the pensioner group rather less buoyant.

Our survey of car users suggests that there is a substantial latent demand for public transport, especially for a frequent, reliable, and easily reachable service. Light rail has a strong potential following among car users, even in cities with no recent experience of light rail or tram.

4. Conclusions

In the months since the surveys discussed above were carried out, the British Government seems to have changed its policy position, and now favours urban light rail more strongly than before. Several completely new urban light rail schemes (e.g. Nottingham) are now being constructed, and the process of catching up with what the rest of Europe regards as normal may have started.

Our cost comparisons showed that in terms of infrastructure costs alone, the differences between light rail and 'intermediate modes' (i.e. modernised forms of bus) were not as wide as commonly thought. The surveys showed that even regular car drivers would still welcome significant improvements in the quantity and quality of public transport. Current British transport policy, however, has the character of 'all stick and no carrot': the petrol prices and new car prices are the highest among major European countries, but Treasury controls on new public expenditure makes it difficult to bring about major improvements in the cost and availability of urban public transport.

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